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Politics and Flemish local tax rates : a simultaneous spatial panel data study (1992-2006)

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Abstract

An impressive amount of studies points to the impact of political and institutional characteristics on a community's fiscal policy. Most of the time, these characteristics are studied in isolation : possible interactions with other political determinants are ignored. Yet, fiscal policy decisions are subject to political and institutional forces contemporaneously. In this paper, we join different models, while explaining simultaneously the variation in the Flemish local income tax rate and the local property tax rate using an extended dataset covering 3 local elections. When confronting the

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results of the separate analyses with those of the joint analysis, we conclude that isolated testing suffers from specification bias.

1. Introduction

The way in which a government determines its tax rates and why policymakers change them has been studied before. Tax smoothing theory states that an efficient government fixes tax rates in a way that minimizes the costs of taxation over time. Consequently, governments will not adjust tax rates to temporary changes in expenditures or revenues and the planned tax rate is expected to be constant over time. Barro (1979) exploited this theory to explain the existence of surpluses and deficits. However, empirical evidence (e.g. Strazicich, 1997) shows that tax rates are not constant over time and refutes tax smoothing theory. Governments do change tax rates and various motivations have been suggested. Hettich & Winer (1984, 1988, 1999 & 2002) provide a theoretical framework for tax choices. They conclude that "tax systems can be viewed as the outcome of optimizing political and economic behavior" (Hettich & Winer, 1988; 711). The Hettich & Winer model assumes that the maximization of support for the government is the main objective when outlining fiscal policy. The probability that an individual votes for the governing party depends positively on the public services provided and negatively on the voter's income loss due to taxation. Both the level of public services and the tax policy differ according to the partisan characteristics of the government. Theories on partisan politics attribute central importance to the ideological differences between groups within society and the parties that represent these groups (Tufte, 1978). Next to partisan influences, other theories focus on politically inspired determinants of tax rates. The political budget cycle theory points to the impact of the timing of elections on tax rates (Franzese, 2002). Fragmentation and tax interaction theories show that, respectively, the composition of the government (Ricciuti, 2004) and the fiscal policy of neighbouring jurisdictions (Besley & Case, 1995) frame tax policy as well. Finally, fiscal illusion effects may explain the level of tax rates. Fiscal illusion refers to features of the tax system that result in an underestimation of the taxpayers' tax burden or the tax price for the provision of public goods (Buchanan, 1967).

The number of surveys that empirically investigate one of the above determinants is impressive. Separately focusing on one feature permits a more detailed analysis of that individual determinant, but leaves the question unanswered how they are mutually related. The question whether tax rate determinants also explain tax rates significantly when they are tested jointly remains empirically unanswered. The purpose of this paper is to test such an integrated model

that takes into account these theories mutually, which has –as far as we know– not been attempted before.

The remainder of this paper is structured as follows. Section 2 elucidates its focus and provides some contributions to the existing research. Section 3 reviews the literature on individual tax rate determinants and formulates some hypotheses. The empirical analysis is clarified in section 4, while the main findings are summarized in section 5.

2. Discussion

Attention to individual fiscal policy determinants has grown gradually. The concept of fiscal illusion was introduced by Puviani as early as 1903 but empirical literature on fiscal illusion has its origin in the mid 1970s. Also at that time Nordhaus (1975) formulated the political business cycle theory. Shortly after, Hibbs (1977), followed by Tufte (1978), introduced the idea that the ideological differences of parties may play an important role in shaping public policy. Frey & Schneider (1978a & 1978b) believe that ideological motives mark the chosen policy. Since the mid 1980s, starting with Zodrow & Mieszkowski (1986) and Wilson (1986), there has been an outpouring of academic research on tax competition, building on Oates' (1972) attempt to understand the potential efficiency problems associated with competition for capital. At the end of the 1980s, Roubini & Sachs (1989a & 1989b) introduced the idea that public policy is also affected by the level of government fragmentation. Ever since these seminal papers, each individual model has been intensively tested empirically on different types of datasets. The first contribution of this paper to this enormous literature is that our model tests the theories jointly.

Secondly, in this paper tax rates are estimated. Most of the papers focus on tax revenues or tax revenues as a share of GDP.[2] However, tax revenues information may be a less accurate reflection of elected officials' intentions, as taxes paid may also reflect economic conditions of which the politician was unaware. Therefore, we explain tax rates in stead of tax revenues (as share of GDP). In particular we explain the Flemish local income tax rate and the local property tax rate. Both taxes are surcharge taxes, the rates of which are the local government's sovereignty. All municipalities are held to use the same definition of the tax base, which is undoubtedly an advantage from an empirical point of view.

[2] See e.g. Poterba (1994), Yoo (1998), Bizer & Durlauf (1990) and van der Ploeg (1990).

The local context in which we test our hypotheses is another contribution to the empirical research on tax rate determinants. Research on the determinants of tax rates at the municipal level is not that widespread. To the best of our knowledge only Allers & Elhorst (2005), Bastiaens *et al.* (2001), Bordignon *et al.* (2003), Brett & Pinkse (2000), Brueckner & Saavedra (2001), Buettner (2001), Heyndels & Vuchelen (1998), Leprince *et al.* (2007), Richard *et al.* (2005), Solé Ollé (2003) and Van Parys & Verbeke (2007) investigate tax rate determinants at the local level. Tax rate determinants at higher government levels on the contrary have been examined extensively.[3]

Fourthly, we estimate both local tax rates simultaneously. Governments decide on both tax rates in the same period and within the same (economic, political as social) context. Moreover, governments consider the one tax rate when setting the other and vice versa. This is not unimportant in our context. We recognize the methodological impact of this feature of the local Flemish tax rate policy by introducing a simultaneous estimation approach.

Finally, our dataset covers 15 years and contains 3 election moments. With this, our dataset presents the longest time series so far used to explain local tax rate policy.[4] Longer time series may lead to more accurate estimators, especially when the political budget cycle theory is tested. The more terms the time series contain, the stronger the evidence that elections may or may not affect fiscal policy term after term.

3. The literature on tax rate determinants

This paper explains simultaneously the local income tax rate and the local property tax rate of Flemish municipalities. We focus on political forces, while economic forces are introduced in the analyses as control variables. This is in line with the Hettich & Winer (1984, 1988, 1999 & 2002) tax structure model that explains fiscal choices and fiscal policies as equilibrium outcomes of a collective choice process that is constrained by political as well as economic forces. The Hettich & Winer tax structure model thus assigns an explicit role to the political process when analysing fiscal policy. It states that "a full understanding of taxation also requires [the] examination of the process by which tax structure is determined" (Hettich & Winer, 1999; 2). The authors

[3] Only some of the authors that examined tax rate determinants at higher government levels are Besley & Case (1995), Besley & Rosen (1998), Case (1993), Esteller-Moré & Solé Ollé (2001), Feld & Reulier (2005), Goodspeed (2000), Hayashi & Boadway (2001), Hernández-Murillo (2003), Rork (2003) and Strazicich (2001).

[4] See Goeminne (2009) for an overview of research on local inhabitant tax rate determinants (Table A2, p. 196-198)

themselves suggest some of these political determinants and e.g. refer to the role of elections, the role of governance and the structural features of revenue systems. Therefore in the following of this paper we focus on political forces that may explain the level of tax rates. We formulate a number of testable hypotheses concerning the factors, ceteris paribus, affecting local tax rate policy.

