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Yardstick Competition
in German Municipalities

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Yardstick Competition in German Municipalities

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Abstract

Does increasing transparency improve fiscal policy behavior of local governments? One way this could take place is via Yardstick Competition between incumbents of neighboring municipalities. This paper contributes to the literature by introducing a simple model which employs probabilistic voting to show the effect of Yardstick Competition on the amount of political rents diverted from the tax revenue. Since additional rents lower the probability of being reelected, the incumbent will reduce equilibrium rents if voters use information on fiscal performance in similar municipalities to evaluate the incumbent's quality. I test this hypothesis on a panel dataset of municipal budget and electoral data in the German state of Northrhine-Westphalia. I show evidence for Yardstick Competition in the local business and property tax rates.

Keywords: transparency, local public finance, political economics,
spatial econometrics

JEL Codes: H71, H73 , R59

Kurzfassung

Kann zunehmende Transparenz im kommunalen Budgetprozess die fiskalpolitische Disziplin der politischen Entscheidungsträger verbessern? In dieser Arbeit wird ein positiver Modellrahmen entwickelt, anhand dessen die Wirkungsweise von steigender Transparenz auf das Entscheidungsverhalten von Kommunalpolitikern durch den Yardstick Competition Effekt dargestellt werden kann. Politiker reduzieren die Veruntreuung finanzieller Mittel, wenn ihr Verhalten von den Wählern relativ zur Leistung von Politikern in benachbarten Kommunen bewertet wird. Unter Anwendung von Methoden der räumlichen Ökonometrie auf kommunale Haushalts- und Wahldaten der Jahre 1989 bis 2004 wird gezeigt, dass die räumliche Korrelation in den Gewerbe- und Grundsteuerhebesätzen in Nordrhein-Westfalen auf die Existenz von Yardstick Competition zurückzuführen ist.

Schlüsselworte: Transparenz, Kommunal финанzen, Politökonomie,
räumliche Ökonometrie

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1 Introduction

Yardstick Competition has been widely examined over the past decade. Interaction between politicians and voters is characterised by delegation of decision-making power, which constitutes a principal-agent-relationship with voters being the principals and politicians being their agents. Officials' fiscal behavior is influenced by a competitive relationship to their counterparts in similar regions because voters compare fiscal policy outcomes between jurisdictions on the same federal level. Uncertainty about own quality in relation to that of other politicians constrains political rentseeking. This effect is reinforced by increased transparency in the political process, since the availability of information about fiscal policy outcomes advances the citizens' ability to monitor political behavior.

Yardstick Competition was introduced by scholars like Baiman and Demski (1980), Holmstrom (1982) and Shleifer (1985) as a means to increase efficiency of firms in monopolistic markets by reducing informational asymmetries. By looking at similar enterprises, the regulator is able to better assess the monopolists cost structure, thereby establishing an indirect competition between the managers of these firms. Besley and Case (1995) transferred the idea to the field of public economics. In a seminal contribution, they show that yardstick competition can detain politicians to set tax rates above their efficient levels.¹ The relationship between voters and politicians resembles that between owners and managers of the same firm. Voters acquire information to evaluate their politicians by looking at fiscal outcomes in similar jurisdictions. Authors like Belleflamme and Hindriks (2005), Besley and Smart (2007), Bordignon et al. (2004), Wrede (2001) or Seabright (1996) point out that at least in some circumstances, yardstick competition can have positive welfare effects by reducing predatory behavior of government officials.

These theoretical predictions have been widely tested on a vast amount of datasets mostly of municipal data. In general, the existence of yardstick competition should lead to spatial autocorrelation in fiscal variables. If voters compare fiscal outcomes in their own jurisdiction to those in similar jurisdictions, one presumes that values of fiscal variables of municipalities with a similar economic structure show a stronger correlation than values of municipalities that do not resemble each other as closely. Spatial autocorrelation can be detected using spatial econometric methods, the foundations of which are thoroughly described in Anselin (1988). A simple implementation of the concept of similarity in the local public finance context is to

¹On the other hand, Acemoglu et al. (2007) show that politicians themselves have instruments to reduce the influence of yardstick competition.

compare fiscal variables of contiguous municipalities as opposed to values of jurisdictions that do not share a border.

Evidence for spatial autocorrelation in public expenditures of American states is presented by Case et al. (1993), Kelejian and Robinson (1993), Saavedra (2000) and Figlio et al. (1999). On the revenue side, Ladd (1992) detects significant spatial dependence between American county taxes, and Brueckner and Saavedra (1997) confirm these results for American municipalities. More recent analyses of tax policy setting in various countries point in the same direction, as Heyndels and Vuchelen (1997) demonstrate for Belgian, Brett and Pinske (2000) for Canadian, Edmark and Agren (2008) for Swedish, Revelli (2002b) for British and Solé-Ollé (2003) for Spanish local authorities.

In this paper, I present a model, in which the welfare losses caused by the principal-agent relationship between voters and politicians is attenuated by the presence of yardstick competition. The analysis draws on earlier work by Revelli (2002a). It extends his approach by using probabilistic voting to directly show the effect of increased transparency concerning fiscal policy outcomes on rent-seeking of selfish politicians.

