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Do Electoral Rules Make Legislators Differently Responsive to Fiscal Transfers? Evidence from German Municipalities*

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Abstract

The paper empirically analyzes whether electoral rules make legislators differently responsive to changes in fiscal incentives. Key to the analysis are two unique reforms in the German state of Lower Saxony which changed (i) the municipal charter by replacing the council-manager system (featuring appointed mayors) by a mayor-council system (with directly-elected mayors) and (ii) the fiscal incentives inherent to the equalization system. We find that municipalities with appointed mayors react less strongly to changes in fiscal incentives. The change in municipal tax rates is three times smaller compared with a system of direct mayoral elections. We point to the different electoral incentives of mayors in the two systems to explain the result.

JEL: D7, H7, C2

Keywords: Electoral rule; Form of municipal government; Fiscal equalization; Business tax rates; Comparative political economy.

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1 Introduction

In democratic societies voters delegate the decision on public spending and taxation to elected politicians. The way politicians cater to the interest of voters depends, among other things, on the rule used to elect politicians and on the way legislative decision-making is organized. Previous research on comparative political economy suggests that majoritarian and proportional rules differently incentivize politicians to spend on public goods and targetable transfers (Lizzeri and Persico, 2001, Milesi-Ferretti et al., 2002). Relatedly, presidential systems provide incentives to spend less in aggregate relative to parliamentary systems (Tabellini et al., 1997, 2000). Electoral rules form one part of the incentive system politicians are exposed to. Apart from political institutions, legislative outcomes also depend on the fiscal environment in which politicians operate. A characteristic feature of decentralized public finance is that transfer income accounts for a significant share of local resources. Transfer programs are tied to economic and social traits of jurisdictions that are partly under the control of politicians and, hence, create fiscal incentives on their own that alter the behavior of politicians.

A natural question is how fiscal incentives and electoral incentives intertwine. Do politicians who are elected under majoritarian rule respond more strongly to fiscal incentives? Is there a rationale for differently designing fiscal incentive schemes to achieve the same economic outcome in, e.g., majoritarian and proportional systems? Understanding these issues is important for the evaluation of public decision making and its optimal design. Work on this policy question is scarce, if not non-existent, however. This paper empirically analyzes whether municipal legislators in the German state of Lower Saxony, who are elected under different rules, respond differently to fiscal incentives that are inherent to state transfers to municipalities.

The lack of evidence on this policy issue might not be surprising. Identification of the causal effect of interest requires policy randomization in two dimensions, i.e. randomization of electoral rules and of equalization policy, both of which are only rarely available in practice. Absent any ‘natural’ policy randomization, empirical work on this issue faces various challenges. One empirical strategy that is adopted in existing literature to identify the fiscal effects of political institutions is to exploit heterogeneity in political systems and fiscal outcomes across nations - see, e.g., Persson and Tabellini (2003) for a review. Drawing causal inferences from the associations in cross-country data is a precarious exercise. Cross-sectional differences in fiscal outcomes may reflect omitted factors related to national culture and institutions that are correlated with electoral rules. As to within-country variation, lower-level governments

typically operate under the same electoral regime. Even when governments within a country operate under different electoral systems, there might be an element of choice associated with them.¹ Hence, governments might self select which undermines a causal interpretation of any empirical relation between political institutions and fiscal outcomes², see Acemoglu (2005), for instance. Similar concerns exist with respect to transfer policy. Transfers are not randomly assigned to jurisdictions. They are typically conditioned on observable measures of fiscal wealth that are partly under the control of jurisdictions.

In the empirical analysis we address the identification problem in two ways. First, our units of observation are municipalities in a single state which operate under relatively homogenous socio-economic and political conditions. Second, we make use of two recent reforms in the state of Lower Saxony (Niedersachsen) as natural experiments to empirically identify the effect of interest. The first reform became effective as of 1996 and changed the electoral rule in municipalities. In the old system, voters elected council members under proportional rule (council-manager system), while in the new system voters also directly elect a mayor under majoritarian rule (mayor-council system). The reform involved a stark shift in decision powers from the council to the directly-elected mayor. Important for our identification strategy, municipalities did not all adopt the new electoral system in the same year. In the new system, the mayor of a municipality also became head of administration. However, the initial 12-year contract with the old head of administration was honored. Since the residual duration of the contract differed across municipalities in 1996, municipalities experienced a gradual transition to the new system which was as good as random. The second reform became effective as of 1999 and involved significant changes in the equalization formula that are used to allocate equalizing transfers to municipalities. The reform was court-ordered. It followed a ruling of the state supreme court in 1997 which declared the existing equalization system unconstitutional and requested the implementation of a new system as of 1999. The two reforms allow us to employ quasi-experimental methods to draw causal inference as to how electoral and fiscal incentives intertwine in the choice of municipal business taxes. It is the staggered reform of the electoral system that allows us to interact both reforms and compare the effect of the transfer change on business taxes in the council-manager system with that in the mayor-council system. As the main result, we find that legislators are differently responsive to changes in fiscal incentives across

¹For example, US cities can influence the municipal charter by choosing between a council-manager system and a mayor-council system. See Svava (1990).

²For instance, observing less spending in a majoritarian system might not be taken as evidence of a causal relation between majoritarian systems and fiscal policy, with causality running from the electoral system to policy. Rather, the observation might be determined by voter preferences if voters in countries that prefer less public spending also prefer a majoritarian system.

electoral systems. The tax rate response in a mayor-council system is up to three times larger compared to a council-manager system.

The fiscal incentive effect we are interested in is related to the formula that is used to calculate equalizing transfers. The prime motivation for fiscal equalization programmes is to ensure that citizens have access to a comparable amount of public services at comparable cost irrespective of their place of residence in a country (Boadway, 2004). One way to achieve the goal is through a transfer formula that compares the fiscal need of a jurisdiction with its fiscal capacity (so-called fiscal capacity equalization). The latter is generally computed as the amount of tax revenues a jurisdiction could collect if it were to levy a tax on its tax base equal to, e.g., the average tax rate of all jurisdictions. Thus, it is a hypothetical rather than the actual tax rate of jurisdictions which is used to compute equalization payments. The adjustment eliminates incentives to lower the tax rate in order to downward manipulate own-source fiscal resources, but still leaves the tax base to be strategically influenced through tax rate choices. Previous literature shows that this dependence implies a positive incentive effect (Smart, 1998). A tax increase in a jurisdiction lowers its tax base and, hence, the fiscal capacity. Transfer income rises in response.

A variety of countries, including Canada, Australia, Switzerland, Italy and Germany, use this type of transfer system to allocate transfers to provincial or municipal governments. Empirical work on the incentive effects of equalization programs in these countries has evolved only recently. For instance, Hayashi and Boadway (2001) and Smart (2007) look at how fiscal equalization influences tax policy of Canadian provinces. Dahlby and Warren (2003) provide a related analysis for Australia, and Barette et al. (2002), Buettner (2006) and Egger et al. (2010) analyze how German states and municipalities respond to transfer policy implemented at different levels of government. While the literature establishes robust evidence on tax-price effects inherent to transfer policy (in particular, to fiscal-capacity equalization), it abstracts from the issue of how political institutions and fiscal equalization intertwine.

