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**Conference Paper**

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# Effective Burden of Business Taxation and Tax Effort of Local Governments

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**Abstract:**

This paper explores to what extent governments consider the effective tax burden of their tax policies. More specifically, the paper asks whether governments set higher statutory tax rates, if the effective tax burden on business is reduced. To address this question, the paper exploits an odd institution in the German federal income tax code, which substantially changed the effective tax burden of the local business tax. A federal tax reform enacted in 2008 made a large part of the business tax deductible from the federal income tax. This paper provides evidence that this implicit subsidy has drastic effects on local tax effort. The empirical analysis exploits the fact the reform has created a quasi-experiment, as the tax burden is treated only below a certain threshold, thus creating a kink point in the public budget constraint. By now, more than 10% of German municipalities have set local tax rates identical to this threshold level, causing excess bunching within the tax rate distribution of more than 10,000 local governments. Using this phenomenon, I will be able to estimate the elasticity of the tax base.

**Keywords**: Local tax policy; Local business tax; Capital Taxation; Optimal Taxation; Public Subsidies; Intergovernmental Grants; Marginal Cost of Public Funds; Bunching

**JEL classification**: H71, H23, H25

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# 1 Introduction

For various reasons, taxing business is a difficult issue. Due to the mobility of the tax base, policy makers are faced with the trade-off that higher taxes may increase revenue but that a higher effective tax burden also makes a location less attractive. This issue is additionally complex, as in a federation multiple layers of governments often use the same tax base. As the literature on fiscal federalism has noticed, this gives rise to vertical interactions and vertical tax competition (Keen, 1998, Wrede 1996). Federal tax deductibility might mitigate this externality (Dahlby et al., 2000). However, as empirical evidence on the implications of federal tax deductibility is still lacking, in this paper I argue that there is a suitable quasi-experiment within the German fiscal system.

In 2001 and 2008 Germany underwent two major corporate tax reforms. These reforms, launched alongside the so-called *Agenda 2010*, were mainly focused on improving Germany's quality as a location for businesses and therefore included drastic tax cuts. Apart from that however, the reforms also caused substantial changes to the relationship between corporate income tax, personal income tax and the *local business tax*. The latter of which is imposed by municipalities and plays an important role for their budgets. As will be shown, these changes caused severe adjustments in local tax policies.

In this paper I will present evidence on an odd institution within the German income tax code (§35 EStG[1]) and its effect on local tax rates. This institution, although introduced in 2008 and aimed at alleviating the tax burden of individual enterprises and associates of partnerships, may have led to an *implicit subsidy* of the local business tax (Buettner et al., 2014). This fact is especially striking, as the taxation of capital on municipal level has been criti-

[1]Steuerermäßigung bei Einkünften aus Gewerbebetrieb.

cized fiercely for decades and the local business tax has a stain of producing highly volatile revenues. Another interesting feature of this institution is the fact, that it does not apply to all municipalities in the same way. I can therefore analyze, how a change in the *marginal cost of public funds (MCF)* influences the tax policy of local governments in reaction to the treatment. It is a unique feature of this quasi-experimental setting, which allows me to analyze the (under normal conditions) endogenous MCF.

In a stylized model, I consider the tax setting behavior of local governments. There is variation across municipalities regarding their *locational attractiveness* (e.g. infrastructure, labor force, transport connections), as well as in their preferences for redistribution. In this Tiebout (1956) kind of setting, I assume that local governments compete for mobile capital and want to maximize tax revenue in order to provide local public goods. In the model, tax rates will be set in accordance to the location quality, i.e. firms pay for what they get. Any tax has adverse effects, but if jurisdictions create a gap between this cost-benefit relation, e.g. by exaggerating tax rates, capital stock will decrease (*elasticity of the tax base*). This in turn will lower tax income, which constitutes the adverse effect of increasing taxes.

Furthermore, I consider an exogenous treatment, induced by central government. This treatment alleviates the adverse effect of a tax hike and therefore can be interpreted as a subsidy to the local jurisdiction. However, jurisdictions will benefit differently from this rule, depending on their optimal tax rate: Municipalities with a tax rate above a certain threshold will not be able to utilize the free lunch. Municipalities below the threshold, on the other hand, will be able to increase taxes, enjoying substantially reduced adverse consequences (or even none at all). This discontinuity produces a kink point (Chetty et al., 2009) in the tax rate distribution. The model implicates that the treatment effect will result in a shift of the tax rate distribution towards the threshold. This implies further that an increased number of municipalities will

locate at the kink point, thereby creating a pattern of excess bunching (Saez, 2010). However, different to *Saez*, who examines the labor-leisure choice of tax payers, I focus on tax policies of local governments in a setting with mobile capital.

