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ELECTORAL RULES AND INCENTIVE EFFECTS OF FISCAL TRANSFERS: EVIDENCE FROM GERMANY [*]

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ABSTRACT: The impact electoral rules and fiscal equalization programs have for local public finance are separately analyzed in the literature. This paper empirically analyzes whether legislator elected under different rules respond differently to changes in fiscal incentives. Using a reform of the electoral rule and the equalization system as a natural experiment, we find that municipalities which elect legislators under proportional rule react less strongly to changes in fiscal incentives.

JEL Codes: 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 under which they are elected and the separation of powers in legislative decision-making. 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).

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 which are partly under the control of politicians and, hence, create fiscal incentives on their own.

The incentive effects inherent to electoral rules and fiscal transfers are separately analyzed in the literature. The literature on electoral rules does not account for fiscal transfers and their incentive effects, while the literature on fiscal equalization does not account for the electoral rule under which politicians are elected and their interaction with equalization systems. This paper empirically analyzes whether electoral rules differ with respect to the incentive effects of fiscal equalization using a reform of the electoral system and a reform of the equalization scheme in the German state of Lower Saxony. In detail, we analyze whether municipalities in the state of Lower Saxony adjust their tax policy differently to a reform of the equalization system, depending on whether voters elect municipal legislators under proportional rule (council-manager system) or whether they also directly elect a mayor under majoritarian rule (mayor-council system). Our results show that legislators are differently responsive to changes in fiscal incentives across electoral systems. The tax rate response in a mayor-council system is 50 per cent larger compared with a council-manager system.

The reason why equalization transfer exert an incentive effect at all is related to the formula used to calculate entitlement payments. The prime motivation for equalization 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 principle of a "social citizenship" is through a transfer formula which compares the fiscal need of a jurisdiction with its fiscal capacity (so-called fis-

cal 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 fiscal resources, but still leaves the tax base as a target to influence through tax rate choices. Previous literature shows this dependence implies a positive tax price effect (Smart, 1998). A tax increase in a jurisdiction lowers its tax base and, hence, the fiscal capacity. Transfer income rises in response. As to policy relevance, such a system of fiscal equalization determines a large share of local public resources in a variety of countries including Canada, Australia, Switzerland, Italy and Germany. At the same time, these countries use different electoral rules at the local level. The observation points to the question of wether the heterogeneity in electoral rules has practical implications for the working of equalization schemes in local public finance.

The fundamental problem of identifying the influence of electoral rules on local fiscal outcomes is that municipalities in a state typically operate under the same electoral regime. Even if municipalities could opt for one of the other regime, the political system may be endogenous to preferences for spending, if for example voters in countries that prefer less public spending also prefer, for some reasons, a majoritarian system. Hence, seeing less spending in a majoritarian system might not be taken as evidence of a causal relation between majoritarian systems and the size of public spending with causality running from the electoral system to spending. Rather, the choice of the two may be exclusively determined by voter preferences.[1] A different possibility of exploiting heterogeneity in political systems is to compare fiscal outcomes across nations. In fact, empirical analyses on the economic effects of electoral rules are mainly at the national level - see, e.g., Persson and Tabellini (2003). It is evident, however, that drawing causal inferences from the associations in cross-country data is a precarious exercise for the reason explained above. Cross-sectional differences in government spending may reflect omitted factors related to national culture and institutions that are correlated with electoral rules.

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. The second reform became effec-

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[1]See Acemoglu (2005) for a more thorough treatment of endogeneity issues in comparative political economy.

tive as of 1999 and involved changes in the equalization formula. The two reforms allow us to employ quasi-experimental methods to draw causal inference.

The paper is organized as follows: Section 2 briefly summarizes the relevant literature. Section 3 explains the details of the two reforms, followed by a description of the data in Section 4. Sections 5 and 6 explain the econometric methods used in the paper and shows the results. Finally, Section 7 draws some concluding remarks.

