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CESIFO WORKING PAPER NO. 4025
CATEGORY 1: PUBLIC FINANCE
DECEMBER 2012

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Abstract

Three sources of strategic tax interactions among local jurisdictions are usually considered in the literature: public expenditure spill-over, tax competition and yardstick competition. However, another source has now been suggested: the intellectual trend. According to that hypothesis, politicians of the same party tend to behave similarly: incumbents of the same party mimic each other's policies. Moreover partisan politics may also act through a monopoly power effect linked to several terms of power for the same party, consecutively: a political party is more likely to have implemented tax rates corresponding to its ideology if it has ruled the municipality several legislatures in a row.

The paper proposes an empirical analysis of tax interactions among Walloon municipalities (the Southern part of Belgium) in view of discriminating among the sources of interaction. Yardstick hypothesis, intellectual trend hypothesis and potential partisan monopoly power effect are tested. Spatial econometrics tools are used along a panel of local tax rates data from 1983 to 2008 and political data. Results confirm the existence of yardstick competition among Walloon municipalities but not that of behaviors in line with the intellectual trend hypothesis. Moreover evidence is found of a partisan monopoly power effect: several successive legislatures with a sole left-wing party in power increase the tax rates. Finally the presence of an electoral cycle is also clearly documented.

JEL-Code: C210, H710, R500.

Keywords: tax interactions, spatial econometrics, local tax rates, intellectual trend.

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Marcel Gérard is also affiliated with Idep, CESifo and Ires; he is indebted to Sonia Paty and colleagues from Munich based Max Planck Institute for Tax Law and Public Finance, CES of the University of Munich and the University of Freiburg, as well as to the Belgian FNRS, for comments, hospitality and support; the idea of writing this paper goes back to the master thesis of Laurent van Malderen under the direction of Marcel Gérard (corresponding; author).

1. Introduction

Strategic interactions among local governments occur because the environment in which local policy decisions are made is affected by the actions of other local jurisdictions (Brueckner, 1998). Fiscal policies are thus interdependent and three mains sources of interaction have been extensively considered in the economic literature so far: public expenditure spill-over, tax competition and yardstick competition (Revelli, 2005).

Public expenditure spill-over appears when a public service provided by a jurisdiction enters the welfare function of another jurisdiction (Gordon, 1983). It follows that expenditure levels are spatially correlated across jurisdictions, and consequently so might be the tax rates (Allers and Elhorst, 2005). Fiscal competition is at work when local jurisdictions compete in order to attract mobile tax bases (Wilson, 1999; Oates, 2002). Typically, a jurisdiction decreases its tax rates and those competitors who lose tax bases revise their tax rates until equilibrium is reached. Finally, one speaks about yardstick competition when local incumbents are mimicking each other (Salmon, 1987) in order to gain re-election. Actually, voters face an asymmetrical information problem with their incumbents (Besley and Case, 1995); they lack knowledge on the cost of public services and, consequently, in order to evaluate the performance of their incumbents, they compare the tax burden in their own jurisdictions with those prevailing in the neighboring ones. The incumbents are aware of the voters' behavior and, therefore, those which are not confident of their re-election (e.g. those backed by a tiny majority) mimic each other in order to be re-elected (Bordignon *et al.*, 2003).

However, another source of fiscal interdependency has been suggested in recent years: the intellectual trend (Redoano, 2003). According to that hypothesis, politicians of the same party, who are thus sharing similar ideological preferences (Hazan, 2003), tend to behave in the same way as a partisan reference group (Santolini, 2008). In fact, as citizens also vote by ideology, political parties provide important cues on how politicians will act once elected (Geys and Vermeir, 2008). As a result, partisan identification of a candidate is used by the citizens for deciding on their vote and, thereafter, for estimating the *'quality'* of their political representatives (Jones and Hudson, 1998). Voters solve their asymmetrical information problem by comparing the tax burden in their jurisdiction with those of neighboring ones ruled by the same party. As a result, local incumbents of the same party, who could also have to follow a party discipline, are more likely to engage in a mimic of each other's policy and to collude and form a political '*cartel*' (Geys and Vermeir, 2008). Hence, tax interactions are more likely to occur among municipalities ruled by the same party.

Moreover partisan politics may also act through a monopoly power effect linked to several terms of power for the same party, consecutively: a political party is then more likely to have implemented tax

rates corresponding to its ideology if it has ruled the municipality several legislatures in a row. In contrast however another interpretation of the monopoly effect is possible, i.e. that such a partisan monopoly effect discourages politicians in power to take care for efficiency, what translates into higher tax rates.

