EFFECTIVE TAXATION OF TOP INCOMES IN GERMANY, 1992-2002

STEFAN BACH
GIACOMO CORNEO
VIKTOR STEINER

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Abstract

We analyze the taxation of top personal incomes in Germany on the basis of an integrated data file of individual tax returns and a general household survey for the years 1992 - 2002. The unique feature of this integrated data set is that it includes all taxpayers in the top percentile of the gross income distribution. We show that despite substantial tax base erosion and significant reductions of top statutory marginal tax rates, German income taxation has remained effectively progressive. The distribution of the tax burden is highly concentrated, and the effective average income tax rate of the German economic elite – the top 0.001 quantile of the gross income distribution – is about 34 percent, which is well below the legislated tax rate.

Stefan Bach
German Institute for Economic Research
DIW Berlin
Mohrenstrasse 58
Germany - 10117 Berlin
sbach@diw.de

Giacomo Corneo
Department of Economics
Free University of Berlin (FU Berlin)
Boltzmannstrasse 20
Germany – 14195 Berlin
gcorneo@wiwiss.fu-berlin.de

Viktor Steiner
German Institute for Economic Research
DIW Berlin
Mohrenstrasse 58
Germany - 10117 Berlin
vsteiner@diw.de

1   Introduction

Despite partial retrenchment of the welfare state in many countries, progressive personal income taxation is still widely regarded as an essential tool to reduce income disparities. In order to evaluate the rationale for abolishing, reforming, or retaining the personal income tax as it is, one has to empirically assess the contribution of that instrument to reduce income inequality. The equalizing effect of the income tax does not only depend on the shape of the tax schedule but also on the pattern and the size of tax base erosion triggered off by tax exemptions, deductions, and various loopholes in the tax code. In this paper we undertake such an empirical investigation for the case of Germany. We assess the true progressivity of the German income tax by estimating effective tax rates for various income fractiles. Special attention is devoted to the taxation of top incomes and to the contribution of the personal income tax (PIT) in reducing the concentration of income in the hands of a tiny group of super-rich people.

On the basis of administrative tax records, OECD (1990) found that redistributive effects of the PIT vary a lot between countries, and that there seems to be no positive correlation between pre-tax inequality and the extent of redistribution. Similar results are reported for the late 1980's and early 1990's by Wagstaff *et al.* (1999) on the basis of survey data for 12 OECD countries and by Wagstaff and van Doorslaer (2001) using administrative tax data for 17 OECD countries, as well as by Verbist (2004) on the basis of survey data for the EU-15 countries. For Germany, there has hitherto been little empirical research on the effective progressivity of the PIT. Using survey data for 1983, Lang *et al.* (1997) found that the effective marginal tax rate for high incomes was 16 percentage points below the legislated one and that much of that difference was due to tax avoidance by interest income and income from real assets. They also documented that the effective tax rate increases with income, although the increase of the tax rate was shown to be negligible at high income levels. However, the dataset used by those authors did not include households within the 2 % richest group of the population, a group contributing a relatively large share to the income tax revenue. Using income tax returns data for the 1990's, Bach *et al.* (2005) showed that the German income tax was effectively progressive and contributed to reduce income concentration in that period.

Recent literature has analyzed the evolution of top incomes and its impact on overall income inequality, while progressivity of the PIT and its impact on the distribution of net incomes has, with a few exceptions, not been the focus of this literature.[1] For Germany, Bach *et al.* (2007) showed that inequality in gross *market* income increased in Germany in the period 1992-2001, and that this in-

crease was mainly driven by the increasing income concentration at the very top of the distribution. In particular, the economic elite, defined as the top 0.001 percentile of the gross income distribution, obtained a much higher increase in real gross market income than the average person or even the average member of the top decile of the income distribution. This finding is in line with the development observed in other OECD-countries (see Atkinson and Piketty, 2007).

In this paper, we present effective average tax rates for various fractiles of the income distribution as well as measures of inequality reduction achieved by means of the income tax. We focus on the taxation of top incomes in Germany in the period 1992-2002, the year with the most recent available data from the tax statistics, and provide detailed information on the taxation of the German economic elite. Our investigation is based on an integrated data file of individual tax returns data and a general household survey for the years 1992 to 2002. The tax returns data include stratified 10 % samples of the total taxpayer population in Germany. Noticeably, *all* German taxpayers that belong to the top percentile of the income distribution are included in our data set. This trait, which distinguishes our study from previous ones, enables us to characterize the taxation of top incomes in a very precise fashion.

The next section provides the reader with some information on the institutional background relevant for the subsequent empirical analysis, especially regarding changes in the taxation of personal incomes that took place in Germany since the early 1990's. Section 3 describes our tax return data and the method we apply to account for non-filers. Section 4 describes our measurement of (economic) gross income from tax returns data. Section 5 contains our main results on the effective income taxation of top incomes. First, we show that tax base erosion, i.e. the gap between taxable and gross income, is substantial and varies significantly by level and source of income. Second, we document that despite substantial tax base erosion and significant reductions of top statutory marginal tax rates in recent years, until 2002 the German PIT has remained effectively progressive. The distribution of the tax burden is highly concentrated, and the German economic elite is still taxed relatively heavily, even though the effective tax rate for this group has significantly declined in recent years. Finally, we show that the PIT substantially contributes to reduce the concentration of income in Germany, where the lion's share of this redistributive effect is contributed by the top 1 % of taxpayers. Section 6 summarizes our main results and concludes.

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[1] Recent contributions include the studies in Atkinson and Piketty (2007) and Burkhauser *et al.* (2007). The taxation of top incomes has been the object of several studies devoted to the US case; see e.g. Slemrod (1994) and Feenberg and Poterba (2000).

2   Institutional Background

In Germany, a taxpayer's PIT is computed as a function of her or his nominal taxable income ('*zu versteuerndes Einkommen*') in that year. Assessed income tax liability ('*Festgesetzte Einkommensteuer*') is computed as the tax burden on the entire taxable income assessed for the tax year (which is the calendar year), on which the tax schedule is applied. Paid withholding taxes, such as the monthly wage tax ('*Lohnsteuer*') or taxes on interest and dividends, are offset against the PIT liability. The tax schedule includes a basic allowance ('*Grundfreibetrag*'), which means that households with low income pay no income tax. The marginal tax rate linearly increases with income until income reaches a certain threshold. For incomes larger than that threshold, the marginal tax rate stays constant. Hence, the average tax rate converges towards the top marginal tax rate with increasing taxable income. Since the average tax rate increases with income, the tax schedule is progressive.

Single taxpayers are taxed according to the tax schedule for individuals ('*Grundtabelle*'). Nearly all married couples are taxed jointly with full income splitting. In the case of joint filing, the couple's tax liability equals twice the tax liability of a single taxpayer whose income is half of the couple's income. In nearly all cases, joint taxation with full income splitting is less onerous than individual taxation, therefore the former procedure is used by default in tax assessment of married couples.

In nominal terms, the German PIT has historically been strongly progressive, as can be seen from the difference in marginal and average tax rates in Figure 1. There have been various tax reforms in the observation period.[2] Top statutory marginal tax rates in the period 1992 to 2002 were reduced from 53 % to 48.5 %.[3] The lowest marginal tax rate was increased from 19 % in 1992 to 25.9 % in 1998 and subsequently reduced to 19.9 % in 2001. This was accompanied by successive increases in the basic allowance, in particular a doubling of the basic allowance in 1996. In 1992 a '*solidarity surcharge*' tax amounting to 3.75 % of the PIT amount was introduced, briefly suspended in 1993, subsequently re-invented at the rate of 7.5 % in 1995, and reduced in 1998 to the current level of 5.5 % of the PIT.

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[2]   Corneo (2005) discusses the evolution of the PIT in Germany in historical perspective. Since the tax schedule is applied to nominal taxable income with no indexation of the basic allowance and other tax expenditures, there is 'bracket creep' implying a relatively high elasticity of the personal income tax to changes in nominal income of about 2, on average (see, e.g., Haan and Steiner, 2005). For this reason, the tax code (including the basic allowance) has to be adjusted from time to time in order to avoid purely nominal income gains to lead to ever higher taxation in real terms. In Germany, this is usually accomplished in connection with periodic tax reforms.