To prove the existence of yardstick competition, one has to disentangle the effect from spatial correlation caused by other factors. Neighboring municipalities are likely to be characterised by the same structural conditions, both in economic and geographic terms. It seems reasonable to assume that these entities are affected in the same way by economic downturns or structural change. To separate the effect of strategic fiscal policy setting caused by yardstick competition from influences of the general economic circumstances on political behavior, it is possible to use unique institutional features of the political process. Revelli (2006) interprets a drop in the magnitude of spatial correlation in social service expenditure of British lower and upper tier federal authorities caused by the introduction of Social Service Performance Rating as a proof of the existence of yardstick competition. He argues that increased transparency enhanced voters' ability to evaluate their incumbents quality more directly. They did not have to rely as much on information from outside their own jurisdiction, which made politicians look at their neighbors expenditure policy to a lesser extent. Bivand and Szymanski (1997) examine the impact of a change in contracting regulations of the British garbage collection industry and find evidence for efficiency gains through yardstick competition enhancing policies. Besley and Case (1995) make use of the fact that American governors face binding term limits. In the presence of yardstick competition effects, spatial correlation should only

be observed in states where the current government aims for reelection. Applying instrumental variables regression methods, the authors show that this is indeed the case. Bordignon et al. (2003) also use binding term limits of Italian mayors as the means to separate yardstick competition from simple tax mimicking. They find positive evidence for the presence of yardstick competition. Revelli (2001) examines tax setting behavior in British counties and districts and points out that tax setting follows a spatial pattern within one federal tier, but not in between governmental tiers. Allers and Elhorst (2005) identify a difference in tax mimicking behavior between dutch municipalities where the government is backed by a large majority compared to governments that are less likely to be confirmed in office. Revelli and Tovmo (2007) show that staff in Norwegian local administrations compare the results of their own public projects with those of neighboring jurisdictions.

Vermeir and Heyndels (2006) use popularity equations to show the existence of yardstick competition in Belgian municipalities. They regress the vote share of the incumbent party on the jurisdictions tax rate and the neighboring jurisdictions' tax rates. Since the own tax rate shows a negative effect on the vote share while the neighbors' tax rates have a positive impact, the authors conclude that yardstick competition plays a role in the tax setting behavior of local authorities in Belgium.

In line with the approach of Vermeir and Heyndels (2006), this paper investigates the effect of several local government expenditure and revenue aggregates and their spatial lags on the election results of the party in office during the past legislative period.

The course of the analysis is the following: Section 2 presents a simple model of probabilistic voting in the context of a two-tiered federal state. Section 3 describes the empirical implementation of the model's implications and describes the dataset used in the analysis. Section 4 provides the results of the estimations and Section 5 concludes.

2 Rent-seeking in local jurisdictions

Consider an economy of n municipalities where the representative individual delegates decision-making-power to a politician who does not maximize social welfare but follows his own agenda. The representative voter derives utility from private and public consumption. Private consumption consists of his endowment which is normalized to unity less a lump-sum tax τ_{it} , levied by the local government i in period t . Public consumption is determined by the provision of a local public good

g_{it} .

$$w_{it} = (1 - \tau_{it}) + \alpha g_{it} \quad (1)$$

Out of the taxrevenue, the incumbent politician finances the public good, personal rents r_{it} and a general economic cost shock $\eta_{it} > 0$, which is randomly determined. The amount of the provision of the public good is fixed, \bar{g}_t . This resembles the fact, that a significant amount of local public expenditure is determined by state or federal law, which cannot be influenced by local politicians.² The politician can divert money from the tax revenue in form of personal political rents. For the representative individual, these rents constitute outright waste since they directly lower the amount of private consumption. r_{it} cannot be observed by the voters, constituting an informational advantage of the politician. The government budget constraint has the form

$$\tau_{it} = \bar{g}_t + r_{it} + \eta_{it}, \quad (2)$$

where η_{it} displays the fiscal consequences of a negative economic shock, which cannot be observed by the voters. If municipality i is hit by a negative shock, the tax rate has to rise in order to finance the same amount of the public good and personal rents. In the eyes of the voter, political rents are a normally distributed random variable with expected value $E(r_{it}) = 0$ and variance σ_r^2 . Likewise, η_{it} is a normally distributed random variable with expected value $E(\eta_{it}) = 0$ and variance σ_η^2 which decreases the financial margin of the politician. Personal rents are the only choice variable of the politician. Tax rates are indirectly determined, once the value of the economic shock is apparent.³ The economic shock constitutes the informational disadvantage of the voters. Since they observe the tax rates they pay and know about the amount of public goods the incumbent is forced to provide, they are aware of overpayments of public output. However, they cannot distinguish whether this overpayment is caused by negative economical influences (positive η_{it}) or rent-seeking politicians (positive r_{it}). This gives governmental decisionmakers the opportunity to use public funds for personal benefit without being detected and punished in the elections. r_{it} und η_{it} are statistically independent. The incumbent's utility function can be expressed as

$$v_A = \sqrt{r_1} + p_I \beta (R + r_2). \quad (3)$$

²Schoch and Wieland (1995) state, that in Germany only 10 % of local public expenditure is completely self-determined. For a comprehensive review of the reasons for the restriction of decision-making-power of local administrations in Germany, see Schwarting (2006).

³This resembles the fact, that German local politicians have decision power over certain local tax rates.

The incumbent politician derives utility by extracting personal rents from the public budget. In period 1, he gets a direct benefit from his rentseeking activities. In period 2 overall rents are discounted by the reelection probability of the incumbent, p_I , and a discount factor β . While r_2 denotes the personal rents taken out of the tax revenue, R corresponds to an ego rent the incumbent enjoys by simply holding office in period 2. If there is no chance of being reelected ($p_I = 0$), the incumbent will provide the institutionally determined amount of the public good and will maximise r_1 by setting maximum taxes in period 1 ($\tau = 1$). This predatory behaviour is reduced by the politician's incentive to win the election to receive period 2 rents.