A large literature has examined whether the composition of the government affects fiscal policy. Mostly partisan or fragmentation characteristics have been the subjects of research, but the power of the government –mostly measured by an electoral margin variable– has also been studied. Partisan characteristics measure for the impact of ideological differences on policy outputs. Imbeau *et al.* (2001) overview the mainstream studies on partisan influences on policy outcome and explicitly state that "changes in the left-right party composition of a government are hypothesized to be related to changes in policy". According to fiscal policy theory left-wing governments are more in favour of income redistribution and an active state than right-wing governments. This may lead to higher public expenditures (Hibbs, 1977 and Schmidt, 1996) resulting in higher tax rates. Leftist governments are thus expected to have a positive effect on tax rates, while the opposite is true for rightist governments. At the local level, the partisan hypothesis is confirmed by Solé Ollé (2003). As a result we shall test whether:

H_1 : Leftist governments impose higher tax rates

Other scholars suggest that more fragmented (or divided) governments increase public spending –which is reflected in a higher tax burden– as several conflicting political objectives have to be reconciled. This idea originates from Roubini & Sachs' (1989a,b) Weak Government Hypothesis that states that more fragmented governments tend to follow less restrictive fiscal policies.[5] As shown in Volkerink & de Haan (2001) and Ricciuti (2004) fragmentation leads to higher levels of expenditure. Consequently we expect higher tax rates for weaker governments. Therefore we test the next hypothesis:

H_2 : More fragmented governments levy higher tax rates

Since Frey & Schneider (1978a) it is well-established that budgetary policy is affected by the incumbents' electoral margin. The higher the electoral margin of the government, the less it needs to engage in opportunistic fiscal behavior because it is relatively confident of re-election,

[5] For a review see Ashworth *et al.* (2005).

regardless of its tax setting behavior. It thus does not have to care much about the loss of votes resulting from high tax rates. Solé Ollé (2003) and Allers & Elhorst (2005) show that fiscal policy depends on the electoral margin in Spanish and Dutch municipalities respectively. We hypothesize that:

H_3 : Governments with a large majority impose higher tax rates

Fiscal policy decisions of a government may be influenced by the fiscal policy decisions of neighbouring jurisdictions as a result of yardstick competition.[6] Traditionally, the fiscal policy literature distinguishes two types of yardstick competition : tax mimicking and tax competition. Tax mimicking theory shows that incumbents are likely to mimic the tax-setting of neighbouring governments. This is because voters are expected to use the fiscal policy of a neighbouring government as a yardstick to evaluate that of their own government when deciding whether or not to re-elect the incumbent government (Besley & Case, 1995). Heyndels & Vuchelen (1998) and Richard *et al.* (2005), Allers & Elhorst (2005) and Solé Ollé (2003) bring forward evidence of tax mimicking behavior in Belgian, Dutch and Spanish municipalities. Tax competition theory suggests that the mobility of the tax base leads governments to adopt lower tax rates in order to attract part of the tax base from other jurisdictions (Zodrow & Mieszkowski, 1986). This competition can lead to tax rates so low that this results in the insufficient provision of public goods. This evolution is known in the literature as the "race to the bottom". Although tax competition is well described in the literature (see Wilson, 1999), empirical evidence at the municipal level is scarce. We can only refer to Van Parys & Verbeke (2007) and Brueckner & Saavedra (2001) who show evidence of tax competition in Belgian municipalities and the Boston metropolitan area respectively. The theory of yardstick competition suggest that fiscal policy may be influenced by that of the neighbouring jurisdictions, so we investigate the meaning of hypothesis 4:

H_4 : Tax rates interact with neighbouring tax rates

Whether or not governments change fiscal policy at elections is the central focus of electoral cycle models. To name some, Bizer & Durlauf (1990), Poterba (1994) and Tufte (1978) provide evidence that politicians manipulate tax levels for electoral purposes. The theoretical expectation is that tax rate reductions (increases) or the abolition (introduction) of (new) taxes increase (decrease) the popularity of the government. Lowering taxes –and correspondingly

[6] See Brueckner (2003) and Revelli (2005) for an overview of empirical models of strategic interaction that give rise to a spatial pattern in local government expenditures and revenues.

increasing expenditures or raising grants– before elections raises the government's probability of re-election. The existence of political budget cycles at the local level is shown by e.g. Ashworth *et al.* (2005 & 2006), Binet & Pentecôte (2004), Brender (2003), Drazen & Eslava (2005), Geys (2007) and Veiga & Veiga (2007). Vermeir & Heyndels (2006) provide evidence that in Flemish municipalities lower tax rates do indeed have a positive impact on electoral outcomes. We therefore test hypothesis 5:

H_5 : Tax rates increase in post-election years and decrease when elections are near

Fiscal illusion refers to the voter's systematically biased perception of fiscal parameters. This misperception is related to the way the government raises revenues. Fiscal illusion allows the government to raise tax revenue while minimizing voters' resistance. The literature discerns various types of fiscal illusion. First, the *flypaper effect* (or *grant illusion*) refers to the expenditure stimulus resulting from unconditional grants (Courant *et al.*, 1979). A second source of fiscal illusion is related to the *elasticity of tax receipts*. It stresses the difference between discretionary and automatic tax increases (Oates, 1975). Tax income growth due to the automatic responsiveness of the tax system to changes in economic activity remains invisible for the taxpayer, while changes in fiscal revenue due to a political action are highly visible. Higher levels of expenditure will be the result of automatic tax increases of which the political costs will be minimized. A third type of fiscal illusion can be found in the *complexity of the tax structure*. It may be difficult for voters to know the total amount of taxes paid when the tax structure is complex. Numerous small taxes rather than a few significant ones make it difficult for the taxpayer to identify the cost of government and thus may create illusionary effects (Heyndels & Smolders, 1994). Finally, *renter illusion* exists when taxation is significantly property based. Most property tax systems tax property owners, not occupants, so that only property owners are likely to perceive correctly the tax price. Renters underestimate their true tax price as they forget that (a part of) the property tax is shifted to them through the rent they pay. This explains why renters accept more easily higher levels of local expenditure (Blom-Hansen, 2005). Evidence of fiscal illusion at the local level is present in Dollery & Worthington (1999), Gemmell *et al.* (2002), Heyndels & Smolders (1994), Pommerehne & Schneider (1978) and Winter & Mouritzen (2001). These authors investigated "full" fiscal illusion models, while others look for evidence of only one of the four sources of fiscal illusion. We refer to Barnett *et al.* (1991), Beck (1984), Bergstrom & Goodman (1973), Blom-Hansen (2005), DiLorenzo (1982), Heyndels (2001) and Heyndels & Smolders (1995). Though fiscal illusion models are used to explain higher expenditure levels, they can also be used to explain the *level of tax rates*, as Bastiaens *et al.* (2001) confirm. Therefore

we expect higher tax rates when fiscal illusion is present and formulate the following (sub-)hypotheses to take into account the different types of fiscal illusion :

$H_{6.1}$: The presence of grant illusion positively affects tax rates

$H_{6.2}$: The elasticity of the tax receipts positively affects the tax rates

$H_{6.3}$: The more complex the tax structure, the higher the tax rates

$H_{6.4}$: The presence of renter illusion positively affects tax rates

4. Empirical analysis

To empirically test the hypotheses formulated in the previous section, we use a dataset of 308 Flemish municipalities for the period 1992-2006. Section 4.1 clarifies the Flemish institutional background. Section 4.2 introduces our dependent variables. Section 4.3 provides a detailed account of the model's specification and the measurement of our variables. Section 4.4 points to the methodology and section 4.5 finally presents the empirical results.

