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ABSTRACT

Optimal top marginal tax rates under income splitting for couples*

This paper analytically derives optimal top marginal tax rates when couples are taxed according to income splitting between spouses, consumption is taxed, and the skill distribution is unbounded. Optimal top marginal income tax rates are then quantified for Germany. Estimation results based on an exhaustive dataset of top taxpayers suggest that the optimal asymptotic tax rate is close to 2/3 and only applies to incomes that are considerably higher than those currently subject to the actual top tax rate.

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1 Introduction

During the last three decades, income concentration at the top of the distribution has risen in many countries.[1] The enhanced ability to pay of top income recipients has renewed research and policy interest in the taxation of very high incomes. Since actual tax codes include a top marginal tax rate that applies to incomes above a certain threshold, a crucial issue for tax policy is to determine what the optimal level of that top marginal tax rate is. The early literature on optimal income taxation delivered a deceiptively simple answer to that question: in its basic model, the optimal tax rate on the highest income level is zero. However, as pointed out e.g. by Tuomala (1984) and Diamond (1998), the zero-taxation result has to be interpreted with great caution. Its policy application requires ex-ante knowledge of the maximum income subject to taxation and optimal marginal tax rates need not approach zero until very close to that maximum. If one instead posits an unbounded distribution of skills, the optimal asymptotic marginal tax rate is typically strictly positive and depends on the shape of the distribution. Saez (2001) offers a formula of such an optimal top marginal tax rate as a function of substitution and income effects as well as the thickness of the top tail of the income distribution. That formula provides an ideal starting point for the analysis of the optimal top marginal income tax rate and the way in which tax policy should react to changing trends in top income inequality.

This paper contributes to the literature on optimal tax rates for top incomes by extending the existing theory and by providing novel estimations of optimal top tax rates. Existing formulas for the optimal top marginal income tax rate do not distinguish between taxation of singles and taxation of couples. Such a distinction is crucial for tax systems that have joint taxation with income splitting for spouses. Joint taxation of couples with income splitting is practised in various countries, for instance Germany and France. We analytically derive a formula for the optimal top marginal income tax rate under such a tax system and show how it relates to existing formulas. Furthermore, we examine how the presence of a consumption tax affects the optimal top marginal income tax rate. Our empirical contribution is to employ high-quality data to estimate the optimal top marginal rate of the income tax for the case of Germany. The empirical distribution of incomes that underpins our quantification exercise is obtained from a dataset that includes all taxpayers in the top percentile of the German distribution.

The optimal tax formulas in this paper are extensions of formulas in Saez (2001).

[1]See e.g. Atkinson and Piketty (2010).

When couples are taxed according to the method of joint taxation with splitting, the spouses' incomes are added together and taxed as if each earned one half of their total income. The income threshold for taxation at the top marginal tax rate is for couples twice the level that applies to single taxpayers. We derive a formula for the optimal top marginal tax rate that depends on the elasticities and income distributions of both couples and singles in the economy. It is shown that in the special case where they have identical asymptotic elasticities, the optimal top tax rate can be written as in Saez (2001) once the Pareto parameter is re-interpreted as a properly modified weighted average of the Pareto parameters of the respective distributions for singles and couples. When consumption is taxed along with income, the optimal top marginal income tax rate has to be adjusted correspondingly. We provide a simple formula that takes the existence of a consumption tax into account which differs from the one mentioned in Saez (2001).

In the empirical part of the paper we apply the optimal tax fomulas obtained in the theoretical part in order to assess what the optimal taxation of top incomes is in Germany, a country where couples account for a large fraction of total top taxpayers and where consumption is relatively heavily taxed. Our computations are based on an administrative dataset that includes the individual tax returns of all taxpayers in the top percentile of the German income distribution of the year 2005. Labor supply elasticities for taxpayers at the top of the income distribution are estimated using data from the German Socio-Economic Panel. A microsimulation model is used to compute their burden in terms of consumption taxes. We find that the optimal asymptotic marginal tax rate for Germany is about 2/3. Convergence obtains at an income threshold for taxation at the optimal top marginal tax rate of about 350,000 € for singles and twice as much for couples. As compared to actual taxation of top incomes in Germany, the optimal asymptotic marginal tax rate is substantially higher and it only applies to a subset of those incomes that are currently subject to the top marginal tax rate of the actual German tax code.[2]

The remainder of the paper is organized as follows. Section 2 extends Saez (2001)'s formulas to the cases of income splitting for spouses and taxation of consumption expenditures. Section 3 implement those formulas empirically for the German case. Section 4 discusses how our findings should be qualified when thinking about policy implications. Section 5 concludes.

[2] In 2005, the top marginal tax rate in Germany (inclusive of the so called "Solidaritätszuschlag") was about 45 % and started at an income level of about 50,000 € for singles and 100,000 € for couples. Since 2007 there exists an additional "Reichensteuer" for incomes above 250,000 € (500,000 € for couples); the resulting top marginal tax rate is about 48 %.

2 Two extensions

As in Saez (2001), households have a well-behaved utility function, defined on consumption and leisure, that can be written as $u(c, y)$, where c is consumption and $y = wl$ is earnings, the only source of income in this model. Households differ according to their skill or productivity w, so that function u varies with productivity. We first introduce couple taxation and then a consumption tax. Whenever useful we attach an index S to variables that relate to single households and an index C to variables that relate to couples.

2.1 Income splitting for spouses

There is a continuum of households whose mass is normalized to unity. Households may be either single persons or couples. Let μ denote the share of couples in the population of tax units. The income of single individuals is taxed according to the tax schedule $T(y)$, while couples are taxed according to joint taxation with income splitting between spouses. A couple with income y pays income tax equal to $2T(y/2)$.