A contiguous municipality j is identical to i with respect to the parameters of the stochastic variables' distributions, the pool of politicians the incumbent and his opponent are drawn from and the institutional features of the political process. The realised values of η_i , η_j , r_i and r_j thus differ from each other. Voters in jurisdiction i are able to observe tax rates in municipality j , τ_j , and know the amount of public good provided, because it matches the amount their own government has to provide. Voters use information to reduce the informational advantage of their incumbent politician.⁴

2.1 Voters' Expectations

Political rents r_i cannot be observed by the inhabitants. They know the amount of taxes they pay and the amount of public good provided, as well as the probability distributions of political rents and the exogenous shock in both municipalities. To evaluate the quality of the incumbent, voters form expectations about the amount of rents diverted from the tax revenue. After observing tax rates in both localities, they form these expectations by weighting these values with the stochastic parameters of economic shocks and political rents. The expected value conditional on the actual values of municipality i 's and j 's tax rates can be derived as

$$\begin{aligned} E(r_{it}|\tau_i, \tau_j) &= \left(\frac{\sigma_{\tau_i r_i} \sigma_{\tau_j}^2 - \sigma_{\tau_i \tau_j} \sigma_{\tau_j r_i}}{\sigma_{\tau_i}^2 \sigma_{\tau_j}^2 - \sigma_{\tau_i \tau_j}^2} \right) (\tau_i - \bar{g}_t) + \left(\frac{\sigma_{\tau_i}^2 \sigma_{\tau_j r_i} - \sigma_{\tau_i \tau_j} \sigma_{\tau_i r_i}}{\sigma_{\tau_i}^2 \sigma_{\tau_j}^2 - \sigma_{\tau_i \tau_j}^2} \right) (\tau_j - \bar{g}_t) \\ &= \alpha (\tau_i - \bar{g}_t) + \gamma (\tau_j - \bar{g}_t) \end{aligned} \quad (4)$$

⁴When assessing the quality of their incumbent, voters will use information about the fiscal performance in every similar municipality. Thus, the values of the tax rates, the economical shock and the political rents of municipality j can be interpreted as weighted averages of the values of all comparable jurisdictions.

This approach is analogous to Revelli (2002a).

with

$$\alpha = \frac{\sigma_{\tau_i r_i} \sigma_{\tau_j}^2 - \sigma_{\tau_i \tau_j} \sigma_{\tau_j r_i}}{\sigma_{\tau_i}^2 \sigma_{\tau_j}^2 - \sigma_{\tau_i \tau_j}^2} = \frac{\nu}{1 - \mu^2 (1 - \nu)^2} \quad (5)$$

and

$$\gamma = \frac{\sigma_{\tau_i}^2 \sigma_{\tau_j r_i} - \sigma_{\tau_i \tau_j} \sigma_{\tau_i r_i}}{\sigma_{\tau_i}^2 \sigma_{\tau_j}^2 - \sigma_{\tau_i \tau_j}^2} = -\mu \frac{\nu(1 - \nu)}{1 - \mu^2 (1 - \nu)^2}. \quad (6)$$

In this expression, $\sigma_{\tau_i r_i}$ denotes the covariance of the tax rate and rents in municipality i , $\sigma_{\tau_i \tau_j}$ the covariance of the tax rates in both jurisdictions, $\sigma_{\tau_j r_i}$ the covariance of the tax rate in j and rents in i , and $\sigma_{\tau_i}^2$ and $\sigma_{\tau_j}^2$ denote the variances of the tax rates of both localities.

$$\mu = \frac{\sigma_{\eta_i \eta_j}}{\sigma_{\eta_i} \sigma_{\eta_j}} \quad (7)$$

is the coefficient of correlation of the economic shocks in both municipalities. It is restricted to be positive ($\mu \geq 0$). μ indicates the economic similarity between both jurisdictions.

$$\nu = \frac{\sigma_r^2}{\sigma_\eta^2 + \sigma_r^2} \quad (8)$$

is a measure of the relative variance of the two stochastic variables in the model. Uncertainty about the actual realizations of rents and the economic shock are essential to the assessment of the incumbents quality. μ determines the importance of information about political outcomes in municipality j for the voter's judgement in locality i . If μ is positive, a difference between tax payments and public consumption in jurisdiction j lowers the conditional expectation of the value of rents diverted by the incumbent in municipality i in equation (4). According to equation (6), γ will in this case be negative. If the economic shocks are correlated and the tax payments exceed the amount of public good provided in both localities, it is more likely that this is caused by the development of the general economic situation than by rent taking of the incumbent politician.

The variance of the political rents can be interpreted as the quality of politicians in general. If σ_r^2 is relatively large, voters face more difficulties in assessing their politicians' quality and politicians consider taking high rents in this case. Looking at equation (5), it is obvious that $\frac{\partial \alpha}{\partial \nu} > 0$. High values of σ_r^2 thus cause the term $(\tau_i - \bar{g}_t)$ to have a large impact on the conditional expectation of political rents in equation (4).

In case of uncorrelated economic shocks ($\mu = 0$), fiscal conditions in jurisdiction j (τ_j and \bar{g}_t) do not influence the judgement of voters in municipality i . Knowledge

of these values is meaningless, because differences between tax payments and public consumption in both jurisdictions can solely be caused by economical disparities between these municipalities. Voters in municipality i can differentiate between rents and the influence of the economy to a lesser extent. Equation (5) shows that $\alpha = \nu$ if $\mu = 0$. Even in the instance of a benevolent government, $(\tau_i - \bar{g}_t)$ has a negative impact on the voters' assessment of the incumbent's quality. Although due to recessive tendencies in the economy, the uncertainty in r_{it} and η_{it} causes voters to infer that the government is malevolent to some extent and raise their expectation concerning rents over the initial expected value $E(r_{it}) = 0$.

If rent extraction was observable, the variance of rent collection would be $\sigma_r^2 = 0$. This implicates $\nu = 0$ and the expected value of rents conditional on the observations of the tax rates in both jurisdictions is $E(r_{it}|\tau_i, \tau_j) = 0$. The difference between tax rates and public good provision will exclusively be addressed to the existence of an economic shock. On the opposite, a high variance of political rents makes it more probable that an incumbent politician diverts personal rents from the tax revenue. In this instance, $(\tau_i - \bar{g}_t)$ has a relatively large impact on $E(r_{it}|\tau_i, \tau_j)$.

The timing of the model is as follows: At the beginning of period 1 the incumbents in localities i and j are elected. Then, the higher tier government decides over the amount of public good provided (\bar{g}_t), independent of political decisions in the municipalities. Nature sets the value of the economic shock and the incumbent decides simultaneously on the amount of his personal rents. Tax rates are determined residually. At the end of Period 1, voters observe tax rates in both municipalities, form their expectations about the height of political rents and vote.