4.1 Flemish municipalities

Before turning to the analyses, we'd like to familiarize the unacquainted reader with some of the financial and institutional characteristics of Flemish municipalities. The governments of the 308 Flemish municipalities have wide-ranging budgetary and fiscal autonomy. They are authorized to decide independently on the level and the structure of expenditures and revenues. Taxation, the focal point of this paper, generates a little less than half of the Flemish municipalities' revenues. Most important taxes are the local income and local property tax. These taxes are surcharge taxes and will be the dependent variables in our analysis.[7] Besides those surcharge taxes, municipalities also collect local taxes for which they themselves set the tax base as well as the tax rate. As in most decentralised countries, local governments in Flanders depend on higher levels of government for their revenue. Grants from higher governments (which are for the most part unconditional) are almost equal in importance to taxation in local governments' revenues.

Flemish local governments have a parliamentary system consisting of the local Council (the legislative body) and the College of Mayor and Alderman (the executive body). Seats in the Council are allocated using a system of proportional representation. The College is elected from the members of the Council. Its composition is determined by the party (or parties) holding a

[7] For more details on the local income tax rate and local property tax rate, see section 4.2.

majority position in the Council. The number of parties in the majority differ between 1 and 5 as shown in Table A1 in appendix on p. 22.

4.2 Dependent variables

The dependent variables of the analysis, LITR and LPTR, represent the *l*ocal *i*ncome *t*ax *r*ate and the *l*ocal *p*roperty *t*ax *r*ate. Over four fifths of the local governments' tax income derives from these taxes. Both taxes are single rate surcharge taxes on the federal income tax and the regional property tax respectively. Higher governments define both tax bases while the local Councils are free to set the tax rate (including 0). LITR is set by the municipality as a percentage of the tax due by the taxpayer to the federal authority. LPTR is expressed as a number of hundredths –or centimes– of the regional tax rate. In the period under study, the average local tax rates were 6.82% and 1127 centimes. In 1992, the first year of our dataset, the average tax rates were 6.66% and 964 centimes. In 2006, the last year of dataset, they were 7.12% and 1297 centimes. Both average local tax rates present a slight upward trend in the period in between.

4.3 Empirical model

We estimate the following system of equations (I.) to test our hypotheses (subscripts i and t referring to municipalities and time respectively):

$$
\begin{aligned}
\text{(I.)} \quad LITR_{it} = {} & \alpha_1 + \alpha_2\, POL_{it-1} + \alpha_3\, INTER_{it} + \alpha_4\, TBE_{it} + \alpha_5\, ILLUS_{it} + \alpha_6\, LPTR_{it} \\
& + \alpha_7\, DEMO_{it-1} + \alpha_8\, TBASE_{it-1} + \alpha_9\, TDEP_{it-1} + \alpha_{10}\, DEBT_{it-1} \\
& + \alpha_{11}\, TREND_t + u_{it} \\
LPTR_{it} = {} & \beta_1 + \beta_2\, POL_{it-1} + \beta_3\, INTER_{it} + \beta_4\, TBE_{it} + \beta_5\, ILLUS_{it} + \beta_6\, LITR_{it} \\
& + \beta_7\, DEMO_{it-1} + \beta_8\, TBASE_{it-1} + \beta_9\, TDEP_{it-1} + \beta_{10}\, DEBT_{it-1} \\
& + \beta_{11}\, TREND_t + v_{it}
\end{aligned}
$$

The dependent variables LITR and LPTR represent the local income tax rate and the local property tax rate.

POL is a vector of political variables, containing partisan and fragmentation characteristics, as well as a variable taking into account the political strength of the government.[8] To test *hypothesis 1*, that is the impact of partisan characteristics on the local tax rates, we introduce the

[8] All political variables are fixed over the legislature and measured at the time of the previous elections.

Ideological Complexion of the Government (ICG) index as developed by Kontopoulos & Perotti (1999) and used previously in research on Flemish municipalities by Ashworth *et al.* (2006) and Geys (2007). ICG takes into account the ideological position of the government and positions the government on a left-right scale with 0 representing extreme left and 10 representing extreme right. ICG is a weighted average of the ideological scores of the individual government parties (as shown in Table A2 on p. 22), where the weight is the relative number of mayor and/or aldermen of a certain party in the government. Presuming that leftist governments levy higher tax rates, the expected value of ICG is negative. *Hypothesis 2* stated that fragmented governments are expected to levy higher tax rates. We add the number of parties of the current government (NPAR) to measure the effect of fragmentation. As Ashworth *et al.* (2005 & 2006), Geys (2007) and Goeminne *et al.* (2008) have previously found a non-linear effect of government fragmentation on Flemish local government's fiscal decision-making, we also test a non linear specification, adding a squared term of NPAR. The seats margin (SEATMAR) measures the strength of the government. It is computed as the difference between the percentage of the seats of the government parties in the Council and 50%. *Hypothesis 3* predicts that tax rates increase with SEATMAR, thus a positive value is expected.

INTER is a vector of spatial tax interaction variables. Like Heyndels & Vuchelen (1998) and Van Parys & Verbeke (2007) the average tax rates of the neighbouring jurisdictions (LITRN and LPTRN) are added to the model to test *hypothesis 4*.[9] Both the empirical literature on tax mimicking and that on tax competition use the average tax rates of neighbouring municipalities to measure for the existence of tax mimicking or tax competition. This implies that it will be impracticable to distinguish between the tax mimic and tax competition effect, or thus we look for evidence of yardstick competition.[10] Traditionally yardstick competition theories test whether a policy instrument of a jurisdiction is significantly affected by the same policy instrument in competing jurisdictions, a so-called "within policy interaction". Nevertheless, a "cross policy interaction" is possible. This occurs when a jurisdiction reacts to a tax rate change of (one of) its neighbours by changing another tax rate as Van Parys & Verbeke (2007) show. Therefore we add both LITRN and LPTRN in both tax rate regressions.

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[9] We calculate unweighted averages. For Flemish municipalities across the language boundary, only Flemish neighbours are taken into account. Therefore, Voeren –that has no Flemish neighbours– is removed from the dataset.

[10] Brueckner (2003) shows that the reaction functions to test each interaction model separately have the same form, so that it is extremely difficult (if not impossible) to empirically verify which model is appropriate.

Whether or not the time to next elections has an impact on local tax rates is the subject of *hypothesis 5*. Following Ashworth *et al.* (2005 & 2006) we test this effect by TBE that takes into account the time before elections in years. TBE has value 5 in post-election years, 4 in the second year after the election and so on to end with value 0 in the election year. For our purpose, the idea is that local politicians, motivated by their chances of re-election, lower taxation before elections. As Ashworth *et al.* (2006) find non-linearities in the electoral cycle when analysing local public debt, we introduce both TBE and its squared term.