This paper provides empirical evidence that a striking number of over 1'200 (over 10% of all German municipalities) are now located at this kink point. I will show that this excess bunching is statistically significant and only originated after the reform. The empirical analysis will then concentrate on those municipalities engaging in the bunching phenomenon and emphasize some interesting features. In a later version of this paper, I will also present an estimate for the (perceived) elasticity of the tax base.

The remainder of my paper is structured as follows. Chapter 2 will contain a very simple model of optimal taxation on a local scale. I will then describe the main characteristics of the German tax reforms of 2001 and 2008 (Chapter 3). In Chapter 4, I will feature details of the exogenous shock, present the dataset and show some descriptive statistics, before showing the regression results and further evidence in Chapter 5. I will then give some concluding observations in the last section of this paper.

# 2 Theory: Modeling Optimal Tax Choices with Mobile Capital

## 2.1 The basic model

Following a standard theory of local tax policy (Wilson, 1999), let us assume a local jurisdiction with the objective to maximize revenue. Its objective function $g$ shall read:

$$max \qquad g = \tau_i k_i \tag{1}$$

$$s.t. \qquad k_i = \epsilon_i - \eta\tau_i \tag{2}$$

Where $\tau_i$ is the local tax rate on capital and $k_i$ is the capital stock per capita. The optimization is subject to the condition that increases in $\tau_i$ will have an adverse effect, i.e. the excess burden of taxation. The strength of this effect is limited by the quality of location $\epsilon_i$ and evolves through $\eta$, which represents the elasticity of the tax base, i.e. by how much capital will decrease in response to a tax hike.

Equating the first order condition to zero:

$$\epsilon_i - 2\eta\tau_i = 0 \tag{3}$$

we can now solve for the optimal tax rate:

$$\tau_i^* = \frac{\epsilon_i}{2\eta} \tag{4}$$

This straightforward result shows, how the optimal tax policy will depend on the elasticity of the tax base. Is $\eta$ equal or close to zero, meaning that capital mobility is rather low, optimal

tax rates may be set over-proportionally with regards to location quality. However, for rising values of $\eta$, capital will be pulled out of the jurisdiction in case of higher taxes, which demands rates to be appropriate for a given location quality.

### 2.2 An asymmetric treatment of local tax effort

I now consider a treatment, which effects the outcome of the basic model. Introducing an exogenous (because determined by federal government) tax rate threshold, denominated as $\tau_0$, we need to update the constraints as follows:

$$max \qquad g = \tau_i k_i \tag{5}$$

$$s.t. \begin{cases} k_i = \epsilon_i - \eta\tau_i & \text{, for } \tau_i > \tau_0 \\ k_i = \epsilon_i - \eta\left(1-\delta\right)\tau_i & \text{, for } \tau_i \leq \tau_0 \end{cases} \tag{6}$$

Obviously, the objective function for all municipalities with a tax rate above $\tau_0$ (see equation (6) upper case) remains unchanged from before, and so does the result. For all other cases however (see equation (6) lower case), I introduce variable $\delta$, which represents the degree to which the elasticity of the tax base is reduced[2]. Analyzing this case, the first order condition

[2]In practice, $\delta$ represents the share of partnerships within the local tax base. If $\delta$ is equal to one, this municipality's firms purely consist of partnerships, for $\delta$ equal to zero, there are only corporations. This matters, because it effects the elasticity of the tax base. More specifically, in this model, partnerships do not suffer in case of a tax hike, as long as the rate stays below $\tau_0$. Thus, they have no incentive to redirect capital. This reduces the elasticity, i.e. makes capital more sticky within the municipality. The variation in $\delta$ is relatively low across jurisdictions, which makes it possible to simplify here and assume homogeneity.

is:

$$\epsilon_i - 2\eta\,(1-\delta)\,\tau_i = 0 \tag{7}$$

The case-dependent optimal tax rate therefore reads:

$$\tau_i^* = \begin{cases} k_i = \frac{\epsilon_i}{2\eta} i & \text{, for } \tau_i > \tau_0 \\ k_i = \frac{\epsilon_i}{2\eta(1-\delta)} & \text{, for } \tau_i \leq \tau_0 \end{cases} \tag{8}$$