2.2 Voting

Political performance is not the only criterion politicians are judged upon. In addition to the amount of rents diverted from government revenue, the result of the election is influenced by a general preference for the incumbent politician in the electorate. Personal attributes of the politician in office, a general preference for certain parties or the political atmosphere in the weeks ahead of the election can have a decisive impact on municipal elections in a federal state. These factors cannot be influenced by the incumbent. Thus, the stochastic variable κ is introduced into the model. κ denotes the general preference for the incumbent and is identically and independently distributed in the interval $[-\frac{1}{2\Phi}, \frac{1}{2\Phi}]$. The distribution is uniform, the density function thus can be depicted by $f(\kappa) = \Phi$ and the expected value is $E(\kappa) = 0$. κ adopts negative values if the politician is less popular than his

challenger.

The density of κ can be interpreted as the ideological homogeneity of the electorate. The higher Φ , the smaller are the values κ can possibly exhibit. If Φ is large, there are no extreme standpoints in the electorate. The incumbent will be reelected, if the conditional expectation of political rents less his own value of popularity is smaller than the expected rents of his opponent. The expected value of political rents of the challenger equals the initial expected value of the incumbent, $E(r_i) = 0$, since voters do not have further information about the political competence of the challenger.⁵ The incumbent wins the election, if

$$E(r_i|\tau_i, \tau_j) - \kappa < E(r_i).$$

Exploiting equation (4) and the fact that $E(r_i) = 0$, this transforms to

$$\alpha(\tau_i - \bar{g}_t) + \gamma(\tau_j - \bar{g}_t) < \kappa. \quad (9)$$

Equation (9) shows the effect of political rents in both localities on the election result in municipality i . A benevolent politician will set taxes only to finance public consumption, hence in the absence of an economic shock it follows that $(\tau_i - \bar{g}_t) = 0$. If the challenger is more popular than the incumbent, κ is negative. Despite his lack of popularity, the incumbent can still win the election, if the government in the other municipality extracts rents from the tax revenue. Since γ is always negative, inequality 9 is fulfilled if $|(\tau_j - \bar{g}_t)| < |\kappa|$. Voters in municipality i observe higher taxes in the neighborhood and reward better political performance by reelecting their incumbent if the difference in tax rates is high enough to compensate for the lack of popularity. Otherwise, if $|\kappa|$ is large enough, even benevolent behavior does not guarantee reelection. If the incumbent is very unpopular, he will even be voted out of office regardless of $E(r_{it}|\tau_i, \tau_j)$.

If the incumbent is popular, he can be confirmed in office if he takes tax funds for himself and the government in the contiguous jurisdiction is benevolent. Even if his political ability is likely to be worse than the ability of his opponent, voters will reelect him if $|(\tau_i - \bar{g}_t)| < |\kappa|$.

Using probabilistic voting theory and the assumptions about the probability distributions of the stochastic variables, the reelection probability of the incumbent

⁵Other than in Coate and Morris (1995) and Belleflamme and Hindriks (2005) the initial quality of incumbent and challenger are identical, as in Besley and Smart (2007).

can be written as

$$\begin{aligned}
p_A &= \Pr(\alpha(\tau_i - \bar{g}_t) + \gamma(\tau_j - \bar{g}_t) < \kappa) \\
&= \frac{1}{2} + \Phi[1 - (\alpha(\tau_i - \bar{g}_t) + \gamma(\tau_j - \bar{g}_t))]
\end{aligned} \tag{10}$$

It is obvious that a rising tax rate in municipality i lowers the reelection probability of the incumbent government, since $\frac{\partial p_A}{\partial \tau_i} < 0$ if $\alpha > 0$. Tax rates in municipality j have a large impact on the outcome of the elections, if the correlation of economic shocks in both jurisdictions is high. In this case, μ is large and γ takes on large negative values. Tax rates of the contiguous municipality have a positive impact on the incumbent's probability of being reelected.

2.3 Political Rentseeking

The incumbent politician in municipality i decides on his personal rents r_i to maximize utility according to equation (3). Using expressions (10) and (2), the incumbent's utility can be expressed as a function of political rents in both periods.

$$v_A = \sqrt{r_{i,1}} + \left[\frac{1}{2} - \Phi[(\alpha(r_{i,1} + \eta_i) + \gamma(r_{j,1} + \eta_j))] \right] \beta(R + r_{i,2}). \tag{11}$$

It is obvious, that the effect of malversation of public funds is twofold. The incumbent derives direct utility from rent extraction in the form of the first term in equation (11). On the other hand, $r_{i,1}$ reduces the reelection probability and thus has a negative impact on v_A . Solving the first order condition for $r_{i,1}$, one obtains equilibrium rent extraction:

$$r_{i,1} = \left(2\Phi \frac{\nu}{1 - \mu^2(1 - \nu)^2} \beta(R + r_{i,2}) \right)^{-2}. \tag{12}$$

Renttaking of the politician in municipality i particularly depends on the correlation of the economic shocks μ , the second period rents ($R + r_{i,2}$), the personal discount factor β and the ideological homogeneity of the electorate. It is easy to show that the incumbent reduces his rents if voters are able to compare economical conditions in municipalities i and j in a better way. Differentiating equation (12) with respect to μ , one can deduce that $\frac{\partial r_{i,1}}{\partial \mu} < 0$. If both localities are hit by an economic shock in a similar way, voters will attribute differences in tax rates to differing rentseeking behavior rather than differences in economic conditions. A rise in the

tax rate of municipality i enlarges the absolute value of the differences between tax payments and public consumption in both municipalities $|(\tau_i - \bar{g}_t) + (\tau_j - \bar{g}_t)|$. It thus increases the conditional expectation in equation (4), which reduces the probability of reelection according to equation (10). This effect is increased by a rise in μ .