To empirically test *hypothesis 6* on fiscal illusion, we introduce ILLUS, a vector of fiscal illusion variables. Different types of fiscal illusion are distinguished. First, we test for the presence of a possible flypaper effect. As in Bastiaens *et al.* (2001), GRANT is defined as the unconditional grants per capita to capture a possible flypaper effect. As higher grants may obscure the real tax price of public goods, it may have a positive impact on the demand for public goods and thus on tax rates (to finance this increased demand). The presence of a flypaper effect should result in a positive value for GRANT. Second, we take into account the elasticity of the tax receipts by the variable TEL. Similar to Heyndels & Smolders (1994), we introduce the proportion of total tax revenue generated by the local income tax to capture a possible elasticity effect. TEL thus is calculated as (income tax revenues/total tax revenues). When no income taxes are levied, TEL has value 0. When only income taxes are levied, TEL has value 1. Should the elasticity of the tax receipts cause fiscal illusion, then we expect a positive value for TEL. More elastic tax revenues should increase spending and again this could have a positive impact on tax rates. Third, the complexity of the tax structure is measured by HHI. Following Wagner (1976) the Hirschman-Herfindahl Index (HHI) is frequently used to measure the complexity of a jurisdiction's tax structure, as in, for example, Bastiaens *et al.* (2001), Dollery & Worthington (1999), Heyndels & Smolders (1994) and Misiolek & Elder (1988). The HHI is calculated as the sum of squared shares of the individual tax items t_i in the total local tax revenues and varies between 0 and 1. Municipalities relying on just one tax source have index 1. The more taxes a government levies and the more the tax revenues are equal to each other, the lower the HHI-value. Complex tax structures thus present low HHI-values. We expect that a more complex tax structure reduces the political cost of raising local tax rates and induces higher tax rates, resulting therefore in a negative value. Finally, to measure a renter illusion effect, the percentage of residences that are non-owner-occupied (RENT) may be introduced in the LPTR estimation.[11] Renters underestimate their true tax price and therefore accept more easily higher

[11] We only test the renter illusion hypothesis for the LPTR as LITR is not a property based tax.

levels of local expenditure (Blom-Hansen, 2005) that for their part lead to higher levels of tax rates. A positive coefficient thus is expected.

Next we introduce the tax rate of the other tax as well as socio-economic, demographic and budgetary determinants as control variables in our model. The introduction of the other tax rate controls for the interdependence of different tax instruments. Hettich & Winer (1988) show that political-cost-minimizing politicians diversify taxes. In these models municipalities are assumed to use different taxes up to the point where marginal political costs are equated for all taxes. If so, an increase in the political cost of raising one particular tax rate prompts an adjustment in the other tax rate(s). Therefore we introduce, as do Heyndels & Vuchelen (1998), the level of LITR in the LPTR estimation and vice versa. DEMO is a vector of demographic and socio-economic variables controlling for intermunicipal differences in preferences for local public services. The size of the municipality (POP), the share of young (YOUNG) and old people (OLD) and the rate of unemployment (UNEMPL) reflect the needs for general and specific public services respectively.[12] Positive coefficients are expected. Revenue-generating characteristics refer to the capability of the government to collect revenues. Tax rates depend in the first place on the tax base yield (TBASE). For the local income tax rate, TBASE is measured as the tax revenue per capita of one percent local income tax. This measure is preferred to the average income per capita since it takes into account the progressiveness of the federal income tax (Van Parys & Verbeke, 2007). To capture the local property tax base we use the tax revenue per capita of one percent (this equals 100 centimes) local property tax. If TBASE represents the capability of the government to collect revenues, a negative sign for TBASE can be expected. Indeed, a higher tax base allows lower tax rates for a given level of tax revenues. Still the tax base may also represent the demand for public goods and services. The idea here is that the demand for public goods and services increases with income, requiring additional financial resources, leading to higher tax rates. The sign of TBASE thus is a priori unknown. Second, tax rates also depend on the availability of alternative revenue sources (Hettich & Winer, 1999). The more a government depends on its tax revenues, the higher the tax rates are expected (TDEP). In the LITR (LPTR) estimation, TDEP is constructed as the part of local income (property) tax revenues in total revenues. Also the level of debt (DEBT, debts per capita in €1000) can be of importance for fiscal policy. If a jurisdiction is confronted with higher levels of debt, higher tax rates can be expected given the resulting interest and amortization

[12] POP is measured as the number of inhabitants. YOUNG and OLD are calculated as the percentage of inhabitants that are below 20 and over 64 respectively. UNEMPL is the percentage of inhabitants that are unemployed.

payments. The inclusion of a linearly increasing trend variable (TREND) accounts for the (slight) upward trend in the dependent variables.

Following Solé Ollé (2003) and Heyndels & Vuchelen (1998), we lagged the political, the demographic, the tax base and the debt variables one year because tax rates are set ex ante. They are fixed in the autumn of the previous year. GRANT, on the other hand, is not lagged because governments know in advance the level of grants they will receive in the next fiscal year. No lags were introduced for the interaction variables because municipalities do not have to wait a year to observe the tax rates of neighbouring municipalities.[13]

Table A4 in appendix on p. 24 shows some descriptive statistics concerning both the dependent and the explanatory variables.

4.4 Methodology

We construct a panel data model (1992-2006) that regresses simultaneously LPTR and LITR on various local characteristics that, according to the theoretical expectations, may influence the tax rates. Some of these characteristics open up a discussion concerning some challenging econometric issues.

First we are confronted with a "between municipalities" simultaneity problem. To measure for the impact of yardstick competition, neighbours' tax rates are introduced in the regression. These tax rates are supposed to be endogenous. The tax rate in municipality i depends on that in municipality j, but also vice versa. This introduces a specific simultaneity problem, which is well established in the spatial econometrics literature (Cliff & Ord, 1973). In general the presence of endogenous regressors at the right-hand side of the equation leads to biased OLS estimates. Following Besley & Case (1995), Heyndels & Vuchelen (1998), Brett & Pinkse (2000), Buettner (2001) and Solé Ollé (2003), we adopt an instrumental variables (IV) approach that controls for additional spatial auto-correlation of residuals, as demonstrated by Kelejian & Pruncha (1998). Like Heyndels & Vuchelen (1998), we introduce the neighbouring municipality's average income, its population size, its percentages of people under 20 and over 64 years and its average tax rates over the past 5 years as instruments in the model.

[13] The setting of tax rates provokes a lot of public discussion. Council meetings –where these tax rates are discussed– are open to the public and politicians from neighbouring municipalities often meet so they are likely to be aware of tax rates in neighbouring municipalities and thus can react immediately. A similar assumption is made for Flemish municipalities in Geys (2006) and Werck *et al.* (2008), but also in Buettner (2001) for German local governments.

Second, the government decides on both LPTR and LITR in the same period and within the same (economic, political as social) context. Therefore the error term of the LPTR estimation could be correlated with the error term of the LITR estimation. We thus are confronted with a "within municipality" simultaneity problem. Traditionally, Zellner's Seemingly Unrelated Regression (SUR) method is then suggested. This method permits to control for possible interaction effects in the setting of both tax rates. This interaction is not unlikely as Hettich & Winer (1988) state that municipalities use different taxes up to the point where marginal political costs are equated for all taxes. If so, an increase in the political cost of increasing one particular tax rate prompts an adjustment in the other tax rates. Therefore we introduce for the LPTR equation LITR as explanatory variable (and vice versa, see supra). To take into account econometrically the fact that governments consider all tax rates when setting each one individually, a simultaneous setting should be estimated. We thus have to construct a system that represents a tax structure of which both tax rates are part. Like Heyndels & Vuchelen (1998) we introduce a pooled three-stages least squares (3SLS) estimation. While two-stage least squares (2SLS) solve the "between municipalities" simultaneity problem, 3SLS allow cross-correlation between the equations and thus also solve the "within municipality" simultaneity problem. In fact 3SLS is a combination of 2SLS and SUR (Zellner & Theil, 1962). The 3SLS procedure allows for the interaction between the settings of these separate taxes. The 3SLS technique estimates both regressions simultaneously and corrects for the possible simultaneity of the left-hand-side variables. Although time-series datasets are sensitive to serial correlation and heteroscedasticity, the 3SLS estimation technique presents consistent estimates despite the possible existence of these features (Wooldridge, 2002).