[3]   The major 2000 reform of the PIT was implemented in three steps: the first step became effective on January 1st, 2001, the second step in 2004, and the third step in 2005. In the second (third) step, the top marginal tax rate was reduced to 45 % (42 %)

Other changes in tax regulations are also likely to have affected the effective taxation of top incomes in our observation period. Owners of unincorporated companies, e.g. sole proprietors and partnerships, are subject to the PIT, in contrast to corporations which are subject to the flat corporation tax in Germany. To level the playing field, the legislator decided to reduce the tax burden of unincorporated companies at the same time as lowering the corporation tax rate by introducing tax rate limitations for income from business enterprise ("*Tarifbegrenzung für gewerbliche Einkünfte*"). The Location Preservation Act ("*Standortsicherungsgesetz*"), which became effective on January 1st, 1994, reduced the corporation tax rate for retained profits from 50 % to 45 %. By the same Act, the general top marginal PIT rate of 53 % was reduced to 47 % for earnings from business enterprise above about 50,000 Euro.

Figure 1: Statutory marginal and average tax rates as percent of taxable income, 1992-2002

Marginal and average tax rate as percent of taxable income

taxable income, 1 000 Euro
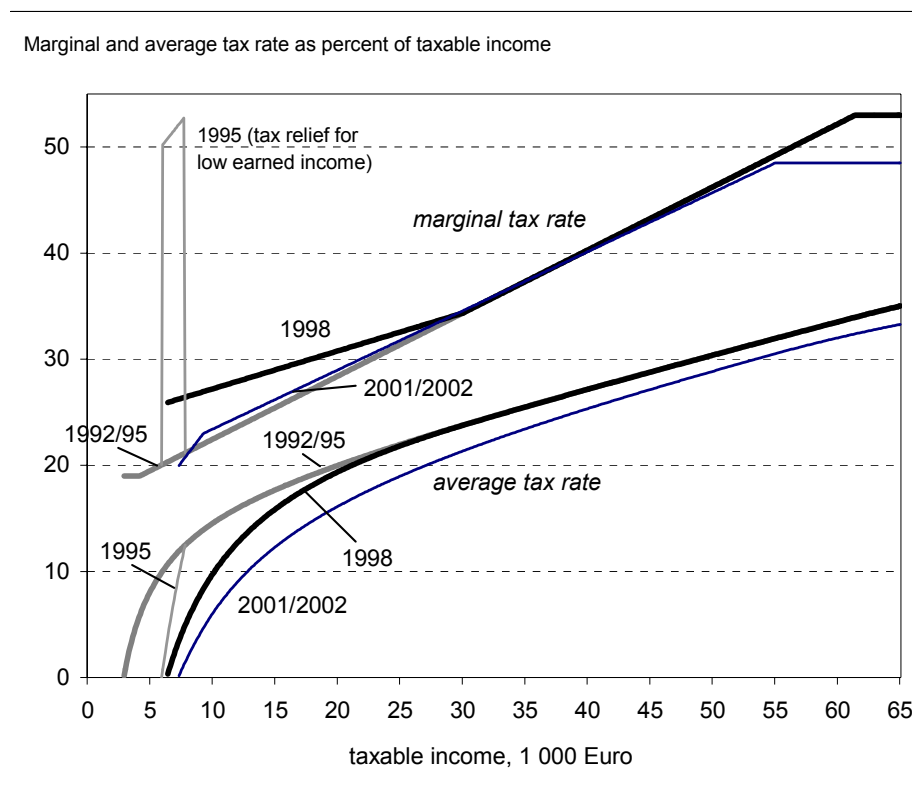
The Tax Relief Act ("*Steuerentlastungsgesetz 1999/2000/2002*"), which was put into effect retroactively on January 1st, 1999, further reduced the corporation tax rate for retained profits to 40 % and limited the top marginal personal income tax rate for earnings above certain thresholds from business enterprise to 45 % in 1999 and to 43 % in 2000. The general top marginal tax rate for all other personal incomes was left unchanged at 53 % in 1999. The top marginal income tax rate (not in-

cluding the solidarity surcharge tax) was reduced to 51 % in 2000 and to 48.5 % in 2001.[4] The reform also replaced the limitation of the top marginal PIT rate for tradesmen referred to above with a lump-sum credit against the local business tax deductible from the PIT.

The Corporation Tax Reform Act ("*Steuersenkungsgesetz* 2000") reduced the corporate tax rate on both retained and distributed profits to 25 %. By the same Act, the previous full imputation system[5] was demised in favour of the classical system with a half-income shareholder relief. Since then, distributed and retained profits are taxed at the same rate of 25 %, with the former being taxed at the personal level at half the shareholder's personal income tax rate in order to mitigate 'double-taxation' of dividends. The half-income system was also applied to the taxation of capital gains.

In Germany, effective taxation of top incomes is also influenced by various tax expenditures. Investments in real estate as well as capital equipment have been vast loopholes for tax-saving activities during the first couple of years after German re-unification. Special depreciation allowances, tax reliefs and generous accounting rules for investments in real estate and business capital formation in East Germany, in combination with tax-free capital gains that could be offset against income from other sources, led to massive tax savings for people at the top of the income distribution. Between 1992 and 1998, most of the capital gains from business income were taxed at half the rate of the then prevailing PIT rate. Other capital gains from capital investment were taxable only if realized within certain time periods defined by the tax law. Reducing these massive tax expenditures and 'broadening the tax base' has been advertised as one aim of the subsequent tax reforms introduced since the late 1990's. We will see below how effective these intentions have been in practice.

3   Data

Our empirical investigation is based on official income tax returns (ITR) data for re-unified Germany in the years 1992, 1995, 1998, 2001, and 2002, the last year for which individual tax returns are presently available. This delay is due to long-lasting assessment procedures, the triennial interval between subsequent income tax statistics (up to 2001), and the way the data are transmitted from the fiscal authorities to the Federal Statistical Office, and finally to the Federal Ministry of Finance. For each of these cross sections, the ITR data include a representative sample of about 3

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[4]   The Tax Relief Act included some complementary measures with the intention to compensate parts of the reduction of tax rates. The most important changes were: Restrictions for high loss offsets between incomes from different sources; more restrictive rules for the assessment of certain provisions, especially in the insurance and nuclear energy industries; restrictions for current-value depreciations. Furthermore, the so-called co-entrepreneurship decree was temporarily abolished, which facilitated tax-neutral transfers of individual assets between partners and their partnerships.

[5]   Under this system distributed corporate profits in the form of dividends are taxed at the same rate as retained profits and dividends are taxed at the shareholder's PIT rate with an allowance for the tax paid at the corporate rate.

million tax returns, i.e. roughly 10 % of the entire taxpayer population. Samples for each of the first four of these cross-sections are drawn by the German Federal Statistical Office from the set of all tax files of each year so as to build a stratified random sample. The sampling fraction for pre-defined cells according to gross taxable income and other tax-relevant characteristics is determined by minimizing the standard error with respect to taxable income (Zwick, 2001). In particular, tax return samples include *all* taxpayers with high incomes or high income losses. The 2002 cross section is similar, in principle, but provided by the fiscal authorities directly to the Federal Statistical Office. Our matching procedure will adjust for differences in the sampling scheme, especially the substantially larger number of non-filers in the 2002 data due to the change in data collection (see below).

The original data set includes all assessed taxpayers, i.e. single persons or married couples who file a tax return in a given year. Slightly more than 50 % of all tax returns are joint files of married couples, where this share has been decreasing over time. Assuming that one taxpayer corresponds to one household, about three quarters of all German households pay income tax. Whilst very good in representing the upper range of the income distribution, as nearly all domestic residents in this range file a tax return, the ITR data do not portray well the lower tail of the income distribution and also miss a non-negligible share of taxpayers in its middle part. In particular, households living on social assistance or income replacement benefits (e.g. from private insurance or social security) usually do not file, unless they have other taxable income. Furthermore, households with wage earnings only file a tax return if they want to claim itemized deductions that are not already taken into account by their wage tax, which is withhold at source by the employer. These taxpayers were only partly recorded by the tax statistics up to 2001, and completely disregarded since 2002.

There are various ways to account for these omissions in tax return data. As suggested by Picketty and Saez (2003), one possibility is to identify the fractiles of the income distribution on the basis of the total number of *potential* tax units. This approach was also applied by Dell (2005) and Bach *et al*. (2005) using German tax return data. However, it assumes that all non-filers can be placed at the lower tail of the gross income distribution. As mentioned above, this assumption is not valid in the German case due to the relatively large number of non-filers with labor income only. Furthermore, the regulations concerning the provisions for filing tax returns were changed by the tax reform of 1996, which did not only affect people at the bottom of the income distribution.

