

# The Elasticity of Taxable Income at the Very Top\*

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## Abstract

We use the recent implementation of a top income surtax in the German personal income tax to estimate taxable income responses at the very top of the income distribution. The surtax affects tax units with taxable income above 250,000€ (singles) or 500,000€ (married couples). The reform affected singles and couples differently, and was postponed for unincorporated business income to 2008, while all other incomes were affected in 2007. We exploit the fact that the high threshold income for the top income surtax generates a much richer control group than typically available. We analyze the reaction of taxable business- and self-employed income and plan to analyze the shifting between income sources in response to this reform.

**JEL Classification:** H24; H31

**Keywords:** Elasticity of Taxable Income, Top Incomes, Personal Income Tax

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# 1 Introduction

The literature on the elasticity of taxable income (ETI) has grown abundantly in recent years (see Saez et al., 2012 for a recent survey), and so far there is little evidence for Germany. Pioneered by works of Feldstein (1995) and Gruber and Saez (2002), the main discussions in the literature tackle the choice of instruments for the marginal net-of-tax rate, which is endogenous if it depends on the income level (e.g. Weber, 2014; for Germany: Werdt, 2015) and the question whether the estimated parameter is actually a sufficient statistic for tax policy (e.g. Chetty, 2009, Doerrenberg et al., 2014). The German case is also complicated by a directly progressive tax schedule inside each income bracket, which affects the instrumentation of the net-of-tax rate: if base-year income is deflated, the instrumented net-of tax rate mechanically increases.

The beauty of the ETI lies in its relevance for setting the optimal tax rate. In the recent academic debate, the optimal tax rate at the top of the income distribution has been a particular matter of debate. Tax policy at the top seems to be a core determinant of the apparently ongoing increase in income and wealth concentration in Western economies in general (see Roine and Waldenström, 2015 for a recent survey of the literature on income and wealth concentration) and Germany in particular (Bach et al., 2009, 2013, Bartels and Jenderny, 2014). Piketty and Saez (2013) propose a dynamic model of income concentration including inheritances and argue that current features of the European economies suggest fairly high tax rates at the top. Policy makers' possibilities of redistribution via tax rates at the top are naturally restricted by the size of the taxable income reaction. Regrettably, the size of the reaction at the top is typically hard to identify empirically, as the identification crucially depends on the availability of a control group that is reasonably similar to the treated group. If the threshold income for the top marginal tax rate is comparatively low, a change in the top marginal tax rate affects a wide income range. Then, the control group has far less income than the top, rendering the elasticity estimation debatable as the control group most probably differs from the treatment group in more characteristics than the observable ones. We are able

to identify reactions using the implementation of a surtax in the German PIT that only affected tax units well above the top 0.1 percent income threshold. Our results are therefore of particular relevance for the possibilities of redistribution via the German PIT.

We estimate the effect of a recently implemented flat surtax on incomes above 250,000€ (500,000€ for married couples) on reported top incomes. We exploit the fact that the marginal tax rate in the highest tax bracket and the surtax are linear (i.e. the net-of-tax rate is exogenous at high income levels). In addition, we use variation in the implementation period of the surtax between income sources: while the surtax was introduced in general in 2007, it was postponed to 2008 for unincorporated business income.

We obtain two main results: First, we find that the elasticity at the top of the distribution significantly exceeds estimates for all income levels, suggesting that taxpayers at the top are more responsive to the net-of-tax rate than the average taxpayer. Second, we find that restricting the control group to taxpayers with an income composition similar to that of the treatment group further increases the elasticity estimate at the very top.

The remainder of this paper is structured as follows: Section 2 gives an overview on the recent literature and common model specifications. Section 3 describes the reform, our data, and details the empirical strategy. Section 4 provides first results and gives an outlook on the ongoing research. Section 5 presents robustness checks, while section 6 summarizes the results.

## 2 Literature Overview

To be written

## 3 Data and Method

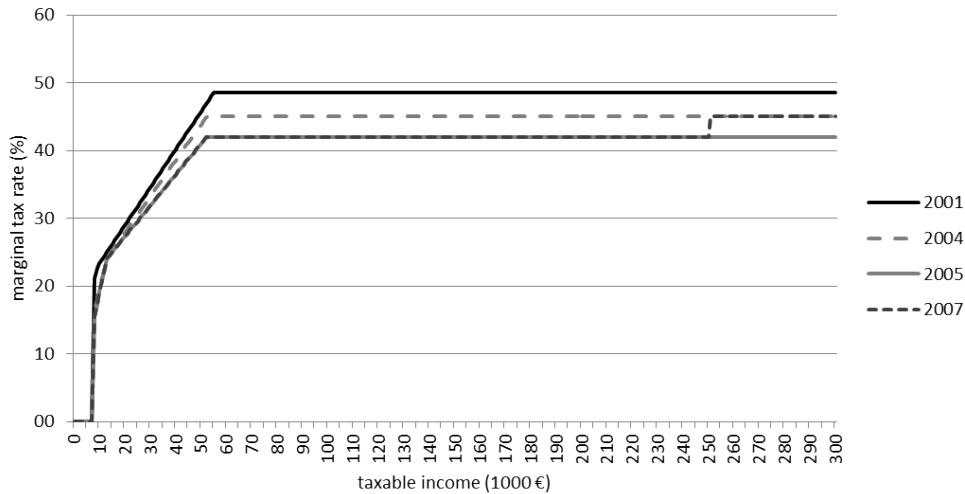
### 3.1 German tariff and TS reform

We use the recent introduction of a flat surtax on incomes above 250,000€ (500,000€ for married couples), henceforth referred to as the top income surtax (TS). Even though the 2000s were a time period with extensive personal income tax reforms in Germany, this reform is unique in its constricting to the very top of the income distribution. Until 2006, the highest tax bracket applied to incomes above about 50,000€ (100,000€ for married couples). Even though the top tax rate changed over the 2000s, the evaluation of behavioral responses had to rely on a control group below that income threshold. As figure 1 shows, the implementation of TS only applied to tax units whose income is five times as high as the previous threshold of the top marginal tax rate. It therefore provides the possibility to evaluate the taxable income response at the very top, using a control group with very similar characteristics: only tax units well within the richest top 0.1 percent are subject to the reform, which renders top income tax units up to that income a viable control group.