The aim of this paper is to empirically investigate tax interactions among the municipalities (i.e. the local jurisdictions) of the Walloon Region (the Southern part of Belgium)[2] in order to test the existence of yardstick competition, the presence of behaviors consistent with the intellectual trend hypothesis and the occurrence of partisan monopoly effects, as well as their interpretation.

To achieve these objectives, spatial econometrics tools and a panel of Walloon local tax rates data from 1983 to 2008 are used. The Belgian municipalities are particularly well-adapted for such an analysis as they are institutionally homogenous and are sharing identical competences (Richard *et al.*, 1997). In addition, both main local taxes, i.e. the local surcharges on income tax and the local surcharges on property tax, account for more than 40 percent of local revenues and are freely determined by policy makers (Heyndels and Vuchelen, 1998). This makes the partisan preferences more likely to play a leading part when determining the tax burden. However, as the political party system is different across the Regions of Belgium (Billiet *et al.*, 2006), the analysis only focuses on the municipalities of one Region of Belgium, the Walloon one. This limitation is not restrictive as Gérard *et al.* (2010) show that they do not interact with those of the other Regions of Belgium.

Thereafter Section 2 proposes a review of the empirical literature on tax interactions among local governments. Section 3 is devoted to the methodology and the presentation of the data set. Section 4 presents the results and finally Section 5 concludes.

2. Review of the literature

The main challenge of empirical work on tax interactions is to discriminate between the different sources of fiscal interdependency (Revelli, 2005).

The public expenditure spill-over hypothesis is tested through the estimation of a local utility function where the utility of the residents of a given jurisdiction depends on control variables like grants received from other levels of governments and socio-demographic characteristics of the jurisdiction, on own spending for public services, and on public spending in neighboring jurisdictions (Case *et al.*, 1993). Murdoch *et al.* (1993) are the first authors to find out empirical evidences of

[2] The Walloon Region consists of 262 municipalities; together they cover 16,844 km² and accounts for about 3.5 million inhabitants representing about 55 per cent of Belgian territory and 32.4 per cent of its population.

expenditure spill-over at the local level. They study the recreation spending of the local jurisdictions of the Los Angeles Area; and they find an interaction effect of 0.4 meaning that an increase in the recreation spending in neighboring jurisdictions of 1 dollar increases the own spending of 0.4 dollars. Further contributions confirm that evidence and different directions and/or magnitudes for the interaction effects have been found depending both on the local jurisdictions studied and on the expenditure analyzed. Sollé-Ollé (2006) distinguishes empirically between two kinds of expenditure spill-overs: '*benefits crowding*', on one hand, arising from the provision of local public goods; and '*crowding spill-overs'*, on the other hand, arising from the crowding of facilities by residents in neighboring jurisdictions. Allers and Elhorst (2010) give an overview and references of the expenditure spill-over literature.

It follows from expenditure spill-over that expenditure levels are spatially correlated across jurisdictions, and consequently so might be the tax rates (Allers and Elhorst, 2005). However, it is not clear whether tax rates interdependency results from expenditure spill-over, or conversely. In fact, both processes could overlap (Revelli, 2002) and are theoretically consistent. Only few papers have dealt with that issue (Revelli, 2002; Schaltegger and Küttel, 2002; Redoano, 2003) but as they analyze local tax rates and expenditures levels separately it is not possible to discriminate among both hypotheses (Allers and Elhorst, 2010). At our knowledge, only Allers and Elhorst (2010) analyze tax and expenditure interdependencies simultaneously but without discriminating between those two relationships. Nonetheless, by adopting such a methodology, they find a higher interaction effect than in separate analyses. In contrast, Revelli (2003) finds that the interaction effect is reduced when taking into account vertical fiscal externalities: expenditure spill-overs are thus attributed to common reaction to upper level fiscal policies. More research could thus turn out to be interesting in this field.

Tax and yardstick competition are tested using an identical empirical specification (Brueckner, 2003): the estimation of a fiscal reaction function, where the optimal tax rate in one jurisdiction depends on the tax rates in nearby jurisdictions (Revelli, 2005). Strategic interaction is confirmed when the estimated slope of the reaction-function is nonzero (Brueckner, 2003). Ladd (1992) is the first to have empirically investigated tax interdependency, calling the phenomenon '*tax mimicking'*. Since this seminal paper, many contributions have found evidences in different countries (see Allers and Elhorst (2005) for a review). Cassette and Paty (2006) extends this model to allow jurisdictions to interact differently depending whether they are located in an urban or a rural area. They find that French rural jurisdictions set their local business tax only by looking at their own socio-economic features whereas urban jurisdictions are interacting with each other. Gérard *et al.* (2010) observe that interregional differences (i.e. differences in institutions, cultures, languages, social norms, etc.)

matter in Belgium and that the higher the substitutability between the jurisdictions of a Region the higher the interactions.