There is a growing body of empirical literature that compares economic outcomes across political regimes.³ Empirical work on the comparison of majoritarian and proportional system include, for instance, Persson and Tabellini (1999) and Milesi-Ferretti et al. (2002), who compare spending outcomes in majoritarian and proportional systems, and Persson et al. (1997, 2000), who focus on spending outcomes in presidential systems versus parliamentary systems. Egger et al. (2009) and Coate and Knight (2011) empirically analyze the spending implications of two main forms of government in German and

³Theoretical work on the comparison between electoral rules is more fulminant. See, for instance, Lizzeri and Persico (2001, 2005) for recent contributions and Austen-Smith and Bank (1999) and Persson and Tabellini (2003) for a review.

US municipalities: council-manager system and mayor-council system.⁴ The papers do not examine how the effects of fiscal equalization play out under the different electoral rules.⁵ Our study seeks to fill the gap.⁶

The paper is organized as follows: Section 2 explains the details of the two reforms, followed by a description of the data in Section 3. Section 4 and 5 explain the econometric methods used in the paper and show the empirical results. Finally, Section 6 summarizes the findings and draws some concluding remarks.

2 Policy reforms

As explained above, we use two policy reforms as a source of exogenous variation in the empirical analysis. The first reform became effective as of 1996 and changed the electoral rule in municipalities. The second reform became effective as of 1999 and involved changes in the equalization formula for all municipalities. We will describe the details of the two reforms below.

Equalization reform: Municipalities in Germany receive equalization transfers or contribute to the equalization fund, depending on their measured fiscal wealth. The exact definition of the equalization scheme differs across states. But the common characteristic is that entitlement payments are calculated by comparing the fiscal need of a municipality with its fiscal wealth. The prime determinants of the fiscal need measure are population size and a level of per-capita spending. Fiscal wealth includes the tax base of the profit tax for which municipalities can independently set the tax rate. However, it is not the actual amount of tax revenues which determines fiscal wealth. The tax base is multiplied by a standardized tax rate, which the state government uniformly selects for all municipalities, to arrive at a measure of fiscal capacity; that is, at an amount of tax revenues that can be collected if the municipality were to levy the standardized tax rate. Any deficiency between fiscal needs and fiscal capacity is at least partly compensated by transfer payments.

⁴See also Baqir (2002) who analyzes the link between the size of legislature and total spending in US cities, operating under either a major-council system or council-manager system.

⁵There is a literature on the political economy of fiscal flows. For instance, Johansson (2003) and Solé-Ollé and Sorribas-Navarro (2008) analyze the effects of partisan behavior on interregional transfer flows. Electoral rules make no appearance.

⁶The issue analyzed in the paper has a different focus than the one in the literature on appointed versus elected public decision-makers, see Besley and Coate (2003), Maskin and Tirole (2004), and Whalley (2010), for instance. Therein, appointed and elected decision-makers have significant decision powers and the effect of the selection method on policy outcomes is compared. In the council-mayor system, the mayoral position is on a honorary basis, endowed without formal decision powers. Thereby, the focus of this paper is on the comparison of policy outcomes in a purely proportional system (council-mayor system) and in a system in which a directly-elected mayor with significant decision powers exists in addition to the council.

To understand the incentives for local tax policy induced by the transfer system, it is useful to consider a snapshot of the equalization formula used in calculating transfers:

$$T(B) = \alpha (N - \bar{t}B(t)) \quad 0 < \alpha \leq 1, \quad (1)$$

where N denotes a level of target spending (fiscal need), t denotes the business tax rate, \bar{t} is the standardized tax rate, and $B(t)$ is the tax base of the municipality. The tax base is negatively sloping, $B'(t) < 0$, which captures the efficiency cost of taxation. α is the rate at which deficiencies between the level of target spending and fiscal capacity are equalized. Differentiating $T(B)$ with respect to the tax rate, one gets $T'(B) = -\alpha \bar{t} B'(t) > 0$. Transfer payments increases following a rise in the tax rate. The reason is that the tax base, i.e. the measure of fiscal capacity, shrinks in response to the higher tax rate. Higher taxes thereby lure more transfers to the local budget. As such, the positive transfer response reduces the cost of taxation, leading to higher tax rates (Smart, 1989).⁷ In practice, the transfer formula is typically piece-wise linear in the equalization rate α , each linear segment being characterized by (1).

Putting the aforementioned hypothesis of a positive incentive effect of fiscal-capacity equalization to a test requires a sizeable change in the equalization rate at which deficiencies are compensated. Small changes may not lead to observable changes in policy outcomes due to optimization frictions such as adjustment costs or inattention (Chetty, 2012). A substantial reform of the equalization system has been implemented in the state of Lower Saxony in 1999. The reform was initiated by a ruling of the state supreme court in November 1997 which declared the initial system unconstitutional and requested the implementation of a new system as of 1999. The core of the municipal transfer system in Lower Saxony is (i) a system of regular equalization grants, which compensate for a fraction of the amount by which each municipality's measured taxation capacity falls short of its targeted spending level or fiscal need, and (ii) a system of supplementary equalization grants, which establish a floor level of spending in each municipality, and equalize 100 per cent of deficiencies up to the floor. The reform prescribed changes in the different equalization rates. Prior to the reform, the regular equalization transfer compensated 50 per cent of deficiencies in capacity below the target level. In the 1999 reform, the regular equalization rate was increased to 75 per cent, while the threshold fraction of the target below which supplementary equalization is paid was decreased.

Insert Figure 1 here

⁷See also Koethenbuerger (2000) and Bucovetsky and Smart (2006).

Figure 1 illustrates the relationship between a municipality's own fiscal capacity B and its equalization transfers $T(B)$ in both the pre-reform and post-reform periods in Lower Saxony. The kinked line segment ADNG is the constraint which obtains in the pre-reform period: capacity deficiencies are fully compensated by transfers when $B \leq \theta^0 N$, so the constraint has slope -1 in this interval; 50 per cent of capacity deficiencies are compensated when $\theta^0 N < B \leq N$, so the slope of the constraint is -0.5 in this interval; and no equalization transfers are paid when $B > N$, the slope of the constraint is thus zero to the right of N . The post-reform budget constraint is represented by the kinked line segment ACNH. The effect of the reform was to increase the fraction of capacity deficiencies compensated by regular equalization transfers to 75 per cent and so to increase the slope of the constraint by 0.25 (in absolute value) in the intermediate interval, while reducing the threshold at which supplementary equalization was paid commensurately to $\theta^1 N$. For governments with tax capacity in excess of need, operating on segment NG, no equalization payments were received before or after the reform. In the post-reform period, however, such municipalities were required to pay 20 per cent of excess tax capacity to the state government, operating now on the segment NH with slope -0.2. Such a payment operates exactly like a negative equalization grant with an equalization fraction of one-fifth.