Focusing on the TS reform also avoids a specific problem for the evaluation of taxable income responses in Germany: the directly progressive personal income tax schedule. As revealed by figure 1, the German tax schedule is directly progressive in the lower tax brackets (roughly up to 50,000€ for single tax units), i.e. the marginal tax rate increases strictly monotonic with taxable income (and not only at bracket thresholds). For lower income ranges, this feature of the tariff affects the instrumentation of the net-of-tax rate in the empirical estimation of the taxable income elasticity. By contrast, for top incomes, the marginal tax rate is constant, with exception of the newly introduced TS threshold.

The TS reform was gradually implemented: in general, it was implemented in 2007, but for unincorporated business income (partnerships and self-employed), the implementation was postponed to 2008. We focus on the second implementation step in 2008, as unincorporated business income is the most important income source

Figure 1: Marginal tax rates in German income tax tariffs (2001–2007)



*Notes:* Each tariff refers to single tax units. Married couples are taxed at the rate that corresponds to the single-tax unit tariff at half their joint income. Tariffs for 2005 and 2007 coincide with exception of the second proportional bracket (taxable incomes above 250,000€ in 2007. The second proportional bracket was postponed to 2008 for unincorporated business income. Source: Jenderny (2015), based on own computation using the German income tax law.

at the top of the German income distribution (see Appendix Figure A.1).

### 3.2 Data

We use panel data of income tax returns on the micro level for the years 2001 to 2008 (Taxpayer Panel, TPP). The TPP is composed by the German federal statistical office (Destatis). It is a balanced panel of all German tax filers between 2001 and 2008. To be a member of the panel population, it is thus necessary to file in all six years. Out of this population, our dataset is a 5 percent sample, stratified by states, assessment type (single/married couple), main income source (business/wage/other), average annual gross taxable income (GTI, Gesamtbetrag der Einkünfte) as well as GTI’s coefficient of variation. Tax units at the top are strongly oversampled. 85 percent of all tax units in the panel population whose average GTI over the data period was at least 150,000€ are included. The data is thus particularly representative for the top of the income distribution.

In the German PIT, filing an income tax return is mandatory for the self-employed but not for wage earners, as payroll taxes are withheld by the employer.

For most high-income wage earners, filing is nonetheless favorable.<sup>1</sup> In addition, filing is mandatory if the tax unit receives income from other sources than wage, such as capital income above the annual allowance<sup>2</sup>, income from renting and leasing, unincorporated business income, or self-employed income. Wage earners at the bottom of the income distribution are therefore underrepresented among tax filers,<sup>3</sup> while above-average income recipients and especially the top of the income distribution are well represented. Top taxpayers usually have a significant share of non-wage income, which requires an income tax return. They are thus expected to file in all years and consequently belong to the panel population. Exceptions might be due to death, migration or marriage.<sup>4</sup> Note that a tax unit can be a single or a married couple.

The TPP contains detailed information on all types of taxable income: wage income, three types of entrepreneurial income, capital income (defined as dividends from corporations and interest income), income from renting and leasing, and pensions. Capital income as defined above is only taxable (and hence only included in PIT returns) as far as it exceeds the savers' allowance. Dividends and interest income are separately reported. Capital gains are only partly included: capital gains from selling a closely held business (both incorporated or unincorporated) are reliably observable. Capital gains from stock shares, real estate, and other private assets such as vintage cars or art were to a large extent completely tax-exempt and are therefore not reliably observable.

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<sup>1</sup>High marginal tax rates raise the attractiveness of claiming allowances. For high-income wage earners with children, it is also more favorable to claim a childrens' tax allowance than to receive the alternative childrens' transfer (Kindergeld).

<sup>2</sup>Saver's allowance, between 1,370€ and 850€ per person during the data period.

<sup>3</sup>Households who do not pay income taxes at all, like some pensioners or recipients of governmental transfers, are also not included. These households are expected to have low incomes, too, because filing becomes mandatory as soon as capital incomes exceed the annual threshold.

<sup>4</sup>If two single tax units marry during the period in focus, one of them loses his or her tax id, which then drops out of the panel completely.

## 4 Estimation Model and First Results

This section describes the empirical model and presents first results. We first employ the basic version of a dynamic estimation model, recently proposed by Werdt (2015). Subsequently, we modify that model in order to define our control group to fit our specific treatment group better: we interact the elasticity of taxable income with two types of income composition, thereby controlling for heterogeneity of taxpayers' income portfolios.