2 Literature

Empirical work on the incentive effects of equalization programs has evolved only recently. Baretti et al. (2002) provide evidence that the equalization system among German states implicitly taxes tax revenues allocated to states through revenue-sharing arrangements. States do not have explicit taxing powers. Thus, the effect of fiscal equalization on tax policy cannot be identified therein. Hayashi and Boadway (2001) report empirical results consistent with the idea that Canadian provinces conform in their tax rate setting to the tax rate of the province of Ontario which predominantly determines the average provincial tax rate used to compute the standard fiscal capacity in the Canadian equalization formula. Smart (2007) extends their approach and finds a robust effect of equalization on the tax policies of grant-receiving governments in Canada. Dahlby and Warren (2003) find a similar incentive effect for Australia. Buettner (2006) uses variation in equalization rates and in the sharing rate in vertical revenue-sharing arrangements in the German state of Baden-Wuerttemberg to estimate the incentive effect of transfers. He finds evidence of a positive incentive effect. Egger, Koethenbuerger and Smart (2010) uses a large-scale reform of equalization rates in the German state of Lower-Saxony as a natural experiment to identify a causal effect of fiscal capacity equalization on municipal tax policy. The aforementioned literature abstracts from the issue of how political institutions and fiscal equalization intertwine.

There is an evolving empirical literature on political economy which compares economic outcomes across political regimes.[2] Previous empirical work on the comparison of majoritarian and proportional system has been done by, for instance, Persson and Tabellini (1999) and Milesi-Ferretti et al. (2002), comparing spending outcomes between majoritarian and proportional systems and by Persson et al. (1997, 2000), comparing spending outcomes in presidential systems versus parliamentary systems. Empirical work on the comparison of council-manager systems (proportional, parliamentary representation) and

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[2]Theoretical 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.

mayor-council system (having elements of a majoritarian, presidential system) include Egger, Koethen-buerger and Smart (2007) and Coate and Knight (2009).[3] They look at spending outcomes in German and US municipalities, respectively. The papers do not lean themselves to the issue of how incentive effects of fiscal equalization play out under different electoral rules.[4]

The omission might not be surprising. Identification of a causal effect requires quasi-randomization in two dimensions, i.e. of electoral rules and of equalization rates, which are rarely available in empirical work.

3 Reforms

Our analysis builds on two reforms which allows us to use quasi-experimental techniques to draw causal inference. The two reforms were phased in at different times. The first reform became effective as of 1996 and changed the electoral rule in municipalities. Municipalities transitioned to the new electoral system over a period of twelve years. The second reform became effective as of 1999 and involved immediate changes in the equalization formula for all municipalities. We will describe the details of the 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 comprises 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 hypothetical tax rate, which the state government selects, to arrive at a measure of fiscal capacity; that is, an amount of tax revenues which can be collected if the municipality were to levy the hypothetical tax rate. Any deficiency between fiscal needs and fiscal capacity is at least partly compensated by transfer payments.

To understand the incentives for local tax policy induced by the transfer system, it is useful to con-

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[3]See 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.

[4]There 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.

sider a snapshot of the equalization formula used in calculating transfers:

$$T(B) = \alpha \, (N - B(t)) \qquad 0 \le \alpha \le 1, \tag{1}$$

where N denotes a level of target spending (fiscal need), t denotes the business tax rate, and $B(t)$ is the tax base, which is negatively sloping, $B'(t) < 0$. 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, 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).[5] In practice, the transfer formula is typically non-linear with different linear segments, each 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. Such a 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

Figure 1 expresses 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 $B \le \theta^0 N$, so the constraint has slope -1 in this interval; 50 per cent of

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[5]See also Koethenbuerger (2000) and Bucovetsky and Smart (2006).

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 manger. The manger

was head of administration and in charge for the daily operation of bureaucracy. It 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.[6] 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 "gridlock" 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 thereby 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 the sole right to propose 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 incentive effects of the reform across the two electoral regimes. Since the municipality mangers' 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.