While the basic interpretation is analogous to before, it can now be stated that for high levels of $\delta$, optimal tax rates will be higher than in case of a low $\delta$. Additionally, we can observe that in a theoretical case of $\delta = 0$, the outcome of the model is identical to the base case. If we compare the two scenarios, it becomes obvious that jurisdictions with a lower $\epsilon$ and thus a lower optimal tax rate, will now have an incentive to increase rates. This affects all jurisdictions below the threshold, causing this part of the distribution to shift upwards. At the threshold however, this shift is discontinued, thus creating the excess bunching at the *kink point*.

One must differentiate between the number of jurisdictions which is shifted onto the threshold and the number of jurisdictions was originally at the threshold as a result of the optimization. Comparing the likelihood of locating at the kink point after the treatment to the original distribution will enable me to calculate the (perceived) elasticity of the tax base. For now, it is save to assume that the more municipalities engage in the bunching, the higher the treatment effect, i.e. the more elastic capital is perceived by local governments.

To summarize, in a simplified model, tax policy is initially determined by two factors: the

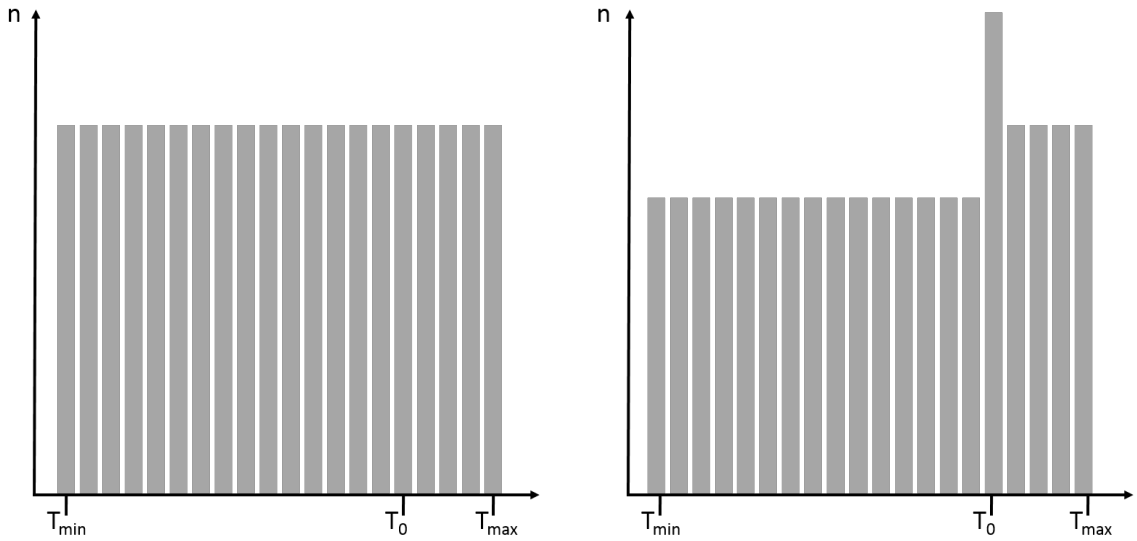


Figure 1: Stylized representation of the model, assuming a uniform distribution of $\epsilon$. The left side shows the original distribution, the right side shows the adjusted distribution, after the treatment. Excess bunching of jurisdictions at the treatment threshold.

quality of location and the elasticity of the tax base. Introducing an exogenous treatment, another factor comes into effect. Municipalities below a certain threshold will be likely to increase taxes, due to a reduced elasticity of the tax base. Thus, these jurisdictions face reduced *marginal costs of public funds*. This discontinuous tax rate shift causes an excessive number of jurisdictions to bunch at the threshold.

# 3 Institutional Background: Tax Reforms in Germany

As mentioned in Chapter 1, the reforms of 2001 and 2008 were mainly focused on improving Germany as a location for businesses and included substantial tax cuts. Apart from that, the reforms also changed substantially the relationship, not only between corporate income tax and personal income tax [3], but also between these two taxes and the local business tax, which

[3]Mainly through institutions like *Halbeinkünfteverfahren, Abgeltungssteuer.*

is imposed by local towns and communities.