The government sets a constant marginal tax rate τ above a level of income $\overline{y}$. The income tax paid by single individuals with $y \geq \overline{y}$ equals $T(\overline{y}) + \tau(y - \overline{y})$. Couples are only affected by the top marginal rate if their income exceeds $2\overline{y}$. In that case, their income tax liability amounts to $2T(\overline{y}) + \tau(y - 2\overline{y})$. For both household types, consumption is related to earnings through $c = y - T(y)$. Thus, the consumption level of singles in the top tax bracket is given by

$$c = y(1 - \tau) + R, \tag{1}$$

where

$$R = \tau\overline{y} - T(\overline{y}).$$

Consumption of couples with $y \geq 2\overline{y}$ is similarly given by

$$c = y(1 - \tau) + 2R. \tag{2}$$

Households in the top income tax bracket choose their earnings so as to maximize their utility function subject to their respective budget constraints, (1) for singles and (2) for couples. The result of the maximization problem is a earnings supply function $y_S(1 - \tau, R)$ for singles and $y_C(1 - \tau, 2R)$ for couples.

In order to derive the optimal tax rate τ, the mechanical and the behavioral effect of a small $d\tau$ for tax revenue are considered. The mechanical effect is denoted by $M = (1 - \mu)M_S + \mu M_C$. One has

$$M = [(1 - \mu)(y_{mS} - \overline{y}) + \mu(y_{mC} - 2\overline{y})]\, d\tau,$$

where y_{mS} denotes the mean of incomes above $\overline{y}$ in the income distribution of singles and y_{mC} denotes the mean of incomes above $2\overline{y}$ in the income distribution of couples.

The behavioral effect $B = (1-\mu)B_S + \mu B_C$ can be decomposed into two parts. First, there is an overall uncompensated increase $d\tau$ in the marginal tax rate starting from 0. Second, there is an increase in virtual income equal to $dR = \overline{y}d\tau$ for singles and equal to $d2R = 2\overline{y}d\tau$ for couples. By the same steps as in Saez (2001), the resulting reduction in tax receipts due to the behavioral responses equals

$$B_S = -\tau(\epsilon^u_S y_{mS} - \eta_S \overline{y})\frac{d\tau}{1-\tau}$$

for singles and

$$B_C = -\tau(\epsilon^u_C y_{mC} - 2\eta_C \overline{y})\frac{d\tau}{1-\tau}$$

for couples. Parameter ϵ^u is the uncompensated labor supply elasticity and η captures the income effect as given by the Slutsky equation.

At the optimal τ, assuming that it is interior, the sum of M and B equals the monetary valuation by the planner of the loss in marginal utility suffered by the top income earners. Assuming that the planner does not care about the marginal utility of top earners - so that the government aims at maximizing the tax revenue collected from those taxpayers - the optimal tax rate is implicitly determined by $M + B = 0$ or

$$\frac{\tau}{1-\tau} = \frac{(1-\mu)(y_{mS} - \overline{y}) + \mu(y_{mC} - 2\overline{y})}{(1-\mu)(\epsilon^u_S y_{mS} - \eta_S \overline{y}) + \mu(\epsilon^u_C y_{mC} - 2\eta_C \overline{y})}. \tag{3}$$

This is the formula that we employ in the next Section to numerically determine optimal top tax rates for Germany.

Computing τ from (3) requires knowledge of the actual distribution of top incomes. While such information is available for Germany, in other instances (3) may be too demanding in terms of data availability. Less demanding formulas can be derived under additional assumptions. In the following we assume that (i) singles and couples in the top tax bracket do not differ with respect to their compensated and uncompensated elasticities and (ii) both the top earnings of singles and those of couples are distributed according to the Pareto law, but with possibly different Paretian alphas. The assumption that top earnings are Pareto distributed means that there exists an income level $k \in (0, \overline{y}]$ such that

$$1 - F(y) = \left(\frac{y}{k}\right)^{-\alpha}, \tag{4}$$

where F is the cumulative distribution function and $y \geq k$. A distinctive property of Pareto distributions is that the average income above any income threshold is a constant multiple of that threshold, independent of the level of the treshold. Formally, let $Y(y) = \int_y^\infty sF'(s)ds/[1 - F(y)]$ denote average income above y. By (4), one has

$$\frac{Y(y)}{y} = \frac{\alpha}{\alpha - 1}.$$

Substituting $y_{mS}/\overline{y} = \alpha_S/(\alpha_S - 1)$ and $y_{mC}/2\overline{y} = \alpha_C/(\alpha_C - 1)$ into (3) and rearranging yields

$$\tau \left\{ \epsilon^u \left[\frac{\alpha_S(1-\mu)}{\alpha_S - 1} + \frac{2\mu\alpha_C}{\alpha_C - 1} \right] - \eta(1+\mu) \right\} = (1-\tau)\left(\frac{1-\mu}{\alpha_S - 1} + \frac{2\mu}{\alpha_C - 1} \right), \tag{5}$$

where we have posited $\epsilon_S^u = \epsilon_C^u = \epsilon^u$ and $\eta_S = \eta_C = \eta$. In the special case $\alpha_S = \alpha_C = \alpha$, the above expression boils down to

$$\tau = \frac{1}{1 + \alpha\epsilon^u - (\alpha - 1)\eta} = \frac{1}{1 + \epsilon^u + (\alpha - 1)\epsilon^c},$$

which is the same formula as in Saez (2001). Also if the Paretian alpha differs across household groups, equation (5) yields a solution similar to the one in Saez (2001) but where α is replaced by a function of the alphas in the two distributions. Specifically, the optimal top tax rate can be written as

$$\tau = \frac{1}{1 + \epsilon^u + (a - 1)\epsilon^c},$$

where

$$a = \frac{\alpha_S\alpha_C - \widehat{\alpha}}{\widetilde{\alpha} - 1}.$$

In the last expression, $\widehat{\alpha} \equiv [(1-\mu)\alpha_S + 2\mu\alpha_C]/(1+\mu)$ is the average alpha per person in the overall population affected by the top tax rate; $\widetilde{\alpha} \equiv [(1-\mu)\alpha_C + 2\mu\alpha_S]/(1+\mu)$ is the average alpha per person in a fictive population where the alphas of the two groups have been exchanged.