Therefore, we follow a different approach, namely merge ITR data with data from the German Socio-Economic Panel (SOEP) for the same years to account for non-filers. The SOEP is an annual survey of private households living in Germany with detailed information on incomes, both at the

individual and household level.[6] Information on individual and household gross incomes as well as income components is collected retrospectively in each wave for the previous year. The sample size is much smaller than that of the ITR; for example, in the year 2001 about 12,000 households were interviewed. Nevertheless, the SOEP represents a larger share of the population than the ITR since it also includes people who do not file tax returns. As previous research has shown (see Bach *et al*., 2007), the SOEP represents the German income distribution very accurately except for the top 1% of the population.[7] This group, on which we focus below, is completely represented in the ITR data.

Our matching approach selects for each person in the SOEP a number of persons in the ITR data base, the number being determined by the relation of the respective weighting factors in the two data sets (for the details, see Bach *et al*., 2007, Appendix 2). Since the ITR data contain a smaller subset of the population than the SOEP, not all individuals contained in the SOEP can be matched to the appropriate number of their 'statistical twins' in the ITR. After all observations in the ITR data are exhausted by this matching algorithm, we are left with a certain number of un-matched individuals in the SOEP, which we add to the ITR data set and sort into the respective income percentile to get the integrated ITR-SOEP data set. Thereby, not only individuals who have no or little income, and therefore do not pay income tax, are added, but also those who, due to specific regulations in the German tax system, do not file tax returns.[8] Detailed income information about these individuals is available in the SOEP, from which the individual PIT is calculated using a microsimulation model (see Schwarze, 1995).

The upper part of Table A1 in the Appendix shows the estimated number of taxpayers and non-filers obtained from our integrated data base. Between 1992 and 2001, the number of assessed tax-payers remained fairly constant at about 29 millions, even though the income tax reform of 1996 relaxed some provisions for filing tax returns. The markedly lower number of taxpayers observed in the ITR data in 2002 is due to the mentioned exclusion of additional non-filers in this data set. This corresponds to the high number of non-filers in that year which exceeds the level reached in 2001 by about 2 million. As shown in the table, the number of non-filers has been increasing over time reaching about 17 million in 2001, and 19 million in 2002. Our matching approach adjusts for both

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[6] A description of the SOEP can be downloaded from www.diw.de/soep; see also Haisken-DeNew and Frick (2005).

[7] Starting in 2002 (S-wave), the SOEP includes a disproportionately large sample of "high-income" households. This so-called *high-income sample* consists of over 1,200 households with monthly net incomes of at least 3,750 Euro. Although the implied level of gross income would put all members of this sample in the top 20 % of the gross income distribution, only very few would make it to the top 1%. Thus, even taking advantage of the high-income sample, the SOEP is not representative for the population of individuals at the top 1% of the income distribution.

[8] Single or couple taxpayers who only have wage income which is taxed at the source in Germany are not obliged to file tax returns independently of their level of taxable income. Since the SOEP does not provide information on the filing status of individuals or households, we match conditionally on a number of variables, such as main income source, occupational status, marital status, age group, family type and the number of children.

the increasing number of non-filers in the period 1992-2001 and the exclusion of additional non-filers in 2002.

4 Measuring Gross Income

In principle, German tax law employs a comprehensive notion of income which includes all earned income and capital income. However, exemptions and various types of tax relief create a substantial gap between taxable income and gross income. In order to cope with this problem and to derive a measure of economic income, we adjust taxable income by adding all tax-exempted incomes and tax relief as well as by accounting for various tax avoidance strategies that can be identified in our data.

In the subsequent analysis, we distinguish between the following income components:

(i) *wage income* consists of wages and salaries, including employers' social security contributions, calculated before deduction of allowable expenses;

(ii) *income from business activity* includes taxable income from agriculture and forestry, from unincorporated business enterprise and from self-employed activities, including professional services;

(iii) *capital income* includes interest and dividends as well as incomes from renting and leasing;

(iv) *capital gains* as realized from sale of an enterprise, parts of an enterprise, or shares of investors with substantial shareholdings, or if classified as '*speculation gains*';

(v) *transfer income* includes unemployment compensation, social assistance, housing benefits, the child benefit, pensions derived from former employment, the taxable share of life annuity funds (pure interest portion of the annuity payment), and alimonies between separated or divorced spouses.

German tax returns data record '*adjusted gross income*' ('*Summe der Einkünfte*') by adding positive incomes from all mentioned sources and deducting losses.[9] Income from business activity and capital income are defined net of various related expenses. From this income measure, we derive (economic) gross income by adding all tax-exempted incomes as well as tax relief that can be identified in our integrated data base, as described in more detail in Appendix 2. Of special importance is the adjustment of incomes from dividends required by the change from the full-imputation to the classical corporation income tax with half-income taxation of dividends at the shareholder level in 2002.

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[9] As of 1999, the offsetting of losses between separate income sources is restricted to 51,500 Euro (103,000 Euro in the case of jointly assessed married couples) plus half of the remaining total of positive income (see Federal Ministry of Finance, 2002).

Until 2001, distributed gross dividends are recorded in our data, whereas dividends for the year 2002 are recorded net of the corporate income tax of 25 %. Hence, we adjust dividend income in that year by multiplying recorded net dividends by the factor 4/3.[10] Moreover, we disregard losses from renting and leasing exceeding some thresholds since most of these losses are likely to arise from tax avoidance.

As a result of our adjustments, we obtain a gross income measure which is fairly close to '*pre tax, post transfer*' household income. As shown in Table A1 in the Appendix, total overall income recorded in the integrated data base was about 1.7 trillion Euro in 2002; excluding capital gains and transfer income it was 1.3 trillion Euro in that year. This represents 82 % of total primary income of private households as documented by the national accounts statistics. There is very little difference in total wage income between our integrated data base and the national accounts. As revealed by Table A1, the discrepancy between gross income and income from national accounts is mainly due to incomes from business and capital. Unfortunately, German national accounts do not provide differentiated information on business and capital income according to the categories used for the income tax assessment, or recorded by the SOEP. It should also be kept in mind that in the national accounts business income is calculated as a residual. Furthermore, non-profit organizations, which often have substantial capital income which regularly remains tax-free, are classified as part of private households in national accounts. To some extent, the discrepancy between our estimates and those from the national accounts may be due to the fact that some fraction of corporate income is received by households in form of capital gains rather than dividends. Furthermore, we may underestimate capital income because of unmeasured tax evasion.

Information on the evaluation of top incomes in comparison to mean and median income during the observation period is contained in Table A2 in the Appendix. There, we break down the top decile into smaller groups starting with the top 1 % percentile down to the 0.0001 percentile of the gross income distribution. This breakdown reveals remarkable differences at the top of the distribution. In 2002, real average gross income received by the top 1 % amounted to about 317,000 Euro, i.e. almost three times the average amount received by the top decile. To make it to the top 0.001 % fractile, which we take as representing the German *economic elite,*[11] your gross income needed to

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[10]   There is another complication concerning dividend income related to the corporate tax reform of 2001: Distributed retained earnings from previous years which were taxed at the then prevailing higher corporate rate could claim tax returns amounting to the difference to the new 25 % rate over a transition period of 15 years. Although this effect may bias upward our calculation of gross income, since we only measure an increase in dividend income but not the corresponding decrease in shareholders' wealth, it should not affect our calculation of the effective tax rate, the main focus of the present study.

[11]   This definition derives from previous analysis of the composition of market incomes within the top 1 % percentile of the distribution which indicates that about 70 % of total gross market income of this group is derived form busi-

exceed 9 million Euro in 2002. A member of this small group of taxpayers received, on average, some 22 million Euro in that year. The tiny group of about 40 taxpayers making up the top 0.0001 percentile received an average amount of 70 million Euro.

Between 1992 and 2002, average real gross income of the economic elite increased by almost 38 %, thus substantially outpacing the increase of 5.4 % realized on average by the top decile. The super-rich did even better, though: On average, their gross income increased by more than 70 % in the period 1992-2002. However, incomes at the very top are rather volatile since they are mainly derived from business income and capital gains.

In the Appendix we also report the distribution of gross income by income component (see Table A3). As expected, transfer income and wage income are the key income sources for the lowest nine deciles of the income distribution. Income from business activity and from capital becomes the main income source only for the top fractiles of the distribution. Thus, the economic elite receives only 4 % of its total income in form of wage income, while more than half of it stems from business activity and the rest comes from capital. Interestingly, in Germany, income from business activity makes up a much larger share and wage income a much smaller share of top incomes than in the US or other large European countries.[12]

5   Effective Income Taxation

An income tax reduces income inequality if the tax schedule is progressive and the tax base closely approximates the economic income of taxpayers. Effective tax progressivity depends both on the statutory income tax schedule and the degree of tax base erosion. The latter, in turn, depends on the share of taxed income by income source (wage income, business income, capital income), which may vary due to special tax regulations, and the distribution of these various income components across the gross income distribution. As shown in the previous section, the composition of gross income varies greatly across the gross income distribution, and this may have a strong impact on effective income taxation if tax base erosion varies by source of income. In the following, we first look at tax base erosion and then derive the degree of effective tax progressivity.