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[6]The mayor-council system and the council-manager system are also the predominant form of city government in the US. See Svara (1990).

4 Data

We employ annual data on municipalities in the state of Lower Saxony over the time period 1994 - 2004. In order to guarantee a clean design for the identification of the reform effects, we restrict the sample by eliminating all municipalities which transitioned to the new electoral regime between 1999 and 2004. This leads to a total number of 351 municipalities included in our analysis out of all 1022 municipalities in the state of Lower Saxony. In the remaining sample, municipalities have either transitioned to the new electoral system at the time the equalization reform became effective or have not transitioned to it until 2005. Given the sample choice, the electoral reform status of the municipalities stays the same over the period 1999 to 2004, allowing for a clean identification of how the business tax rate of municipalities responded over the period 1999 - 2004.

Extending the time window to years after 2004 would result in a significant loss in observations in the non-reform group of municipalities. Since virtually all municipalities work under the new electoral system following 2005 onwards, sufficient variation in the electoral reform status can only be exploited from years prior to 2005. Similarly, it is not possible to exploit information from years prior to 1999, since the number of municipalities working under the new electoral system was too small and the equalization reform took place in 1999 (with no indication of any anticipation effects).[7] The question at stake is how municipalities working under the old versus the new electoral rule adjusted their tax rates in response to the reform of the equalization formula.

As our dependent variable, we use data on the business tax rate (Gewerbesteuer) which, in Germany, is set at the municipal level.[8] Furthermore, we employ information about the transfer formula as illustrated in Figure 1 before and after the equalization reform for each municipality. We use individually-collected data on the timing of electoral reforms at the municipal level. We also use socio-economic characteristics of the respective municipalities such as population (inhabitants, age structure, and pop-

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[7]See Egger, Koethenbuerger, and Smart (2010) which uses the full sample to test for anticipation effects in 1998. Note, the state supreme court declared the old equalization system unconstitutional in 1997, with the request to implement a new system as of 1999.

[8]The three most important sources of own-source tax revenues are the business tax (Gewerbesteuer), 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. Besides this, it is also the largest revenue category which municipalities can control.

ulation density) and income per capita. Also, we account for geographical characteristics of a municipality (land used for agriculture, forests, water sheds, and size of the road network). Finally, we employ political characteristics such as the party composition of the local government (social democrats, liberals, conservatives, and the greens). These socio-economic, geographical, and political characteristics are employed as control variables to make sure that the estimated treatment effects of the equalization reform for municipalities under the old and the new electoral regime are not confounded by omission of these observables. Data on socio-economic, geographic, and political characteristics are available from the respective statistical office (Statistisches Landesamt), most of it is available in a on-line data base.[9]

As in Egger, Koethenbuerger, and Smart (2010), 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). As said before, we exclude municipalities which changed their electoral system between 1999 and 2004. Then, we consider the impact of the equalization reform in municipalities with electoral reform versus ones without electoral reform in 1999 relative to the control group. The latter is defined as municipalities which were not eligible for supplementary transfers prior to 1999. Table 1 tabulates the number of supplementary transfer eligible and non-eligible municipalities against ones with and without electoral reform in our sample. As shown in the table, 66.7 per cent of the 351 municipalities considered here 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 which adopted the electoral reform before 1999 were not eligible for equalization transfers. About 40.7 percentage points of municipalities which were eligible for equalization transfers ran under the old electoral regime over the period 1999 - 2004.