However, in many cases, the positive sign of the estimated slope does not allow discriminating between tax competition and yardstick competition. In fact, the positive slope result is consistent with both theories (Wildasin and Wilson, 2004). In order to face this issue, Revelli and Tovmo (2007) use a tax reaction function estimated on data on Norwegian local politicians' attitudes towards comparative performance evaluation. They find that comparative performance evaluation generates a positive spatial auto-correlation consistent with the yardstick competition theory. Bordignon *et al.* (2003) adopt a different methodology. They estimate a tax reaction function which also takes into account the features of the electoral system (in this case the Italian one): they allow the incumbents to adopt different behaviors depending on whether they may run for a re-election or they face a term limit. They find that the municipalities where the mayor faces a term limit or is backed by a large majority do not interact with the other ones. This result points yardstick competition as the most likely source of fiscal interaction. Allers and Elhorst (2005) and Elhorst and Fréret (2009) adopt a similar methodology and confirm these findings respectively on Dutch cross-sectional data and French panel data.

Santolini (2008) follows this strand of literature but extends the model in order to test the intellectual trend hypothesis as suggested by Redoano (2003). She analyzes the local jurisdictions of the Marche Region (Italy) and her equation allows the incumbents to adopt different behaviors depending on their political preferences. She finds that jurisdictions governed by the same coalition tend to implement similar tax rates according to their ideology. It also appears that the intensity of tax interactions is stronger between incumbent politicians belonging to right-wing coalition. These results are consistent with the intellectual trend hypothesis and the formation of a political '*cartel'* as suggested by Geys and Vermeir (2008).[3]

Other empirical contributions dealing with the partisan influence on local taxes study the partisan influence on tax levels rather than on tax interactions. Thus, Borge (1995) adds the share of left-wing parties in the local council as an exploratory variable. He finds that Norwegian left-wing governments report higher fee income. Allers *et al.* (2001) model the partisan influence by differentiating between the '*political color*' of local councils and of executive committees and find that left-wing parties have a higher tax burden.

[3] See also Delgado et al. (2011).

3. Methodology, data and institutional background

Thereafter we first describe the methodology; then we present the data set and provide the reader with some relevant institutional information.

3.1. Methodology

We follow a two-step methodology. First, we conduct a spatial panel analysis; its aim is to test the presence of strategic tax interactions among the Walloon municipalities and to discriminate among several hypotheses, including the intellectual trend. Then we test the presence of a partisan monopoly effect using a cross-sectional analysis; therefore we take into account the number of successive legislatures with a sole and given party holding the power in the municipality; such a variable can only be incorporated in a cross-sectional analysis.

3.1.1. Panel analysis

Three steps characterize the spatial panel analysis. First, we conduct the specific-to-general approach proposed by Elhorst (2010) in order to find out the data-generation process of our data set. This approach consists in two steps. First, LM-tests and robust LM-tests are computed on the residuals of a regression without spatial effects. If both tests conclude to the presence of spatial effects, the spatial Durbin model of equation (1) is estimated. This model generalizes both the spatial lag and the spatial error models (Adjemian *et al.*, 2010). Likelihood Ratio (LR) tests are then applied to the results in order to discriminate between these three spatial specifications (i.e. spatial lag, spatial error and spatial Durbin). Following the spatial Durbin specification, the jurisdiction *i* tax decision in year *t*, denoted by t_{it}, depends on observed own socio-demographic characteristics k of the municipality, x_{it}^{k}, and on both the observed socio-demographic characteristics and tax choices of the neighboring municipalities, x_{jt}^{k} and t_{jt} respectively. Adopting a linear specification, the model may be written

$$t_{it} = \alpha + \rho \sum_{j \neq i} w_{ij} t_{jt} + \sum_{k} \beta_k x_{it}^{k} + \sum_{k} \theta_k \sum_{j \neq i} w_{ij} x_{jt}^{k} + \eta_i + \tau_t + u_{it} \qquad (1)$$

where α is a constant; η_i is a municipal fixed effect taking into account unknown time-invariant factors influencing tax rates; τ_t is a trend variable; and w_{ij} is an element of the spatial weight matrix $\boldsymbol{W}$ that describes the spatial arrangement of the jurisdictions in the sample (Elhorst and Fréret, 2009).