### 4.1 Baseline Specification

Our basic model follows Werdt (2015), who describes the individual income  $y_{it}$  for period  $t$  as a function of an individual fixed effect  $i$ , its own lag, base year income  $y_{it-1}$  with elasticity  $\rho_2$ , the net-of-tax rate  $1 - \tau_{it}$  with elasticity  $\beta$ , a linear time trend  $t$  with coefficient  $c$  and current demographic characters  $W_{it}$  with a vector of coefficients  $\gamma_1$ . Moreover, demographic characteristics  $W_{it}$  are interacted with the time trend  $t$ , allowing for a dynamic influence of demographics. The corresponding coefficient vector is  $\gamma_2$ . This income process is shown in equation (1):

$$\ln(y_{it}) = i + \beta \ln(1 - \tau_{it}) + \rho_2 \ln(y_{it-1}) + \gamma_1 W_{it} + t \cdot (c + \gamma_2 W_{it}) + \epsilon_{it}^5 \quad (1)$$

The individual residual in period  $t$  ( $\epsilon_{it}$ ) is assumed to be independent of the control variables in  $W_{it}$  and  $\ln(y_{it-1})$  and uncorrelated over time. In first differences the individual fixed effect is eliminated and the estimation model becomes:

$$\ln\left(\frac{y_{it}}{y_{it-1}}\right) = \beta \ln\left(\frac{1 - \tau_{it}}{1 - \tau_{it-1}}\right) + \rho_2 \ln\left(\frac{y_{it-1}}{y_{it-2}}\right) + (\gamma_1 + t\gamma_2)\Delta W_{it} + c + \gamma_2 W_{it-1} + \Delta\epsilon_{it} \quad (2)$$

Note that this model includes two potentially endogenous variables: the growth rate of the net-of-tax rate and the lagged income growth. Both correlate systematically with  $\epsilon_{it-1}$  and need to be instrumented. We instrument the growth of the net-of-tax

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<sup>5</sup>This model is a special case of the model of Holmlund and Söderström (2011) if  $\gamma_2$  is zero. Their model also includes the lagged net-of-tax rate and the demographic control variables from period  $t$  and period  $t - 1$ .

Table 1: Results for Average incomes above 100,000 Euro

	(1)	(2)	(3)	(4)	(5)	(6)
$\ln\left(\frac{y_{it-1}}{y_{it-2}}\right)$		0.076*** (0.01)	0.086*** (0.01)	0.095*** (0.01)	0.098*** (0.01)	0.098*** (0.01)
$\ln\left(\frac{1-\tau_{it}}{1-\tau_{it-1}}\right)$	0.661*** (0.13)	0.525*** (0.13)	0.605*** (0.14)	0.654*** (0.14)	0.671*** (0.14)	0.617*** (0.14)
Age			0.035*** (0.01)	-0.000 (0.00)	-0.003* (0.00)	-0.003 (0.00)
Age squared			0.064*** (0.00)	-0.000 (0.00)	0.000 (0.00)	-0.000 (0.00)
Change of state in 2007			-0.021*** (0.00)	0.319*** (0.09)	0.322*** (0.09)	0.321*** (0.09)
Change of state in 2008				-0.126 (0.10)	-0.128 (0.10)	-0.126 (0.10)
D New child <sub>07</sub>				0.018 (0.01)	0.017 (0.01)	0.025 (0.01)
D New child <sub>08</sub>				-0.044** (0.02)	-0.047** (0.02)	-0.042** (0.02)
D Donation				-0.008 (0.01)	-0.024*** (0.01)	-0.024*** (0.01)
Age <25				0.013* (0.01)	-0.310*** (0.05)	-0.300*** (0.05)
Age >55				0.032*** (0.01)	-0.007 (0.01)	0.002 (0.01)
D Handicapped				-0.009* (0.00)	-0.004 (0.01)	-0.003 (0.01)
D Single parent					0.006 (0.01)	0.007 (0.01)
D Two earner taxpayer					-0.008 (0.01)	-0.009 (0.01)
D Change into retirement					0.011 (0.01)	-0.092*** (0.01)
D Tax free incomes					0.026*** (0.01)	-0.040*** (0.01)
D one child					-0.008 (0.00)	0.009 (0.01)
D two children						0.023*** (0.01)
D marriage						-0.004 (0.00)
constant	0.029*** (0.00)	0.026*** (0.00)	0.015*** (0.00)	0.103** (0.04)	0.197*** (0.04)	0.186*** (0.04)
Tests of weak Instruments						
First stage F-Statistic	1858	1844	1798	1773	1762	1758
Partial $R_1^2$		0.091	0.093	0.095	0.096	0.096
Partial $R_2^2$	0.077	0.077	0.07	0.074	0.074	0.073
Number of Observations	88,907	88,907	88,907	88,906	88,906	88,906

Notes: Dependent variable: taxable income growth from 2007 to 2008. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Partial  $R^2$  is the partial R-squared for the growth rate of the net-of-tax rate, see Shea (1997) and Godfrey (1999) for a description.

Source: Own computation based on German Taxpayer Panel 2001-2008.



rate with its growth when tax schedules  $\tau_{it}$  and  $\tau_{it-1}$  are applied to the individual taxpayers second income lag  $y_{it-2}$ . Lagged income growth is instrumented with income growth's second lag.

This model extends other common models in the literature that estimate the elasticity of taxable income by the inclusion of lagged income growths as control variable (e.g. Weber (2014), see Werdt (2015) with a thorough discussion about the differences to the seminal model in the literature by Gruber and Saez (2002)). While the income process specified above suggests that lagged income growth should be included, Werdt (2015) shows that it actually has explanatory power.

While Werdt (2015) used the period 2001–06 for the estimation and thus aims at obtaining a parameter for all income levels, we employ this model for the year 2008 as time  $t$ , i.e. the elasticity we measure corresponds to the second implementation step of TS, which affected unincorporated business income and self-employed income of taxpayers whose taxable income exceeded 250,000 €. As our treatment group consists of tax units at the very top of the income distribution (taxpayers with incomes above 250,000 €.), we expect tax units in the upper income ranges to be the best control group. Results for the elasticity of taxable income are therefore presented for several control groups that differ in the threshold income that their average income has to exceed. To avoid a selection bias, we select observations according to the average taxable income from years 2001 to 2004.

Table (1) shows first 2SLS results for all taxpayers that had an average income between 2001 and 2004 above 100,000 €.