Insert Table 1 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 at least 2005 in Figure 2. 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 which were not eligible for supplementary transfers prior to 1999 and

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[9]The link is http://www1.nls.niedersachsen.de/Statistik/.

which did not undergo the electoral reform until 2005 (referred to as control group) and two treatment groups: municipalities which were eligible for supplementary transfers, but did not undergo electoral reform until 2005 (displayed by the dashed line), and ones which were eligible but reformed their electoral system in 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, Koethenbuerger, and Smart, 2010). From Figure 2, it is quite 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 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 2 here

5 Estimating the reform effect: 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 in 1999-2004 relative to the average year 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 $t = 1999, ..., 2004$ as $\Delta\tau_{it}$, we will generally estimate models of the kind

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

where X_{it} is a $1 \times K$ vector of control variables which inter alia may include a constant, aforementioned determinants of tax rate change, and the main effect of the electoral reform E_i, γ_t is a $K \times 1$ vector of parameters on X_{it}, and u_{it} is a disturbance term. We will estimate these models for each year $t = 1999, ..., 2004$ separately.

In regression equation (2), 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 from 1999 onwards 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 in Table 1 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 2 here

In Table 2, we summarize the average difference of the business tax rate for municipalities by means of regression analysis. Consistent with Figure 2, 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. How big are the effects for the two groups? To answer this question, 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)[10] and in line with the empirical findings in Egger, Koethenbuerger, and Smart (2010).[11] The results differ markedly across electoral systems. The average treatment effect on municipalities with electoral reform is −0.206 in 1999 and −0.659 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 −0.110 in 1994 and reaches −0.278 in 2004, being more than 50 per cent smaller than the response of the reform group.

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

6 Estimating the reform effect: endogenous treatment effect of supplementary transfer eligibility conditional on electoral reform status

6.1 Estimation procedures for average effects of endogenous supplementary transfer eligibility

The equalization reform entails different changes in the equalization rate. Most notably, the qualitative change in rates depends on whether municipalities are eligible for a supplementary equalization payment, i.e. whether they initially operated to the left of point $\theta^0 N$ on the budget line in Figure 1. These experience a drop in the equalization rate, while the other municipalities 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 2 might thus be biased.

Wooldridge (2002) suggests estimating the average effects of endogenous treatments (ATE), if treatment effects vary according to interactive effects. One suggested procedure may be referred to as a generalized Heckman-type model which entails estimating a switching regression that accounts for self-selectivity (Heckman, 1978). In contrast to Heckman's original model, the one to be used here includes two independent inverse Mills ratios, one for the treatment group ($S_i = 1$) and one for the control group

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[10]Municipalities 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 3. Hence, the former group should have decreased the tax rate, while the latter municipalities should have increased their tax rates.

[11]In Egger, Koethenbuerger, and Smart (2010), we use the universe of 1022 municipalities in Lower Saxony. We equally find an increase in the gap in tax rates between supplementary transfer eligible and non-eligible municipalities, $\beta_{S,t} < 0$, but at a higher level of significance. The reason why we get less significant results here is related to the reduced sample size. Redoing regression (2) in the reduced sample without the interaction term yields similar (in magnitude and in statistical significance) average treatment effects as in Table 2.

($S_i = 0$). These are added to the list of independent variables in regression (2). To calculate the inverse Mills ratios, one ought to estimate a probit model in a first step. The model we use is a cross section model that is estimated on time averages for the period 1994-98. The results are available upon request.

Alternatively, the prediction of this probit model can be used to estimate the probability of $S_i = 1$, $\hat{S}_i$, and use it as an instrument for S_i in a two-stage least squares model. Similarly, the interactive term $S_i \times \tilde{E}_i$ in (2) will be instrumented by $\hat{S}_i \times \tilde{E}_i$. In subsequent analysis, we will apply both procedures.