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ness activity, and that more than 50 % in this group almost exclusively derive their incomes from business activity, see Bach *et al.* (2007). Note, however, their analysis refers to a different definition of gross income (i.e., market income excluding capital gains) and to the personal rather than the taxpayer level.

[12] For a comparison between Germany, the US and France, focusing on developments in the 1990s in terms of market incomes, see Bach *et al.* (2007).

5.1 Tax base erosion

Several provisions in the tax code contribute to tax base erosion, i.e. 'taxable income' ('zu versteuerndes Einkommen') falling short of gross income. Taxable income, as measured in German tax returns data, is derived by deducting income-specific expenses, income-specific allowances, special personal expenses, and extraordinary financial burdens from adjusted gross income which was defined in Section 4. Special personal expenses are those not related to a specific income source, such as the allowances for contributions to public or private health or pension insurance funds, educational expenses for own children, alimonies, the church tax and charitable contributions up to certain amounts. Extraordinary financial burdens include high expenses for health care, disability, and child care (see Federal Ministry of Finance, 2002). Furthermore, we deduct child allowances from taxable income as the basis for the assessment of the PIT according to the basic tax schedule.[13]

Table 1 reports the evolution of the share of, respectively, adjusted gross income and of taxable income, in each case measured relative to our measure of (economic) gross income, during the observation period. In 2002, adjusted gross income amounted to about 67 % of total gross income, on average. This share has remained fairly constant during the observation period. Basically the same can be said about the share of taxable income, if at a significantly lower level. In 2002, for example, this share was just 52 %, i.e. 15 percentage points below the share of adjusted gross income.

Both the share of adjusted gross income and of taxable income is much smaller in the bottom half of the income distribution. The latter declined from 33.9 % in 1992 to 22.4 % in 2002, which reflects the rise of untaxed transfer income and the strong increase of the basic allowance and the child allowance during the observation period. In contrast, the share of taxable in gross income amounts to more than 70 % in the top decile of the gross income distribution, and this share has decreased only slightly in the observation period. Within the top 1 % of the income distribution, this share is even higher, amounting to 78.4 % in 2002, with little change since the early 1990's. However, this share significantly varies within the top percentile for a given year and also over time. In particular, for this group the year 1995 stands out with a relatively low ratio of taxable to gross income recorded. The same is true for the share of adjusted gross income in gross income. Although this ratio has subsequently increased, it did not attain its previous value by the end of the observation period. The decline in the share of taxable income in gross income within the top 1 % is espe-

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[13] For taxpayers receiving the child benefit this is only an approximation. For them, the correct measure would be the difference between the child allowance and the pure transfer component of the child benefit. Since this difference would have to be simulated for part of the population, and we focus on top incomes for whom this differentiation is irrelevant, we decided to simplify matters slightly here.

cially pronounced for the economic elite and the super-rich.[14] One reason for this is may be the impact of tax expenditures on investments in real estate, as described below.

Table 1: Share of adjusted gross income and of taxable income as percentage of gross income, 1992-2002

Gross income[1) fractiles	Adjusted gross income as percentage of gross income[1)					Taxable income[2) as percentage of gross income[1)				
	1992	1995	1998	2001	2002	1992	1995	1998	2001	2002
1st - 5th decile	47.7	43.9	42.6	40.9	39.2	33.9	29.1	25.9	25.9	22.4
6th - 9th decile	72.3	70.6	69.6	69.1	69.4	57.3	54.5	53.2	52.6	52.7
10th decile	81.0	76.7	77.1	79.3	79.2	70.3	65.0	66.0	68.5	68.0
Top 1%	87.7	79.5	82.8	86.6	86.0	79.9	70.4	75.4	80.0	78.4
Top 0.1%	90.7	82.3	87.9	90.2	87.9	84.5	74.0	81.9	85.3	81.9
Top 0.01%	93.7	85.6	91.4	91.1	87.2	88.3	77.7	85.9	86.6	80.6
Top 0.001%	93.8	84.9	92.3	88.6	84.7	89.4	77.3	85.4	85.2	77.5
Top 0.0001%	92.9	71.3	95.3	81.6	79.1	85.6	62.5	87.5	81.1	73.7
Total	70.1	67.2	66.8	67.0	66.9	56.7	52.7	52.1	52.7	51.9

1) For the definition of gross income, see Section 4.- 2) Less child allowance.
Source: ITR-SOEP data base.

For the year 2002, Table 2 shows that the degree of tax base erosion, as measured by the ratio between adjusted gross income and gross income, differs greatly between the various income components (calculations for the other years are reported in Table A4 in the Appendix).[15] In that year, the share of taxed wage income amounted to 77.2 %, compared to 97.4 % for income from business activity, and less than 30 % for transfer income. The case of capital income is special due to the taxation of incomes from renting and leasing. Erosion is so extreme that, on average, positive economic incomes from renting and leasing and tax expenditures on this income source just balanced in 2002. As Table A4 shows, taxed income from renting and leasing has even been strongly negative in the 1990's amounting to more than *minus* 100 % in the mid and late 1990's, implying that, on average, each Euro earned from renting and leasing was associated with losses of one Euro. This was made possible by generous tax regulations introduced especially for investments in East Germany after re-unification. This resulted in substantial negative tax revenues on average from this income source, the more so as taxpayers with high tax rates had strong financial incentives to invest in such funds. As with regard to income from interest and dividends, the fraction of it that effec-

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[14] In their study of income tax avoidance in Germany in 1983, Lang *et al*. (1997) found that the portion of taxed to gross income tends to increase in the income deciles. Their data came from the Income and Consumption Survey (EVS), which does not include households with top incomes.

[15] The calculation of the share of taxable income in gross income by source of income would require assumptions about the division of the second type of tax expenditures mentioned above between the various income components which cannot be tested.

tively is taxed increased since the early 1990's, reaching about two thirds in 2002. This diminishing tax erosion can mainly be explained by various reductions of the savers allowance for interest and dividend income.

Table 2: Share of adjusted gross income as percentage of gross income by income component, 2002

Gross income[1] fractiles	Gross income[1]	Wage income[2]	Income from business activity[3]	Capital gains[4]	Capital income			Transfer income
					Total	Interest, dividends[5]	Renting and leasing[6]	
1st - 5th decile	39.2	68.5	97.6	127.9	32.7	35.3	27.3	23.8
6th - 9th decile	69.4	76.1	99.7	52.9	47.8	58.7	20.8	32.1
10th decile	79.2	81.4	96.1	92.9	50.9	78.2	- 21.9	34.1
Top 1%	86.0	89.0	93.8	96.7	60.7	87.0	- 17.0	41.7
Top 0.1%	87.9	92.9	88.1	99.6	78.1	92.7	6.7	51.7
Top 0.01%	87.2	90.5	82.3	99.9	86.6	94.8	7.7	61.1
Top 0.001%	84.7	91.8	75.3	100.0	90.8	96.2	10.0	62.2
Top 0.0001%	79.1	84.7	67.9	100.0	93.0	98.6	- 922.4	86.7
Total	66.9	77.2	97.4	90.6	47.1	65.6	1.1	27.8

1) For the definition of gross income, see Section 4.- 2) Including employers' social security contributions and imputed social security contributions for civil servants, minus taxable pensions from former employments, plus tax-exempted foreign income and income from tax-exempted "minijobs".- 3) Taxable income from agriculture and forestry, from business enterprise, from self-employed activities (professional services), plus tax reliefs, less capital gains from business activity, plus tax-exempted foreign income.- 4) From business activity and from from private investments (solely speculation gains).- 5) Taxable income from investments (exclusive income from business activities), inclusive receipts below the savers allowance, less capital gains from private investments.- 6) Taxable income from renting and leasing, plus higher losses from renting and leasing.
Source: ITR-SOEP data base.

Table 2 also reveals that the share of taxed income by component greatly varies across the income distribution. Whereas the variation is small in case of business income, the share of taxed wage income is much lower in the lower part of the gross income distribution than at the top. One important factor contributing to this difference is the inclusion of employers' social security contributions, which remain untaxed, into our measure of gross income. Due to the existence of an upper social security threshold, this has only a small effect at the top of the income distribution where wages tend to be relatively high. Differences in the taxed shares of wage and business income across the gross income distribution have changed little since the early 1990's (see Table A4).

