Optimal Taxation of Top Incomes Under Income Splitting

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Abstract

This paper offers a twofold contribution to the literature on the optimal top marginal tax rate when the skill distribution is unbounded. First, we extend 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 implement 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 currently subject to the actual top tax rate.

Keywords: Optimal income tax, Top incomes, Pareto distribution.

JEL-Classification: D31, D72, H23.

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1 Introduction

The recent rise of income concentration at the top of the distribution - see e.g. Atkinson and Piketty (2010) - has renewed research and policy interest in the taxation of very high incomes. Since tax codes typically include a top marginal tax rate that applies to incomes above a certain threshold, a crucial issue for tax policy is to assess the optimal level of that top marginal tax rate. The early literature on optimal income taxation delivered a deceiptively simple answer to that question: in the basic deterministic 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 however 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 differs from 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. Specifically, the empirical distribution of incomes that underpins our quantification of the optimal top tax rate 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).

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 and thereby show that the adjustment proposed by Saez (2001) is not correct, except in the special case where the optimal top marginal tax rate is 1/2.

In the empirical part of the paper we apply the novel optimal tax fomulas to the taxation of top incomes in Germany, a country where couples - taxed according to the splitting method - account for a large fraction of total top taxpayers and where consumption is relatively heavily taxed. 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. We find that the optimal asymptotic tax rate for Germany is about 2/3 and that convergence obtains at an income level 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 tax rate is 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.[1]

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 in the case of Germany. Section 4 discusses how our findings should be qualified when thinking about policy implications. Section 5 concludes.

[1] 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 of Saez's formula

The following theoretical framework is based on the one considered by 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 referred to single households and an index C to variables referred 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 singles 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 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

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

for singles and

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

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 wants to maximize tax revenue from those taxpayers - the optimal tax rate is implicitly determined by $M + B = 0$ or

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

This is the formula that we employ in the next Section to numerically determine optimal top tax rates for Germany. That formula requires knowledge of the actual distribution of top incomes. While such information is available for Germany, in other instances data limitations may hinder the quantification of τ as given by (3). It is therefore useful to derive the optimal tax rate under additional, empirically palatable, assumptions. In the following, it is assumed 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 says 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. Using (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

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

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, one has

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

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 derived in Saez (2001) to the case where also consumption is taxed. In that article it is claimed 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. As shown below, the needed adjustment is different.

For the sake of brevity, the case of a model economy with single households only is considered; by a completely analogous approach, the obtained result can be generalized to the setting studied above where couples are 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 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 Saez (2001) 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

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

The adjustment of the optimal income tax formula suggested by Saez (2001) to take the consumption tax into account 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 the adjustment suggested by Saez (2001) yields τ_y =60 %.

3 Estimating the optimal τ_y for Germany

We are in a position to compute numerical values of the optimal top tax rate as implied by (3) and (8) for selected levels of $\overline{y}$ for 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 one 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 reported in the Appendix; they are similar to those for 2005.

3.1 Income measures

The above model depicts earnings from the supply of labor, while capital income and pure profits are neglected. It also neglects the remuneration of risk. We therefore employ income measures that are as close as possible to a theoretical notion of labor income. Three earnings measures can be recovered from the 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 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.

The labor income reported in the tax returns is not immediately equivalent to an economic concept of gross market income from labor. Therefore, a few adjustments were performed by adding all tax-exempted incomes and tax reliefs. Furthermore, we computed wage income including employers' social security contributions. Since civil servants are not covered by the social security system but are entitled to pensions and health insurance, we imputed social security contributions to them.[2]

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 incomes of about 500,000 €, 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 top taxpayers including the business owners is about 1.5 while excluding them it is about 2.

Tables 1, 2 and 3 show for each income measure the distribution of income above various possible thresholds $\overline{y}$.

[2] Details of the adopted adjustments are provided in Bach *et al.* (2009) where the same adjustments were performed.