This result shows the constraint on political behavior established by the feasibility of interjurisdictional comparison of political outcomes. If voters are able to use information on fiscal variables in economically comparable municipalities, unobserved incumbent behavior can better be supervised and malevolent behavior can better be punished. Informational asymmetries between political agents and their principals are alleviated and the amount of public funds used for personal use is reduced.

This constraining effect on politicians' behavior raises the utility of the electorate. Equation (1) shows that tax rates determine the utility of the voters, since voters' income and the amount of public good provided are exogenous. Lower rents *ceteris paribus* lead to lower tax rates (equation 2) and thus raise voters' utility in equation (1).

3 Local public finance in Northrhine-Westphalia

3.1 Introduction

Referring to classical downsian argumentation, it is assumed that rational voters approve the politician whose agenda delivers them the greatest expected utility. Voters reward their incumbent for good policies by increasing his vote share and punish him for bad policies by reducing his share of the vote. The yardstick competition literature expands this point by referring to relative evaluation of politicians. The incumbent's vote share will rise if his policies are good, relative to the political agenda in economically similar, i.e. contiguous, jurisdictions. On the other hand, the vote share of the incumbent is expected to fall if his policies are worse than the ones of politicians in the surrounding jurisdictions. The model laid out in section 2 suggests that rising tax rates worsen the election result of the incumbent politician on the local tier of a federation. On the contrary, rising tax rates in contiguous localities are expected to raise the incumbent's share of the vote.⁶ Additionally, this effect is expected to be enforced by rising similarity between the municipalities.

⁶Recall the interpretation of equation (10) on page 12.

One way to detect the existence of yardstick competition is by estimating empirical models linking the share of the vote of the incumbent government to tax rates in the own and in neighboring municipalities. Drawing on classical downsian argumentation, it is assumed that rational voters approve the politician whose agenda delivers them the greatest expected utility. Thus voters reward their incumbent for good policies by increasing his vote share and punish him for bad policies by reducing his share of the vote.

Dataset The applied dataset draws on various sources. Budget data of the years 1992 to 2005 are taken from the official statistical office of Northrhine-Westphalia (Jahresrechnungsstatistik). Data for the budgetary year 2006 is taken from the quarterly cash statistics. The internet-based, free-access database Informationssystem Finanzstatistik, which is maintained by the state’s statistical office, delivered municipal tax rates, tax revenue and base values of the local taxes, as well as cash credits and public debt. Electoral data is taken from the website of the state’s department of the interior. A binary contiguity matrix of localities in Northrhine-Westphalia was delivered by the state’s statistical office on May 8, 2008. Electoral outcomes of municipal council elections in Northrhine-Westphalia are evaluated for the years 1989, 1994, 1999 and 2004.

3.2 Empirical specification

Following the reasoning of Besley and Case (1995), Revelli (2002a) and Bosch and Solé (2004) this article employs geographical proximity as a means to measure economical similarity. In the empirical investigation, the influence of economic variables of similar jurisdictions is implemented by the unweighted average value of all neighboring jurisdictions. The Spatial Lag of a variable X is calculated by multiplying the vector of a certain variable with a spatial weights matrix. I use a row-standardised binary contiguity matrix \mathbf{W} . This $\mathbf{N} \times \mathbf{N}$ matrix (\mathbf{N} being the total number of observations) contains the elements $w_{ij} = \frac{1}{\sum_j w_{ij}}$ if the corresponding municipalities are neighbors and 0 otherwise.⁷ The elements \bar{x}_i of the spatial lag \bar{X} of a variable X can thus be identified as $\bar{x}_i = \sum_{j-1}^n w_{ij}x_j$.

Drawing on Vermeir and Heyndels (2006), the estimated model has the functional

⁷For a thorough discussion of the basic elements of spatial econometrics, see Anselin (1988). Spatial weights matrices of the same type are used by Besley and Case (1995), Revelli (2002a), Büttner (2006) and Vermeir and Heyndels (2006).

form

$$S_{it}^{[t-1,t]} = \beta T_{it} + \gamma \sum_{j=1}^n w_{ij} T_{jt} + \alpha S_{i(t-1)}^{[t-1,t]} + \delta \mathbf{X}_{it} + \lambda_t + \varepsilon_{it}. \quad (13)$$

$S_{it}^{[t-1,t]}$ depicts the share of seats won in the election in year t by the incumbent party of the forgone legislative period. $S_{i(t-1)}^{[t-1,t]}$ stands for the share of seats won by the same party in the election in $t - 1$. This means that $S_{i(t-1)}^{[t-1,t]}$ is not a true lagged variable. The value of $S_{i(t-1)}^{[t-1,t]}$ is the lagged value of $S_{it}^{[t-1,t]}$ only if the same party won the elections in $t - 1$ and in t . T_{it} is the vector of the analysed local taxrate, whereas $\sum_{j=1}^n w_{ij} T_{jt}$ represents the spatial lag of these taxrates. \mathbf{X}_{it} constitutes the matrix of control variables, λ_t is a fixed time effect and ε_{it} a stochastic error term. i is a municipality and t a time index. Table 1 summarises descriptive statistics of the relevant variables.

Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	Min.	Max.
% seats incumbent	49.116	8.951	0	85
% seats incumbent (t-1)	50.798	7.310	33.333	85.714
business tax rate	392.87	32.39	260	490
business tax rate neighbor	394.638	26.751	320	470
base value business tax	3944.994	11041.896	60	165953
total expenditure	1.891	0.489	1.078	5.014
total expenditure neighbor	1.933	0.329	1.275	3.371
government fragmentation	2.689	0.448	1.342	4.429
total population	45362.989	87429.036	4134	969709
population age < 15	0.176	0.02	0.125	0.261
population age > 65	0.161	0.025	0.091	0.269
area	8606.638	5000.251	2049.8	40515.102
number of observations		1188		