2.2 Taxation of consumption

We now generalize the formula for the optimal top tax rate to the case where also consumption is taxed. In Saez (2001) it is suggested that an optimal income tax rate τ derived from the standard model should be reduced to $(1-t)\tau$ in the presence of a consumption tax at rate t. For the sake of comparison, we deal with the case of a model economy with single individuals only; by a completely analogous approach, the obtained result can be generalized to the setting studied above where there are couples taxed according to the splitting method.

In the presence of a proportional consumption tax at rate t, household consumption is related to earnings through

$$c(1+t) = y - T(y),$$

where $T(y)$ denotes the income tax schedule. The government optimally sets a constant marginal tax rate τ_y above a given level of income $\overline{y}$. Thus, the income tax paid by individuals with $y \geq \overline{y}$ equals $T(\overline{y}) + \tau_y(y - \overline{y})$. Inserting that income tax in the budget constraint yields

$$c = \frac{1}{1+t}\left[y(1-\tau_y) + \tau_y \overline{y} - T(\overline{y})\right]. \tag{6}$$

Individuals in the top income tax bracket choose their earnings so as to maximize their utility function $u(c, y)$ subject to (6). That constraint can also be written as

$$c = y(1-\tau) + \widetilde{R},$$

where

$$\tau = \frac{\tau_y + t}{1+t} \tag{7}$$

and

$$\widetilde{R} = \tau\overline{y} - \frac{T(\overline{y}) + t\overline{y}}{1+t}.$$

This way of rewriting the budget constraint allows one to have a model which is equivalent to the one in Saez (2001). Hence, the expressions for the optimal top tax rate derived in that article are valid for the optimal τ in the current model where consumption is taxed at rate t. Using (7), the optimal income tax rate reads

$$\tau_y = \tau - (1-\tau)t. \tag{8}$$

Thus, the adjustment of the optimal income tax formula suggested by Saez (2001) is correct only in the special case $\tau = 1/2$ and the difference can be considerable if $\tau \neq 1/2$. By way of an example, if $\tau = 3/4$ and $t = 1/5$, the optimal τ_y as implied by (8) is 70 % while using the formula $\tau_y = (1-t)\tau$ yields $\tau_y = 60\%$.

3 Estimations for Germany

Numerical values for the optimal top tax rate as implied by (3) and (8) can be computed for selected levels of the income threshold $\overline{y}$ in the case of Germany. Our computations are based on administrative tax data that include the individual tax returns of all taxpayers in the top percentile of the German income distribution. The dataset that we use can be accessed to through the Research Data Centre of the Federal Statistical Office of Germany. That dataset allows us to identify all income components for each individual within a tax unit - a single person or a couple. We use the most recent available information which is the one pertaining to the year 2005. Results for the year 2004 are similar to those for 2005 and are reported in the Appendix.

3.1 Distribution of top incomes

The above model depicts earnings from the supply of labor, while capital income and pure profits are neglected. Three measures of labor income can be recovered from our data. The first one only includes wages and salaries, i.e. income from dependent employment. The second one adds to wages and salaries the income received from professional services of the self-employed. The third measure of household income additionally includes the income from business enterprise. Going from the first to the third measure, it is likely that an increasing part of measured income can be ascribed to capital and economic rents rather than labor. Also risk taking is likely to be a more important determinant of income for the self-employed rather than the wage earners. We shall therefore mainly discuss the results based on our preferred income measure, namely wages and salaries.[3]

Figures 1 and 2 depict for each income measure its distribution in the population of, respectively, singles ("Grundtabelle") and couples ("Splittingtabelle"). Those Figures show the shape of $Y(y)/y$, the ratio of the average income of all incomes above y to y. As noted above, that ratio is constant if the underlying income distribution is the Pareto one. Figures 1 and 2 suggest that the top of the German income distribution is rather well described by a Pareto distribution: starting with yearly incomes of about 350,000 € for singles and 400,000 € for couples, the $Y(y)/y$ ratio is approximatively constant. However, the level of that ratio is significantly higher for the most comprehensive income measure, the one including income from business enterprise. In terms of Paretian alphas, the α for the income distribution including business income is about 1.5, while excluding it reduces the alpha to about 2.

[3] All measures refer to taxable income. We also performed the same empirical exercise using the broader definition of income proposed in Bach *et al.* (2009). Optimal asymptotic marginal tax rates were very close to the ones obtained here. Optimal top marginal tax rates were somewhat lower in the case of an income threshold between 50,000 € and 100,000 €. Details are available from the authors upon request.