6.2 Results

In Table 3, we summarize the results for the generalized Hecknman models, while we report the corresponding findings for the instrumental variables models in Table 3 and Table 4. Qualitatively, the results are quite similar between Tables 3 and 4. In general, the endogenous treatment effect models point to bigger average treatment effects of equalization reform for both municipalities with and without electoral reform than the exogenous treatment models in Table 2 do. However, the magnitude of the estimated treatment effect of electoral reform is somewhat bigger under instrumental variables estimation. For 2004, the estimate of the average treatment effect of municipalities with electoral reform is -1.212 in Table 3 while it is -1.438 in Table 4. The corresponding effects on municipalities without electoral reform are -0.830 in Table 3 and -1.042 in Table 4. Hence, both procedures point to a difference in the average treatment effects between municipalities with and without electoral reform of about one-third of the magnitude of the former. Hence, the magnitude of the treatment effects is bigger when considering endogenous selection than when ignoring it. However, the relative reaction of municipalities with or without electoral reform is less pronounced than in Table 2, where the response for municipalities with electoral reform was about three times as big as the one for municipalities without electoral reform as of 2004. However, comparing the response across electoral regimes with endogenous selection, the response of municipalities which have transitioned to the mayor-council system is roughly 50 per cent larger than the response of municipalities which still operate under a council-manager system as of 2004 and generally also in previous years. The pattern holds under instrumental variable estimation and in the generalized Heckman model.

Insert Tables 3 and 4 here

In Table 5 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 the 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 (Gewerbekapitalsteuer) and, to compensate for the loss in revenue, receive 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 5, the two sensitivity analyses leave the basic findings of the analysis intact, both in terms of the magnitude of the coefficients and their statistical significance.

Insert Table 5 here

In a final exercise, we add a measure of equalizing transfer income to the regression equation (in addition to the aforementioned covariates). 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 transfer income is a precarious exercise. Actual transfer income is endogenous and using it as a explanatory variable would bias the results. 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 yearly adjustment in the per-capita grant (Grundbetrag).[12] To calculate the proxy, we use the population size and fiscal capacity averaged over the pre-reform period 1995-97. Again, the basic findings remain intact, showing that the change in the business tax rates across the different electoral regimes is related to the change in the equalization rates.

7 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

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[12]Fiscal 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 and would potentially bias our results.

which changed (i) the electoral rule under which the mayor is elected 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 which have transferred significant decision-powers to the mayor appear to react more strongly to the equalization reform. The result points to the more general issue of how responsive municipalities are 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. 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. For instance, 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. 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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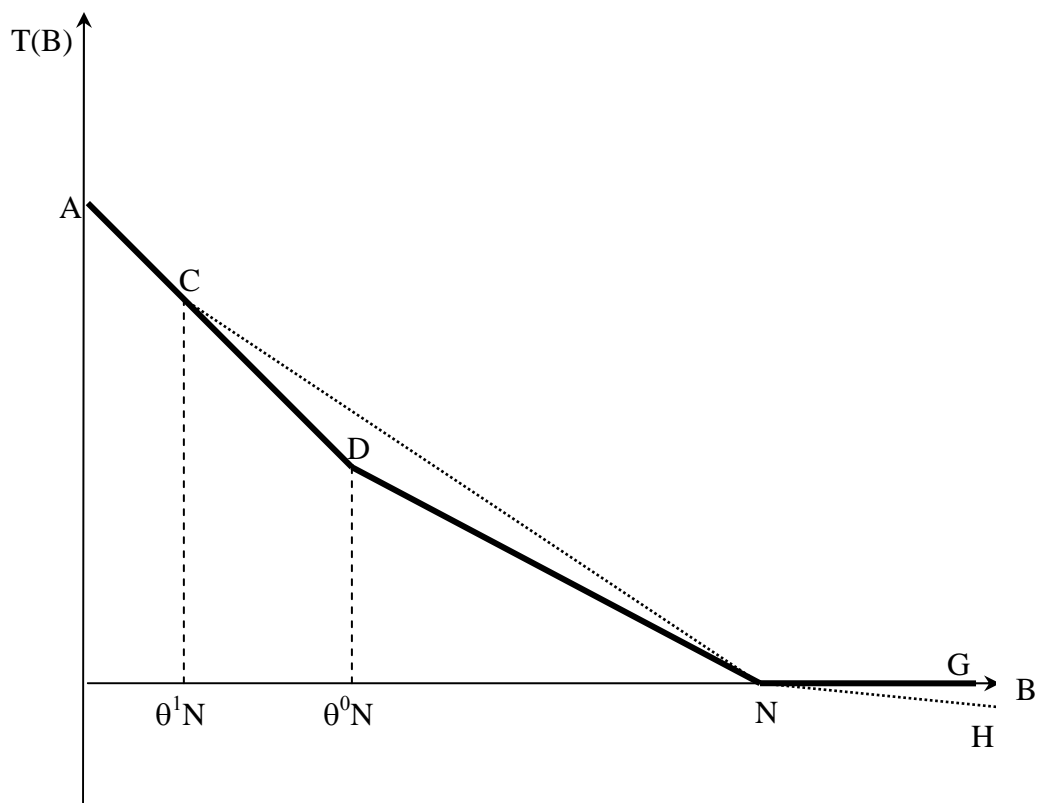
Figure 1: Equalization Formula