For the corporate income tax, rates were reduced from 40% on retained earnings and 30% on dividends to a uniform 25% in 2001. In 2008 this rate was then further reduced to 15%, resulting in substantially lower effective tax burdens. While up to 2000, the effective tax rate on retained earnings was 51.83%, it went to 38.65% after 2001 and to 29.83% after 2008.[4]

However, a substantial part of enterprises in Germany are run in the form of individual enterprises and partnerships and for these, the relevant rate is the personal income tax. Here, the top income tax rate (for the highest income bracket) was gradually reduced from 53% to 42% (45% for very high incomes) between 2001 and 2008.

Finally, also the federal framework for the local business tax was adjusted. Local business taxation in Germany is, despite a wide range of related problems, a major source of income for local budgets and accounts for over 40% of their overall tax income. Local politicians decide on some kind of tax multiplier (*Hebesatz*), which is multiplied with a base rate (set on the federal level), to determine the statutory tax rate. With multipliers between 200 and 500[5], statutory rates effectively range between about 7% and 18%. This shows that there is large variation in tax rates at the local level, which may influence investment decisions. Changes in the business tax code included resetting the base rate from a maximum of 5% (there used to be a progression here) to a uniform 3.5% for all businesses. On the other hand, the classification of business tax payments as a business expenses and the resulting *self-deductibility* was disestablished. The most influential change however, happened with regards to the relationship between local business tax and personal income tax. Presumably, a reduction of the personal income tax rates comparable to the changes in corporate incomes tax rate was

[4]Rates calculated including 5.5% solidarity surcharge and assuming a local business tax multiplier of 400.

[5]Some small jurisdictions even choose values up to 900.

politically neither intended nor achievable. So, to (equally) alleviate the overall tax burden for individual enterprises and partnerships, local business tax payments by these entities were made deductible from federal income taxes. This institution was, however, introduced with a cap, i.e. a threshold multiplier up to which deductions were possible. This cap was first set to 180 and in 2008 increased to 380. The detailed functionality of this threshold shall be further investigated in the next chapter. However it could be summed that for individual entrepreneurs and associates of partnerships, local business tax payments were basically transformed into a down-payment on their federal income tax payments. This is fully the case for inhabitants of municipalities and towns with a multiplier lower or equal to 380. For all those in other regions, local business taxes still mean an actual additional tax burden. Before turning to the dataset, used in this analysis, I want to further investigate some aspects of the 380 multiplier threshold. It has been established that making local business tax payments deductible from personal income taxes of individual entrepreneurs and associates of partnerships (as specified in §35 EStG of the German income tax law) aimed at reducing their overall tax burden. More specifically, this has been motivated by the fact that effective corporate tax rate were also reduced significantly.

However, this mechanism also enables the local jurisdiction to participate (Buettner et al., 2014): In theory a local community with a tax base of exclusively individual enterprises and partnerships and a multiplier below the threshold, could increase the tax multiplier up to 380 without producing an additional burden for tax payers[6]. The mechanics in this exemplary case are easily studied by considering the effective local business tax rate as proposed by

[6]Due to the special treatment of the solidarity surcharge in this institution, the effective tax burden is even slightly negative.

Rumpf and Wiegard (2010, p.33):

$$\tau^{Loc.Bus.} = b \cdot m - min\left(b \cdot m, b \cdot 380\right) \cdot \left(1 + \tau^{Soli.}\right) \tag{9}$$

, where b stands for the federal base rate, m for the local multiplier. $\tau^{Soli}$ stands for the solidarity surcharge which is additional 5.5% on all income tax payments. Using equation (9) to calculate the effect of an increase in the multiplier by 1 point, we get:

$$\frac{\partial \tau^{Loc.Bus.}}{\partial m} = \begin{cases} b & \text{for } m \geq 380 \\ -b \cdot \tau^{Soli} & \text{for } m < 380 \end{cases} \tag{10}$$

Hence a tax hike would become possible without an actual increase in the effective tax burden. More specifically, it would become possible without any adverse effects on current or future capital. Of course, in reality local tax basis are not that uniform and to a certain degree, adverse effects may always be impending. It is nevertheless easy to assume certain conditions under which these effects could be neglected or at least be weighed less heavily.

# 4 Data and Investigation Approach

As mentioned in the previous sections, German municipalities autonomously set tax multipliers[7]. The vast majority of these multipliers range from roughly 250 to 450, resulting in a kind of normal distribution pattern (peaking around 350). Figure 2 shows a very stylized density distribution of 2013.