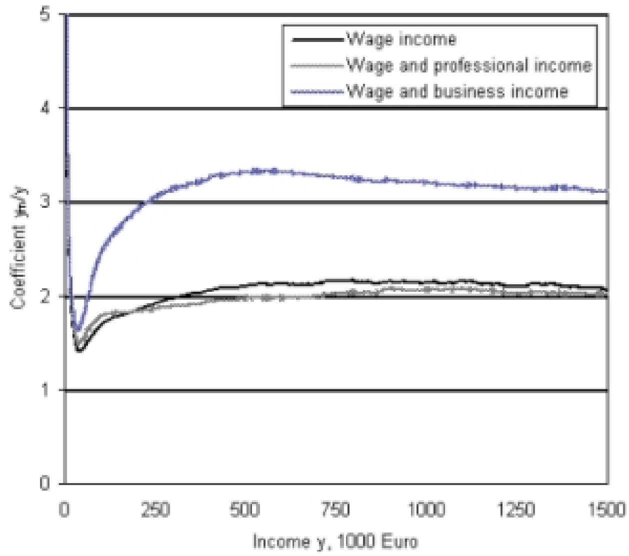

Figure 1: Singles' income distribution

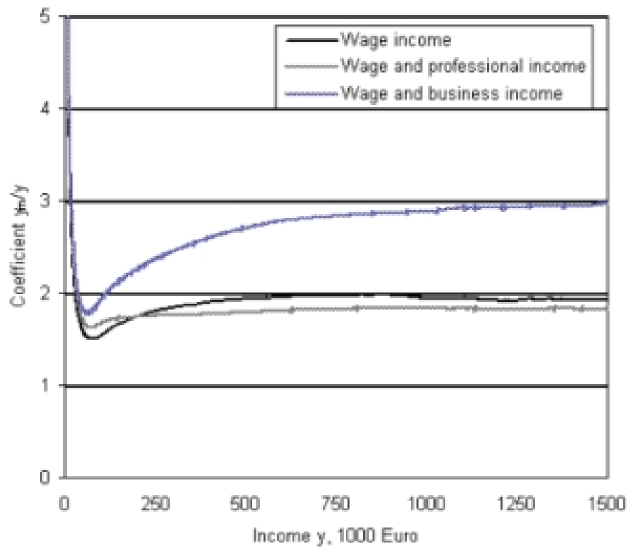

Figure 2: Couples' income distribution

Tables 1, 2 and 3 show for each income measure the distribution of income above the threshold $\overline{y}$ for selected numerical values of that threshold.

3.2 Elasticities

We have estimated labor supply elasticities using data from the German Socio-Economic Panel, separately for singles and couples. In the case of couples, the estimation is based on a household utility model. It is assumed that both spouses jointly maximize a utility

Table 1: Wage Income

Singles		Couples		Total	
ȳ	nr. of obs.	2ȳ	nr. of obs	nr. of obs	μ
50,000	913,362	100,000	523,008	1,436,370	0.364
60,000	449,273	120,000	287,204	736,477	0.390
70,000	254,915	140,000	176,736	431,651	0.409
80,000	159,741	160,000	119,674	279,414	0.428
90,000	109,071	180,000	86,011	195,082	0.441
100,000	78,537	200,000	64,191	142,728	0.450
200,000	12,794	400,000	11,459	24,253	0.472
300,000	4,799	600,000	4,681	9,479	0.494
400,000	2,497	800,000	2,549	5,046	0.505
500,000	1,558	1,000,000	1,670	3,228	0.517
600,000	1,080	1,200,000	1,169	2,249	0.520
700,000	800	1,400,000	849	1,649	0.515
800,000	610	1,600,000	642	1,252	0.513
900,000	493	1,800,000	505	998	0.506
1,000,000	406	2,000,000	417	823	0.507
1,100,000	335	2,200,000	340	675	0.504
1,200,000	294	2,400,000	276	570	0.484
1,300,000	251	2,600,000	232	483	0.480
1,400,000	224	2,800,000	199	423	0.470
1,500,000	205	3,000,000	156	361	0.432

Table 2: Wage and Professional Income

Singles		Couples		Total	
ȳ	nr. of obs.	2ȳ	nr. of obs	nr. of obs	μ
50,000	1,048,765	100,000	689,177	1,737,943	0.397
60,000	546,856	120,000	418,322	965,177	0.433
70,000	331,564	140,000	280,239	611,803	0.458
80,000	217,146	160,000	201,656	418,802	0.482
90,000	157,241	180,000	151,700	308,941	0.491
100,000	118,554	200,000	117,408	235,962	0.498
200,000	23,324	400,000	22,468	45,792	0.491
300,000	9,142	600,000	8,529	17,671	0.483
400,000	4,744	800,000	4,402	9,146	0.481
500,000	2,876	1,000,000	2,679	5,555	0.482
600,000	1,987	1,200,000	1,808	3,795	0.476
700,000	1,414	1,400,000	1,272	2,686	0.474
800,000	1,051	1,600,000	917	1,968	0.466
900,000	802	1,800,000	701	1,503	0.466
1,000,000	662	2,000,000	569	1,231	0.462
1,100,000	541	2,200,000	450	991	0.454
1,200,000	472	2,400,000	369	841	0.439
1,300,000	405	2,600,000	312	717	0.435
1,400,000	352	2,800,000	265	617	0.429
1,500,000	312	3,000,000	211	523	0.403

Table 3: Wage, Professional and Business Income

Singles		Couples		Total	
ȳ	nr. of obs.	2ȳ	nr. of obs	nr. of obs	μ
50,000	1,200,836	100,000	810,411	2,011,247	0.403
60,000	650,621	120,000	505,944	1,156,564	0.437
70,000	415,316	140,000	348,158	763,474	0.456
80,000	271,621	160,000	256,483	528,104	0.486
90,000	202,465	180,000	197,268	399,733	0.493
100,000	156,860	200,000	156,574	313,434	0.500
200,000	39,303	400,000	37,643	76,946	0.489
300,000	19,168	600,000	17,733	36,901	0.481
400,000	11,995	800,000	10,912	22,908	0.476
500,000	8,448	1,000,000	7,612	16,061	0.474
600,000	6,512	1,200,000	5,604	12,117	0.463
700,000	5,303	1,400,000	4,403	9,706	0.454
800,000	4,435	1,600,000	3,502	7,937	0.441
900,000	3,770	1,800,000	2,939	6,709	0.438
1,000,000	3,265	2,000,000	2,531	5,796	0.437
1,100,000	2,873	2,200,000	2,202	5,075	0.434
1,200,000	2,536	2,400,000	1,909	4,444	0.429
1,300,000	2,300	2,600,000	1,724	4,024	0.428
1,400,000	2,046	2,800,000	1,545	3,591	0.430
1,500,000	1,877	3,000,000	1,331	3,208	0.415