Table 1 - Electoral Reform and Supplementary Transfer Eligibility on Business Tax Rates in Lower Saxony (1999-2004)

Type of municipalities	Percentage
Supplementary transfer eligibility	66,7
Electoral reform	38,7
Electoral reform & Supplementary transfer eligibility	25,9
	Number
All observations	351

Figure 2 - Business Tax Rate Changes in Lower Saxony for Municipalities with and without Electoral Reform (1999-2004 relative to 1994-98)

Table 2 - 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	-0,147 #	-0,290 ***	-0,349 ***	-0,505 ***	-0,353 **	-0,426 ***
	0,094	0,096	0,096	0,130	0,144	0,140
Electoral reform × Supplementary transfer eligibility	-0,096	-0,103	-0,163 *	-0,188 #	-0,421 ***	-0,381 ***
	0,092	0,094	0,096	0,129	0,143	0,138
Observations	351	351	351	351	351	351
R^2	0,045	0,055	0,061	0,064	0,051	0,064
Root mean squared error	0,759	0,779	0,792	1,061	1,181	1,144

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.
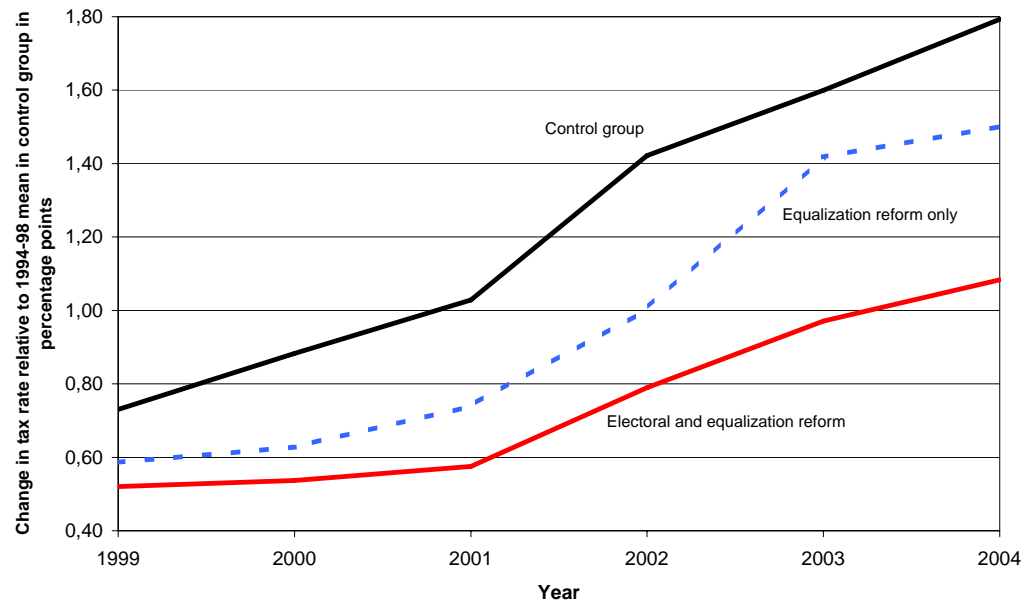
Table 3 - Effects of Supplementary Transfer Eligibility on Business Tax Rates in Lower Saxony for Municipalities with and without Electoral Reform (1999-2004) (Endogenous treatment effect models)