Results in column (1) are obtained without control variables. The estimated elasticity of taxable income in column (1) is .66 and is significant at the 0.1% level. In column (2), lagged income growth is included, which reduces the point estimate to 0.53. Increasing the number of control variables does not significantly affect the estimated taxable income elasticity with an elasticity of .62 in the specification with the maximum number of control variables in column (4). The importance of lagged income growth increases with increasing number of control variables and is highest in column (4) with an estimate of 0.1.

We turn to the test results of weak instruments: as we instrument two vari-

ables, we need to be sure that both correlate sufficiently with our instruments. Both partial  $R^2$ 's are sufficiently high and above .05 with Craig-Donald F-Tests above 1,000 in all specifications. Our instruments are thus sufficiently strong.

We now further increase the average income of our control group, as we expect high-income tax units to be the best control group for the top 0.01%. Results in table (2) show 2SLS estimations with a smaller control group than table (1), including in the only taxpayers with 2001 to 2004 incomes above 150,000 Euro. That restriction excludes about half of the observations from table (1) and yields a control group whose average incomes are more close to those of the treatment group.

The structure of the four columns corresponds to table (1): the table presents first results without control variables in column (1) and most control variables in column (4). Choosing a richer control group generates similar results, increasing the elasticity of taxable income to 0.74 when all controls are included, while the importance of lagged income growth diminishes. As before, the test results for weak instruments suggest reliable instrumentation.

Our estimation results are significantly higher than results from Werdt (2015) based on the same model, suggesting that the top of the distribution reacts more strongly to a change in the net-of-tax rate than the average taxpayer. Our results also exceed results of most specifications by Doerrenberg et al. (2014), who estimate several specifications for all income levels using the same dataset. Tbc.

## 4.2 Controlling for Income Composition

In our next estimation step, we further modify the control group. We suspect the control group in our base specification might be too broadly defined for the following reasons: As described in section 3.1, TS was implemented in two steps: in 2007, the surtax was introduced for tax units whose taxable income exceeded 250,000 € and applied to incomes that were neither unincorporated business income nor self-employed income. In 2008, the surtax was introduced for the remaining income sources. We chose this second reform step to evaluate the taxable income elasticity at the top, as unincorporated business income is the most important income source at the top (see Appendix figure A.1). This choice, however, defines our treatment group

Table 2: Results for Average incomes above 150,000 Euro

	(1)	(2)	(3)	(4)	(5)	(6)
$\ln\left(\frac{y_{it-1}}{y_{it-2}}\right)$		0.032 (0.02)	0.037* (0.02)	0.042* (0.02)	0.046** (0.02)	0.046** (0.02)
$\ln\left(\frac{1-\tau_{it}}{1-\tau_{it-1}}\right)$	0.585*** (0.17)	0.530** (0.17)	0.631*** (0.18)	0.737*** (0.18)	0.792*** (0.18)	0.747*** (0.18)
Age			0.036*** (0.01)	-0.001 (0.00)	-0.004 (0.00)	-0.004 (0.00)
Age squared			0.064*** (0.01)	-0.000 (0.00)	0.000 (0.00)	0.000 (0.00)
Change of state in 2007			-0.022*** (0.01)	0.218 (0.16)	0.225 (0.16)	0.227 (0.16)
Change of state in 2008				-0.117 (0.18)	-0.119 (0.18)	-0.112 (0.18)
D New child <sub>07</sub>				-0.005 (0.02)	-0.006 (0.02)	0.001 (0.02)
D New child <sub>08</sub>				-0.025 (0.02)	-0.029 (0.02)	-0.026 (0.02)
D Donation				0.002 (0.02)	-0.040*** (0.01)	-0.041*** (0.01)
Age <25				0.015 (0.01)	-0.311*** (0.06)	-0.301*** (0.06)
Age >55				0.034*** (0.01)	-0.013 (0.01)	-0.004 (0.01)
D Handicapped				-0.012 (0.01)	-0.013 (0.02)	-0.014 (0.02)
D Single parent					-0.004 (0.02)	-0.004 (0.02)
D Two earner taxpayer					0.001 (0.02)	0.002 (0.02)
D Change into retirement					0.013 (0.01)	-0.097*** (0.02)
D Tax free incomes					0.026** (0.01)	-0.039*** (0.01)
D one child					-0.012 (0.01)	0.011 (0.01)
D two children						0.024** (0.01)
D marriage						-0.008 (0.01)
constant	0.024*** (0.00)	0.023*** (0.00)	0.013* (0.01)	0.107* (0.05)	0.229*** (0.07)	0.217*** (0.07)
Tests of weak Instruments						
First stage F-Statistic	1271	1068	1079	1084	1088	1088
Partial $R_1^2$		0.088	0.089	0.09	0.090	0.091
Partial $R_2^2$	0.102	0.101	0.099	0.097	0.096	0.09
Number of Observations	44,546	44,546	44,546	44,545	44,545	44,545

Notes: Dependent variable: taxable income growth from 2007 to 2008. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Partial  $R^2$  is the partial R-squared for the growth rate of the net-of-tax rate, see Shea (1997) and Godfrey (1999) for a description.

Source: Own computation based on German Taxpayer Panel 2001-2008.