function that depends on leisure of both spouses and net household income. Working hours include paid overtime and are modeled using the discrete-choice framework proposed by van Soest (1995). Household budget constraints for several hours categories are constructed using a detailed microsimulation model also based on data from the German Socio-Economic Panel. Applying the estimated structural parameters of the model and simulation methods, we derive compensated and uncompensated wage elasticities of hours worked for households in various intervals of the income distribution.[4] For the determination of the optimal top tax rate we are interested in the labor supply elasticity of taxpayers with incomes of at least 50,000 € in case of singles and 100,000 € in case of couples. According to our estimations, the average uncompensated labor supply elasticity for singles with income larger than 50,000 € is 0.14 while the income effect amounts to -0.06. The corresponding parameters for couples with income larger than 100,000 € are 0.18 and -0.02. Those estimates include labor supply responses both along the intensive and the extensive margin. Uncompensated elasticities are somewhat higher for earners with lower income levels.[5] Lack of data prevents us from further differentiating the extent of behavioral responses within smaller groups at the top of the income distribution.

[4]Details of the microsimulation model are discussed in Steiner and Wrohlich (2008). Further details about our estimation results can be obtained from the authors upon request.

[5]They range from 0.25 to 0.3. Income effects are about -0.07 for singles and -0.02 for couples.

3.3 Consumption tax

Consumption is taxed by means of various instruments in Germany. We have used a microsimulation model based on the German Income and Consumption Survey to estimate the average consumption tax rate for the top decile of the income distribution. The main tax is the VAT at a regular rate of 19 %. According to our simulations, roughly 3/4 of the consumption expenditure of the top decile is taxed at the standard rate, the rest being partly subject to the reduced 7 % VAT rate and partly VAT-exempted. To compute the overall tax rate on consumption, we have also taken energy taxation, the insurance tax, taxes on real estate, the motor vehicle tax, taxes on alcohol and tobacco and other quantitatively minor taxes into account. As a result, our simulations suggest that the average consumption tax for the high-income earners amounts to about 20 %.[6]

3.4 Results

Eq. (3) and (8) imply that the optimal top marginal income tax rate can be written as

$$\tau_y = \frac{A - t}{1 + A},$$

where

$$A \equiv \frac{(1-\mu)(y_{mS} - \overline{y}) + \mu(y_{mC} - 2\overline{y})}{(1-\mu)(\epsilon_S^u y_{mS} - \eta_S \overline{y}) + \mu(\epsilon_C^u y_{mC} - 2\eta_C \overline{y})}.$$

Using the empirical findings reported above, we set $t = 0.2$, $\epsilon_S^u = 0.14$, $\eta_S = -0.06$, $\epsilon_C^u = 0.18$ and $\eta_C = -0.02$. Optimal top rates are computed for various threshold levels from 50,000 € to 1,500,000 €. Results for all three income measures are reported in Table 4.

Optimal tax rates start at a level close to 56 % for a threshold of 50,000 € and converge to a level of about 2/3 for higher income levels. Convergence is obtained at threshold levels between 300,000 € and 400,000 €. Thus, the optimal asymptotic marginal tax rate is about 2/3 and applies to incomes larger than about 350,000 € for singles and 700,000 € for couples.

Our estimations of optimal tax rates are not much affected if the incomes of professionals are included in the income measure. They are significantly larger if the income of business owners is included. That is due to the higher level of concentration of business incomes, as shown by Figures 1 and 2.

[6] Details of the simulations can be obtained from the authors upon request.

Table 4: Optimal top marginal income tax rates for various thresholds and various income concepts

$\overline{y}$	wage income	wage and professional income	wage, professional and business income
50,000	0.5621	0.6007	0.6554
60,000	0.5837	0.6157	0.6751
70,000	0.6017	0.6253	0.6875
80,000	0.6144	0.6318	0.6989
90,000	0.6237	0.6348	0.7055
100,000	0.6320	0.6377	0.7111
200,000	0.6621	0.6464	0.7361
300,000	0.6730	0.6546	0.7454
400,000	0.6787	0.6595	0.7490
500,000	0.6780	0.6625	0.7509
600,000	0.6774	0.6620	0.7524
700,000	0.6781	0.6647	0.7524
800,000	0.6794	0.6696	0.7533
900,000	0.6789	0.6730	0.7531
1,000,000	0.6764	0.6710	0.7525
1,100,000	0.6775	0.6747	0.7520
1,200,000	0.6785	0.6743	0.7525
1,300,000	0.6795	0.6740	0.7511
1,400,000	0.6783	0.6742	0.7513
1,500,000	0.6842	0.6798	0.7528

4 Qualifications

With respect to their policy implications, our results should be qualified in at least two respects. First, the use of labor supply elasticities rather than taxable income elasticities should be discussed. Second, there are determinants of optimal top tax rates that are absent from the theoretical framework on which our estimations are based.

4.1 Taxable income vs. labor supply elasticities

We have used elasticity estimates obtained from an investigation of labor supply in Germany. Those elasticities only incorporate the effect of taxation on labor market participation and number of hours worked. Households can however respond to taxation also through other channels affecting e.g. human capital accumulation, choice of career, and effort per hour. Unfortunately, there exists very little direct empirical evidence about the effect of income taxation on those dimensions of taxpayer behavior. Because of conflicting income and substitution effects, one cannot even conclude from theory that traditional labor supply elasticities constitute a lower bound of the overall response of taxpayers.[7]

[7]In case of long-term decisions about education and career, it is the expected tax rate that matters and there seems to be no attempt to empirically measure those expectations. Notice that the elasticity