4.5 Results

We present several sets of regression results in Table 1. The most general estimations in columns (1) and (2) include all the available explanatory variables. We then gradually eliminate the least significant variables until we obtain models with only statistically significant –at least at the 10% level– coefficients in columns (3) and (4). In general, results match very well with the predicted effects. Most of the coefficients are significant and our model explains about 64% and 82% of the variance of LITR and LPTR respectively. In general the explanatory power of the presented models is much higher than previous research on LITR and LPTR in

Belgian/Flemish municipalities.[14] It seems that both the length of our time series and the joint hypothesis test contributes to the higher explanatory power of the models.[15] The adjusted R^2s give no indication that regressors are added without contributing to the explanatory power of the model. Wald tests were performed and reject the null hypotheses that all slope coefficients of our analysis are equal to zero.

[14] The Heyndels & Vuchelen (1998) cross-section analysis on Belgian municipalities explains 15% of LITR and 44% of LPTR. The Bastiaens *et al.* (2001) cross-section analysis on Flemish municipalities explains 25% of LITR and 36% of LPTR. Van Parys & Verbeke (2007) use panel-data of Belgian municipalities but do not present R^2 values.

[15] See also Table A3 on p. 23 in appendix where individual hypothesis-tests are presented.

Table 1 Estimation results of the 3SLS estimation

Hyp.	Dep. Var.	1 $LITR_t$	2 $LPTR_t$	3 $LITR_t$	4 $LPTR_t$
	Intercept	-1.975 *** (-4.95)	1976.526 *** (8.61)	-1.949 *** (-4.89)	2159.172 *** (9.03)
1	ICG_{t-1}	-0.037 * (-1.83)	12.699 *** (2.92)	-0.038 * (-1.88)	14.366 *** (3.34)
2	$NPAR_{t-1}$	0.179 *** (3.02)	40.433 *** (3.74)	0.180 *** (3.04)	39.534 *** (3.55)
	$NPAR^2_{t-1}$	-0.046 *** (-3.34)	-6.004 ** (-2.42)	-0.046 *** (-3.35)	-6.029 ** (-2.34)
3	$SEATMAR_{t-1}$	-0.305 *** (-3.02)	-0.127 (-0.01)	-0.301 *** (-2.98)	-
4	$LITRN_t$	0.301 *** (6.96)	-184.163 *** (-4.95)	0.312 *** (7.18)	-211.912 *** (-6.18)
	$LPTRN_t$	-0.002 *** (-9.32)	0.386 *** (7.57)	-0.002 *** (-9.57)	0.423 *** (9.11)
5	TBE_t	0.121 *** (5.42)	29.695 *** (6.61)	0.121 *** (5.41)	30.866 *** (7.20)
	TBE^2_t	-0.024 *** (-5.42)	-4.374 *** (-5.05)	-0.023 *** (-5.39)	-4.580 *** (-5.49)
6.1	$GRANT_t$	0.001 * (1.79)	0.525 *** (7.09)	0.001 * (1.88)	0.555 *** (7.14)
6.2	TEL_t	5.606 *** (30.41)	-1815.124 *** (-45.23)	5.596 *** (30.35)	-1810.328 *** (-47.93)
6.3	HHI_t	-2.849 *** (-13.41)	290.581 *** (6.08)	-2.870 *** (-13.51)	307.768 *** (6.91)
6.4	$RENT_t$	-	2.067 *** (5.65)	-	2.030 *** (5.51)
	$LITR_t$	-	93.511 *** (31.34)	-	95.146 *** (29.96)
	$LPTR_t$	0.002 *** (32.68)	-	0.002 *** (32.79)	-
	OLD_{t-1}	5.567 *** (7.82)	597.591 *** (4.11)	5.560 *** (7.82)	513.211 *** (3.15)
	$YOUNG_{t-1}$	7.109 *** (9.02)	-1267.420 *** (-5.15)	7.067 *** (8.97)	-1444.606 *** (-5.49)
	$UNEMPL_{t-1}$	4.782 *** (3.13)	-29.458 (-0.09)	4.102 *** (2.67)	-
	POP_{t-1}	4.34E-06 *** (5.94)	-0.001 *** (-6.38)	4.29E-05 *** (5.87)	-0.001 *** (-6.74)
	$TBASE_{t-1}$	-0.075 *** (-22.02)	-35.481 *** (-56.65)	-0.075 *** (-22.18)	-35.6257 *** (-54.70)
	$TDEP_{t-1}$	5.173 *** (17.47)	1119.320 *** (18.25)	5.157 *** (17.41)	1117.516 *** (18.31)
	$DEBT_{t-1}$	0.180 *** (5.99)	96.508 *** (16.30)	0.180 *** (6.01)	94.707 *** (15.38)
	$TREND_t$	0.106 *** (17.08)	21.370 *** (27.02)	0.107 *** (17.20)	21.241 *** (25.75)
	R^2	0.644	0.834	0.642	0.820
	Adjusted R^2	0.642	0.833	0.640	0.819
	Wald F-stat (p)	1221868 (p<0.01)		11808115 (p<0.01)	

Note: N=4521, t-values between brackets (except for Wald-test where p is presented); * significant at 10%, ** at 5% and *** at 1%. Wald statistic has a Chi^2 distribution with R degrees of freedom (R being the number of estimated parameters).

We discuss the results hypothesis by hypothesis. As to *hypothesis 1* on partisan politics, we find significant coefficients for ICG. Partisan politics have a significant impact on both LITR and LPTR. In line with the expectations, ICG presents a negative coefficient in the LITR estimation. Leftist governments levy higher LITR and support hypothesis 1. In the LPTR estimation, against the expectations, the coefficient is positive. Leftist governments impose lower LPTR. The results

of the ICG variable show that leftist governments tend towards high income tax rates, while they prefer low property tax rates. This is in line with the general idea that left-wing governments rely more heavily on the taxation of personal income as they favour the progressivity of tax schedules[16] –as in the federal income tax on which the local income tax is a surcharge (see for example Cusack & Beramendi, 2006 and Imbeau *et al.*, 2001). As the local property tax in Flemish municipalities lacks progressivity, this might explain why leftist governments rely more on income taxes.