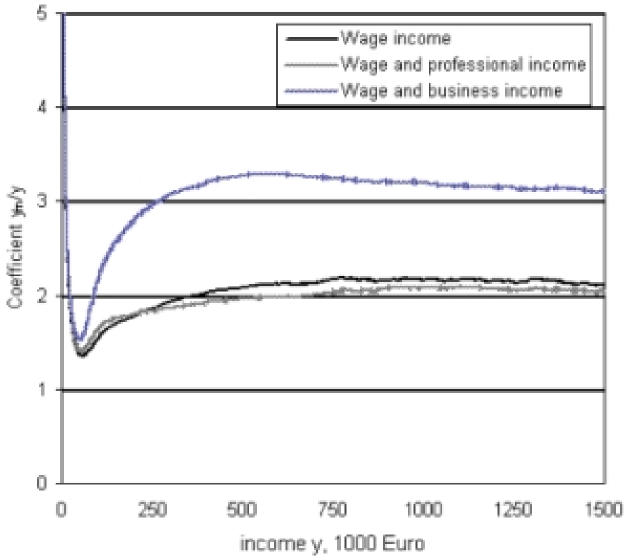

Figure 1: Singles

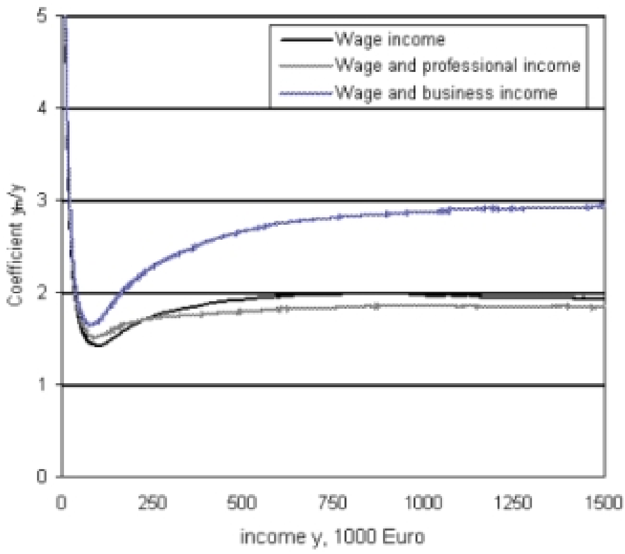

Figure 2: Couples

Singles		Couples		Total	
$\overline{y}$	nr. of obs.	$2\overline{y}$	nr. of obs.	nr. of obs.	μ
50,000	2,193,070	100,000	1,072,229	3,265,299	0.3284
60,000	1,123,860	120,000	555,899	1,679,759	0.3309
70,000	584,909	140,000	307,709	892,618	0.3447
80,000	327,590	160,000	186,971	514,561	0.3634
90,000	200,874	180,000	124,132	325,005	0.3819
100,000	131,945	200,000	88,074	220,018	0.4003
200,000	16,240	400,000	13,185	29,425	0.4481
300,000	5,659	600,000	5,178	10,836	0.4778
400,000	2,881	800,000	2,787	5,668	0.4917
500,000	1,769	1,000,000	1,805	3,574	0.5051
600,000	1,202	1,200,000	1,263	2,465	0.5125
700,000	893	1,400,000	925	1,817	0.5089
800,000	667	1,600,000	704	1,371	0.5134
900,000	544	1,800,000	549	1,093	0.5021
1,000,000	448	2,000,000	459	907	0.5059
1,100,000	368	2,200,000	377	745	0.5058
1,200,000	317	2,400,000	306	623	0.4909
1,300,000	271	2,600,000	262	533	0.4913
1,400,000	245	2,800,000	225	470	0.4784
1,500,000	220	3,000,000	180	400	0.4496

Table 1: Number of tax units with income larger than selected income levels. Income concept: wages and salaries.

Singles		Couples		Total	
$\overline{y}$	nr. of obs.	$2\overline{y}$	nr. of obs.	nr. of obs.	μ
50,000	2,324,908	100,000	1,246,623	3,571,532	0.3490
60,000	1,221,743	120,000	696,992	1,918,735	0.3633
70,000	662,068	140,000	419,094	1,081,162	0.3876
80,000	385,921	160,000	275,504	661,425	0.4165
90,000	250,896	180,000	194,596	445,492	0.4368
100,000	174,051	200,000	144,988	319,039	0.4545
200,000	26,931	400,000	24,556	51,487	0.4769
300,000	10,069	600,000	9,110	19,178	0.4750
400,000	5,171	800,000	4,706	9,876	0.4764
500,000	3,107	1,000,000	2,824	5,931	0.4762
600,000	2,119	1,200,000	1,915	4,034	0.4748
700,000	1,512	1,400,000	1,360	2,871	0.4736
800,000	1,110	1,600,000	981	2,091	0.4691
900,000	863	1,800,000	746	1,609	0.4635
1,000,000	703	2,000,000	612	1,315	0.4653
1,100,000	575	2,200,000	489	1,064	0.4594
1,200,000	497	2,400,000	399	896	0.4451
1,300,000	425	2,600,000	343	768	0.4464
1,400,000	372	2,800,000	295	667	0.4420
1,500,000	328	3,000,000	236	564	0.4181

Table 2: Number of tax units with income larger than selected income levels. Income concept: wages and salaries and professional income.