Thus, the reform resulted in a rather stark change in the extent to which marginal changes in local resources B are compensated through the formula. Municipalities may be classified into three groups based on their equalization status prior to the reform. Group 1, corresponding to segment CD of the pre-reform budget constraint, faced a decrease in equalization fraction of 25 percentage points following the reform, while Groups 2 and 3, corresponding to segments DN and NG, faced increases in the equalization fraction of 25 and 20 percentage points, respectively. According to theory then, tax rates among the former group of municipalities are predicted to fall, compared to those of the other two groups. In the empirical analysis we will lump municipalities in Groups 2 and 3 together, looking at how their tax rates reacted relative to the tax rates of municipalities in Group 1.

Electoral reform: The second reform entailed a change in the electoral rule for municipal elections in Lower Saxony. Prior to the reform, municipalities operated under a council-manager system which was introduced by the British military government after World War II. The political system draws on the British local government system and features three political institutions: the council, the mayor, and the municipal manager. The size of the council ranged from 8 to 65 members (depending on the population size of the municipality) and council members were elected under single-district, proportional rule.

Elections took place every 5 years. The political power exclusively lay with the council. The members decided on the fiscal affairs of the municipality and appointed high-level political employees of the administration. The council elected a mayor for whom the city charter defined a representative role, without any formal authority. For the task of administration, the council nominated a manager. The manager was head of administration and in charge for the daily operation of bureaucracy. He was nominated for 12 years and accountable to the council.

The manager-council system was the predominant form of municipal decision making in the Northern states of Germany, while the states of Bavaria and Baden-Wuerttemberg adopted a mayor-council system.⁸ These systems co-existed for nearly 50 years. In the 1990, politicians questioned the adequacy of the mayor-manager system. Experience has shown that such a system may result in legislative "grid-lock" at a time when council fragmentation increased. Also, it was held that the position of a honorary mayor was no longer appropriate, only absorbing resources without offering significant benefits for the electorate (Gissendanner and Kersting, 2005).

In 1996, the state of Lower Saxony amended its municipal charter legislation to introduce direct election of mayors, chosen in community-wide majoritarian elections that take place concurrently with council elections. The mayor is politically independent from the council and a move by the council to recall the mayor must be approved by at least half of the electorate. Besides introducing direct elections for the mayor, the reform involved a substantial change in the balance of power between the council and the mayor. The mayor is the head of administration; a function which was assigned to a nominated manager in the pre-reform system. The council has no longer authority to nominate top-level employees in the administration, including high-level political administrators (civil servants who serve for 8 years). These arrangements imply that the mayor has a wide range of control in the administration. To facilitate decision-making, the council nominates members for an intermediary executive body which is chaired by the mayor and in which the mayor has a prime role in proposing and preparing legislation (Gissendanner and Kersting, 2005).

The new electoral system was phased in gradually among municipalities in Lower Saxony over a period of twelve years, following expiration of the long-term contract with the municipality's manager. Hence, at the time the new equalization rates become effective, some of the municipalities already operate under the new mayor-council system. It is this feature of the reform that permits us to compare the

⁸The mayor-council system and the council-manager system are also the predominant forms of city government in the US. See Svava (1990).

incentive effects of the reform across the two electoral regimes. Since the municipality managers' contract is honored, the timing of the transition appears to be as good as random, and so does the electoral reform status of municipalities at the time the new fiscal equalization system was phased in.

3 Data

The state of Lower Saxony has 1022 municipalities. 735 municipalities form administrative units (so-called *Samtgemeinden*) for which the council and, after the reform, also the directly-elected mayor are the legislative bodies that decide jointly on policy issues. There is a total of 134 *Samtgemeinden*, each comprising 2-6 municipalities. Each of the residual 287 municipalities is an independent administrative unit (so-called *Einheitsgemeinden*). It is at the level of the 423 *Samtgemeinde* and *Einheitsgemeinde* at which the reform of the electoral system took place. Since most of the control variables are available at the municipal level, we use municipal observations as our unit of observations in the regressions.

We employ annual data on municipalities in the state of Lower Saxony over the time period 1994 - 2004. The data comprises fiscal, socio-economic, geographical and political characteristics of municipalities. Except of the electoral reform data, the data is available from the statistical office in Lower Saxony (Statistisches Landesamt), most of it is available in an on-line data base.⁹ Table 1 provides descriptive statistics of the data as of 2000.

Insert Table 1 here

As the dependent variable, we use data on the business tax rate (*Gewerbsteuer*). The rate is set at the municipal level and the associated revenue is the largest tax revenue category that municipalities control. Also, on institutional grounds, the business tax rate can be expected to respond to changes in the equalization rate, unlike other taxes that municipalities set.¹⁰

⁹The link is <http://www1.nls.niedersachsen.de/Statistik/>.

¹⁰The three most important sources of own-source tax revenues are the business tax (*Gewerbsteuer*), a property tax related to agricultural land (*Grundsteuer A*), and a property tax levied on land not used in agriculture (*Grundsteuer B*). All three tax instrument share the common feature (i) that their tax bases simultaneously enter the calculation of fiscal capacity in the equalization system (i.e., the term *B* in the preceding description of the equalization system) and (ii) that a municipality can decide on the tax rates, while the tax base is determined by federal law. In the case of the two property taxes, the tax base is a hypothetically determined value of land (*Einheitswert*) which does not vary with the fiscal and economic conditions in a municipality. Hence, on institutional grounds, there is no direct response in the property tax rates to be expected after the change in the equalization rates. Differently, the tax base of the business tax is business profits which will vary with the level of business taxation in a municipality. This makes the business tax rate the preferred choice of dependent variable in our empirical analysis.

Data on the timing of municipal electoral reforms is collected individually for each municipality. Figure 2 shows the number of municipalities that experienced a change in the electoral system over the period 1996 - 2004.

Insert Table 2 here

The year refers to the first year in which the *Samt- und Einheitsgemeinden* had a directly-elected mayor who decided jointly with the council on the business tax. The mayoral election took place the year before. The number in parentheses in Table 2 gives the respective number of reforming municipalities. In 2002 the data exhibits a peak in the number of switching municipalities. The reason for the peak might be related to the merger of municipalities around 1976 which resulted in an expiration of the municipality managers' contracts before 2002. In 2001 also state-wide municipal council elections took place and it is conceivable that municipalities tried to economize on costs of running elections by aligning mayoral and council elections. We should note that we do not make use of the variation in the reform status in 2002, as explained below.