Dependent Variable The dependent variable $S_{it}^{[t-1,t]}$ denotes the share of seats in the municipality council, won by the party which gained the most votes in the year $t - 1$. This does not necessarily have to be the most successful party in the election in year t . Out of the 396 localities in Northrhine-Westfalia, this was the case in 51 municipalities in 1994. In 1999, the most successful party changed in 101 jurisdictions and in 2004 there was a turnover in 29 localities. Comparing this approach to Vermeir and Heyndels (2006), the number of seats won by the governing coalition cannot be utilized, because on the local government level in Northrhine-Westfalia, council and mayor are independently elected. Thus, the position of the mayor does

not depend on a majority in the assembly, rendering fixed coalitions between parties to elect the executive irrelevant.⁸ In German municipalities, politicians often decide according to their position towards the subject rather than their party affiliation. Correspondingly, testable data on decision behavior is not available and it is impossible to gain information about which party actually sets the political agenda. As a proxy for incumbency, this paper uses the party which gained the largest fraction of seats in the council in the election in $t - 1$. In all but six cases in the dataset the party with the most seats has either been the Social Democratic Party (SPD) or the Christian Democratic Union (CDU). The exceptions have been local parties that mostly won the election by emphasizing an agenda uniquely important for the municipality.⁹

Local Tax Rates This article uses local tax rates to deliver evidence for the relevance of the yardstick competition hypothesis in local fiscal politics. Local tax revenue consists of the municipal share of the federal income and value added tax, as well as the revenue of the business and property taxes. Property taxes are twofold: Property tax A is levied on agricultural acreage and property tax B is paid for private real estate. Another minor source of income are certain local consumption taxes and fees like the hunting tax, dog license fee or the second residence tax.¹⁰

To detect the existence of yardstick competition, the only tax rates of interest are the ones which are likely to be recognised as locally determined tax rates by a majority of the voters. The general income and value added taxes are set by the federal government which makes them likely not to be used as an evaluation criterion of the quality of local politicians. Local governments derive only a small fraction of their total revenue out of local consumption taxes and fees, so these are weak indicators for incumbent policy evaluation as well.¹¹ German local governments have the

⁸An alternative Method of modelling the election outcome is employed by Case (1993). In her contribution, the dependent variable is a dummyvariable indicating whether the incumbent was reelected.

⁹In the municipality of Beelen, the free voters union (FWG) is traditionally the strongest party. In the municipal council elections 1989, 1994 and 2004 it gained the largest share of the vote. In 1999 the CDU and the FWG won the same number of seats in the assembly. However, since the FWG drew a larger share of the vote, it is considered incumbent in the period between 1999 and 2004. In the small town of Schalksmühle the independent voters union (UWG) gained the most seats in all four elections. In Hallenberg, the citizen's list (BL) drew 18 of 21 seats in the assembly in 1989 and in Hallenthal, the citizens' association turned out to be the winner of the election. Voters punished the well-established politicians for an unfavorable sewage policy.

¹⁰For a more detailed description of German local taxes, see Innenministerium des Landes Nordrhein-Westfalen (2007), p.16.

¹¹According to Schwarting (1999), in the late 1990s, the share of revenue collected by these taxes amounted to less than 2 percent of total German municipal revenue.

right to add a municipal tax rate on federal business and property tax rates. These rates vary widely between local jurisdictions, making them reasonable indicators for local political behavior. In the econometric analysis, the key explanatory variables thus are local business and property tax rates T_{it} and their respective spatial lags $\sum_{j=1}^n w_{ij}T_{jt}$.

Hypotheses Considering the results of the theoretical model laid out above, one can presume that rising tax rates in the municipality should have a negative effect on the election result of the strongest party. Voters punish politicians in charge for setting high tax rates. According to the yardstick competition hypothesis, the levels of tax rates in the surrounding localities are taken into account by the voters when evaluating tax policy. If the neighbors set high tax rates as well, the election result of the incumbent party should be better than in the opposite case.¹²

Control Variables Obviously the election result does also depend on factors independent of local tax policy. To control for these influences, several control variables are included into the regression equation. First, behavioral voting is controlled for by using the share of the seats obtained in the election in $t - 1$ by the strongest party in the election $S_{i(t-1)}^{[t-1,t]}$. As indicated in the model above, the electorate tends to have a general ideological preference for a certain party and the election result in a municipality is likely to be biased towards one of the parties running for office.

Since GDP data is not available for municipalities in Northrhine-Westfalia, the base value of the local business tax is incorporated into the model to account for the influence of changes in the population's wealth.¹³ It seems reasonable to expect a positive impact on the election result.

Following Vermeir and Heyndels (2006), per capita total expenditure is used as a proxy for the quantity and quality of public services in the municipality. High expenditures should thus have a positive impact on the election result of the incumbent party. Analogous to the local tax rates, it is assumed that voters compare the level of public services in their own municipality with that in neighboring jurisdictions. This effect is controlled for by using the spatial lag of per capita expenditures in the regression equation.

Additionally, a dummy for the cities not organised in a county (kreisfreie Städte) and an indicator for government fragmentation are used in the empirical model. By constructing this Herfindahl-Index, the article refers to Ashworth et al. (2005) using

¹²Congleton (2007) emphasizes the importance of the mass media for fiscal policy evaluation.

¹³These base values are calculated by dividing the tax revenue by the local business tax rate.

$H = \frac{1}{\sum_{i=1}^n p_i^2}$ with p_i being the seat share of party i in the municipal council. If the distribution of seats in the council is balanced, this indicator takes on a high value. In this case, the voters face more difficulties to differentiate between the influence of the different parties on policy outcomes. Accordingly, fiscal policy in general is expected to have a lower influence on the election result of the party with the largest share of seats. Finally, I include year effects into the equation. Table 1 summarizes the descriptive statistics of the variables.