An alternative to labor supply elasticities that has received much attention in the literature is the elasticity of taxable income with respect to the marginal tax rate. In the formal framework adopted above, the two elasticity concepts are equivalent. In practice, taxable income elasticity does not only mirror labor market participation and hours but also effort and other dimensions of work intensity that are neglected by labor supply elasticities. Thus, taxable income elasticity might be a better indicator of the efficiency costs of taxation and a more reliable way to quantify optimal top tax rates.[8] Empirical elasticities of taxable income are typically larger than labor supply elasticities. For the U.S., Saez *et al.* (2010) consider the most reliable longer-run estimates to lie in the range from 0.12 to 0.4, with very small income effects for top incomes. The only existing study for Germany is Gottfried and Schellhorn (2004) who use data from a tax return panel for the years 1988 and 1990. Their preferred estimates of the compensated elasticity range from 0.38 to 0.58 with somewhat higher values for high income taxpayers who are not wage earners and lower values for top wage earners. However, their estimated elasticities widely vary with specification and estimation method and the use of only two years makes it impossible to control for trends in income inequality and for mean reversion without compromising identification. For France, Cabannes and Landais (2008) estimate the elasticity of taxable income using an exhaustive panel of top taxpayers in a period during which three large reforms of the tax code took place. They find that the taxable income elasticity for top earners is around 0.15.

Given the lack of precision with which taxable income elasticities are estimated at the top of the distribution, their use to quantify top tax rates leads to a rather wide spectrum of values. Applying to our data an elasticity of 0.15 as suggested by Cabannes and Landais (2008) yields an asymptotic optimal tax rate of 72 %. Assuming instead a compensated elasticity of 0.3 and no income effect reduces the asymptotic rate to about 55 %, while an elasticity of 0.4 - the upper-bound estimate suggested by Saez et al. (2010) - brings it down to 47 %.

The problem of using the elasticity of taxable income is that it captures reactions that have little to do with efficiency costs and revenue losses for the government. As pointed out e.g. by Saez *et al.* (2010), reductions in reported incomes may simply be due to a shift away from income subject to the personal income tax to other forms of taxable income such as corporate income. They may also mirror a shifting of reported income across fiscal

of expected future tax rates with respect to the actual rate needs not be positive: once the intertemporal budget contraint of the government is taken into account by agents, a higher tax rate today may decrease the tax rate that is expected for tomorrow.

[8]That presumption was forcefully argued by Feldstein (1999). However, Chetty (2009) shows that under plausible conditions taxable income elasticity leads to overstate the deadweight loss of taxation, especially so in the case of taxation of high incomes.

years. A similar fiscal externality is present when reductions in reported incomes are due to increased tax evasion: in that case, it is governmental revenue from fining evaders that is bound to increase.[9] The fiscal externality may also involve a shift of tax liabilities across taxpayers, e.g. in the case of top executives and ordinary shareholders: higher executive compensation after a tax rate cut may be the result of more effort by CEOs to make a bigger intake in the firm's profits at the expense of shareholders' (taxable) returns. The fiscal externality may also take the form of a reduction of public expenditure, as in the case of charitable giving: a decrease of taxable income may mirror increased tax-deductible charitable contributions which in turn reduce the costs of poverty alleviation for the government.

Estimates of the labor supply elasticity neglect some dimensions of taxpayer behavior, like human capital formation and intensity of work, that are implicitly accounted for in the basic model of optimal income taxation and are likely to affect the optimal top marginal tax rate. Estimates of taxable income elasticities have the merit of incorporating responses in terms of changed work intensity. But they also mirror changes in tax evasion, avoidance, and rent-seeking, i.e. reactions that are associated with fiscal externalities. Arguably, many high-income earners face a relatively large set of possibilities of evasion, avoidance and rent-seeking, while they often seem committed to putting much effort into their work. This suggests that labor supply elasticities may be a more reliable instrument than taxable income elasticities to capture the incentive costs of taxation that are relevant for the determination of the optimal top marginal tax rate. Taxable income elasticities may instead be especially useful when assessing the role of loopholes in the tax code and the scope for increased tax auditing.

4.2 Further determinants of the optimal top tax rate

Besides the incentive costs of taxation that are at the core of the traditional optimal taxation model, additional factors may significantly affect the socially optimal tax rate for high incomes. We now briefly discuss how that tax rate may be affected by the international mobility of top earners, social externalities related to income polarization, and attitudes toward risk.

4.2.1 Migration

A distinctive concern especially for European governments is the threat of migration by high income individuals. As shown by Simula and Trannoy (2010), adding the possibility

[9] Chetty (2009) shows that if taxpayers are rational and risk neutral, the tax revenue lost because of evasion is exactly recouped by increased fines collected by the government.

of migration to the standard Mirrleesian model tends to lower the marginal tax rate for top earners. Their simulations for France suggest that the effect from migration is sizeable. Simula and Trannoy assume that when a top earner migrates, the domestic government loses an amount of tax revenue exactly equal to the income tax that was paid by that top earner. However, it is likely that in reality the fiscal consequences of migration strongly differ according to the occupation of migrants. By way of an example, migration of scientists is more harmful than assumed in the Simula and Trannoy's model if scientists generate positive spillovers on the productivity of their co-workers. Conversely, migration of top managers may have tiny effects on collected taxes if their remuneration is mainly due to informational rents that are necessary to mitigate moral hazard and adverse selection problems. Replacement of the migrated manager by a new one may entail a new equilibrium where only the income tax on the reservation wage - rather than on the manager's compensation - is actually lost by the treasury.

Taking the possibility of migration into account tends to lower the optimal top tax rate and points to the contraints for policy makers resulting from international tax competition. The threat of migration may be less severe if migration of top earners makes housing more affordable for the poor. As shown by Glazer *et al.* (2008), if land quality is vertically differentiated and rents are endogenous, a tax which induces emigration of the rich reduces demand for desirable locations, thereby raising the utility of the poor.