[7]Data on the business tax multipliers of German towns and communities is publicly available for up to 20 years back. The publication *Hebesätze der Realsteuern* is accessible through the German Statistical Bureau.

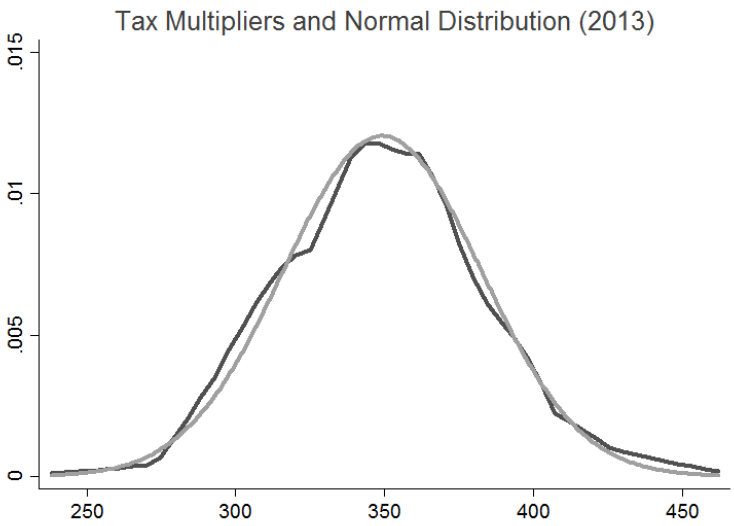


Figure 2: Smoothed Density Distribution of German Municipal Business Tax Multipliers (dark grey) in 2013 plotted against Normal Distribution (light grey)

Of course, the true distribution is much more complex. See Figure 3 for a histogram of multiplier bins. One can still clearly see the broad shape of the normal distribution. However some (round) values seem to attract additional observations (Albers, 1983 and von Hagen et al., 2006).

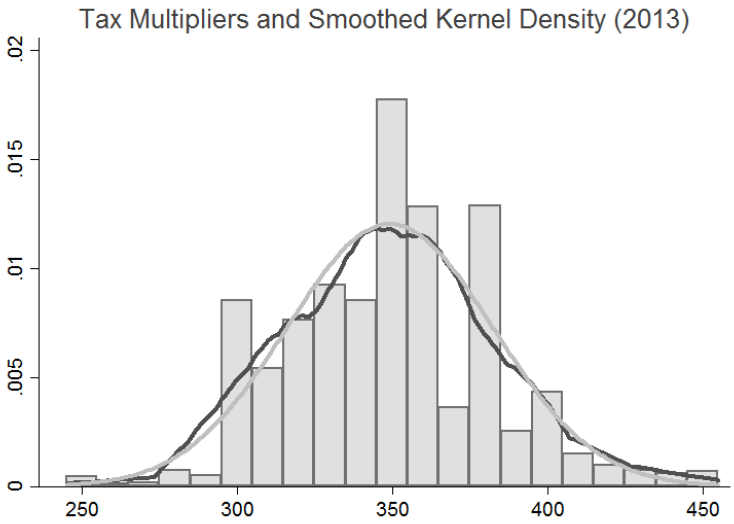


Figure 3: Histogram of German Municipal Business Tax Multipliers (Binwidth 10 Points) in 2013 plotted against Smoothed Density Function (dark grey) and Normal Distribution (light grey)

I examine a panel of over 11′150 municipalities in Germany and limit my observations to the year around 2008, i.e. the second reform year. During this observation period, we can observe a general trend of increasing multipliers (Büttner et al., 2014). Refer to Table 1 for some overview statistics.

Table 1: German Municipalities 2004-2013

| Year | Municipalities (stat.) | Observations | Min | Max | Mean | Median |
|---|---|---|---|---|---|---|
| 2004 | 12692 | 11086 | 200 | 900(600) | 330.6 | 330 |
| 2005 | 12430 | 11102 | 200 | 900(600) | 332.6 | 330 |
| 2006 | 12340 | 11108 | 200 | 900(600) | 333.7 | 330 |
| 2007 | 12312 | 11124 | 200 | 900(600) | 334.3 | 330 |
| 2008 | 12263 | 11131 | 200 | 900(600) | 335.0 | 330 |
| 2009 | 12227 | 11148 | 200 | 900(600) | 335.7 | 335 |
| 2010 | 11993 | 11149 | 200 | 900(600) | 338.2 | 340 |
| 2011 | 11442 | 11150 | 200 | 900(600) | 343.7 | 350 |
| 2012 | 11292 | 11150 | 200 | 900(600) | 347.0 | 350 |
| 2013 | 11197 | 11150 | 200 | 900(600) | 350.0 | 350 |

Table 1: Descriptive statistics of German municipalities 2004-2013. The maximum multiplier is an outlier, the second-highest value is shown in brackets.