Table 1 shows that fragmentation (*hypothesis 2*) affects fiscal policy in Flemish municipalities. As in Ashworth & Heyndels (2005), Ashworth *et al.* (2005 & 2006), Geys (2007) and Goeminne *et al.* (2008), the effect of fragmentation on tax rate policy is not linear. Not only NPAR, but also $NPAR^2$ shows significant coefficients for both tax rates. Table A5 on p. 24 in appendix shows that tax rates first increase with the level of fragmentation, then they decrease. Highest tax rates are observed in governments with 2 and 3 parties for LITR and LPTR respectively. The impact of fragmentation on tax rates thus is concave. Indeed, broad-based coalitions are more likely to follow fiscal policies acceptable for a larger part of the population (see e.g. Lijphart & Crepaz, 1991). These broad-based coalitions might be less prone to threats of minor interest groups, limiting increases in expenditures and thereby the need to set higher tax rates.

With respect to *hypothesis 3* the expectation was that stronger majorities would be less liable to opportunistic fiscal behavior as they are relatively confident about re-election, regardless of their tax setting. The SEATMAR coefficient is only significant in the LITR estimation. Its sign suggests that more powerful governments levy lower LITR. Although contrary to the expectations, this result may not be that surprising. A stronger majority may indeed be less liable to opportunistic behavior without this automatically leading to higher tax rates. On the contrary, good vote perspectives may create a working environment in which a government is able to focus only on the needs of the municipality independent of possible opportunistic or strategic motivations. This may lead to lower tax rates. Indeed, a strong government may more easily reduce spending (Volkerink & de Haan, 1999). There is for example no need to gain additional votes by increasing expenditures or developing impressive (and costly) investment projects. Instead, the government can develop long-term planning with a staggering of investments over different terms, tax rates need not be increased after elections to permit tax decreases in election years, and so on. Governments that are more confident about re-election are thus not (or less) tempted to act

[16] Wilensky (2002; 235) explicitely states that "especially progressive income taxes are the favourites of leftist parties everywhere".

opportunistically and are able to focus on the good governance of the municipality. This may lead to more efficient governments, resulting in lower tax rates. There is no indication that the power of the government explains LPTR.

Hypothesis 4 was related to the impact of neighbouring municipalities' fiscal policy decisions. The results show that tax rates depend on those of neighbouring municipalities both in within- and cross-policy approaches. First, there is evidence that "within policy interaction" effects are present. The results provide support for the yardstick competition hypothesis. The coefficients indicate that governments whose neighbours increase their average income (property) tax rate by 1% (100 centimes) will also increase the LITR (LPTR) by 0.312% (42 centimes). The tax rate of the neighbouring municipalities thus are used as a yardstick, still their effect is partial. Second, results in Table 1 show that there is not only evidence of within-policy interaction, but also offer evidence of "cross-policy interaction". LITR is not only defined by the level of LITRN, but also by the level of LPTRN. An increase of LPTRN by 100 centimes reduces LITR by 0.2%. The same is true for LPTR. Here an increase of LITRN by 1% reduces LPTR by 212 centimes. Taking the within- and cross-policy interaction effects together –a change of LITRN by 1% changes LITR by 0.312% in the same and LPTR by 212 centimes in the opposite direction– a change in the average neighbouring local income tax rate is thus only partly compensated for. The same conclusion can be drawn for changes in the LPTRN –a change of LPTRN by 100 centimes changes LPTR by 42 centimes in the same and LITR by 0.2% in the opposite direction.

There is evidence that confirms *hypothesis 5* for both tax rates. In line with the expectations, we find that governments impose lower tax rates in election years and that they increase tax rates once elections have taken place. The electoral cycle variables present a non-linear path of fiscal policy variables. This is in line with a standard finding in the public choice literature (Imbeau & Chenard, 2002). Both the LITR and LPTR increase once elections took place. The highest tax rates are observed 3 years before elections. Then, LITR is 0.15% higher than in election years, while LPTR is 51 centimes higher. When elections come near tax rates reduce to present the lowest level over the electoral cycle in the election years.[17]

Table 1 provides evidence that allows to confirm *hypothesis 6* on fiscal illusion, still the results are not univocal. First we discuss the results for the LITR. Here, all three tested hypotheses could

[17] The joint impact of TBE and TBE² on LITR and LPTR for all years of the electoral cycle is presented in Table A6 on p. 25 in appendix.

be confirmed.[18] We find significant coefficients that have the expected signs and may conclude that in Flemish local governments LITR "suffers" from fiscal illusion. The higher the grant revenue, the more complex the tax system and the more a government depends on income taxes, the higher LITR. For LPTR, there is evidence that confirms the existence of grant illusion and of renter illusion. As Heyndels & Smolders (1994) and Van Parys & Verbeke (2007) we find that higher grants may obscure the real tax price of public goods leading to an increase in the demand for public goods with a higher LPTR as consequence. Contrary to Ashworth & Heyndels (1997), Heyndels & Smolders (1994) and Schockaert (1987) we do find empirical evidence for renter illusion in Flemish municipalities. A higher percentage of renters in the municipality pushes the LPTR up. As Bastiaens *et al.* (2001) we only find support for tax the complexity hypothesis for LITR. If the complexity of the tax system has no illusionary effects on LPTR, HHI represents the spread of tax revenues over the different taxes. The more different taxes a government levies, the lower the average revenues per tax it needs to collect the needed total tax revenues. Therefore governments with a higher number of taxes are able to set lower LPTR. Or, when the total tax revenues can be spread over more taxes, LPTR decreases. Finally, the sign of TEL is negative, suggesting that there is no evidence that a higher elasticity of the tax revenues increases LPTR. On the contrary, the negative sign points to a lower LPTR with high tax elasticity. This may suggest that in the LPTR estimation TEL suffers from a "tax dependence bias". The higher the percentage of local income tax revenues in total tax revenues, the less it is dependent on those of local property tax, so the less need to set high LPTR. This is in line with the positive sign of control variable TDEP in the LPTR estimation and the positive sign of TEL in the LITR estimation.

One of the contributions of this analysis is that the findings on the different hypothesis-tests result from a joint analysis. Nevertheless, we also present in Table A3 on p. 23 in appendix –as a kind of sensitivity analysis– results from individual tests of the different hypotheses (we restrict to the most efficient regressions). We do not intend to discuss the results of the individual analysis in detail, still a clear observer may conclude that the joint model not only presents increased explanatory power, it also shows that the power and signs of the estimators differ – especially for LPTR– and thus lead to modified and even opposite findings. This indicates that former research based on separate analyses may be misspecified.

Finally, some general findings on the *control variables*. In line with the Hettich & Winer tax model

[18] Remind that in the LITR the renter illusion hypothesis is not tested as LITR is not a property based tax.

and the Heyndels & Vuchelen (1998) findings, we find that municipalities have coherent tax policies in that the level of LITR is significantly and positively affected by the level of LPTR (and vice versa) in each model. Next the variables reflecting the needs for general and specific local public services are discussed. POP, OLD, YOUNG and UNEMPL all affect the LITR in a significantly positive way. This is in line with the expectations. We cannot find a similar effect on the LPTR estimation. The results show that both larger and younger municipalities have lower LPTR and that the unemployment rate does not affect LPTR. The latter may be not that surprising as unemployment policy is in fact in the hands of the federal and regional government. The cost of unemployment thus is particularly defrayed by higher governments. TBASE presents significant negative coefficients in both regressions and thus represents the capability of the government to collect revenues. A higher tax base allows lower tax rates for a given level of tax revenues. TDEP, DEBT and TREND finally have significant coefficients in both regressions, each time with the expected positive signs. First, the more a government depends on a certain tax, the higher the rates. Second, higher levels of debt may lead to higher interest payments and higher tax rates. Finally, the slight positive trend in the dependent variables is taken into account in the significant positive coefficient of TREND.