Singles		Couples		Total	
$\overline{y}$	nr. of obs.	$2\overline{y}$	nr. of obs.	nr. of obs.	μ
50,000	2,470,342	100,000	1,377,144	3,847,486	0.3579
60,000	1,328,483	120,000	790,819	2,119,302	0.3732
70,000	745,930	140,000	490,375	1,236,306	0.3966
80,000	440,452	160,000	332,521	772,973	0.4302
90,000	296,849	180,000	242,454	539,302	0.4496
100,000	213,183	200,000	185,814	398,997	0.4657
200,000	42,999	400,000	40,057	83,056	0.4823
300,000	20,193	600,000	18,448	38,640	0.4774
400,000	12,470	800,000	11,264	23,734	0.4746
500,000	8,735	1,000,000	7,799	16,535	0.4717
600,000	6,668	1,200,000	5,727	12,395	0.4620
700,000	5,412	1,400,000	4,515	9,927	0.4548
800,000	4,516	1,600,000	3,584	8,100	0.4424
900,000	3,848	1,800,000	3,000	6,849	0.4381
1,000,000	3,314	2,000,000	2,580	5,895	0.4378
1,100,000	2,916	2,200,000	2,250	5,167	0.4356
1,200,000	2,574	2,400,000	1,955	4,529	0.4317
1,300,000	2,326	2,600,000	1,762	4,089	0.4311
1,400,000	2,074	2,800,000	1,572	3,647	0.4312
1,500,000	1,904	3,000,000	1,363	3,268	0.4173

Table 3: Number of tax units with income larger than selected income levels. Income concept: wages and salaries, professional income and income from business activity.

3.2 Parameter values

We estimate 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 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.[3] 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 paramters 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.[4] Lack of data prevents us from further differentiating the extent of behavioral responses within smaller groups at the top of the income distribution.

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 quantitatively most relevant consumption 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 take also 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 %.[5]

[3] 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.

[4] Uncompensated elasticities typically are in the range 0.25 – 0.3. Income effects are about -0.07 for singles and -0.02 for couples.

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

Our computations are based on Eq. (3) and (8), that imply

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

where

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

Using the empirical findings reported above, we set $t = 0.2$, $\epsilon^u_S = 0.14$, $\eta_S = -0.06$, $\epsilon^u_C = 0.18$ and $\eta_C = -0.02$.

3.3 Results

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.

$\overline{y}$	wages and salaries	wages and professional income	wages, professional and business income
50 000	0.5188	0.5525	0.6034
60 000	0.5225	0.5600	0.6228
70 000	0.5430	0.5783	0.6475
80 000	0.5665	0.5960	0.6697
90 000	0.5857	0.6078	0.6838
100 000	0.6018	0.6167	0.6945
200 000	0.6542	0.6422	0.7322
300 000	0.6707	0.6539	0.7435
400 000	0.6779	0.6591	0.7476
500 000	0.6790	0.6640	0.7498
600 000	0.6795	0.6640	0.7516
700 000	0.6795	0.6660	0.7515
800 000	0.6813	0.6716	0.7526
900 000	0.6814	0.6748	0.7523
1 000 000	0.6782	0.6728	0.7519
1 100 000	0.6789	0.6757	0.7513
1 200 000	0.6810	0.6764	0.7517
1 300 000	0.6805	0.6751	0.7504
1 400 000	0.6788	0.6741	0.7507
1 500 000	0.6842	0.6798	0.7519

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

Optimal tax rates start at a level close to 1/2 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.

4 Qualifications

Given the practical relevance of top income tax rates, it is important that the above results be properly interpreted. We now discuss two issues that help us qualifying those results. First, we compare the use of labor supply elasticities to the use of taxable income elasticities. Second, we point out 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 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.[6]

An alternative to labor supply elasticities that has received much attention in the recent 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

[6] 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 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 expected tax rate for tomorrow.

efficiency costs of taxation and a more reliable way to quantify optimal top tax rates.[7] 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 results that are slightly above our asymptotic optimal tax rate of 2/3. 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 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.[8] 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.

[7] 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.

[8] 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.

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 should affect the top marginal tax rate. Estimates of taxable income elasticities have the merit of incorporating responses in terms of changed work intensity and the drawback of mirroring also changes in evasion, avoidance, and rent-seeking. 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.[9]

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 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. Migration of scientists may be more harmful than assumed in the Simula and Trannoy's model because scientists often create positive spillovers on the productivity of their co-workers. Conversely, migration of top managers may have tiny effects on collected taxes if their remuneration mainly con-

[9] Relatively large taxable income elasticities as compared to labor supply elasticities have more direct policy implications in terms of tightening up on tax loopholes and intensifying tax auditing.

sists of informational rents that are necessary to cure 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 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 increase 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 justify an optimal tax rate that exceeds the revenue-maximizing one.

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 finding. 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 cosiderable 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.

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

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

should be applied only to incomes much larger that those currently 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.

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