The share of taxed capital gains varies a great deal both across the income distribution and over the observation period, which is probably related to the type of capital gains included in our data set and the way they are realized. In contrast, about two thirds of all interest and dividends recorded in our data base get taxed, on average, and this share seems to be strongly increasing in the level of gross income: Whereas in the lower half of the gross income distribution less than a third of income from interest and dividends is taxed, this share is almost 80 % in the top decile and increasing towards 100 % at the very top. The small share of taxed capital income in the lower part of the in-

come distribution can be explained by the savers allowance for interest income as well as by tax evasion.

Whereas about a quarter of income from renting and leasing is taxed in the lower part of the income distribution, taxation of this income source becomes strongly negative for the top decile and the top 1 % of all taxpayers, due to the mentioned special regulations in the tax code. The tiny group of super-rich took extreme advantage of those tax regulations, transforming their positive incomes form renting and leasing into an overall loss of more than 900 % in 2002. Table A4 reveals that net tax receipts on renting and leasing were, on average, even negative during the 1990's, and that tax expenditures related to this income source were extremely high especially at the top of the income distribution. For example, in 1995 the top percentile of the income distribution could transform each Euro of positive income from renting and leasing into 2.5 Euros of income losses for tax purposes. In that year, this form of tax avoidance was even higher at the very top of the gross income distribution reaching staggering values of almost 6 Euro losses per one Euro positive income from renting and leasing for the economic elite, and even some 22 Euro for the super-rich. This was not magic, but just a careful exploitation of loopholes in the tax code. This extreme form of tax avoidance was substantially reduced since the mid-1990's but, on average, it still leaves income from renting and leasing effectively untaxed and provides huge tax savings for some very rich people.

As shown in the last column of Table 2, less than one third of transfer income gets taxed, on average, and this share is strongly increasing in the level of income. The small share in the lower part of the distribution can be explained by the fact that most of these transfers relates to public pensions, taxed only by the interest portion of the annuity payment ('*Ertragsanteil*', approximately 30 % on average), and tax-exempted social security contributions. There has been little change in the taxed share of transfer income across the income distribution over time.

Taxable income in 2002 was about the same fraction of gross income as it was in 1992. However, the share of taxable income substantially varied both across the gross income distribution and also over time. The share of taxed income also varied greatly by income component, with relatively little variation, both across the distribution and over time, for business income and substantial variation for other income components. At the very top of the income distribution the share of taxed capital income, not including capital gains, has been strongly increasing since the mid-1990's due to changes in the tax treatment of income from renting and leasing, whereas the share of taxed capital gains declined over time.

5.2 Effective tax progressivity

Having derived gross income as described in Section 4, for each taxpayer the effective average tax rate, as measured in terms of gross income, can be calculated by applying the tax schedule of the respective year, see Section 2. We account for both the PIT and the solidarity surcharge tax. Social security contributions are not taken into account when calculating individual tax liabilities because the German social security system is of the Bismarckian variety, strongly relying on the equivalence principle. Thus, social security contributions can be viewed as outlays for insurance against individual risks that the individual would have incurred in the absence of mandatory social insurance, as it is the case for most self-employed people in Germany. We adjust for the change in the taxation of dividend income in 2002 (see Section 4) by adding taxes paid on dividend income at the personal as well as the corporate level, where the latter can directly be calculated from the information on the amount of dividend taxes paid by the private shareholder coded in the ITR data.

Starting with the distribution of the assessed income tax, Table 3 shows that taxpayers in the top decile contributed more than half of the total tax revenue in all years. Their share increased from 52.7 % in 1992 to 54.7 % in 2002, whereas the share in the bottom half declined and the one paid by taxpayers in the 6th-9th decile of the gross income distribution remained more or less constant. On average, in 2002 households making up the top decile paid 25,300 Euro income tax, measured in 2000 prices. In real terms, this means an increase of almost 2,000 Euro during the observation period. By comparison, the average income tax paid by the 10 % poorest taxpayers was about 500 Euro in 2002, and that of those making up the 6th to 9th decile 4,600 Euro, almost the same as in 1992. At the other end of the distribution, the economic elite paid about 7.7 million Euro as income tax in 2002, on average, an increase of almost 1 million Euro in real terms compared to 1992. For the super-rich, the average amount of income tax was more than 22 million Euro in 2002, an increase of more than 5 million Euro since 1992. As a summary measure of inequality in the distribution of the tax burden, the Gini coefficient was about .765 in 2002, compared to .728 in 1992. This indicates that the high concentration of the tax burden already prevailing in the early nineties has markedly increased since then.

Table 3: Assessed income tax liability 1992-2002 - structure and average tax burden

Gross income[1] fractiles	Assessed income tax liability (including solidarity surcharge)									
	structure in percent					average tax burden in 1 000 Euro at 2000 prices[2]				
	1992	1995	1998	2001	2002	1992	1995	1998	2001	2002
1st - 5th decile	7.0	7.6	5.8	4.3	5.1	0.6	0.7	0.5	0.4	0.5
6th - 9th decile	40.3	42.1	39.6	38.9	40.2	4.5	4.5	4.6	4.4	4.6
10th decile	52.7	50.2	54.5	56.7	54.7	23.4	21.6	25.5	25.6	25.3
Top 1%	24.4	20.7	24.3	24.4	22.2	108.5	88.8	113.6	109.9	102.8
Top 0.1%	11.3	9.1	12.0	10.7	9.5	502.1	390.9	558.0	484.1	440.0
Top 0.01%	4.6	3.9	5.6	4.5	4.1	2 062.1	1 672.2	2 622.9	2 041.5	1 891.8
Top 0.001%	1.5	1.4	2.3	1.7	1.7	6 779.0	6 075.2	10 645.3	7 582.7	7 680.0
Top 0.0001%	0.4	0.4	0.7	0.5	0.5	17 333.3	15 897.4	33 538.8	21 088.6	22 468.3
Total	100.0	100.0	100.0	100.0	100.0	4.4	4.3	4.7	4.5	4.6
Gini coefficient	0.7284	0.7206	0.7553	0.7770	0.7649					

1) For the definition of gross income, see Section 4.- 2) Deflated by consumer price index.
Source: ITR-SOEP data base.

Average tax rates for the various income groups are presented in Table 4. In 2002, the effective average tax rate for the entire taxpayer population was 12.9 % as measured relative to gross income, and 24.8 % if measured in terms of taxable income. Thus, on average, tax allowances cut the level of the effective tax rate almost by half. In the top decile of the gross income distribution, average tax rates increase to 21.9 % and 32.3 %, respectively. Between the top decile and the top percentile of the income distribution, effective average tax rates increase by more than 10 percentage points. In 2002, the average effective tax rate at the top 1 % of the gross income distribution amounted to 32.4 %, and to 41.4 % if measured in terms of taxable income. Thus, in relative terms the difference in average tax rates when measured, respectively, relative to taxable income and gross income is strongly declining in the level of the latter reflecting the much larger share of taxable income in gross income at the top of the distribution.

As shown by Table 4, up to the top 0.1 % of the income distribution the German PIT effectively is progressive, i.e. the effective average tax rate increases with gross income. Tax progression disappears at the top of the income distribution, however. For instance, in 2002 the effective tax rate monotonically decreases with income over the four top fractiles of the distribution. Given that the top nominal marginal PIT rate was still 48.5 % in 2002, and more than 51 % including the solidarity surcharge tax, our results indicate that the effective burden of the PIT is much lower than the German tax schedule would imply. Still, at the top of the income distribution the tax burden is substan-

tial, whereas it seems quite modest in the lower half of the distribution amounting, on average, to less than 4 % of gross income and 16 % of taxable income.[16]

Table 4: Average income tax rates, 1992-2002

Gross income[1] fractiles	Assessed income tax liability (including solidarity surcharge)									
	in percent of gross income[1]					in percent of taxable income[2]				
	1992	1995	1998	2001	2002	1992	1995	1998	2001	2002
1st - 5th decile	4.4	4.7	3.9	2.9	3.5	13.0	16.2	15.0	11.0	15.7
6th - 9th decile	10.5	10.6	10.8	10.1	10.5	18.3	19.5	20.3	19.2	20.0
10th decile	21.4	19.9	21.6	21.9	21.9	30.4	30.6	32.8	32.0	32.3
Top 1%	34.2	30.1	31.5	33.4	32.4	42.8	42.7	41.7	41.8	41.4
Top 0.1%	41.0	35.7	35.6	38.2	36.1	48.6	48.2	43.5	44.8	44.1
Top 0.01%	42.3	36.6	36.4	38.7	35.3	47.9	47.1	42.4	44.6	43.8
Top 0.001%	41.6	35.3	41.0	38.1	34.3	46.6	45.7	48.1	44.7	44.2
Top 0.0001%	42.3	31.0	45.0	36.0	32.0	49.4	49.6	51.5	44.4	43.4
Total	12.7	12.3	13.0	12.6	12.9	22.4	23.4	25.0	23.9	24.8

1) For the definition of gross income, see Section 4.- 2) Less child allowance.
Source: ITR-SOEP data base.