In order to guarantee a clean design for the identification of the reform effects, we restrict the sample by eliminating all municipalities that adopted the new electoral regime between 1999 and 2004. This leads to a total number of 351 municipalities included in our analysis out of 1022 municipalities in the state of Lower Saxony. Hence, in our sample, municipalities have switched to the new electoral system prior to 1999, the year in which the equalization reform becomes effective, or use the initial electoral system at least until 2005. Given the sample choice, the electoral reform status of the municipalities stays the same over the period 1999 to 2004 in which municipalities are subject to the equalization reform. Extending the time window to years after 2004 would result in a further loss in observations in the group of municipalities that experience no electoral reform. Since the vast majority of municipalities work under the new electoral system following 2005 onwards, we are only able to exploit sufficient variation in the electoral reform status in the years prior to 2005.

To address concerns that reforming and non-reforming municipalities differ with respect to some observable or unobservable characteristics that are correlated with our outcome variable (which is the change in the business tax rate), we plot the business tax rates of reforming and non-reforming municipalities 10 years prior to the electoral reform in Figure 2. The upper (lower) panel depicts the business tax rates of municipalities that had the first mayoral election in 1996 (1997) and the first full fiscal year under the new system in 1997 (1998). Switching municipalities have higher tax rates than those that do

not switch in the same year (dotted line) and that do not switch over the whole sample period (lower solid line). The latter serve as the electoral control group in the empirical analysis. Relevant for our identification strategy, the changes in the tax rates are quite aligned.

Insert Figure 2 here

We employ information about the transfer formula, as illustrated in Figure 1, for each municipality before and after the equalization reform. We consider municipalities in Lower Saxony as being eligible for supplementary transfers, if they have actually received such transfers in at least one year in the pre-reform period (1994-98). We thereby arrive at four groups of municipalities in our sample which differ with respect to their electoral reform status and their equalization status prior to the transfer reform. Table 3 tabulates the number of supplementary transfer eligible and non-eligible administrative units (Samt- und Einheitsgemeinden) and municipalities (listed in parenthesis) against ones with and without electoral reform in our sample.¹¹ As shown in Table 3, 66.7 per cent of the 351 municipalities were eligible for supplementary transfers, and 38.7 per cent adopted the electoral reform in 1999. Of those, about 25.9 percentage points were municipalities which were also eligible for supplementary transfers. Hence, 12.8 percentage points of the municipalities that adopted the electoral reform before 1999 were not eligible for equalization transfers. About 40.7 percentage points of municipalities that were eligible for equalization transfers ran under the old electoral regime over the period 1999 - 2004.

Insert Table 3 here

We may illustrate the development of the business tax rates in Lower Saxony for municipalities with an electoral reform as of 1999 and without a reform until 2005 in Figure 3. The year 1999 in the figure indicates the year in which the state-wide equalization reform was launched in Lower Saxony. Also, in that year some of the municipalities have already adopted the electoral reform. The figure indicates how business tax rates have changed in an individual year relative to the average of 1994-98 for the group of municipalities that were not eligible for supplementary transfers prior to 1999 and that did not undergo the electoral reform until 2005 (referred to as control group) and two treatment groups: municipalities that were eligible for supplementary transfers, but did not undergo the electoral reform until 2005 (displayed by the dashed line), and municipalities that were eligible but reformed their electoral system prior

¹¹As said before, we exclude municipalities which changed their electoral system between 1999 and 2004, leaving 351 out of 1022 municipalities in our sample.

to 1999 (displayed by the lower line). The upper line displays the tax rate change of the control group. Notice that there was a difference in levels in business tax rates for those municipalities before 1999, but no difference in growth rates (see Egger et al., 2010). From Figure 3, it becomes obvious that it takes some time to adjust to a new equilibrium difference in tax rates between the alternative groups. The gap in the tax rates between the control municipalities and the ones in the two treatment groups increased gradually after the year of the two reforms, and the increase was particularly pronounced for the municipalities which had adopted the new electoral system. After a sluggish adjustment, a new ‘equilibrium’ gap in business tax rates seems to be reached at the end of the observation period (in 2003 and 2004) since the slope coefficients of the different loci are very similar to each other.

Insert Figure 3 here

4 Estimating the reform effects: Exogenous treatment effects of supplementary transfer eligibility conditional on electoral reform status

We start out by regressing the change in business tax rates for all municipalities between any year 1999-2004 relative to the average tax rate over the period 1994-98. The analysis may be dubbed an analysis of *exogenous* average treatment effects, since we ignore any possible problem of self-selection of municipalities into supplementary transfer eligibility status for the moment.

Defining the business tax rate change of municipality i between the average year 1994-1998 and year $t = 1999, \dots, 2004$ as $\Delta\tau_{it}$, we will generally estimate models of the kind

$$\Delta\tau_{it} = \beta_{S,t}S_i + \beta_{E,t}\tilde{E}_i + \beta_{S \times E,t}S_i \times \tilde{E}_i + X_{it}\gamma_t + u_{it}, \quad (2)$$

where X_{it} is a $1 \times K$ vector of control variables which inter alia may include a constant and the aforementioned determinants of tax rate changes other than the reform effects. γ_t is a $K \times 1$ vector of parameters on X_{it} , and u_{it} is a disturbance term. We employ a dummy variable S_i , capturing supplementary transfer eligibility, that is set at one for eligible municipalities (those should respond to the equalization reform in Lower Saxony by reducing their business tax rates according to theory) and at zero for non-eligible ones. Then, we employ a dummy variable E_i that is set at unity if a municipality adopted the electoral reform prior to 1999 and at zero otherwise. We want to interact the electoral reform dummy variable with the transfer eligibility dummy variable as an additional regressor to transfer eligibility as such. This allows us to estimate separate treatment effects of transfer eligibility for municipalities with and without electoral

reform. However, we wish to ensure that the parameter of the supplementary transfer eligibility variable, $\beta_{S,t}$, captures the average treatment effect for year t and the parameter of the interactive effect, $\beta_{S \times E,t}$, captures the difference for municipalities with electoral reform to the average. This can be accomplished by demeaning the electoral reform dummy variable in the interactive effect, $\tilde{E}_i = E_i - N^{-1} \sum_{j=1}^N E_j$ where $N = 351$ is the number of included municipalities, so that the interactive effect $S_i \times \tilde{E}_i$ is zero at the mean (see Wooldridge, 2002).

The interactive effect measures the difference for municipalities which implemented an electoral reform to the average municipality. The corresponding parameter is to be interpreted as follows. A fraction of 0.387 undertook the electoral reform in 1999 according to Table 1. Hence, in the interactive effect, the demeaned variable “*Electoral reform*” takes on a value of either $1 - 0.387 = 0.613$ or -0.387 . Accordingly, the average treatment effect of supplementary transfer eligibility is $\beta_{S,t} + 0.613\beta_{S \times E,t}$ for municipalities with electoral form and $\beta_{S,t} - 0.387\beta_{S \times E,t}$ for ones without electoral reform.

Captured by the matrix X_{it} in (2), we control for other determinants of tax rates in estimating those coefficients to make sure that estimates of the treatment effects are not confounded by the omission of relevant determinants of tax rates. The list of variables include the change in population, the population density, the area of streets, and the share of elderly in the population.