5. Conclusion

The purpose of this paper was to bring together different explanations for local tax rate policy in one single estimation model, using an extended dataset. Based on a large literature on tax rate determinants, we formulated hypotheses to test the presence of partisan effects, fragmentation effects, interaction dynamics, electoral cycles and fiscal illusion effects. We construct an estimation model in which we integrate all the variables simultaneously. As in reality we expect these specific effects to explain the Flemish local income and local property tax rates contemporaneously. Results indicate that for both taxes partisan effects are important. Although the effect is not linear, also the level of fragmentation affects the tax rates. The strength of the government is decisive for LITR and allows to conclude that strong governments may increase efficiency leading to lower LITR. Interaction effects and political budget cycles are observed for both tax rates. LITR suffers from fiscal illusion as all three tested hypotheses can be confirmed. For LPTR only grant illusion and renter illusion can be confirmed. The main contribution of this paper is that the results above result from a model that attempts to test the joint impact of these theories. We are aware of the fact that the development of a comprehensive tax choice model is a task that is beyond the reach of this paper and it was not our intention to create a global model. It has, however, been shown that,

although largely described in significant models individually, theories on fiscal policy need to be studied and interpreted simultaneously to avoid misspecification.

Appendices

Table A1 Size of the College of Mayor and Alderman in Flanders (N=308)

	1989-1994	1995-2000	2001-2006
1 party	140 (45.5%)	120 (39.0%)	96 (31.2%)
2 parties	136 (44.8%)	149 (48.4%)	162 (52.6%)
3 parties	27 (8.8%)	31 (10.1%)	43 (14.0%)
+ 3 parties	5 (1.6%)	8 (2.6%)	7 (2.3%)
Average number of parties	1.67	1.77	1.87

Source : Ashworth *et al.* (2005, 400)

Table A2 Ideological positions of Flemish parties

General name	1989-1994	1995-2000	2001-2006
Ecologists	2.9	2.6	2.6
Socialists	2.8	2.7	2.8
Nationalists	5.1	4.7	5.0
Local parties	5.0	5.0	4.5
Christian Democrats	5.1	5.3	5.3
Liberals	5.6	6.1	6.0
Extreme right	-	8.9	8.7

Source : Deschouwer (1996) & Rihoux (2001)

Table A3 Estimation results of the 3SLS estimation – individual hypothesis (columns 1-12) and joint hypotheses tests (columns 13-14)

Hypothesis	H_1 on partisan politics		H_2 on fragmentation		H_3 on government strength		H_4 on policy interaction		H_5 on electoral cycles		H_6 on fiscal illusion		Joint hypotheses tests	
Dep. Var.	1 $LITR_t$	2 $LPTR_t$	3 $LITR_t$	4 $LPTR_t$	5 $LITR_t$	6 $LPTR_t$	7 $LITR_t$	8 $LPTR_t$	9 $LITR_t$	10 $LPTR_t$	11 $LITR_t$	12 $LPTR_t$	13 $LITR_t$	14 $LPTR_t$
Intercept	3.110 *** (19.61)	-895.293 *** (-12.32)	2.744 *** (22.41)	-931.584 *** (-12.78)	2.821 *** (23.76)	-993.055 *** (-14.28)	0.337 (0.77)	374.616 *** (2.58)	2.562 *** (20.97)	-1079.696 *** (-15.64)	-0.844 *** (-2.68)	1230.627 *** (22.14)	-1.949 *** (-4.89)	2159.172 *** (9.03)
ICG_{t-1}	-0.084 *** (-3.72)	-23.038 *** (-4.57)	-	-	-	-	-	-	-	-	-	-	-0.038 * (-1.88)	14.366 *** (3.34)
$NPAR_{t-1}$	-	-	0.440 *** (6.63)	47.455 *** (3.26)	-	-	-	-	-	-	-	-	0.180 *** (3.04)	39.534 *** (3.55)
$NPAR^2_{t-1}$	-	-	-0.103 *** (-6.65)	-9.033 *** (-2.66)	-	-	-	-	-	-	-	-	-0.046 *** (-3.35)	-6.029 ** (-2.34)
$SEATMAR_{t-1}$	-	-	-	-	-0.580 *** (-5.16)	-49.658 ** (-1.99)	-	-	-	-	-	-	-0.301 *** (-2.98)	-
$LITRN_t$	-	-	-	-	-	-	0.520 *** (10.44)	-197.483 *** (-6.76)	-	-	-	-	0.312 *** (7.18)	-211.912 *** (-6.18)
$LPTRN_t$	-	-	-	-	-	-	-0.003 *** (-12.66)	0.722 *** (18.67)	-	-	-	-	-0.002 *** (-9.57)	0.423 *** (9.11)
TBE_t	-	-	-	-	-	-	-	-	0.209 *** (8.44)	56.004 *** (10.38)	-	-	0.121 *** (5.41)	30.866 *** (7.20)
TBE^2_t	-	-	-	-	-	-	-	-	-0.041 *** (-8.53)	-9.108 *** (-8.60)	-	-	-0.023 *** (-5.39)	-4.580 *** (-5.49)
$GRANT_t$	-	-	-	-	-	-	-	-	-	-	0.001 * (1.75)	0.393 *** (6.72)	0.001 * (1.88)	0.555 *** (7.14)
TEL_t	-	-	-	-	-	-	-	-	-	-	6.386 *** (36.47)	-2064.691 *** (-64.59)	5.596 *** (30.35)	-1810.328 *** (-47.93)
HHI_t	-	-	-	-	-	-	-	-	-	-	-3.090 *** (-15.11)	102.096 *** (2.82)	-2.870 *** (-13.51)	307.768 *** (6.91)
$RENT_t$	-	-	-	-	-	-	-	-	-	-	-	2.396 *** (7.15)	-	2.030 *** (5.51)
$LITR_t$	-	33.360 *** (11.98)	-	33.408 *** (12.13)	-	33.109 *** (11.83)	-	46.896 *** (15.37)	-	31.554 *** (11.44)	-	90.112 *** (42.10)	-	95.146 *** (29.96)
$LPTR_t$	0.001 *** (22.58)	-	0.001 *** (22.83)	-	0.001 *** (22.75)	-	0.002 *** (23.62)	-	0.001 *** (21.49)	-	0.001 *** (37.82)	-	0.002 *** (32.79)	-
OLD_{t-1}	-3.671 *** (-6.77)	3679.481 *** (22.68)	-4.115 *** (-7.48)	3395.719 *** (20.22)	-3.314 *** (-6.10)	3716.702 *** (22.77)	1.351 * (1.66)	1768.573 *** (14.59)	-3.268 *** (-6.06)	3734.786 *** (23.30)	3.082 *** (4.64)	1145.191 *** (9.78)	5.560 *** (7.82)	513.211 *** (3.15)
$YOUNG_{t-1}$	-	1456.678 *** (7.68)	-	1372.371 *** (7.16)	-	1412.294 *** (7.44)	3.304 *** (3.68)	-	-	1449.908 *** (7.74)	5.361 *** (7.13)	-436.779 *** (-3.37)	7.067 *** (8.97)	-1444.606 *** (-5.49)
$UNEMPL_{t-1}$	15.563 *** (11.23)	5465.959 *** (18.49)	14.079 *** (10.41)	5160.185 *** (18.56)	16.500 *** (12.01)	5651.134 *** (19.22)	6.412 *** (3.74)	5462.185 *** (17.76)	17.313 *** (12.62)	5972.527 *** (20.47)	9.432 *** (7.22)	-1724.247 *** (-7.66)	4.102 *** (2.67)	-
POP_{t-1}	6.89E-05 *** (15.77)	0.001 *** (7.78)	7.45E-06 *** (16.08)	0.001 *** (8.26)	6.85E-06 *** (15.69)	0.001 *** (7.95)	5.41E-06 *** (11.73)	0.001 *** (7.61)	6.94E-06 *** (16.02)	0.001 *** (8.15)	5.10E-06 *** (7.58)	-0.001 *** (-6.13)	4.29E-05 *** (5.87)	-0.001 *** (-6.74)
$TBASE_{t-1}$	-0.089 *** (-28.93)	-33.016 *** (-50.21)	-0.094 *** (-28.05)	-32.971 *** (-46.81)	-0.088 *** (-28.52)	-33.105 *** (-50.26)	-0.111 *** (-29.91)	-25.826 *** (-33.52)	-0.093 *** (-29.97)	-33.275 *** (-51.18)	-0.058 *** (-20.97)	-36.706 *** (-76.93)	-0.075 *** (-22.18)	-35.6257 *** (-54.70)
$TDEP_{t-1}$	12.011 *** (55.51)	3497.953 *** (57.67)	11.553 *** (53.52)	3426.422 *** (56.52)	11.965 *** (55.40)	3490.052 *** (57.46)	10.690 *** (44.72)	2743.662 *** (43.77)	12.179 *** (56.35)	3514.466 *** (58.58)	4.911 *** (16.94)	989.120 *** (17.68)	5.157 *** (17.41)	1117.516 *** (18.31)
$DEBT_{t-1}$	0.073 ** (2.22)	162.901 *** (-21.51)	0.111 *** (3.03)	164.551 *** (19.86)	0.067 ** (2.02)	164.181 *** (21.65)	0.120 *** (3.52)	106.842 *** (14.57)	0.096 *** (2.92)	162.001 *** (21.59)	0.171 *** (5.80)	116.047 *** (22.40)	0.180 *** (6.01)	94.707 *** (15.38)
$TREND_t$	0.116 *** (23.46)	25.886 *** (32.89)	0.111 *** (21.17)	23.854 *** (30.81)	0.113 *** (23.05)	25.575 *** (32.58)	0.164 *** (25.00)	16.029 *** (17.45)	0.120 *** (24.25)	26.559 *** (34.07)	0.069 *** (14.00)	24.550 *** (36.05)	0.107 *** (17.20)	21.241 *** (25.75)
R^2	0.518	0.687	0.497	0.675	0.520	0.686	0.492	0.727	0.525	0.694	0.644	0.861	0.642	0.820
Adjusted R^2	0.517	0.686	0.496	0.675	0.519	0.685	0.491	0.726	0.524	0.693	0.643	0.861	0.640	0.819
Wald test	490005 (p<0.01)		460426 (p<0.01)		490090 (p<0.01)		669797 (p<0.01)		494158 (p<0.01)		1180363 (p<0.01)		11808115 (p<0.01)	
N	4587		4563		4567		4553		4567		4539		4539	