While the range of multipliers seems extremely wide at first glance, it is important to realize that 99% of all municipalities choose a multiplier between 250 and 450, i.e. the range shown in Figure 2 and Figure 3. If one considers the threshold of 380, roughly 1400 municipalities are located above it. Of those, about 600 range higher than 400. Germany has 107 cities, so-called *kreisfreie Städte*, of which are 8, 4 and 95 located below, at and above the threshold. This implies that overall, cities were less influenced by the subsidy treatment.

# 5 Results

In this section, I provide some dynamic figures, describing the tax rate shift that was expected out of the theoretic model. Also, I will present regression results which indicate that the bunching phenomenon only appeared after the reform plus some adjustment time. In a later version of this paper, this section will also feature an estimation strategy and result for the *elasticity of the tax base*.

It has been established above that in 2013 we see an increased number of municipalities at the threshold of 380. Figure 4 further illustrates the phenomenon by showing the tax rate histograms for selected years. In 2007, one year before the Reform, the threshold bin of 380 is of no special significance. Starting with 2009 we see the threshold bar increasing and the left side of the distribution shifts upwards.

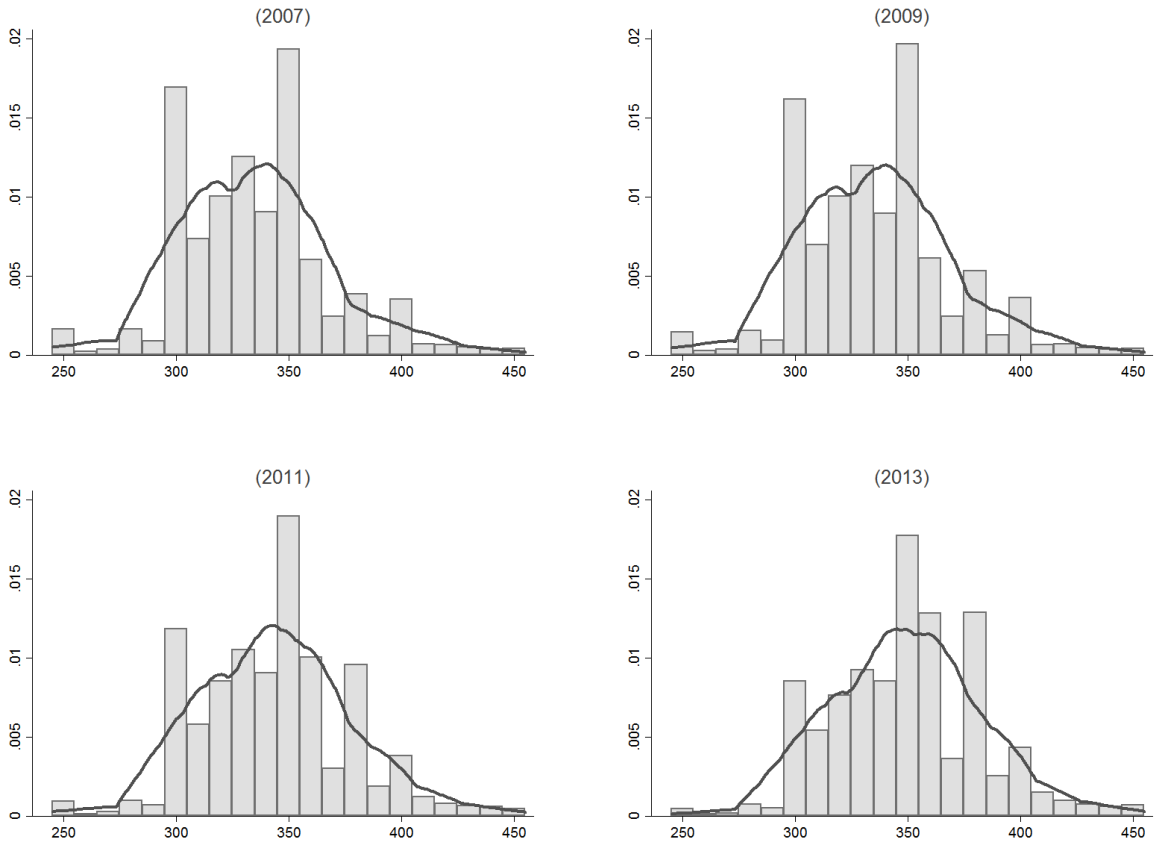


Figure 4: Tax multiplier distribution over time

Figure 5 gives a more detailed view on the kink point. It provides an overview of how municipalities with a tax rate of 380 have stagnated before, but almost tripled after the reform. It also suggests that bunching might increase further, before reaching a new equilibrium.

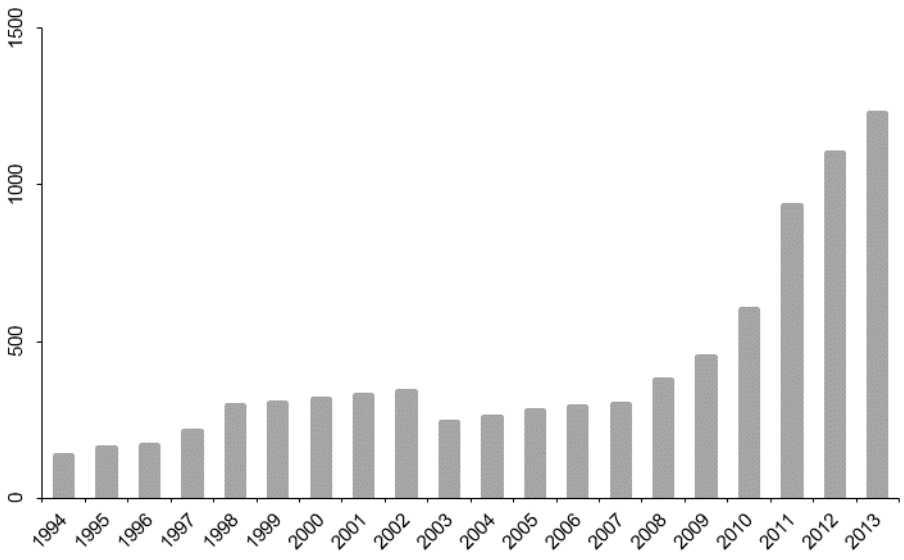


Figure 5: German Municipalities with a Local Business Tax Rate of 380. Reform year: 2008.