Supplementary transfer eligibility as a determinant of business tax rates	Estimates are based on generalized Heckman models (Wooldridge, 2002, p. 608)					
	1999	2000	2001	2002	2003	2004
	Municipalities with electoral reform					
Supplementary transfer eligibility	-0,222	-0,361	-0,373	-0,765 *	-1,052 **	-0,978 **
	0,297	0,294	0,295	0,440	0,479	0,477
Electoral reform × Supplementary transfer eligibility	-0,085	-0,094	-0,156 #	-0,172	-0,391 ***	-0,382 ***
	0,095	0,096	0,098	0,132	0,144	0,138
Observations	351	351	351	351	351	351
R^2	0,078	0,062	0,066	0,061	0,061	0,079
Root mean squared error	0,717	0,784	0,796	1,067	1,182	1,145
Joint significance of inverse Mills ratios (p-value)	0,399	0,426	0,335	0,765	0,092	0,062

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.

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Table 4 - 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	0,024	-0,126	-0,131	-0,707 *	-1,141 **	-1,195 **
	0,296	0,292	0,298	0,422	0,473	0,472
Electoral reform × Supplementary transfer eligibility	-0,183 #	-0,172	-0,261 **	-0,218	-0,353 *	-0,396 **
	0,122	0,122	0,124	0,173	0,193	0,183
Observations	351	351	351	351	351	351
R^2	0,028	0,044	0,061	0,050	0,088	0,115
Root mean squared error	0,768	0,789	0,792	1,070	1,244	1,203

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.

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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
Benchmark (as in Table 4)						
Supplementary transfer eligibility	0,024	-0,126	-0,131	-0,707 *	-1,141 **	-1,195 **
	0,296	0,292	0,298	0,422	0,473	0,472
Electoral reform × Supplementary transfer eligibility	-0,183 #	-0,172	-0,261 **	-0,218	-0,353 *	-0,396 **
	0,122	0,122	0,124	0,173	0,193	0,183
Additional political controls (I)						
Supplementary transfer eligibility	0,112	-0,017	-0,087	-0,690 #	-1,104 **	-1,167 **
	0,296	0,294	0,305	0,427	0,473	0,474
Electoral reform × Supplementary transfer eligibility	-0,210 *	-0,204 **	-0,274 *	-0,218	-0,354 *	-0,395 **
	0,124	0,126	0,126	0,175	0,193	0,184
Additional controls as in (I) plus value added tax (II)						
Supplementary transfer eligibility	0,108	-0,019	-0,070	-0,684 #	-1,104 **	-1,179 **
	0,298	0,294	0,308	0,436	0,480	0,480
Electoral reform × Supplementary transfer eligibility	-0,212 *	-0,211 *	-0,268 **	-0,216	-0,355 *	-0,399 **
	0,124	0,125	0,126	0,173	0,191	0,182
Additional controls as in (II) plus income effect control (III)						
Supplementary transfer eligibility	0,125	0,040	-0,002	-0,683 #	-1,158 **	-1,184 **
	0,342	0,331	0,327	0,455	0,511	0,510
Electoral reform × Supplementary transfer eligibility	-0,187 #	-0,200 #	-0,261 **	-0,176	-0,338 *	-0,379 **
	0,126	0,127	0,126	0,170	0,189	0,180

Notes: Control variables at the municipality level in the benchmark models are 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.

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