Note: t-values between brackets (except for Wald-test where p is presented); * significant at 10%, ** at 5% and *** at 1%. Wald statistic has a Chi^2 distribution with R degrees of freedom (R being the number of estimated parameters).

Table A4 Descriptive statistics of the variables of the tax rate functions and data sources (1992-2006)

	Mean	Median	Max.	Min.	Std. Dev.	Source
Local income tax rate ($LITR_t$)	6.82	7.00	9.50	0.00	1.17	VVSG[19]
Local property tax rate ($LPTR_t$)	1127.73	1125.00	2300.00	260.00	319.22	VVSG
Ideological Complexion of the Government (ICG_{t-1})	4.90	5.10	6.10	2.70	0.54	MICE, VUB[20]
Actual number of government parties ($NPAR_{t-1}$)	1.78	2.00	5.00	1.00	0.73	MICE, VUB
Average LITR of neighbouring municipalities ($LITRN_t$)	6.95	6.90	9.00	5.23	0.54	VVSG, matrix of MICE, VUB
Average LPTR of neighbouring municipalities ($LPTRN_t$)	1131.73	1112.50	1979.17	450.00	251.43	VVSG, matrix of MICE, VUB
Time before elections (TBE_t)	2.20	2.00	5.00	0.00	1.69	-
Grants (p/c) ($GRANT_t$)	116.47	96.60	976.89	60.32	68.41	MICE, VUB
Tax elasticity (TEL_t)	0.53	0.55	0.99	0.00	0.11	MICE, VUB
Hirschman-Herfindahl Index (HHI_t)	0.37	0.37	1.13	0.09	0.06	Own calcul. on AHA[21]
Percentage of non-owner occupied residences ($RENT_t$)	25.19	23.72	53.78	8.31	7.30	AHAEconomy
Number of inhabitants (POP_{t-1})	19186.20	13295.00	467518.00	84.00	30952.38	FPS Economy[22]
Proportion of young ($YOUNG_{t-1}$)	0.24	0.24	0.32	0.15	0.02	FPS Economy
Proportion of elderly (OLD_{t-1})	0.16	0.16	0.26	0.07	0.03	FPS Economy
Unemployment rate ($UNEMPL_{t-1}$)	0.02	0.02	0.07	0.00	0.01	CORE, UCL[23]
LIT tax base ($TBASE^{LIT}_{t-1}$)	25.11	24.04	55.69	1.23	7.57	AHA
LPT tax base ($TBASE^{LPT}_{t-1}$)	14.30	12.62	54.30	3.70	6.28	AHA
Tax dependence LIT ($TDEP^{LIT}_{t-1}$)	0.23	0.24	0.58	0.00	0.07	AHA
Tax dependence LPT ($TDEP^{LPT}_{t-1}$)	0.20	0.20	0.55	0.05	0.06	AHA
Debt (p/c in 1000€) ($DEBT_{t-1}$)	0.91	0.84	4.00	0.00	0.44	MICE, VUB

Table A5 Joint impact of NPAR and $NPAR^2$ on the evolution of LITR and LPTR

Number of government parties	LITR	LPTR
1	0.1340	33.5046
2	0.1763	54.9512
3	0.1269	64.3397
4	-0.0142	61.6701
5	-0.2470	46.9424

[19] "Vereniging Vlaamse Steden en Gemeenten", the Association of Flemish Cities and Municipalities.

[20] MICE (Micro-Economics for Profit and Non Profit Sector) research team of the Faculty of Economic, Social and Political Sciences, and Solvay Business School, Vrije Universiteit Brussel.

[21] Agency for Home Affairs of the Flemish Government .

[22] Belgian Federal Public Service Economy, SME, Independent Professions and Energy.

[23] CORE (Center for Operations Research and Econometrics), Université catholique de Louvain.

Table A6 Joint impact of TBE and TBE² on the evolution of LITR and LPTR in non-election years compared to the tax rate in election years

Years before elections	LITR	LPTR
5	0.0155	39.8272
4	0.1064	50.1819
3	0.1503	51.3766
2	0.1472	43.4112
1	0.0971	26.2856
0	0.0000	0.0000

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