Beyond visual inspection, the existence of an excess mass at some specific point of the tax-rate distribution can be tested more formally following the empirical approach by Chetty et al. (2011) who consider bunching at kink points of the income tax code. More specifically, I model the counts of municipalities that choose a specific tax rate and explore whether the count of municipalities choosing the threshold rate is significantly larger. The estimation equation in this case will read:

$$\begin{aligned} C_i &= \alpha + \sum_{j=1}^{p} \beta_j m_i^j + \delta_1 I\left(m_i \in \{250\%, 260\%, ...\}\right) + \delta_2 I\left(m_i \in \{255\%, 265\%, ...\}\right) \\ &+ \gamma I\left(\tau_i = 380\%\right) + u_i. \end{aligned}$$

$C_i$ denotes the counts of municipalities that choose a specific multiplier. To capture the distribution of tax preferences, we include a linear term and also a higher-order polynomial

of the specific tax multiplier $m_i$ of each count as a control. $\delta_1, \delta_2$ capture the effects of further controls which take account of the fact that municipalities may tend to favor tax multipliers that are multiples of 10 or 5. Finally, we add a dummy variable capturing specifically the median of the tax-rate distribution. If $\gamma > 0$, we can confirm that there is significant bunching at the median tax rate. This estimation is now performed for each of the years from 2007-2013. table 2 shows the results. Moving through the columns left to right, one can see, that the linear and polynomial controls are insignificant. The coefficients indicating a tendency towards multiples of 5 and ten are positive and significant. It is interesting to see, how the coefficients for the threshold bin remain insignificant for the years during the reform. Only after a short reaction time, we see rising numbers which are statistically highly significant.