Table 4 also shows that tax rates have, on average, remained fairly stable over time, and this holds true irrespective of whether they are measured relative to gross income or taxable income. Only at the very top do we observe a marked decline in effective tax rates. In particular, average effective tax rates paid by the economic elite declined from 41.6 % in 1992 to 34.3 % in 2002, and an even stronger decline can be observed for the super-rich. This substantial reduction in top effective tax rates, which mainly occurred after 1998, outpaced the decline in assessed tax liabilities in relation to taxable income. This finding mirrors the decline in the share of taxed income at the very top, as documented in Section 5.1. Remarkably, between 1998 and 2002 average effective tax rates in the top decile and even top 1 % of the gross income distribution even slightly increased, whilst they stayed more or less constant if measured relative to taxable income. Thus, the 2000 tax reform described in Section 2 seems to have substantially reduced the effective tax burden at the very top, with little effect on other taxpayers.[17]

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[16] Recall, however, that our definition of individual tax liability does not include social security contributions which weigh relatively heavily on taxpayers with low earnings and little other income.

[17] This result is not driven by the change in the taxation of dividends brought about by the Corporation Tax Reform Act 2000, since we have properly adjusted dividends and taxes reported in the ITR data base, as explained above.

5.3 Net versus gross income concentration

As the comparison of the Gini coefficient for the pre-tax and after-tax distribution of income in Table 5 shows, personal taxation of incomes does reduce income inequality in Germany. For example, in 2002 the Gini coefficient of 0.462 for gross income was reduced to 0.428 if inequality is measured in terms of net income, which means a reduction in the Gini coefficient by about 7 %. The PIT has also reduced income inequality in each of the other years and its impact in reducing inequality seems to have changed little during the observation period.

Table 5: Distribution of gross income and net income, 1992-2002

Gross income[1]/ net income[2] fractiles	Gross income[1]					Net income[2]				
	structure by income fractiles in percent					structure by income fractiles in percent				
	1992	1995	1998	2001	2002	1992	1995	1998	2001	2002
1st - 5th decile	20.00	20.04	19.41	19.10	18.73	21.80	21.70	21.32	21.15	20.70
6th - 9th decile	48.72	48.86	47.74	48.42	49.10	49.95	49.74	48.96	49.73	50.29
10th decile	31.28	31.11	32.85	32.49	32.17	28.25	28.56	29.72	29.12	29.01
Top 1%	9.06	8.47	10.06	9.17	8.85	6.87	6.81	7.99	7.04	6.91
Top 0.1%	3.50	3.14	4.37	3.53	3.40	2.39	2.34	3.27	2.52	2.51
Top 0.01%	1.39	1.31	2.01	1.47	1.49	0.94	0.97	1.49	1.04	1.12
Top 0.001%	0.46	0.49	0.72	0.56	0.62	0.32	0.37	0.50	0.40	0.48
Top 0.0001%	0.11	0.14	0.21	0.16	0.19	0.08	0.12	0.14	0.12	0.15
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Gini coefficient	0.4444	0.4440	0.4593	0.4597	0.4615	0.4118	0.4162	0.4255	0.4234	0.4281

1) For the definition of gross income, see Section 4.- 2) Gross income less assessed income tax liability, disregarding other direct taxes on household income or wealth, social security contributions and other charges levied by public authorities.
Source: ITR-SOEP data base.

Looking in Table 5 at the distribution of gross and net incomes across percentiles of the gross income distribution reveals some additional insights. In 2002, taxpayers in the lower half of the gross income distribution received 18.7 % of gross income and 20.7 % of net income. The share of gross income received by taxpayers placed in the 6th-9th decile of the gross income distribution was 49.1 %, against 50.3 % share in net income. Thus, only the top decile contributed to the redistribution of income to people in the lower deciles. While taxpayers in the top decile received 32.2 % of gross income in 2002, they only obtained 29 % of total net income in that year. Much of this difference is due to the relatively heavy taxation of very high incomes. While 8.9 % of total gross income accrued to taxpayers in the top percentile, they only received 6.9 % of total net income. Although effective taxation is even higher for the economic elite and the super rich, as documented in the previous Section, in absolute terms these tiny groups of taxpayers have a modest impact on the reduction of overall income inequality. Looking at the shares of net income accruing to those groups over time generates an insight into the evolution of income concentration in Germany. Strikingly, the share received by the economic elite increased by 50 % between 1992 and 2002; the super-rich almost doubled their share.

6   Summary and Conclusion

Whilst the evolution and concentration of top incomes have recently been analyzed for a number of countries, their taxation has received relatively scant attention. In this paper, we have analyzed the progressivity and redistributive effects of the PIT focusing on top incomes on the basis of individual tax returns data for the period 1992-2002. The great advantage of our data source is that it allows us to investigate the upper tail of the income distribution on the basis of complete and reliable data. Since *all* taxpayers within the 1 % percentile are represented in our integrated data set, we can provide a fine breakdown of the top percentile of the income distribution in Germany that does not entail any sampling error. Thus, for the first time the German *economic elite*, which we defined as representing the 0.001 % quantile of the gross income distribution, and even the super-rich – the 0.0001 % quantile – could be investigated.

We have measured (economic) gross income by adding to adjusted gross income reported in tax returns data all tax-exempted incomes as well as tax reliefs that can be identified in our integrated data base. Although there are some shortcomings in comparison to a theoretically well-defined economic income concept in terms of the Schanz-Haig-Simons net accrual principle, our empirical measure of income seems to be a reasonably effective tool to investigate the actual income situation and composition of gross incomes and to calculate the degree of effective tax progressivity.

On the basis of our integrated data set, we have shown that gross income in Germany is strongly concentrated at the very top of the distribution and that in the period 1992-2002 the increase of inequality in gross income was mainly driven by a rapid increase in gross income received by the German economic elite. Given the progressive German statutory tax schedule, this strong income concentration implies that the PIT could potentially play an important redistributive role and reduce income inequality. However, since the composition of income systematically varies with the level of income, effective progression differs from statutory progression. Tax base erosion, i.e. the gap between taxable and gross income, amounts to almost 50 %, on average, with relatively little variation over time but substantial variation by level and source of income. The observed pattern of tax base erosion can be explained by differences in both specific tax regulations for the various income sources and the ability to exploit loopholes in the tax code. For top incomes, the share of taxed income has significantly declined in recent years.

Despite this decline and the recent tax reforms which reduced top marginal tax rates significantly, the PIT effectively remains progressive in Germany. The distribution of the tax burden is highly concentrated: the top decile contributes more than half of the entire tax revenue and the share of taxes paid by the top 1 % exceeded 20 % in 2002. The average PIT liability of the German economic elite was almost 8 million Euro in that year, and its average effective tax rate measured in

terms of gross income (including the solidarity surcharge and dividend taxation occurring at the corporate level) was about 34 %. This is substantially less than the top statutory rate and substantially more than the overall average effective PIT rate of about 13 %. However, effective tax progression stops at income levels within the top percentile, i.e. the effective tax rate is not monotonically increasing in gross income within the top percentile of the income distribution. Furthermore, we have found that, whilst the average effective tax rate has remained fairly constant in the observation period, it has significantly declined at the very top. In particular, for the economic elite the average effective tax rate dropped by almost 18 % in that decade.

As shown by our comparison of the distribution of gross and net income, the PIT income tax substantially contributes to reduce economic disparities in Germany. In 2002, the PIT led to a reduction in the *Gini* coefficient from about 0.462 to 0.428, and this redistributive effect of the PIT has hardly changed since the early 1990's in Germany. We have also shown that in each year only the top decile of the gross income distribution contributed to the redistribution of income to people in the lower part of the distribution, where the lion's share of this redistributive effect is contributed by the top 1 % of taxpayers.