Table 3: Results for Interaction model with Average incomes above 150,000 Euro

Share	(1) 5%	(2) 25%	(3) 50%	(4) 75%	(5) 90%	(6) 95%
$\ln\left(\frac{y_{it-1}}{y_{it-2}}\right)$	0.057 (0.03)	0.058* (0.02)	0.059** (0.02)	0.050** (0.02)	0.047** (0.02)	0.046** (0.02)
$\ln\left(\frac{1-\tau_{it}}{1-\tau_{it-1}}\right)_1$	0.714*** (0.18)	0.716*** (0.19)	0.721*** (0.19)	0.718*** (0.18)	0.766*** (0.18)	0.791*** (0.20)
$\ln\left(\frac{1-\tau_{it}}{1-\tau_{it-1}}\right)_2$	1.837 (4.25)	1.990 (2.52)	2.251 (1.20)	0.966 (0.57)	0.550 (0.34)	0.637* (0.27)
Age	-0.004 (0.00)	-0.004 (0.00)	-0.003 (0.00)	-0.004 (0.00)	-0.004 (0.00)	-0.004 (0.00)
Age squared	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)
Change of state in 2007	0.223 (0.17)	0.222 (0.17)	0.242 (0.17)	0.229 (0.17)	0.224 (0.16)	0.225 (0.16)
Change of state in 2008	-0.112 (0.18)	-0.112 (0.18)	-0.110 (0.18)	-0.113 (0.18)	-0.114 (0.17)	-0.113 (0.18)
D New child <sub>07</sub>	0.000 (0.02)	0.001 (0.02)	0.001 (0.02)	0.001 (0.02)	0.001 (0.02)	0.001 (0.02)
D New child <sub>08</sub>	-0.028 (0.02)	-0.028 (0.02)	-0.028 (0.02)	-0.026 (0.02)	-0.026 (0.02)	-0.026 (0.02)
D Donation	-0.041*** (0.01)	-0.041*** (0.01)	-0.041*** (0.01)	-0.041*** (0.01)	-0.040*** (0.01)	-0.041*** (0.01)
Age <25	-0.302*** (0.06)	-0.302*** (0.06)	-0.301*** (0.06)	-0.301*** (0.06)	-0.302*** (0.06)	-0.302*** (0.06)
Age >55	-0.004 (0.01)	-0.003 (0.01)	-0.004 (0.01)	-0.004 (0.01)	-0.004 (0.01)	-0.004 (0.01)
D Handicapped	-0.013 (0.02)	-0.014 (0.02)	-0.013 (0.02)	-0.013 (0.02)	-0.014 (0.02)	-0.014 (0.02)
D Single parent	-0.003 (0.02)	-0.003 (0.02)	-0.002 (0.02)	-0.003 (0.02)	-0.004 (0.02)	-0.004 (0.02)
D Two earner taxpayer	0.001 (0.02)	0.001 (0.02)	0.001 (0.02)	0.002 (0.02)	0.002 (0.02)	0.002 (0.02)
D Change into retirement	-0.100*** (0.02)	-0.101*** (0.02)	-0.103*** (0.02)	-0.098*** (0.02)	-0.096*** (0.02)	-0.097*** (0.02)
D Tax free incomes	-0.039*** (0.01)	-0.039*** (0.01)	-0.039*** (0.01)	-0.039*** (0.01)	-0.039*** (0.01)	-0.039*** (0.01)
D one child	0.011 (0.01)	0.011 (0.01)	0.011 (0.01)	0.011 (0.01)	0.011 (0.01)	0.011 (0.01)
D two children	0.024** (0.01)	0.024** (0.01)	0.024** (0.01)	0.024** (0.01)	0.024** (0.01)	0.024** (0.01)
D marriage	-0.009 (0.01)	-0.009 (0.01)	-0.009 (0.01)	-0.008 (0.01)	-0.008 (0.01)	-0.009 (0.01)
constant	0.216** (0.07)	0.218** (0.07)	0.216** (0.07)	0.216** (0.07)	0.218*** (0.07)	0.218*** (0.07)
Tests of weak Instruments						
First stage F-Statistic	4	9	34	126	300	444
Partial $R_1^2$	0.026	0.055	0.084	0.090	0.091	0.091
Partial $R_2^2$	0.147	0.163	0.180	0.214	0.253	0.270
Partial $R_3^2$	0.001	0.001	0.005	0.017	0.040	0.057
Number of Observations	44,545	44,545	44,545	44,545	44,545	44,545

Notes: Dependent variable: taxable income growth from 2007 to 2008. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Partial  $R^2$  is the partial R-squared for the growth rate of the net-of-tax rate, see Shea (1997) and Godfrey (1999) for a description.

Source: Own computation based on German Taxpayer Panel 2001-2008.

as tax units who receive predominantly income from unincorporated business and from self-employment. Our control group in the basic specification consists of (i) tax units with taxable income below 250,000€ and (ii) tax units above 250,000€ whose income composition differs from the treatment group's one. There are several reasons to suspect that income trends of different income types differed in the relevant years (2007 to 2008). First, other income sources than the treated ones had been treated in the previous year, which may result in some overshooting in 2008. Second, 2008 is the pre-reform year of the introduction of the German dual income tax, which may have had substantial consequences for the realization of capital income (not treated) in 2008. We therefore interact the ETI parameter with income composition, in order to restrict the control group to tax units with comparable income composition.

Results are shown in Table 3. All columns include the full set of control variables. The ETI coefficient is now estimated for two groups: Group 1 includes tax units with a high share of unincorporated business income or self-employed income. Members of this group whose income exceeded 250,000€ were treated in 2008. Group 2 includes tax units with a low share of unincorporated business income or self-employed. Separating these two groups essentially restricts the control group to tax units with a comparable income composition. From column (1) to column (6), we alter the definition of group 1 and group 2, with column (1) being the least restrictive: in column (1) all tax units whose unincorporated business income or self-employed income amounted to at least 5% of their total taxable income are included in group 1. In column (6), a tax unit is only included in group 1 if its unincorporated business income or self-employed income amounts to at least 95% of total taxable income. Sorting into the groups is based on taxable income composition in 2006, in order to avoid endogenous selection.

We focus on results for group 1 as this group includes the treated tax units and their restricted control group. Results are remarkably robust to the definition of group 1 and very similar to the baseline results. Suggesting that income composition of the control group does not have a large impact on estimation results in the base specification.

In a third step, we plan to integrate the first implementation step of the reform

and include income shifting between the treated and non-treated income sources. Tbc.

## 5 Robustness Checks

To be written.