4.2.2 Social and political externalities

To the extent that a high income concentration creates negative externalities, a higher top tax rate may not only raise more revenue but also improve allocative efficiency. An example of those externalities is when the effort to increase one's income is motivated by a quest for social status or higher relative position. If the marginal utility of consumption is decreasing while the utility from rank is convex, status-seeking motives may be distictively powerful for top income earners - something which is consistent with the observed large number of hours worked by the working rich. The quest for status entails a negative externality since the rank improvement by an individual causes a rank worsening for somebody else. As shown by Boskin and Sheshinski (1978) and Oswald (1983), optimal tax rates are higher when a keeping-up-with-the-Joneses motive is operative; Corneo (2002) shows that a progressive income tax can even generate a Pareto improvement when the Gini coefficient of the distribution of skills is low. In principle, feelings of relative deprivation, as formalized by Yitzhaki (1979), might generate an optimal top tax rate that exceeds the revenue-maximizing one considered in this paper.

Further negative externalities associated with a high level of income concentration are the disproportionate influence of the wealthy in politics and the increase of returns to criminal activity. Corneo (2006) and Petrova (2008) develop models where higher inequality is associated with more media capture; Petrova also offers some empirical support for that prediction. Dahlberg and Gustavsson (2008) discuss the relationship between income inequality and crime and present some empirical evidence suggesting that inequality in permanent income leads to more crime.

4.2.3 Risk taking

Under income uncertainty, income taxes generally affect the amount of risk taking by households, while redistributive taxation can generate valuable additional insurance if financial markets are incomplete.[10] Those aspects can matter for the level of the optimal marginal tax rate for top earners, the more so as many of them are entrepreneurs or otherwise self-employed individuals subject to considerable income risk.

From the viewpoint of the poor, risk taking by the rich should be encouraged if risk is idiosyncratic and aggregate risk is unaffected. In that case, more risk taking tends to increase aggregate taxable income and tax revenue available for redistribution. If instead individual risks are positively correlated, encouraging risk taking leads to an increase of aggregate risk and there is a trade-off involving the expected tax revenue and its variability. Simply increasing the top marginal tax rate tends to reduce the private gain from taking risk in case of good luck. The resulting effect on individual risk-taking involves conflicting income and substitution effects, whereby the latter is likely to dominate, i.e. a higher top marginal tax rate may adversely affect entrepreneurship. If more risk taking is socially desirable, our estimations of the optimal top tax rate - that neglect risk - may then be too high.

Empirical findings by Cullen and Gordon (2007) suggest that the magnitude of the effect of income taxation on risk taking is small because successful entrepreneurs have the option to incorporate or to avoid high personal income taxes by underreporting their income. Furthermore, when income is uncertain, the government can use a high marginal income tax rate on top incomes in combination with low rates on low incomes in order to provide implicit insurance for potential entrepreneurs and thereby encourage risk taking.

[10] Early contributions include Eaton and Rose (1980) and Varian (1980); see Chiu and Eeckhouodt (2010) for a recent update.

5 Conclusion

Increases in income concentration in many countries have renewed interest in the optimal taxation of top incomes. This paper has offered a twofold contribution to the literature on the optimal top marginal tax rate when the skill distribution is unbounded. First, we have extended existing formulas to the empirically relevant case where couples are taxed according to income splitting between spouses and where not only income but also consumption is taxed. Second, we have implemented those formulas to compute the optimal top marginal income tax rate for Germany. Estimations based on an exhaustive dataset of top taxpayers suggest that the optimal asymptotic tax rate is close to 2/3 and should be applied only to incomes much larger that those subject to the actual top tax rate. Our estimations have focused on the revenue loss that is caused by a higher marginal tax rate through its effect on labor supply. Taking the possibility of migration of top earners and the effects of taxation on risk-taking into account is likely to reduce the optimal asymptotic tax rate in Germany. Estimating the magnitude of those responses is an important task for future research.