If the specific-to-general approach points a spatial model as the one of the data-generation process, a positive and significant value of the spatial parameter may be interpreted as evidence of tax

mimicking (Allers and Elhorst, 2005). The higher is the value of that parameter, the stronger the interactions among municipalities.

In this first step of the analysis, a first-order contiguity weight matrix is considered because it has the highest probability, compared to other matrices, to fit the true model while decreasing the mean squared error of spatial and regressions parameters (Stakhovych and Bijmolt, 2009). Moreover, Gérard *et al.* (2010) show that tax interactions in Belgium only occur between close neighbors. This weight matrix, ***W***, is row-standardized so that $\sum_{j \neq i} w_{ij} t_{jt}$ represents the arithmetical mean of the tax rates of municipalities adjacent to *i*.

Finally, u_{it} denotes independently and identically distributed error terms. Equation (1) is estimated by Maximum Likelihood (ML).

Secondly, once the specification of the model is found out, the approach used by Bordignon *et al.* (2003) is followed in order to test whether tax interactions are due to tax competition or to yardstick competition. The spatial model is extended to two different spatial regimes taking into account electoral considerations.

The yardstick competition hypothesis considers that local incumbents are more sensitive to fiscal policy changes in the neighboring jurisdictions when they are not confident about their re-election. Consequently, we define a binary variable δ_{it} which takes the value *1* when jurisdiction *i* at time *t* is ruled by a heterogeneous political coalition and *0* otherwise. In that latter case, local government is backed by a majority of the same political party; therefore the incumbent will be more confident about her re-election. Following this assumption and a spatial Durbin specification, $\delta_{it} \sum_{j \neq i} w_{ij} t_{jt}$ of equation (2) reflects the mean tax rate of municipalities contiguous to a heterogeneous coalition whereas $\left(1 - \delta_{it}\right) \sum_{j \neq i} w_{ij} t_{jt}$ does for the mean tax rate of municipalities contiguous to a homogeneous political coalition (Santolini, 2008). Hence, the parameters ρ_1 and ρ_2 measure the degree of interaction between the jurisdictions that belong to the first and second regime respectively. If the process behind tax interactions is yardstick competition, ρ_1 should be significantly larger than zero and larger than ρ_2. Model (2) is estimated by Maximum Likelihood and the MATLAB routine developed by Elhorst is used[4],

$$\begin{aligned} t_{it} = {} & \alpha + \rho_1 \delta_{it} \sum_{j \neq i} w_{ij} t_{jt} + \rho_2 \left(1 - \delta_{it}\right) \sum_{j \neq i} w_{ij} t_{jt} + \sum_k w_{ij} x_{it}^k \\ & + \sum_k \beta_k x_{it}^k + \sum_k \theta_k \sum_{j \neq i} w_{ij} x_{jt}^k + \eta_i + \tau_t + u_{it} \end{aligned} \tag{2}$$

[4] http://www.regroningen.nl/elhorst/software.shtml

In a third step, the intellectual trend hypothesis is tested by estimating the equations with a spatial weight matrix, ***W***, whose elements initially have a value *1* when jurisdiction *j* and neighboring jurisdiction *i* are governed by a political party of the same color, and *0* otherwise (Santolini, 2008), before being standardized as above. A positive and significant sign of the spatial autoregressive parameters is consistent with the theory; in that case, tax interactions only occur among jurisdictions governed by the same political party. A control dummy variable is also introduced in the model which takes the value *1* when jurisdiction *i* does not have any neighbor governed by the same party. It models different behaviors that can be adopted by those jurisdictions when they set their tax rates.

3.1.2. Cross-sectional analysis

Finally, a cross-sectional analysis is performed in order to test the effect of ideology. In fact, left-wing parties are expected to implement higher tax rates than right-wing parties because they are believed to be more favorable to an active state and more committed to income redistribution (Allers *et al.*, 2001). To achieve this objective, two monopoly variables are constructed: one for the left-wing parties and one for the right-wing one. These variables are defined as the number of consecutive municipal legislatures in power of the same party. Similarly, the specific-to-general approach of Elhorst (2010) is used in order to find out the data-generation process that fits our data. The model which is selected by this approach is then estimated with the monopoly variables defined above.