## 6 Conclusion

We estimated the elasticity of taxable income at the very top of the German income distribution, using the implementation of the top income surtax implemented in 2007 and 2008. We use panel micro data on German income tax returns and apply 2SLS estimation with instruments suggested by Werdt (2015). So far, we focus on the second reform step, that implemented the surtax on unincorporated business income and self-employed income in 2008. We find that the elasticity at the top of the distribution significantly exceeds estimates for all income levels, suggesting that taxpayers at the top are more responsive to the net-of-tax rate than the average taxpayer. In a second step we restricted the control group to taxpayers with an income composition similar to that of the treatment group. This additional restriction yields very similar elasticity results. We plan to extend the estimation and integrate the first implementation step of the reform, thereby allowing for income shifting between the treated and non-treated income sources. Tbc.

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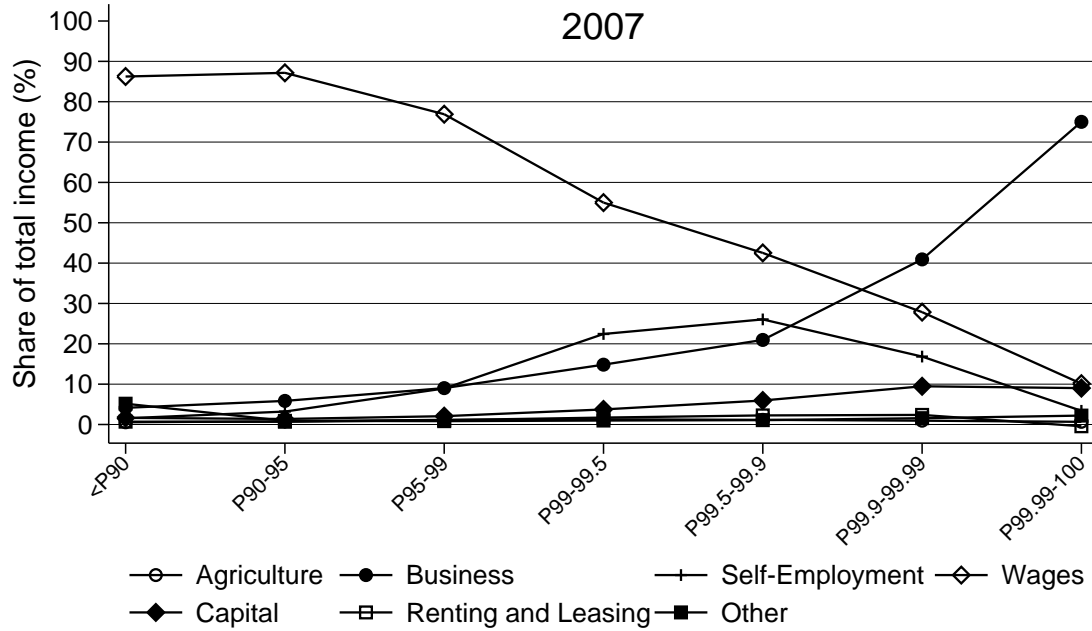
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## Appendix A Income Composition at the Top

Figure A.1: Taxable income composition across the distribution



*Notes:* Taxable income after income-specific deductions and allowances. Top income fractiles defined by annual gross taxable income 2007, tax units can either be singles or married couples. Unincorporated business income includes the categories business, self-employed, and agriculture.  
Source: Bartels and Jenderny (2014), based on FAST microdata 2007.

## Appendix B Robustness: Regression Results

Table B.1: Results for Interaction model with Average incomes above 100,000 Euro

Share	(1) 5%	(2) 25%	(3) 50%	(4) 75%	(5) 90%	(6) 95%
$\ln\left(\frac{y_{it-1}}{y_{it-2}}\right)$	0.125*** (0.03)	0.134*** (0.02)	0.114*** (0.01)	0.102*** (0.01)	0.099*** (0.01)	0.098*** (0.01)
$\ln\left(\frac{1-\tau_{it}}{1-\tau_{it-1}}\right)_1$	0.532*** (0.16)	0.542*** (0.16)	0.565*** (0.15)	0.577*** (0.14)	0.631*** (0.15)	0.687*** (0.16)
$\ln\left(\frac{1-\tau_{it}}{1-\tau_{it-1}}\right)_2$	4.364 (3.75)	5.352 (2.95)	2.438* (1.03)	0.928* (0.47)	0.502 (0.28)	0.463* (0.22)
Age	-0.003 (0.00)	-0.003 (0.00)	-0.003 (0.00)	-0.003 (0.00)	-0.003 (0.00)	-0.003 (0.00)
Age squared	-0.000 (0.00)	-0.000 (0.00)	-0.000 (0.00)	-0.000 (0.00)	0.000 (0.00)	0.000 (0.00)
Change of state in 2007	0.361** (0.11)	0.371** (0.11)	0.350*** (0.10)	0.325*** (0.09)	0.318*** (0.09)	0.318*** (0.09)
Change of state in 2008	-0.159 (0.11)	-0.168 (0.12)	-0.142 (0.11)	-0.129 (0.10)	-0.125 (0.10)	-0.124 (0.10)
D New child <sub>07</sub>	0.028 (0.02)	0.032 (0.02)	0.028 (0.02)	0.026 (0.01)	0.025 (0.01)	0.025 (0.01)
D New child <sub>08</sub>	-0.042* (0.02)	-0.041* (0.02)	-0.041* (0.02)	-0.042** (0.02)	-0.042** (0.02)	-0.041** (0.02)
D Donation	-0.026*** (0.01)	-0.026*** (0.01)	-0.025*** (0.01)	-0.024*** (0.01)	-0.024*** (0.01)	-0.024*** (0.01)
Age <25	-0.320*** (0.06)	-0.328*** (0.06)	-0.309*** (0.05)	-0.302*** (0.05)	-0.300*** (0.05)	-0.300*** (0.05)
Age >55	0.002 (0.01)	0.003 (0.01)	0.002 (0.01)	0.002 (0.01)	0.002 (0.01)	0.002 (0.01)
D Handicapped	-0.006 (0.02)	-0.007 (0.02)	-0.003 (0.01)	-0.003 (0.01)	-0.003 (0.01)	-0.003 (0.01)
D Single parent	0.009 (0.01)	0.010 (0.01)	0.008 (0.01)	0.007 (0.01)	0.007 (0.01)	0.007 (0.01)
D Two earner taxpayer	-0.010 (0.01)	-0.010 (0.01)	-0.009 (0.01)	-0.009 (0.01)	-0.008 (0.01)	-0.008 (0.01)
D Change into retirement	-0.107*** (0.02)	-0.114*** (0.02)	-0.102*** (0.01)	-0.094*** (0.01)	-0.091*** (0.01)	-0.091*** (0.01)
D Tax free incomes	-0.041*** (0.01)	-0.043*** (0.01)	-0.041*** (0.01)	-0.040*** (0.01)	-0.040*** (0.01)	-0.040*** (0.01)
D one child	0.010 (0.01)	0.009 (0.01)	0.009 (0.01)	0.009 (0.01)	0.009 (0.01)	0.009 (0.01)
D two children	0.024*** (0.01)	0.024*** (0.01)	0.024*** (0.01)	0.023*** (0.01)	0.023*** (0.01)	0.023*** (0.01)
D marriage	-0.005 (0.01)	-0.006 (0.01)	-0.005 (0.00)	-0.004 (0.00)	-0.004 (0.00)	-0.004 (0.00)
constant	0.188*** (0.05)	0.195*** (0.05)	0.186*** (0.05)	0.185*** (0.04)	0.186*** (0.04)	0.187*** (0.04)
Tests of weak Instruments						
First stage F-Statistic	5	7	41	159	383	590
Partial $R_1^2$	0.023	0.033	0.076	0.093	0.097	0.097
Partial $R_2^2$	0.108	0.133	0.150	0.178	0.210	0.226
Partial $R_3^2$	0.000	0.000	0.003	0.011	0.026	0.039
Number of Observations	88,906	88,906	88,906	88,906	88,906	88,906