Insert Table 4 here

We will estimate the regression model (2) for each year $t = 1999, \dots, 2004$ separately. In Table 4, we summarize the results of the regression analysis. Consistent with Figure 3, we find that the gap in business tax rates between the considered municipalities starts widening in 1999, but differences which are significantly different from zero at conventional levels do not appear prior to the year 2000 and mainly materialize towards the end of the observation period. To gauge the size of the reform effects for the two groups, we need to consider the aforementioned general thoughts about average treatment effects with interactive effects. It turns out that the point estimate of equalization reform average treatment effect is negative for municipalities with and without the electoral reform. The finding is consistent with the general theory on the incentive effects of fiscal capacity equalization (Smart, 1989)¹² and in line with the empirical findings in Egger et al. (2010).¹³ Importantly, the results differ markedly across electoral systems.

¹²Municipalities which are supplementary transfer eligible correspond to the ‘Group 1’ municipalities in our description of the equalization reform, while non-eligible municipalities correspond to municipalities in ‘Group 2’ and ‘Group 3’. Hence, according to theory, the former group should have decreased the tax rate, while the latter municipalities should have increased their tax rates.

¹³Egger et al. (2010) use the universe of 1022 municipalities in Lower Saxony to estimate the average treatment effect of the

The average treatment effect on municipalities with electoral reform is -0.16 in 1999 and -0.543 in 2004. It changes significantly from year to year until 2002 and remains quite stable from then onwards. The corresponding effect on municipalities without electoral reform is -0.116 in 1999 and reaches -0.297 in 2004, being almost 50 per cent smaller than the response of the reform group. Also, the new electoral system has on average a moderating effect on business tax policy. Municipalities which operate under a mayor-council system adjust their tax rates less strongly on average, $\beta_{E,t} < 0$. However, the coefficients $\beta_{E,t}$ and $\beta_{S \times E,t}$ turn to be statistically insignificant.

In the subsequent analysis, we will account for self-selection of municipalities into supplementary transfer eligibility.

5 Estimating the reform effects: Endogenous treatment effects of supplementary transfer eligibility conditional on electoral reform status

The equalization reform entails different changes in the equalization rate for municipalities that are eligible for a supplementary equalization payment, i.e., those that are initially operated to the left of point $\theta^0 N$ on the budget line in Figure 1, and ones that are not. Initially eligible municipalities experience a drop in the equalization rate, while the other ones face a higher equalization rate after the reform. Evidently, the supplementary transfer status may be partly influenced by a municipality and, hence, is endogenous. To the extent that factors which are related to self-selection also influence tax policy after the reform, the change in business tax rates between the pre- and post-reform periods will depend on this endogenous selection. The results in Table 4 might thus be biased.

Wooldridge (2002) suggests procedures for estimation of average effects of endogenous treatments (ATE), if ATE vary by means of observable characteristics. One suggested procedure may be referred to as a generalized Heckman-type model which entails estimating a switching regression that accounts for self-selection into treatment (Heckman, 1978). Beyond other covariates, that model includes the treatment indicator (S_i) whose parameter measures the average treatment effect (ATE) and also the interactive term $S_i \times \tilde{E}_i$ in (2), where \tilde{E}_i is demeaned so that it is zero on average. Moreover, that model includes two inverse Mill's ratios, one for the treated and a separate one for the untreated, as control functions so that, unlike Heckman's original model, the disturbances are allowed to display different second moments for the treated and the untreated. For this, we use a cross-sectional probit model in a first step that

equalization reform, $\beta_{S,t}$ in our notation. They find an increase in the gap in tax rates between supplementary transfer eligible and non-eligible municipalities, $\beta_{S,t} < 0$, which is statistically significant at conventional levels.

is estimated on time averages for the period 1994-98. Alternatively, the prediction of this probit model can be used to estimate the probability of $S_i = 1$, \hat{S}_i . Then, \hat{S}_i and $\hat{S}_i \times \tilde{E}_i$ can serve as instruments for S_i and $S_i \times \tilde{E}_i$, respectively, in a two-stage least-squares version of (2). In what follows, we only report the results of the Heckman approach. The results of the instrumental variable estimation are qualitatively and quantitatively very similar.¹⁴

In Table 5, we summarize the results for the second-stage generalized Heckman model.

Insert Table 5 here

In general, the endogenous treatment effect model points to bigger average treatment effects of the equalization reform for municipalities with and without electoral reform than the exogenous treatment model does in Table 4. For instance, in 2004 the estimate of the ATE for municipalities with electoral reform is -3.995 in Table 6 and -0.543 in Table 4. The corresponding effects on municipalities without electoral reform are -1.238 in Table 6 and -0.297 in Table 4. Hence, the magnitude of the ATE is bigger by a factor of 4-7, when considering endogenous selection than when ignoring it. Also, as of 2004, the relative reaction of municipalities with or without electoral reform is more pronounced than in Table 2, where the response for municipalities with electoral reform was slightly less than twice as big as the one for municipalities without electoral reform. In the Heckman model it is up to three times larger. All in all, when accounting for self-selection into transfer eligibility, the responses of interest become stronger in absolute and relative magnitude. Still, the same qualitative finding holds as in Table 2. The electoral reform exposed municipalities to the transfer reform differently, where responses to changes in the equalization rate are more sizeable in the mayor-council system.

In Table 6, we assess the sensitivity of these findings along the lines of inclusion of further covariates in X_{it} . In a first regression, we extend the set of covariates by political variables which are the change in seats won by the four major parties in the local council (Social Democrat Party, Christian Democrat Party, Liberal Party, and Green Party) before the equalization reform and the respective year after the reform. In a second exercise we extend the set of covariates by the change in the value-added tax revenue of municipalities. As of 1997, municipalities lost authority to levy a tax on the stock of business capital

¹⁴In particular, we jointly estimate a probit model for transfer eligibility and for the electoral reform status to capture potential interdependencies between both outcome variables. As it turns out, the transfer eligibility status is primarily determined by geographical characteristics, most notably the share of land covered by water and forest, and negatively determined by population size. The finding is in line with the notion that mostly remote municipalities with an disadvantageous economic structure qualify for supplementary transfers. We also report the LR test statistic for the hypothesis that the two probit equations are independent. The test statistic is insignificant. The results are available upon request.

(Gewerbekapitalsteuer) and, to compensate for the loss in revenue, have received a share of value-added tax revenues since then. The variable "change in value-added tax income" controls for the impact the change in the fiscal constitution of municipalities has on business tax rates. As can be inferred from Table 6, the two sensitivity checks leave the basic findings of the analysis intact, both in terms of the magnitude of the coefficients and their statistical significance.