3.2. Data set and institutional information

The database of Gérard *et al.* (2010)[5] is used; it is updated for the 262 Walloon municipalities in order to cover the period 1983-2008. The database is also enriched with political data. The main data sources are the Belgian National Institute of Statistics, the Association of Walloon Municipalities, the Walloon Region and the Center for Socio-Political Research and Information (CRISP, a French acronym for *Centre de Recherches et d'Informations Socio-Politiques*).

The independent variables are the local surcharges on income tax and the local surcharges on property tax. The reader should know that the Walloon Region consists of 262 municipalities which are supervised by the Walloon government. As explained in Gérard *et al.* (2010) their major expenditure categories include culture and education, police, welfare and transport infrastructures, and general administration. Municipalities levy numerous local taxes, which account for more than 40 percent of the local revenues, including the surcharges referred to above; transfers from the regional authorities are the other main source of funds for Walloon municipalities. The two taxes mentioned above, the local income tax and local property tax surcharges, and mainly the former one, cause the largest part of municipal tax revenues (around 80 percent):

[5] This database gathers data collected by Richard *et al.* (2002) and Van Parys and Verbecke (2006).

- the local income tax is a surcharge on the federal income tax levied on individuals at the place of their residence; the rate of the surcharge lies between 0 and 10 percent (see Table 1); in practice, this is a tax on labor income since savings income is mainly taxed separately; and

- the local property tax is a surcharge on the regional property tax; its base, also defined at federal level, is an imputed income on immovable property; that tax is levied on all taxpayers – individuals, companies, charities – on the basis of the location of the property. Therefore it is a source based tax even if, for owner occupied property, source and residence coincide; the regional property tax in the Walloon Region amounts to 1.25 percent of the imputed income on immovable property; the local surcharge varies between 235 and 3100 centimes or corresponding percent of the regional tax (see Table 1).

Each municipality has a council that is elected every six years, in October, on the same day in the whole country. Residents of the municipalities vote for candidates on lists presented either by political parties also active at regional and federal level, or by local interest groups; each list gets municipal councilors in line with the number of votes obtained. Then a majority contract is passed within the municipal council; on that base the mayor is proposed for designations by the Region[6] and her deputies in charge of specific local responsibilities are elected by the municipal council. The mayor and her deputies form the executive of the municipality which is called the municipal college. The mayor may be reappointed for a new six-year term indefinitely. Finally, the main reasons for mobility are workplace location – though many Walloon residents commute daily long distances, at the scale of Belgium, to places of work located either in Wallonia or in Brussels – and price and size of grounds and homes.

In line with the literature, two socio-demographic control variables have been introduced: population density and *per capita* income. These variables reflect the expenditures needs of local jurisdictions. Consequently, a positive sign is expected for the parameter associated to the population density variable whereas a negative sign is expected from the *per capita* income parameter. Moreover, three electoral dummies were created in order to test the existence of an electoral cycle where incumbents adopt opportunistic behaviors, i.e. they set lower tax rates in the years around the election year (for a survey of the theory and literature of local taxes related electoral cycle, see e.g. Foremny and Riedl (2012)); indeed four elections occurred during the period

[6] Notice that effective at the election of October 2012 the mayor will be the most voted candidate of the most voted list.

investigated, respectively in 1988, 1994, 2000 and 2006. Table 1 reports the summary statistics of the variables.

Table 1 – Summary statistics of the variables

Variable	Unit	Mean	Standard Deviation	Min	Max
Local surcharges on income tax	%	7.05	0.97	0	10
Local surcharges on property tax	Centimes	2185.27	444.91	235	3100
Population density	10^2 inhabitants/Km²	2.98	4.34	0.19	36.61
Per capita income	10^3 €	8.93	3.2	3.4	21.6
Heterogeneous coalition	Dummy	0.18	0.39	0	1
Majority	Dummy	0.82	0.38	0	1
Election year – 1	Dummy	0.15	0.36	0	1
Election year	Dummy	0.15	0.36	0	1
Election year + 1	Dummy	0.19	0.39	0	1

With regard to the partisan variables, the *Liberal Reforming Party* (PRL) and any coalition of this party with the *Movement of the Citizens for the Change* (MCC) or with the *French-speaking Democratic Front* (FDF)[7] is considered as a right-wing party. A municipality is considered as ruled by a left-wing party when the *Socialist Party* (PS) is in power alone. Any coalition between right-wing and left-wing parties has been considered as a center coalition. The *Humanist and Democratic Centre* (CDH) and its predecessor, the *Christian Social Party* (PSC), as well as the *Ecologist Party* (Ecolo) are considered as center parties and, when those parties are in power, alone, together or in coalition with either the left-wing or the right-wing party, we speak about a center majority. We have also considered as center parties all the local parties which are not present at an upper level (e.g. the so called *Lists of the Mayor*).