We may have overestimated the degree of effective tax progressivity in Germany because our measure of gross income does nut fully account for tax avoidance, and taxpayers with very high incomes might be in a better position to exploit those unobserved avoidance strategies. Hints of this come from comparing the business and capital incomes reported by the tax statistics to roughly comparable items in national accounts. Still, the magnitude of gross tax progressivity revealed by our analysis seems sufficiently large that our conclusions would remain valid even if the margins of error of our estimates were considerable.

Finally, it should be recalled that the present paper is restricted to the analysis of the progressivity of the personal income tax and its impact on the distribution of incomes at the level of taxpayers. To draw out the implications of this analysis for economic welfare and analyze the vertical redistribution and horizontal inequity effects of the PIT would require one to move from the taxpayer level to the individual level - taking household composition into account - which seems an interesting topic for future research.

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Appendix 1

Table A1: Structure of the ITR-SOEP data base compared to the national accounts, 1992-2002

	unit	1992	1995	1998	2001	2002
Income taxpayers (assessment)	1 000	29 479	29 676	28 673	29 104	27 557
Single assessment (singles)	1 000	13 961	14 299	13 789	14 595	13 798
Joint assessment (married couples)[1]	1 000	15 518	15 377	14 884	14 509	13 760
Potential tax units total[2]	1 000	44 502	44 619	45 173	46 260	46 662
Estimated non-filers	1 000	15 023	14 943	16 500	17 156	19 105
Private households total[3]	1 000	35 700	36 938	37 532	38 456	38 720
Taxpayers as percentage of potential tax units	%	66.2	66.5	63.5	62.9	59.1
Taxpayers as percentage of private households	%	82.6	80.3	76.4	75.7	71.2
Gross income[4] (integrated data base)	mill. Euro	1 295 340	1 428 540	1 565 068	1 651 233	1 690 463
Gross income less capital gains and transfers	mill. Euro	1 071 999	1 156 930	1 227 134	1 293 999	1 310 840
Gross domestic product[5]	mill. Euro	1 646 620	1 848 450	1 965 380	2 113 160	2 143 180
Primary income of private households[5]	mill. Euro	1 270 240	1 402 200	1 466 590	1 599 320	1 597 550
Gross income less capital gains and transfers as percentage of primary income private households	%	84.4	82.5	83.7	80.9	82.1
Wage income[6] (integrated data base)	mill. Euro	902 253	984 404	1 019 664	1 069 102	1 082 666
Compensation of employees[5] (national accounts)	mill. Euro	917 170	997 020	1 032 250	1 120 610	1 128 320
Wage income from tax statistics as percentage of compensation of employees from national accounts	%	98.4	98.7	98.8	95.4	96.0
Income from business activities and capital income[4] (integrated data base, less capital gains)	mill. Euro	169 938	167 141	208 211	224 261	228 160
Entrepreneurial and property income of private households[5] (national accounts)	mill. Euro	353 070	405 180	434 340	478 710	469 230
Entrepreneurial income	mill. Euro	124 990	143 280	142 120	132 970	143 000
Property income (net)[7]	mill. Euro	228 080	261 900	292 220	345 740	326 230
Business and capital income from tax statistics as percentage of entrepreneurial and property income from national accounts	%	48.1	41.3	47.9	46.8	48.6

1) Married couples living together are assesed as one tax payer.- 2) Derived from population census statistics: Entire population of 20 years and older, married couples counted as one tax unit.- 3) Current population survey, may of resp. years.- 4) For the definition of gross income, see Section 4.- 5) At current prices, national accounts.- 6) Including employers' social security contributions and imputed social security contributions for civil servants, minus taxable pensions from former employments, plus tax-exempted foreign income and income from tax-exempted "minijobs".- 7) Recieved less payed property income (interest, distributed income of corporations, property income attributed to insurance policy holders, rents).
Source: Income tax statistics 1992-2002; ITR-SOEP data base; national accounts.

Appendix 2

From Taxable Income to Gross Income

We obtain (economic) gross income by adding all tax-exempted incomes as well as tax reliefs that can be identified in our integrated data base. Specifically, the various income categories are computed as follows:

- Our measure of *wage income* includes employers' social security contributions and is calculated before deduction of allowable expenses. Since civil servants are not covered by the social security system but are also entitled to pensions and health insurance, we have imputed social security contributions to them, following the approach applied in national accounts. Taxable pensions from former employment, which are part of the statutory income from employment, are accounted as transfer income (see below). Tax-exempted foreign wage income is added.

- Income from *business activity* includes taxable income from agriculture and forestry, from unincorporated business enterprise and from self-employed activities (professional services). Tax reliefs are taken into account as far as they are identifiable in our data, *e.g.*, tax-exempted profits from outbound business investments or tax subsidies explicitly surveyed in tax assessment. Since German income tax statistics do not provide information from financial accounting of firms (tax balance sheet, profit and loss statement), we cannot account for certain tax expenditures, such as depreciations according to the declining balance method or provisions for impending losses or pension reserves. We also cannot quantify the extent to which businessmen avoid taxation by disguising private expenses as operating expenditures or transferring part of their profits abroad via manipulations of transfer price.

- *Capital gains* from financial investments are taxable solely if they are classified as "speculation gains", i.e. if sale of the asset closely follows acquisition of that asset. In 2002, for example, this meant that the time lapse between buying and selling had to be less than 10 years in the case of real estate and less than a in the case of other assets (e.g. securities) for the capital gain to be legally counted as taxable income. Thus, capital gains included here are predominantly capital gains that were realized from transfer of an enterprise, parts of an enterprise, or shareholdings.

- Taxable income from *interest and dividends* includes all capital income from private investments, except income from business activities. Especially in this field we face difficult measurement issues. First, interest and dividend income was granted in the 1990s a rather high savers allowance of 6,000 DM / 3,070 Euro per year (double this amount for married couples). We compute those allowances as part of gross income whenever tax units claim them. However, many taxpayers with financial income did not claim them since their financial income was lower. Second, bank secrecy law might have encouraged tax evasion of financial income to some extent. By definition, evaded income is not recorded by tax returns, but can be partially imputed from information contained in the SOEP.

- Taxable income from *renting and leasing* has been a vast loophole for tax-saving activities in Germany for decades, especially in the 1990s. Depreciation allowances, tax reliefs and generous accounting rules in combination with tax-free capital gains led to massive budgetary losses that could be set off against income from other sources to a large extent. Since most of these activities are likely to be motivated by tax avoidance, we ignore losses exceeding some thresholds. In particular, losses of more than 5,000 Euro from direct investments in real estate and of more than 2,500 Euro from shareholdings (closed property funds, property developer partnerships etc.) are disregarded in calculating gross income. As a sensitivity check, we have alternatively included up to 50 % of reported losses in gross income, which had very little effect on our calculations of tax erosion by income quantile and effective tax rates.

- Taxable *transfer income* includes taxable pensions derived from former employments, the taxable share of life annuity funds (pure interest portion of the annuity payment), and alimonies between separated and/or divorced spouses. We correct for the allowance for taxable pensions from former employment. Furthermore, we add the non-taxable share of life annuity funds, which is estimated as 70 % of the whole pension. The ITR data set also provides the non-taxable replacement amounts from insurances for loss of earned income (e.g. benefits from unemployment or health insurance), as they are relevant for taxation with progression ('*Progressionsvorbehalt*'). Social assistance, housing benefits, and other public transfers not captured by the ITR data are taken from the information contained in the SOEP.

Table A2: Average and top average real gross incomes in Germany, 1992-2002

Gross income[1]	1992	1995	1998	2001	2002	1995	1998	2001	2002
	1 000 Euro at 2000 prices[2]					1992 = 100			
Mean income	35.0	34.9	35.9	35.8	35.9	99.6	102.5	102.4	102.5
Median income	27.6	27.0	26.8	26.6	26.2	98.1	97.3	96.4	95.0
Average income									
Top 10%	109.5	108.4	117.8	116.5	115.4	99.0	107.6	106.4	105.4
Top 1%	317.1	295.1	361.0	328.9	317.3	93.1	113.8	103.7	100.1
Top 0.1%	1 223.2	1 095.0	1 566.8	1 266.2	1 218.1	89.5	128.1	103.5	99.6
Top 0.01%	4 875.6	4 569.4	7 207.2	5 280.5	5 357.0	93.7	147.8	108.3	109.9
Top 0.001%	16 280.5	17 198.3	25 936.2	19 917.8	22 393.3	105.6	159.3	122.3	137.5
Top 0.0001%	40 947.6	51 226.3	74 478.6	58 540.7	70 247.1	125.1	181.9	143.0	171.6
Lowest income									
Top 10%	66.7	68.1	69.3	70.8	72.3	102.1	104.0	106.2	108.4
Top 1%	143.5	142.9	151.4	153.7	151.2	99.6	105.5	107.1	105.4
Top 0.1%	475.8	428.1	512.0	481.7	450.6	90.0	107.6	101.2	94.7
Top 0.01%	2 093.4	1 772.1	2 714.5	2 085.7	1 905.9	84.6	129.7	99.6	91.0
Top 0.001%	8 627.7	8 197.8	12 068.7	9 396.3	9 421.9	95.0	139.9	108.9	109.2
Top 0.0001%	26 112.2	27 589.2	47 732.8	33 046.7	37 092.7	105.7	182.8	126.6	142.1

1) For the definition of gross income, see Section 4.- 2) Deflated by consumer price index.
Source: ITR-SOEP data base.