Endogeneity problems Empirical models using local tax rates usually face endogeneity problems. Consider an incumbent party, which faces a popularity deficit during the pre-election campaign, possibly caused by events on the federal political arena which are not controlled for in the regression equation. If political decision-makers lower tax rates to compensate for their lack of popularity and thus raise the probability of being reelected, the local tax rate will be correlated with the error term and the Ordinary Least Squares (OLS) estimators will be biased accordingly.¹⁴ I follow Vermeir and Heyndels (2006), Revelli (2006) and Revelli (2002a) by using Two Stage Least Squares estimation methods to account for this problem. The local tax rates are instrumented by the share of the young (under 15) and the elderly (over 65 years old), as in Besley and Case (1995) and Revelli (2002a). Besley and Case (1995) point out, that there might be an effect of changes in the share of old people on the election result in the municipality. The results of the statistical tests indicate that the instruments used are valid. The instrumental variables thus seem to be correlated with local public expenditure and the local tax rates, but they are not correlated with the election result.

In the empirical investigation, OLS-, Fixed Effects (FE)- and 2SLS-regression methods with fixed time effects are used. Fixed municipality effects are not included in the equation, because they are likely to distort regressors which are not strictly exogenous. Especially a lagged endogenous variable used as a regressor is certainly not strictly exogenous.¹⁵ As indicated by Arellano and Bond (1991), this requires a transformation of the data and estimation in first differences. However, taking first differences causes the lagged election result to correlate with the error term, a problem which can be solved by instrumenting the seat share by its second order time lag. In the context of local public finance in Northrhine-Westphalia, the data is not available for a time period long enough to apply this approach. On the other

¹⁴Bosch and Solé (2004) establish the same argument using the example of a positive popularity shock.

¹⁵This problem is pointed out by Vermeir and Heyndels (2006), p. 2292.

hand, as pointed out above, $S_{i(t-1)}^{[t-1,t]}$ is not a time lag of $S_{it}^{[t-1,t]}$ for observations in which the most successful party in $t-1$ was not the winner of the election in $t-2$. In the municipal council elections of 1994, this was the case for 51 of the 396 localities in Northrhine-Westfalia. In 1999, the winner changed in 101 jurisdictions and in 2004 this was the case in 29 municipalities. Taking this into account, the endogeneity problem of the estimation equation applied is largely reduced.

Spatial correlation in business tax rates To asses spatial correlation in local business tax rates in Northrhine-Westfalia, the Moran statistic is calculated for all observations in the dataset by using the same row-standardised spatial weights matrix as outlined above. Table 2 shows, that the null hypothesis of spatial independence can be rejected on a significance level of 1%. There seems to be considerable spatial correlation in the local business tax rates of the election years 1994, 1999 and 2004.¹⁶

Table 2: Moran I Tests on Spatial Correlation

	I	E(I)	Std. Dev. (I)	z	p-value
Gewerbesteuer	0.076	-0.001	0.010	7.444	0.000
Hebesatz Grundsteuer B	0.053	-0.001	0.010	5.216	0.000

Other ways of testing for spatial correlation are Moran I and Lagrange Multiplier tests on the residuals of the OLS-estimation of the model

$$T_{it} = \delta \mathbf{X}_{it} + \varepsilon_{it}.$$

In this model, T_{it} resembles the business tax rate of municipality i at time t , \mathbf{X}_{it} the vector of control variables in period t and ε_{it} the residuals to be tested.¹⁷ The results of the tests summarized in table 3 suggest a spatial correlation in the business tax rates in Northrhine-Westfalia to actually be existent. In line with the reasoning in Allers and Elhorst (2005), these tests indicate that modelling the spatial interaction in the dataset by applying a spatial lag of the explanatory variable is better than modelling a spatially correlated error term.

¹⁶Seperate Moran's I tests of the cross sections of each individual election year confirm this result.

¹⁷Robust LM-Tests are thoroughly described by Anselin et al. (1996).

Table 3: Spatial Statistics Residuals

spatial weights matrix			
weights:			
contiguity row-standardised			
Test	estimate	dof	p-value
spatial correlation residuals:			
Moran's I	1.667	1	0.095
Lagrange Multiplier	21.332	1	0.000
Robust Lagrange Multiplier	4.958	1	0.026
Spatial Lag:			
Lagrange Multiplier	17.404	1	0.000
Robust Lagrange Multiplier	1.030	1	0.310

4 Results

4.1 Business Tax Rate

The results of the OLS-, FE- and 2SLS-regressions of the spatial lag business tax rate models are displayed in table 4. Column 1 contains the coefficients of the OLS-regressors, the standard errors are shown in parentheses. The incumbent party's result at the past election polls has a positive and highly significant effect on the seat share in the present election. The own tax rate's coefficient is negative as expected and significant on a 1% level. Raising local tax rates leads to a drop in the seat share of the most successful party. The spatial lag of the business tax rate has a positive impact on the election result, but is not significant at any conventional level. Per capita public expenditure and the base value of the local business tax are highly significant but negative, which is counterintuitive. This could be explained by the fact that both variables are weak proxies for the quality of public services and municipal wealth, respectively. Public expenditure in contiguous jurisdictions is not significant, but shows the expected sign. The dummies for cities and the fixed time effects are significant at 5% levels and the index for government fragmentation has a significant negative effect on the election result of the party with the largest seat share. This last result is not surprising, since the possibility that the incumbent party holds a large seat share is bigger in less fragmented governments.

The coefficients of the fixed effects regressions are shown in column 2 of table 4. The results resemble the ones of the OLS regressions. The coefficient of the seat share in the last election is positive and highly significant. Own business tax rates