Insert Table 6 here

In a final exercise, we add a measure of equalizing transfer income to the basic regression equation. A natural concern is that the equalization reform creates changes in entitlement payments which may have caused the observed change in business tax rates. Controlling for income effects on tax policy that are associated with the transfer reform is a precarious exercise. Actual transfer income is endogenous and using it as an explanatory variable would bias the results. Instead, we follow the approach by Gruber and Saez (2000) by calculating a proxy for grants that is a function only of pre-reform behavior. That is, we compute transfers a municipality would have received post-reform if its tax base and population size (co-determining the need measure) were the same as in the pre-reform period, but the new formula was in place. Specifically, we account for the new equalization rates, the new definition of the fiscal need measure, and the annual adjustment in the per-capita grant ("Grundbetrag").¹⁵ To calculate the proxy, we use the population size and fiscal capacity averaged over the pre-reform period 1995-97. Again, the basic insights remain unchanged, showing that the change in the business tax rates across the two electoral regimes is related to the change in the tax price effect, which results from the changes in the equalization rates, rather than from income effects.

6 Conclusion

This paper combines two strands of literature by analyzing how electoral rules affect incentive effects of fiscal equalization systems. Key to the analysis are two reforms in the German state of Lower Saxony which changed (i) the municipal charter by replacing the council-manager system by a mayor-council system and (ii) the rate at which fiscal deficiencies in fiscal wealth of municipalities are compensated. The most interesting result concerns the adjustment in business tax rates over time. Municipalities

¹⁵Fiscal need is defined as the product of population size, a qualifier which rises with population size, and a per-capita grant. The latter is annually determined to balance the budget for equalizing transfers. The functional form of the qualifier changed due to the reform. We hence calculate fiscal need as pre-reform population times the post-reform qualifier and the per-capita grant of the respective year. Post-reform population may be endogenous to the reform which could potentially bias our results.

which have transferred significant decision-powers to the directly elected mayor appear to react more strongly to the equalization reform.

The result points to the more general issue of why electoral systems make municipalities differently responsive to changes in the fiscal environment. One motivation for the electoral reform was that the direct election of mayors was viewed by some actors as a means of dealing with legislative ‘gridlock’ in fragmented municipal councils and so of speeding legislative response to fiscal problems. The empirical findings are consistent with this view.¹⁶ An alternative rationale for the difference in results across electoral regimes is that the cost of taxation, as perceived by politicians, is higher in a mayor-council system. Council members may engage in pork-barrel spending and only internalize the cost of public spending which falls onto the group the legislator targets. The mayor, however, is elected under majoritarian rule which affects policy incentives of the mayor.¹⁷ Given the difference in electoral systems, the mayor presumably internalize a larger share of the overall costs of pork-barrel spending, with the consequence of reacting more strongly to changes in the cost of taxation which follow, for instance, from a change in the equalization rate.

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¹⁶Relatedly, Persson and Tabellini (2003) show that presidential systems lead to stronger fiscal adjustments.

¹⁷See, e.g., Lizzeri and Persico (2001) who show that legislators elected under majoritarian rule (under which mayors are elected in a mayor-council system) are more likely to internalize the overall cost of pork-barrel spending.

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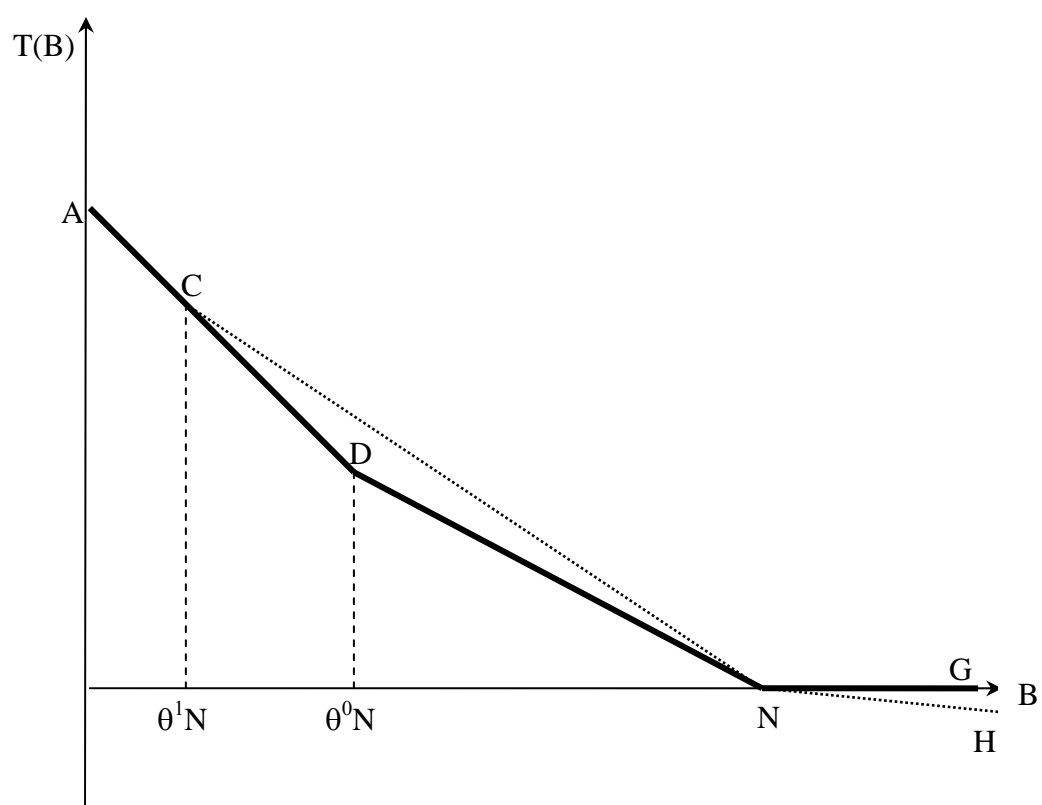


Figure 1: Equalization Formula

Table 1 - Descriptive statistics as of 2000.

Variable	Obs	Mean	Std. Dev.	Min	Max
Business tax rate in %	1022	16.02	1.34	12.50	23.00
Income per capita in EUR	1022	9923.64	2145.63	3493.05	27699.58
Population	1022	7738	22366	338	515001
Density	1022	1.37	1.74	0.06	25.72
Population share with age ≤ 15	1022	0.18	0.03	0.06	0.27
Population share with age > 65	1022	0.17	0.03	0.05	0.40
Agricultural land in ha	1022	0.60	0.23	0.00	0.93
Forest in ha	1018	0.18	0.15	0.00	0.82
Streets in ha	1021	0.05	0.05	0.00	0.66
Fiscal capacity per capita in EUR	1022	370.60	166.48	98.28	2269.80

Note: The fiscal capacity comprises standardized municipal own-source tax revenues and tax revenues that upper level governments share with municipalities. The measure is used in the fiscal equalization system to measure the fiscal wealth of a municipality.