Table A3: Distribution of gross income by income components, 2002

Gross income[1] fractiles	Gross income[1]	Wage income[2]	Income from business activity[3]			Capital gains[4]	Capital income less capital gains			Transfer income
			Total	Thereof: income from			Total	Interest, dividends[5]	Renting and leasing[6]	
				business enterprise	profess. services					
by income fractiles, in percent										
1st - 5th decile	18.7	9.6	1.3	- 1.1	3.7	- 0.9	15.3	14.3	17.7	53.8
6th - 9th decile	49.1	56.6	34.6	42.5	24.2	5.0	33.3	33.2	33.4	37.4
10th decile	32.2	33.8	64.1	58.7	72.1	95.9	51.5	52.5	48.9	8.7
Top 1%	8.8	5.4	38.1	34.8	41.3	86.7	27.9	29.2	24.6	1.1
Top 0.1%	3.4	1.0	18.0	21.9	9.5	69.6	15.5	18.0	9.1	0.2
Top 0.01%	1.5	0.2	8.6	12.1	1.0	49.4	6.9	8.7	2.2	0.0
Top 0.001%	0.6	0.0	3.8	5.0	0.1	26.7	2.3	3.0	0.5	0.0
Top 0.0001%	0.2	0.0	1.3	1.6	0.0	8.2	0.5	0.7	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
by income fractiles, in percent										
1st - 5th decile	100.0	32.9	0.6	- 0.3	0.7	0.0	3.7	2.5	1.2	62.9
6th - 9th decile	100.0	73.9	6.3	4.1	1.8	0.1	3.1	2.2	0.9	16.7
10th decile	100.0	67.2	17.9	8.6	8.0	1.7	7.2	5.3	2.0	5.9
Top 1%	100.0	38.8	38.6	18.6	16.7	5.7	14.3	10.7	3.6	2.7
Top 0.1%	100.0	18.9	47.5	30.6	10.1	11.9	20.6	17.1	3.5	1.1
Top 0.01%	100.0	8.3	51.4	38.2	2.4	19.2	20.8	18.8	2.0	0.3
Top 0.001%	100.0	4.1	54.5	38.3	0.6	24.9	16.3	15.3	1.0	0.1
Top 0.0001%	100.0	1.8	61.6	38.1	0.0	24.6	11.8	11.8	0.1	0.1
Total	100.0	64.0	9.0	4.7	3.6	0.6	4.5	3.2	1.3	21.9

1) For the definition of gross income, see Section 4.- 2) Including employers' social security contributions and imputed social security contributions for civil servants, minus taxable pensions from former employments, plus tax-exempted foreign income and income from tax-exempted "minijobs".- 3) Taxable income from agriculture and forestry, from business enterprise, from self-employed activities (professional services), plus tax reliefs, less capital gains from business activity, plus tax-exempted foreign income.- 4) From business activity and from from private investments (solely speculation gains).- 5) Taxable income from investments (exclusive income from business activities), inclusive receipts below the savers allowance, less capital gains from private investments.- 6) Taxable income from renting and leasing, plus higher losses from renting and leasing.
Source: ITR-SOEP data base.

Table A4: Adjusted gross income as percentage of gross income by income component, 1992-2001

Gross income[1] fractiles	Gross income[1]	Wage income[2]	Income from business activity[3]	Capital gains[4]	Capital income			Transfer income
					Total	Interest, dividends[5]	Renting and leasing[6]	
2001								
1st - 5th decile	40.9	69.6	92.5	107.1	28.5	30.3	24.7	24.4
6th - 9th decile	69.1	76.2	98.3	29.3	33.5	40.4	14.9	32.1
10th decile	79.3	81.6	95.8	89.1	50.1	77.1	- 47.1	33.0
Top 1%	86.6	89.6	95.1	93.8	65.2	88.7	- 32.1	42.0
Top 0.1%	90.2	93.3	93.6	96.9	80.7	93.6	- 9.9	53.2
Top 0.01%	91.1	94.2	91.4	96.1	87.4	94.7	- 16.6	61.4
Top 0.001%	88.6	91.8	86.6	91.9	91.7	96.7	- 61.5	50.0
Top 0.0001%	81.6	93.8	77.5	77.9	95.6	98.2	- 68.3	75.1
Total	67.0	77.3	96.6	84.4	42.0	60.4	- 13.4	28.0
1998								
1st - 5th decile	42.6	70.2	97.7	83.6	10.0	9.0	11.9	25.4
6th - 9th decile	69.6	76.2	98.6	61.4	- 1.9	18.3	- 44.0	32.6
10th decile	77.1	80.9	96.4	96.0	4.8	64.9	- 196.6	38.7
Top 1%	82.8	89.5	96.0	98.4	20.6	82.6	- 207.7	39.9
Top 0.1%	87.9	94.2	95.1	99.8	44.7	90.4	- 230.8	44.3
Top 0.01%	91.4	95.7	93.0	100.0	58.7	91.6	- 327.7	38.6
Top 0.001%	92.3	96.9	92.8	100.0	68.8	92.7	- 270.4	35.6
Top 0.0001%	95.3	97.0	95.5	100.0	73.5	83.5	- 129.4	40.9
Total	66.8	77.1	97.2	95.0	3.7	45.2	- 105.9	29.0
1995								
1st - 5th decile	43.9	71.4	91.7	65.4	14.4	7.4	25.5	24.1
6th - 9th decile	70.6	77.0	98.7	32.9	4.3	20.7	- 34.6	32.0
10th decile	76.7	81.2	97.0	87.9	- 5.2	67.5	- 224.3	44.2
Top 1%	79.5	88.6	96.7	95.0	1.2	87.4	- 254.5	43.6
Top 0.1%	82.3	93.3	96.0	99.6	24.8	96.8	- 293.3	52.2
Top 0.01%	85.6	94.5	93.9	99.8	41.5	99.3	- 394.3	58.7
Top 0.001%	84.9	96.1	88.9	99.7	43.9	99.8	- 589.0	50.4
Top 0.0001%	71.3	92.5	75.2	100.0	14.9	99.9	- 2 247.1	73.7
Total	67.2	77.6	97.5	84.4	1.2	44.4	- 105.2	28.3
1992								
1st - 5th decile	47.7	72.5	99.0	79.8	15.1	11.9	21.2	25.9
6th - 9th decile	72.3	78.0	99.7	65.3	2.4	20.0	- 47.9	32.7
10th decile	81.0	82.2	99.0	94.4	33.2	82.0	- 131.8	40.0
Top 1%	87.7	89.7	98.7	97.3	49.1	99.8	- 146.9	44.2
Top 0.1%	90.7	94.0	98.3	99.7	63.3	100.0	- 165.5	51.2
Top 0.01%	93.7	93.8	97.8	100.0	75.8	100.0	- 193.6	59.3
Top 0.001%	93.8	95.0	96.8	100.0	73.1	100.0	- 496.9	60.3
Top 0.0001%	92.9	92.4	96.7	100.0	75.5	100.0	- 439.6	76.3
Total	70.1	78.6	99.2	92.6	21.6	54.2	- 72.2	29.2

1) For the definition of gross income, see Section 4.- 2) Including employers' social security contributions and imputed social security contributions for civil servants, minus taxable pensions from former employments, plus tax-exempted foreign income and income from tax-exempted "minijobs".- 3) Taxable income from agriculture and forestry, from business enterprise, from self-employed activities (professional services), plus tax reliefs, less capital gains from business activity, plus tax-exempted foreign income.- 4) From business activity and from from private investments (solely speculation gains).- 5) Taxable income from investments (exclusive income from business activities), inclusive receipts below the savers allowance, less capital gains from private investments.- 6) Taxable income from renting and leasing, plus higher losses from renting and leasing.
Source: ITR-SOEP data base.

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