Figure 1 maps the partisan variables and Table 2 further documents on the evolution of municipal power in Wallonia.

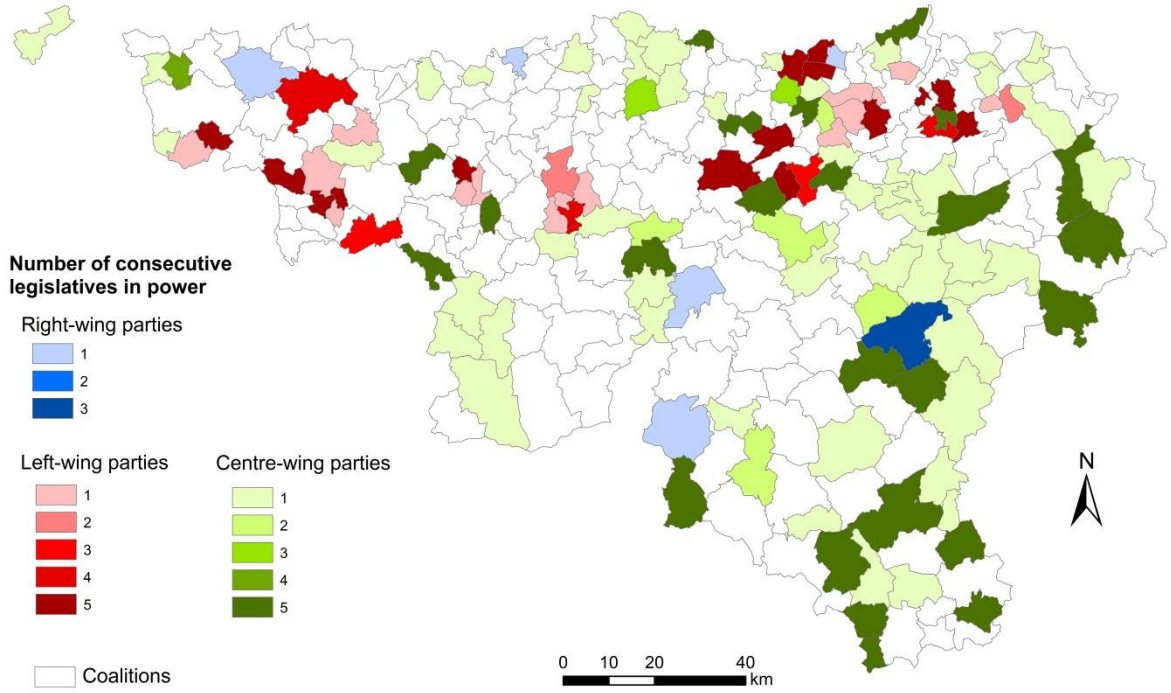
Inspection of Figure 1 reveals that, after the 2006 elections – the map shows the picture of municipal power in 2008 but usually municipal power is rather stable over the legislature, currently the 2006-2012 legislature –, the large majority of the municipalities are ruled by coalitions (in white on the map) or center parties (from light to dark green on the map depending of the number of consecutive legislatures at power); the other municipalities are either ruled by the sole left (from pink to dark red on the map) or by the sole right (from light to dark blue on the map).

Moreover twenty municipalities exhibit a leftist partisan monopoly (three or more successive legislatures with the sole Socialist Party in power), only one shows a similar rightist monopoly (dark

[7] These three parties have formed an association in 2002 known as the *Reforming Movement* (MR).

blue); and twenty seven show a center party monopoly, which at municipal level might be that of a national or regional political party or of a local “list of the Mayor”.

Figure 1 - Monopoly variable



However, what the picture does not show, but Table 2 does, is that one observes a decline in the share of majorities, from 88 till 48 per cent, and a simultaneous upward trend in the number of coalitions from 12 to about 52 per cent, over the five legislatures which occurred between 1982 and 2012. Especially the share of leftist majorities fell from around 32 to about 15 per cent over the period examined.

The sharp increase in the number of coalitions after the 2000 municipal elections is to be set forth and possibly related to the presence of a ruling coalition of the *Socialist Party* (left) and the *Reforming Movement* (right), jointly with *Ecolo* (center), at both federal and regional levels at that moment.