Table 4: Results Business Tax

	(1)	(2)	(3)
	OLS	FE	2SLS
share of seats incumbent (t-1)	0.322*** (11.58)	0.101*** (2.81)	0.249*** (6.48)
business tax rate	-0.0423*** (-4.63)	-0.0176 (-1.11)	-0.272*** (-4.80)
business tax rate neighbor	0.0101 (0.83)	0.0177 (0.59)	0.184*** (4.12)
total expenditure per capita	-1.006** (-2.16)	1.569** (2.15)	1.806** (2.03)
base value business tax per capita	-8.323** (-2.28)	-17.15** (-2.39)	-31.88*** (-4.39)
dummy city	2.050** (2.37)	0 .	8.975*** (4.52)
government fragmentation	-12.11*** (-24.96)	-16.57*** (-23.79)	-12.21*** (-20.37)
total expenditure per capita neighbor	-1.054 (-1.61)	-0.352 (-0.24)	-2.842*** (-3.10)
dummy election year 1994	-4.069*** (-7.27)	-4.363*** (-3.14)	-6.588*** (-7.15)
dummy election year 1999	-2.061*** (-4.47)	-3.209*** (-4.19)	-3.324*** (-5.15)
cons	84.46*** (19.31)	89.99*** (6.40)	110.7*** (13.28)
Sargan test			4.782
p-value			0.0288
Anderson test			46.95
p-value			6.38e-11
number of observations	1188	1188	1188

dep var = seat share incumbent

*p < 0.10, **p < 0.05, ***p < 0.01

t-values in parentheses

show the expected sign, but are not significant. The indicator for municipal wealth is negative and significant as well and the results for government fragmentation, the year effects and public expenditure of contiguous municipalities are consistent with the OLS estimates. The FE-estimate of own expenditure shows the expected sign and is significant at a 5% level.

The endogeneity tests of Davidson and MacKinnon (1993) are rejected on a significance level of 1%. This indicates, that the OLS estimates are inconsistent and the explanatory variables have to be instrumented. The third column presents the coefficients of the 2SLS regression. Business tax rates are instrumented by the total population share of young and elderly. The null hypothesis of the Sargan test cannot be rejected on a 5% significance level. The instruments thus seem to be valid. The low p-value of the Anderson Likelihood Ratio tests indicates identification of the regression equation.

The 2SLS estimator of the past election result is positive and significant, showing that long term popularity effects influence election outcomes in Northrhine-Westfalias municipalities. The most important result of the investigation are the expected signs and significance of the coefficients of the business tax rate and its spatial lag. Own tax rates lower the share of seats gained by the strongest party while rising tax rates in the neighbouring localities have a positive impact on the election result. This proves the existence of yardstick competition in tax rate setting in Northrhine-Westfalia. Local politicians are punished for setting high tax rates, but voters use information about fiscal policy in contiguous jurisdictions when assessing their political decisionmakers.

The coefficients of all other variables in the 2SLS-estimation are significant at least on a 5% level. Per capita public expenditure has the expected positive effect on the election outcome. Its spatial lag has a negative coefficient, leading to the conclusion, that voters compare fiscal policy on the expenditure side as well. The Dummies for large cities, the year effect and the index of government fragmentation are all significant on a 5% level.

4.2 Property tax rate

Table 5 displays the results of the estimations of the property tax rate model. They are similar compared to those of the business tax rate model. In the 2SLS estimation, the property tax rate shows a significant negative effect on the election outcome, whereas the spatial lag of the property tax rate indicates a positive effect on the election result of the strongest party in the municipality council. If politicians

Table 5: Results Property Tax

	(1)	(2)	(3)
	OLS	FE	2SLS
share of seats incumbent (t-1)	0.331*** (11.85)	0.103*** (2.87)	0.260*** (5.92)
property tax rate	-0.0192*** (-3.04)	-0.0000640 (-0.01)	-0.251*** (-4.51)
property tax rate neighbor	0.00280 (0.35)	-0.0315 (-1.60)	0.142*** (4.07)
total expenditure per capita	-1.280*** (-2.75)	1.491** (2.04)	2.699** (2.32)
base value business tax per capita	-6.682* (-1.80)	-16.34** (-2.27)	-46.80*** (-4.29)
dummy city	2.370** (2.43)	0 .	21.51*** (4.53)
government fragmentation	-12.11*** (-24.80)	-16.62*** (-24.05)	-11.92*** (-16.71)
total expenditure per capita neighbor	-1.290* (-1.85)	-1.233 (-0.84)	-4.739*** (-3.64)
dummy election year 1994	-4.317*** (-5.70)	-7.430*** (-3.81)	-13.07*** (-5.57)
dummy election year 1999	-2.246*** (-4.24)	-4.769*** (-4.50)	-6.799*** (-5.13)
cons	77.91*** (22.71)	104.2*** (10.84)	117.4*** (11.08)
Sargan test			0.309
p-value			0.578
Anderson test			32.55
p-value			8.54e-08
Number of observations	1188	1188	1188

dep var = seat share incumbent

*p < 0.10, **p < 0.05, ***p < 0.01

t-values in parentheses

raise property tax rates, they seem to lose votes, but on the other hand gain decisionmaking power if tax rates in the surrounding jurisdictions are high. The coefficient of per capita expenditure is positive and significant while government expenditure in contiguous localities has a negative impact on the election result. The other variables show the same signs as in the business tax rate model and are significant without exception. The Sargan test identifies the instruments used in the 2SLS regression to be valid and the Anderson test rejects underidentification of the regression equation.

The empirical investigation confirms the results of the theoretical model. Yardstick Competition seems to influence local politicians in setting tax policy in the German state of Northrhine-Westfalia.

5 Conclusion

This paper presents a simple yardstick competition model and tested the basic hypothesis using a panel data set containing public budget and electoral data of the German state of Northrhine-Westfalia. The theoretical part of the essay employs probabilistic voting theory to show that politicians reduce exploitative fiscal policy when voters are able to use information about fiscal variables in similar jurisdictions. Decisionmakers know about the importance of their political performance relative to the policy of their counterparts in contiguous municipalities. In equilibrium, personal renttaking of the incumbent politician is reduced by increased economic similarity between the localities in the model.

The theoretical result is supported by the results of the empirical investigation. Using a panel data set containing government budget figures of the election years 1989, 1994, 1999 and 2004, 2SLS estimations have shown that raising business or property tax rates reduces the amount of seats gained by the leading party in the council. However, the election result improves with rising tax rates in contiguous municipalities. This proves that voters use information about fiscal policy in neighboring municipalities to better assess their politicians' competence when deciding about which party to vote in municipal council elections. Local politicians thus engage in yardstick competition when setting municipal tax rates.

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Yardstick Competition in German Municipalities

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