Table 2: Test for Bunching at the 380 Threshold for German Municipalities (2007-2013)

| | (2007) | (2008) | (2009) | (2010) | (2011) | (2012) | (2013) |
|---|---|---|---|---|---|---|---|
| $I\,(m_i = 380\%)$ | -90.766 | 2.997 | 84.698 | 241.56 ** | 587.71 *** | 761.31 *** | 881.43 *** |
| | (113.30) | (107.84) | (108.89) | (100.57) | (86.964) | (82.533) | (77.617) |
| $I\,(m_i$ multiple of 5) | 28.389 *** | 25.649 *** | 24.793 *** | 26.151 *** | 24.619 *** | 26.223 *** | 28.289 *** |
| | (9.637) | (9.041) | (9.423) | (8.418) | (7.517) | (7.376) | (7.333) |
| $I\,(m_i$ multiple of 10) | 380.23 *** | 259.62 *** | 355.78 *** | 340.70 *** | 311.51 *** | 294.50 *** | 282. 09 *** |
| | (118.20) | (111.368) | (112.69) | (102.05) | (85.653) | (79.546) | (73.930) |
| $m_i$ | 26565 | 24513 | 23724 | 20489 | 13312 | 9360.5 | 6516.3 |
| | (18413) | (17008) | (17139) | (15037) | (12012) | (10718) | (9828.9) |
| $m_i^2$ | -9934.2 | -9109.9 | -8775.8 | -7531.6 | -4655.9 | -3079.8 | -1948.5 |
| | (7388.9) | (6824.9) | (6877.9) | (6046.0) | (4845.2) | (4340.2) | (3989.5) |
| $m_i^3$ | 1623.5 | -1479.2 | 1417.9 | 1208.2 | 705.10 | 430.58 | 234.06 |
| | (1298.8) | (1199.9) | (1209.3) | (1065.4) | (857.22) | (771.13) | (710.67) |
| $m_i^4$ | -98.196 | -88.887 | -84.764 | -71.675 | -39.186 | -21.535 | -8.932 |
| | (84.491) | (78.084) | (78.690) | (69.495) | (56.170) | (50.764) | (46.892) |
| Constant | -142.50 | -132.13 | -128.31 | -111.38 | -75.345 | -55.690 | -7569.1 |
| | (16938) | (15652) | (15768) | (13816) | (11014) | (9795.6) | (8965.8) |
| $R^2$ | 0.336 | 0.339 | 0.334 | 0.367 | 0.439 | 0.473 | 0.509 |
| $R^2$ corr. | 0.316 | 0.319 | 0.314 | 0.348 | 0.422 | 0.457 | 0.495 |
| $N$ | 421 | 421 | 421 | 421 | 421 | 421 | 421 |

Table 2: Dependent variable: counts of local tax multipliers by size in Germany. OLS results. Robust standard errors are given in parentheses. * denotes significant at 10%; ** significant at 5%; *** at 1%. The counts refer to the empirical distribution of tax multipliers among all 11150 municipalities covering a range from 265% at the minimum and 420% at the maximum.

# 6 Conclusion

In this paper, I have discussed an apparent issue in fiscal federalism. In the presence of vertical interdependence and vertical tax competition, policy makers have to consider not only the consequences of their own rules, but also the rules of others, potentially on other levels of government. I have presented evidence on an odd institution within the German income tax code. This institution, though constructed in a different context, has proven to provide an implicit subsidy from the federal level to local jurisdictions. This subsidy is not a cash transfer, but rather works as a facility, which enables local governments to increase distortionary taxes at reduced costs. In this paper, I have provided evidence, both theoretically and empirically, showing that local politicians have reacted considerably, by increasing tax rates up to a certain threshold. This has led to excess bunching at the threshold. I also argue that, using the quasi-experimental features of the phenomenon, I will be able to calculate some measure for the elasticity of capital, i.e. the tax base.

In a theoretic model, I have first shown that optimal taxation in a tax competition setting depends on the unique features of each location. The distribution of those features throughout all municipalities also reflects in the resulting distribution of tax rates. However, if a threshold is introduced, up to which the adverse effects of a tax hike are being reduced, we see an increase in tax rates up to this threshold. In a descriptive section, I have shown that during the German tax reform in 2008, though probably not intentionally, such a treatment has been implemented. Empirical evidence, both in form of descriptive statistics and regression results, has been provided to show that local politicians have indeed adjusted their tax effort according to the model predictions. This treatment effect offers a rare opportunity to analyze the *elasticity of the tax base*.

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