Table 2 – Evolution of the power in Walloon municipalities, 1983-2012

Legislature	Coalition (%)	Majority (%)			
		Total	Left	Right	Center
1982-1988	11,83	88,17	31,68	6,49	50,00
1988-1994	6,13	93,87	32,82	8,02	53,03
1994-2000	16,09	83,91	32,06	11,83	40,01
2000-2006	28,35	71,65	29,77	12,98	28,90
2006-2012	51,72	48,28	14,56	2,30	31,42

4. Results

As indicated above in the methodological section we first conduct a spatial panel analysis, then a cross sectional one.

4.1. Spatial panel analysis

Table 3 reports the results of the specific-to-general approach which is used to find out the spatial specification of the model to be estimated. The results show that the spatial Durbin model is the one to favor for both the local income tax surcharge and the local property tax surcharge. Therefore we only report and comment on the results obtained from the use of the spatial Durbin model.

Table 3 – Results of the specification tests (spatial panel analysis)

	Local income tax surcharge	Local property tax surcharge
LM test (error)	1.6818	0.0609
LM test (lag)	0.3507	7.1930***
Robust LM test (error)	27.5385***	272.1297***
Robust LM test (lag)	26.2073***	279.2618***
LR test (H0: error)	10.80*	26***
LR test (H0: lag)	11.2322*	22.2578**

*Note: (i) significant at *0.10 **0.05 ***0.01*

We comment on the results reported in Table 4 and Table 5 simultaneously. They refer to the local income tax surcharge and the local property tax surcharge respectively.

Let us start with column – and model – (1) of both tables; they report on the results from standard analysis, see equation (1). Among the usual control variable only one is significantly different from zero, and in this case negative, the *per capita* income: when municipal average income goes up, so does the revenue and an identical amount of expenditures might be financed with a reduced surcharge rate. In contrast the population density is not significantly positive, probably due to the fact that Walloon large cities benefit more from transfer from the Region.

Moreover, in both cases, a positive trend is significant, presumably reflecting the increasing budgetary needs of the municipalities; that increase reflects e.g. the obligation made to municipalities, in the second half of the period under examination, to pay for the local police created by the police reform. Other arguments are the increasing responsibilities of municipalities in terms of social assistance and the need to offset cuts in marginal tax rates occurring at federal level – remember that municipal tax is a surcharge on the federal rate on income and on the regional rate on property value.

Evidence of an electoral cycle also appears in both tables; notice that, unlike e.g. Riedl and Foremny (2012), the year after the election is also signed negatively; that may illustrate that municipal elections take place in October with the new municipal executive taking responsibilities at the end of the year.

Table 4 - Spatial Durbin, local income tax surcharge

Explanatory Variable	One regime (1)	One regime + political weight matrix	Two regimes (2)	Two regimes + Political weight matrix
Population density	0.0002 (0.0116)	-0.0021 (-0.1128)	0.0022 (0.1195)	-0.0011 (-0.0616)
Per capita income	-0.0556*** (-5.0953)	-0.0460*** (-4.8285)	-0.0535*** (-4.9992)	-0.0444*** (-4.7409)
Election year – 1	-0.0669*** (-3.2553)	-0.0699*** (-3.4032)	-0.0677*** (-3.3633)	-0.0703*** (-3.4923)
Election year	-0.1434*** (-6.8984)	-0.1492*** (-7.1845)	-0.1440*** (-7.0658)	-0.1493*** (-7.3358)
Election year + 1	-0.0577*** (-3.0524)	-0.0587*** (-3.1056)	-0.0558*** (-3.0088)	-0.0574*** (-3.0948)
Trend variable	0.0479*** (9.7263)	0.0533*** (12.7128)	0.0457*** (9.4332)	0.0522*** (12.5793)
Isolated municipalities	-	-0.0224 (-0.7261)	-	-0.0118 (-0.3903)
W*population density	0.0139 (0.3251)	0.0102 (1.3049)	0.0137 (0.3259)	0.0104 (-1.3477)
W*per capita income	0.0479*** (3.1899)	0.050*** (3.0067)	0.0516*** (3.4897)	0.0052*** (3.2041)
Spatial regressor	0.0310 (1.5656)	-0.0020 (-0.5502)	-	-
Spatial regressor: Majorities	-	-	-0.0718* (-1.9103)	-0.0602*** (-8.9968)
Spatial regressor: heterogeneous coalitions	-	-	0.0581*** (2.7726)	0.0164*** (4.4033)
R^2	0.6562	0.6561	0.6568	0.6566
Log L	-5812.7308	-5814.2788	-5804.6594	-5807.1286
AIC	12168.1264	12170.5575	12149.3187	12154.2572
BIC	13940.4271	13949.4223	13921.6195	13926.5579
Spatial fixed effects	Yes	Yes	Yes	Yes