Table 2 - First direct elections of mayors in municipalities in Lower Saxony

1997	1998	1999	2000	2001	2002	2003	2004
57 (96)	20 (40)	42 (108)	31 (63)	13 (24)	149 (397)	13 (15)	15 (42)

Notes: The year is the first year in which the municipality operated under the mayor-council system throughout the whole fiscal year. The first mayoral election took place the year before. The first number in the second row refers to the number of administrative units (Samt- and Einheitsgemeinden). The number in parenthesis gives the number of municipalities.

Figure 2: Business tax rates of municipalities prior to the electoral reform.

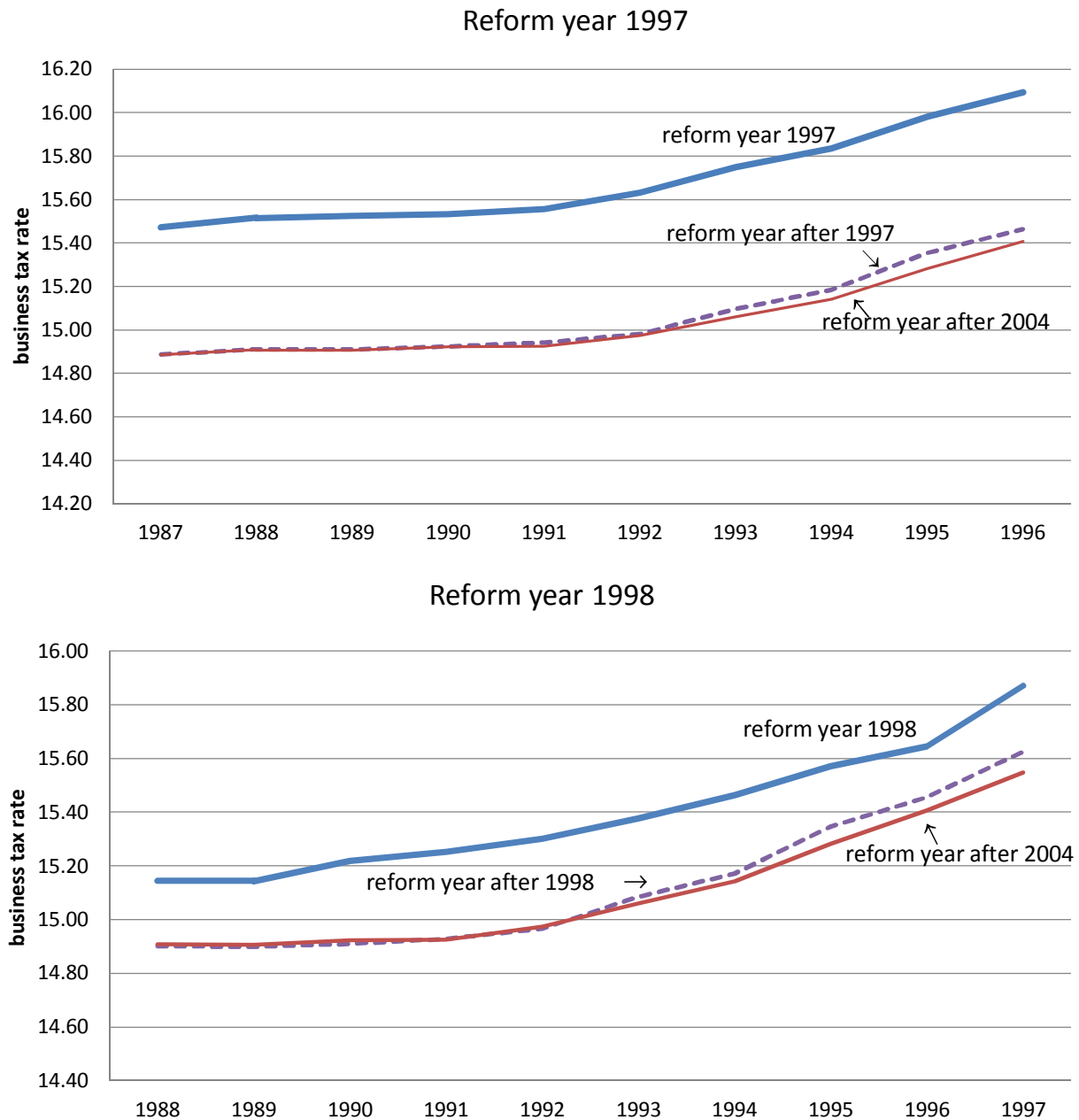


Table 3 - Electoral Reform and Supplementary Transfer Eligibility on Business Tax Rates in Lower Saxony (1999-2004)

Supplementary transfer eligibility	Electoral reform		Total
	Yes	No	
Yes	44 (91)	51 (143)	95 (234)
No	33 (45)	34 (72)	67 (117)
Total	77 (136)	85 (215)	162 (351)

Note: The number (number in parenthesis) refers to the number of Einheits- and Samtgemeinden (municipalities).

Figure 3 - Business Tax Rate Changes in Lower Saxony for Municipalities with and without Electoral Reform (1999-2004 relative to 1994-98)