Notes: Dependent variable: taxable income growth from 2007 to 2008. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Partial  $R^2$  is the partial R-squared for the growth rate of the net-of-tax rate, see Shea (1997) and Godfrey (1999) for a description.

Source: Own computation based on German Taxpayer Panel 2001-2008.

Table B.2: Results for selection with Average incomes above 100,000 Euro

Share	(1) 5%	(2) 25%	(3) 50%	(4) 75%	(5) 90%	(6) 95%
$\ln\left(\frac{y_{it-1}}{y_{it-2}}\right)$	0.099*** (0.02)	0.095*** (0.02)	0.087*** (0.02)	0.095*** (0.02)	0.086*** (0.02)	0.084*** (0.02)
$\ln\left(\frac{1-\tau_{it}}{1-\tau_{it-1}}\right)$	0.879*** (0.16)	0.896*** (0.16)	0.957*** (0.16)	1.049*** (0.17)	1.151*** (0.18)	1.150*** (0.20)
Age	-0.003 (0.00)	-0.001 (0.00)	-0.005* (0.00)	-0.005* (0.00)	-0.008** (0.00)	-0.005 (0.00)
Age squared	-0.000 (0.00)	-0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	0.000* (0.00)	0.000 (0.00)
Change of state in 2007	0.450*** (0.11)	0.496*** (0.12)	0.502*** (0.12)	0.512*** (0.12)	0.489*** (0.13)	0.461** (0.14)
Change of state in 2008	-0.117 (0.14)	-0.060 (0.16)	-0.007 (0.18)	-0.009 (0.18)	0.045 (0.21)	0.049 (0.21)
D New child <sub>07</sub>	0.031 (0.02)	0.035 (0.02)	0.035 (0.02)	0.022 (0.02)	0.035 (0.02)	0.045 (0.02)
D New child <sub>08</sub>	-0.043* (0.02)	-0.048** (0.02)	-0.043* (0.02)	-0.040 (0.02)	-0.051* (0.02)	-0.028 (0.02)
D Donation	-0.025*** (0.01)	-0.027*** (0.01)	-0.025*** (0.01)	-0.027*** (0.01)	-0.026** (0.01)	-0.026** (0.01)
Age <25	-0.340*** (0.06)	-0.328*** (0.06)	-0.373*** (0.06)	-0.410*** (0.06)	-0.481*** (0.06)	-0.516*** (0.07)
Age >55	0.006 (0.01)	0.004 (0.01)	0.008 (0.01)	0.010 (0.01)	0.006 (0.01)	0.000 (0.01)
D Handicapped	0.016 (0.02)	0.022 (0.02)	0.014 (0.02)	0.017 (0.02)	0.001 (0.03)	0.019 (0.03)
D Single parent	0.012 (0.01)	0.011 (0.01)	0.014 (0.01)	0.006 (0.02)	0.025 (0.02)	0.022 (0.02)
D Two earner taxpayer	0.017 (0.01)	0.011 (0.02)	0.007 (0.02)	0.016 (0.02)	0.019 (0.02)	0.007 (0.02)
D Change into retirement	-0.075*** (0.01)	-0.064*** (0.01)	-0.059*** (0.01)	-0.062*** (0.02)	-0.045* (0.02)	-0.044* (0.02)
D Tax free incomes	-0.034*** (0.01)	-0.025*** (0.01)	-0.017* (0.01)	-0.019* (0.01)	-0.012 (0.01)	-0.017 (0.01)
D one child	-0.000 (0.01)	0.001 (0.01)	0.007 (0.01)	0.010 (0.01)	0.010 (0.01)	0.009 (0.01)
D two children	0.014* (0.01)	0.012 (0.01)	0.017* (0.01)	0.013 (0.01)	0.009 (0.01)	0.010 (0.01)
D marriage	-0.003 (0.01)	-0.004 (0.01)	-0.003 (0.01)	-0.003 (0.01)	0.001 (0.01)	0.005 (0.01)
constant	0.215*** (0.06)	0.164** (0.06)	0.259*** (0.06)	0.277*** (0.06)	0.337*** (0.07)	0.255** (0.08)
Tests of weak Instruments						
First stage F-Statistic	1271	1223	1193	1111	866	712
Partial $R_1^2$	0.091	0.099	0.109	0.114	0.111	0.116
Partial $R_2^2$	0.088	0.098	0.107	0.121	0.131	0.133
Number of Observations	58,423	51,406	45,168	38,576	30,388	24,470