APPENDIX: Figures and Tables for 2004

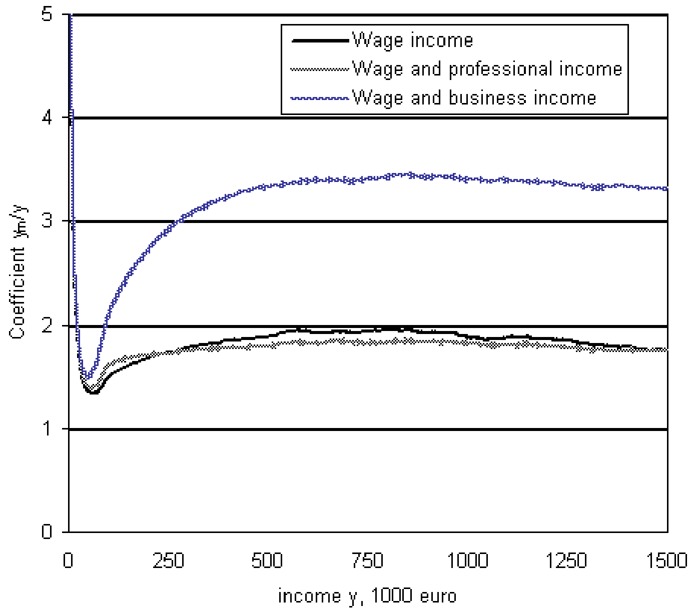

Figure 3: Singles' income distribution

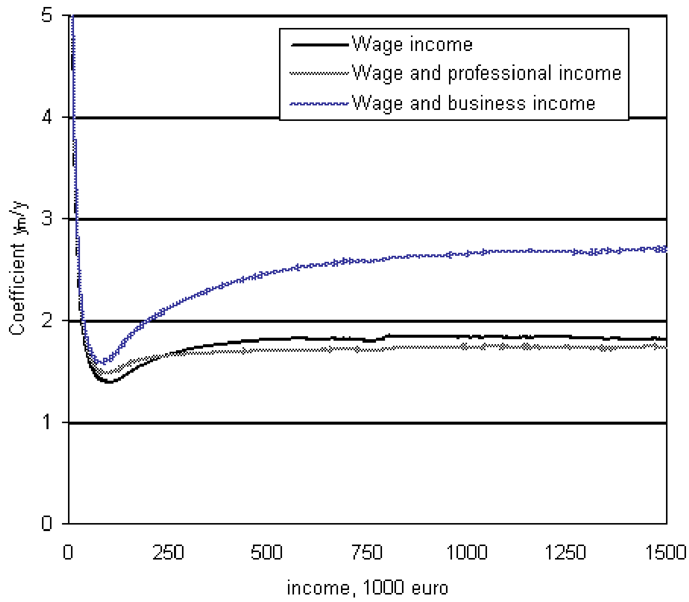

Figure 4: Couples' income distribution

Table 5: Wage Income

Singles		Couples		Total	
ȳ	nr. of obs.	2ȳ	nr. of obs	nr. of obs	μ
50,000	936,510	100,000	501,249	1,437,759	0.349
60,000	493,338	120,000	268,206	761,545	0.352
70,000	254,282	140,000	162,561	416,842	0.390
80,000	152,765	160,000	107,845	260,610	0.414
90,000	101,996	180,000	76,503	178,499	0.429
100,000	75,141	200,000	56,541	131,682	0.429
200,000	10,931	400,000	9,261	20,192	0.459
300,000	3,909	600,000	3,571	7,480	0.477
400,000	1,939	800,000	1,911	3,850	0.496
500,000	1,177	1,000,000	1,185	2,362	0.502
600,000	775	1,200,000	775	1,550	0.500
700,000	569	1,400,000	574	1,143	0.502
800,000	414	1,600,000	424	838	0.506
900,000	333	1,800,000	319	652	0.489
1,000,000	284	2,000,000	256	540	0.474
1,100,000	228	2,200,000	210	438	0.480
1,200,000	187	2,400,000	178	365	0.488
1,300,000	172	2,600,000	149	321	0.464
1,400,000	151	2,800,000	126	277	0.455
1,500,000	126	3,000,000	109	235	0.464

Table 6: Wage and Professional Income

Singles		Couples		Total	
ȳ	nr. of obs.	2ȳ	nr. of obs	nr. of obs	μ
50,000	1,059,231	100,000	655,933	1,715,164	0.382
60,000	583,474	120,000	389,477	972,951	0.400
70,000	328,106	140,000	258,295	586,401	0.440
80,000	207,516	160,000	183,628	391,144	0.469
90,000	147,827	180,000	137,072	284,898	0.481
100,000	113,860	200,000	105,292	219,152	0.480
200,000	21,012	400,000	18,672	39,684	0.471
300,000	7,827	600,000	6,847	14,674	0.467
400,000	3,950	800,000	3,399	7,349	0.462
500,000	2,355	1,000,000	1,981	4,335	0.457
600,000	1,526	1,200,000	1,265	2,791	0.453
700,000	1,072	1,400,000	885	1,957	0.452
800,000	789	1,600,000	628	1,417	0.443
900,000	609	1,800,000	468	1,077	0.434
1,000,000	489	2,000,000	374	863	0.433
1,100,000	399	2,200,000	292	691	0.423
1,200,000	328	2,400,000	241	569	0.424
1,300,000	291	2,600,000	211	502	0.420
1,400,000	245	2,800,000	174	419	0.415
1,500,000	201	3,000,000	143	344	0.416

Table 7: Wage, Professional and Business Income

Singles		Couples		Total	
ȳ	nr. of obs.	2ȳ	nr. of obs	nr. of obs	μ
50,000	1,193,973	100,000	776,414	1,970,387	0.394
60,000	671,997	120,000	475,586	1,147,583	0.414
70,000	396,264	140,000	324,256	720,520	0.450
80,000	260,795	160,000	236,304	497,099	0.475
90,000	191,975	180,000	180,207	372,182	0.484
100,000	149,885	200,000	141,729	291,614	0.486
200,000	35,047	400,000	31,773	66,820	0.475
300,000	16,399	600,000	14,390	30,789	0.467
400,000	10,100	800,000	8,671	18,771	0.462
500,000	7,066	1,000,000	5,915	12,980	0.456
600,000	5,360	1,200,000	4,333	9,692	0.447
700,000	4,309	1,400,000	3,375	7,684	0.439
800,000	3,511	1,600,000	2,678	6,188	0.433
900,000	2,974	1,800,000	2,241	5,215	0.430
1,000,000	2,592	2,000,000	1,910	4,502	0.424
1,100,000	2,273	2,200,000	1,640	3,913	0.419
1,200,000	2,015	2,400,000	1,413	3,429	0.412
1,300,000	1,841	2,600,000	1,261	3,103	0.407
1,400,000	1,653	2,800,000	1,116	2,770	0.403
1,500,000	1,506	3,000,000	988	2,494	0.396

Table 8: Optimal top marginal income tax rates for various thresholds and various income concepts

$\bar{y}$	wage income	wage and professional income	wage, professional and business income
50,000	0.5479	0.5893	0.6421
60,000	0.5598	0.5993	0.6595
70,000	0.5827	0.6123	0.6757
80,000	0.5978	0.6205	0.6872
90,000	0.6077	0.6235	0.6943
100,000	0.6131	0.6242	0.6998
200,000	0.6426	0.6296	0.7289
300,000	0.6531	0.6345	0.7410
400,000	0.6563	0.6375	0.7457
500,000	0.6561	0.6392	0.7485
600,000	0.6602	0.6426	0.7505
700,000	0.6559	0.6426	0.7511
800,000	0.6583	0.6458	0.7528
900,000	0.6590	0.6475	0.7528
1,000,000	0.6547	0.6450	0.7524
1,100,000	0.6541	0.6467	0.7526
1,200,000	0.6517	0.6459	0.7532
1,300,000	0.6465	0.6368	0.7520
1,400,000	0.6443	0.6385	0.7525
1,500,000	0.6444	0.6441	0.7530

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