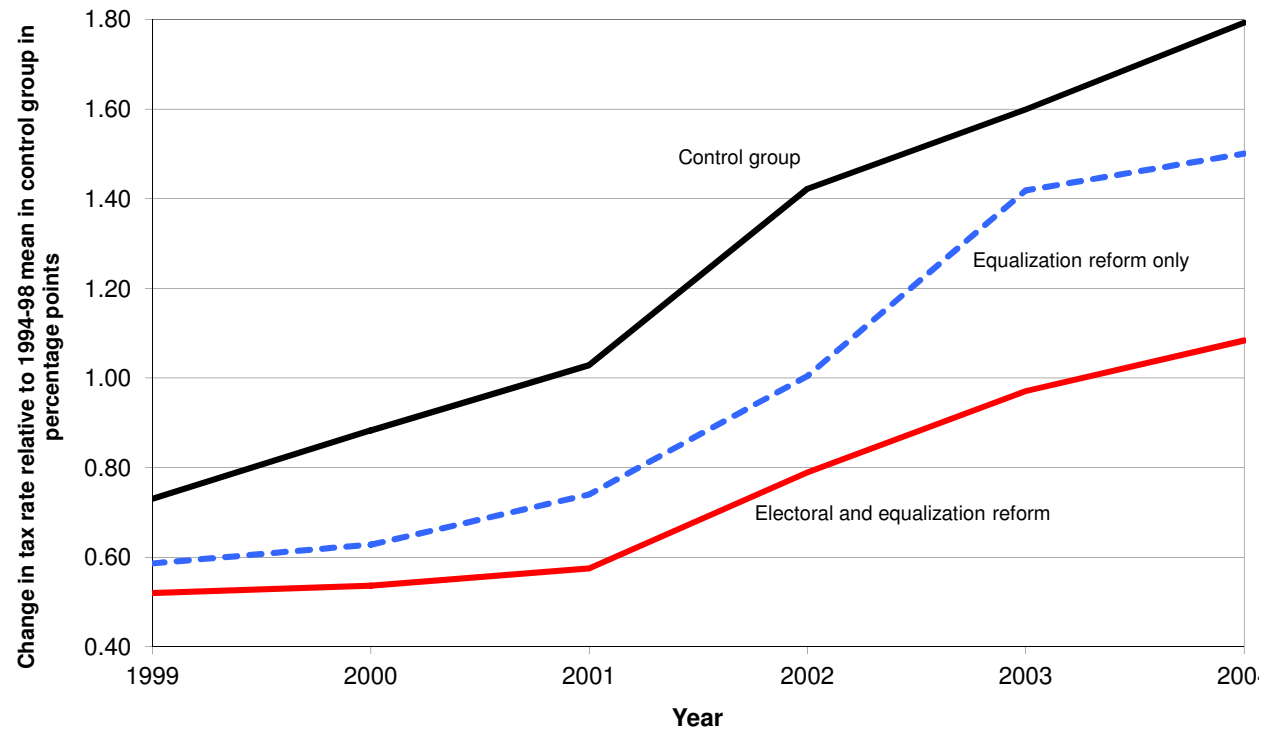


Table 4 - Effects of Supplementary Transfer Eligibility on Business Tax Rates in Lower Saxony for Municipalities with and without Electoral Reform (1999-2004)
(Exogenous treatment effect models)

Supplementary transfer eligibility as a determinant of business tax rates	Estimates are based on ordinary least squares					
	1999	2000	2001	2002	2003	2004
	Municipalities with electoral reform					
Supplementary transfer eligibility	-0.133 #	-0.278 ***	-0.320 ***	-0.480 ***	-0.319 **	-0.392 ***
	0.089	0.092	0.094	0.130	0.144	0.140
Electoral reform × Supplementary transfer eligibility	-0.044	-0.090	-0.102	-0.128	-0.360	-0.246
	0.181	0.182	0.187	0.262	0.292	0.288
Electoral reform	-0.046	0.001	-0.037	-0.040	-0.046	-0.119
	0.162	0.162	0.164	0.231	0.254	0.252
Observations	351	351	351	351	351	351
R ²	0.052	0.064	0.069	0.069	0.056	0.068
Root mean squared error	0.709	0.733	0.750	1.026	1.155	1.120

Notes: Other control variables at the municipality level are the main effect of electoral reform, change population, population density, area of streets, share of elderly in the population. ***, **, *, and # indicates significance of coefficients at 1%, 5%, 10%, and 15%, respectively.

Table 5 - Effects of Supplementary Transfer Eligibility on Business Tax Rates in Lower Saxony for Municipalities with and without Electoral Reform (1999-2004)
(Endogenous treatment effect models)

Supplementary transfer eligibility as a determinant of business tax rates	Estimates are based on two-stage least squares models (Wooldridge, 2002, p. 621)					
	1999	2000	2001	2002	2003	2004
	Municipalities with electoral reform					
Supplementary transfer eligibility	-0.475	0.026	-1.151	-1.690	-2.559	-2.307
	2.220	15.272	4.550	3.561	5.370	3.325
Electoral reform × Supplementary transfer eligibility	-1.843 ***	-0.025	-2.424 ***	-2.089 ***	-2.707 ***	-2.757 ***
	0.202	1.529	0.277	0.341	0.329	0.191
Electoral reform	-0.030 ***	-0.073	-0.023 ***	0.023	-0.079 ***	-0.152 ***
	0.009	0.055	0.006	0.014	0.012	0.010
Observations	345	345	345	345	345	345
R ²	0.173	0.200	0.208	0.234	0.214	0.236
Root mean squared error	0.928	0.960	1.171	1.481	3.241	1.638

Notes: Other control variables at the municipality level are the main effect of electoral reform, change population, population density, area of streets, share of elderly in the population. ***, **, *, and # indicates significance of coefficients at 1%, 5%, 10%, and 15%, respectively.

Table 6 - Effects of Supplementary Transfer Eligibility on Business Tax Rates in Lower Saxony for Municipalities with and without Electoral Reform (1999-2004)
(Endogenous treatment effect models)

Estimates are based on two-stage least squares models (Wooldridge, 2002, p. 621)						
Supplementary transfer eligibility as a determinant of business tax rates	1999	2000	2001	2002	2003	2004
Benchmark (as in Table 3)						
Supplementary transfer eligibility	-0.475	0.026	-1.151	-1.690	-2.559	-2.307
	2.220	15.272	4.550	3.561	5.370	3.325
Electoral reform × Supplementary transfer eligibility	-1.843 ***	-0.025	-2.424 ***	-2.089 ***	-2.707 ***	-2.757 ***
	0.202	1.529	0.277	0.341	0.329	0.191
Electoral reform	-0.030 ***	-0.073	-0.023 ***	0.023	-0.079 ***	-0.152 ***
	0.009	0.055	0.006	0.014	0.012	0.010
Additional political controls (I)						
Supplementary transfer eligibility	-0.452	-0.857	-0.800	-1.932	-2.492	-2.176
	1.193	3.338	6.969	8.316	4.636	3.340
Electoral reform × Supplementary transfer eligibility	-1.642 ***	-2.233 ***	-1.987 ***	-2.852 ***	-2.658 ***	-2.567 ***
	0.055	0.199	0.436	0.518	0.281	0.195
Electoral reform	-0.085 ***	-0.049 ***	0.001	0.000	-0.145 ***	-0.212 ***
	0.005	0.006	0.014	0.011	0.011	0.010
Additional controls as in (I) plus value added tax (II)						
Supplementary transfer eligibility	-0.375	-0.705	-0.529	-1.239	-5.428	-2.324
	5.882	1.585	12.812	12.128	108.241	22.793
Electoral reform × Supplementary transfer eligibility	-1.467 ***	-1.976 ***	-1.468 ***	-1.811 ***	-1.836 ***	-3.475 ***
	0.369	0.078	0.809	0.765	0.614	1.438
Electoral reform	-0.103 ***	-0.053 ***	0.084	0.019	0.071	-0.080 ***
	0.016	0.007	0.052	0.049	0.079	0.024
Additional controls as in (II) plus income effect control (III)						
Supplementary transfer eligibility	-0.469	-0.948	-1.086	-1.185	-1.572	-4.422
	1.994	38.484	4.767	8.026	6.210	87.193
Electoral reform × Supplementary transfer eligibility	-2.222 ***	-0.001	-3.005 ***	-2.821 ***	-2.196 ***	-7.987 #
	0.105	2.435	0.286	0.500	0.387	5.512
Electoral reform	-0.421 ***	0.491	-0.281 ***	-0.300 ***	-0.186 ***	-0.350 ***
	0.019	0.906	0.021	0.086	0.024	0.042

Notes: Control variables at the municipality level in the benchmark models are the main effect of electoral reform, change population, population density, area of streets, share of elderly in the population. ***, **, *, and # indicates significance of coefficients at 1%, 5%, 10%, and 15%, respectively.