Notes: Dependent variable: taxable income growth from 2007 to 2008. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Partial  $R^2$  is the partial R-squared for the growth rate of the net-of-tax rate, see Shea (1997) and Godfrey (1999) for a description.

Source: Own computation based on German Taxpayer Panel 2001-2008.

Table B.3: Results for selection with Average incomes above 150,000 Euro

Share	(1) 5%	(2) 25%	(3) 50%	(4) 75%	(5) 90%	(6) 95%
$\ln\left(\frac{y_{it-1}}{y_{it-2}}\right)$	0.033 (0.02)	0.048* (0.02)	0.049* (0.02)	0.060* (0.03)	0.071* (0.03)	0.056 (0.03)
$\ln\left(\frac{1-\tau_{it}}{1-\tau_{it-1}}\right)$	0.899*** (0.22)	0.928*** (0.23)	1.031*** (0.24)	1.131*** (0.26)	1.210*** (0.28)	1.101*** (0.31)
Age	-0.003 (0.00)	-0.002 (0.00)	-0.006* (0.00)	-0.007* (0.00)	-0.010** (0.00)	-0.007 (0.00)
Age squared	0.000 (0.00)	-0.000 (0.00)	0.000 (0.00)	0.000 (0.00)	0.000* (0.00)	0.000 (0.00)
Change of state in 2007	0.426* (0.17)	0.431* (0.17)	0.425* (0.19)	0.429* (0.19)	0.422* (0.21)	0.417* (0.21)
Change of state in 2008	-0.260 (0.28)	-0.076 (0.35)	-0.185 (0.43)	-0.183 (0.43)	-0.156 (0.59)	-0.149 (0.59)
D New child <sub>07</sub>	0.029 (0.03)	0.043 (0.03)	0.051 (0.03)	0.031 (0.03)	0.043 (0.03)	0.049 (0.03)
D New child <sub>08</sub>	-0.011 (0.03)	-0.003 (0.03)	0.010 (0.03)	0.013 (0.03)	0.004 (0.03)	0.017 (0.03)
D Donation	-0.045*** (0.01)	-0.047*** (0.01)	-0.046*** (0.01)	-0.050*** (0.01)	-0.048*** (0.01)	-0.044** (0.01)
Age <25	-0.387*** (0.07)	-0.374*** (0.07)	-0.423*** (0.07)	-0.461*** (0.07)	-0.511*** (0.08)	-0.567*** (0.08)
Age >55	-0.012 (0.01)	-0.014 (0.01)	-0.004 (0.01)	-0.006 (0.02)	-0.016 (0.02)	-0.016 (0.02)
D Handicapped	-0.017 (0.03)	-0.016 (0.03)	-0.028 (0.03)	-0.048 (0.04)	-0.086* (0.04)	-0.062 (0.05)
D Single parent	-0.000 (0.02)	-0.001 (0.02)	-0.002 (0.02)	-0.018 (0.02)	0.005 (0.02)	0.011 (0.02)
D Two earner taxpayer	0.021 (0.02)	0.021 (0.02)	0.015 (0.03)	0.029 (0.03)	0.014 (0.03)	-0.006 (0.03)
D Change into retirement	-0.083*** (0.02)	-0.068*** (0.02)	-0.071*** (0.02)	-0.094*** (0.02)	-0.067* (0.03)	-0.072* (0.03)
D Tax free incomes	-0.042*** (0.01)	-0.035*** (0.01)	-0.023* (0.01)	-0.024* (0.01)	-0.016 (0.01)	-0.027 (0.02)
D one child	-0.002 (0.01)	0.002 (0.01)	0.006 (0.01)	0.010 (0.01)	0.012 (0.01)	0.007 (0.02)
D two children	0.011 (0.01)	0.010 (0.01)	0.015 (0.01)	0.009 (0.01)	0.004 (0.01)	0.005 (0.01)
D marriage	-0.002 (0.01)	-0.002 (0.01)	-0.000 (0.01)	-0.003 (0.01)	0.008 (0.01)	0.014 (0.01)
constant	0.222** (0.08)	0.170* (0.08)	0.289*** (0.09)	0.311*** (0.09)	0.376*** (0.10)	0.299** (0.11)
Tests of weak Instruments						
First stage F-Statistic	624	590	575	504	392	310
Partial $R_1^2$	0.084	0.091	0.10	0.101	0.099	0.100
Partial $R_2^2$	0.098	0.102	0.107	0.114	0.118	0.118
Number of Observations	30,667	27,177	23,886	20,345	16,131	13,018

Notes: Dependent variable: taxable income growth from 2007 to 2008. \* p<0.05, \*\* p<0.01, \*\*\* p<0.001. Partial  $R^2$  is the partial R-squared for the growth rate of the net-of-tax rate, see Shea (1997) and Godfrey (1999) for a description.

Source: Own computation based on German Taxpayer Panel 2001-2008.