*Notes: (i) t-values are in parentheses; (ii) constants are not provided; (iii) Two-tailed t-test significant at *0.10 **0.05 ***0.01.*

The spatial regressor is not significant both for the local income tax surcharge and for the local property tax, which is an invitation to turn to more refined models. In contrast however there is an interaction between municipalities through *per capita* income, but with a different sign depending on

the surcharge considered. That sign is positive for the surcharge on the income tax: an increase in municipality *i* surcharge is correlated with an increase in *per capita* income in the neighboring municipalities. A tentative explanation may be found in terms of substitution between places of residence: one your neighbors become poorer you signal your attractiveness or your efficiency through a smaller tax while simultaneously your neighbor tax rate is supposed to increase. The corresponding coefficient in Table 5 is negative, possibly illustrating a co-movement between the municipalities: when *i* and neighboring municipalities experiment higher income, the negative tax effects will be reinforced by an interaction among them.

Table 5 – Spatial Durbin, local property tax surcharge

Explanatory Variable	One regime (1)	One regime + political weight matrix	Two regimes (2)	Two regimes + political weight matrix
Population density	-9.1059 (-1.4974)	-6.5481 (-1.074)	-8.4401 (-1.4165)	-5.9703 (-1.0001)
Per capita income	-11.9488*** (-3.3416)	-26.8049*** (-8.4075)	-11.1397*** (-3.1741)	-25.8846*** (-8.2388)
Election year – 1	-33.1456*** (-4.9142)	-31.8346*** (-4.7064).	-33.7582*** (-5.1066)	-32.4914*** (-4.9059)
Election year	-66.3159*** (-9.6560)	-64.9134*** (-9.4487)	-67.0058*** (-9.9478)	-65.7345*** (-9.7838)
Election year + 1	-15.7488** (-2.5436)	-18.2657*** (-2.9358)	-15.0796** (-2.4848)	-17.6696*** (-2.8962)
Trend variable	49.4446*** (26.6990)	42.8999*** (29.1163)	48.7712*** (26.5348)	42.5265*** (29.0150)
Isolated municipalities	-	-0.0303 (-0.0030)	-	-17.5475* (-1.7618)
W*population density	16.3727 (1.1638)	3.9785 (1.5399)	16.7822 (1.2177)	4.1476 (1.6286)
W*per capita income	-42.7523*** (-8.5705)	-1.8234*** (-3.3323)	-41.4796*** (-8.4481)	-1.7276*** (-3.2299)
Spatial regressor	0.0160 (0.80561)	0.007** (2.0830)	-	-
Spatial regressor: Majorities	-	-	-0.0576** (-2.0568)	-0.0631*** (-12.9758)
Spatial regressor: heterogeneous coalitions	-	-	0.0315 (1.5521)	0.0176*** (5.2058)
R^2	0.8254	0.8238	0.8258	0.8242
Log L	-45262.2439	-45295.6616	-45252.6773	-45285.0300
AIC	91064.4878	91133.3231	91047.3545	91110.0595
BIC	92836.7885	92912.1879	92826.2193	92882.3607
Spatial fixed effects	Yes	Yes	Yes	Yes

*Notes: (i) t-values are in parentheses; (ii) constants are not provided; (iii) Two-tailed t-test significant at *0.10 **0.05 ***0.01.*

Moving to the next column and thus to the test of the intellectual trend, the results denoted so far are basically left unchanged when the contiguity weight matrix is substituted with a political weight matrix, but for the spatial regressor which becomes significantly different from zero and positive when the surcharge on the local property tax is concerned. Simultaneously, in that case, the interdependence in terms of *per capita* income, although still significantly different from zero, declines.

According to Elhorst (2010), the choice between models based on the use of various weight matrices should obey the following rule "if a spatial interaction model is estimated based on *S* different spatial weight matrices and the log-likelihood function value of every model is estimated, one may select the spatial weight matrix exhibiting the highest log-likelihood function value". In our case, this implies that the contiguity weight matrix has to be chosen for the surcharge on the personal income tax; however the difference in the log-likelihood function value is extremely small. This means that the intellectual trend hypothesis is either rejected or not discriminated from its competitor: local incumbents are not likely to follow some party discipline rule in tax matters at the local level.

If we combine the two regime model with the contiguity weight matrix – column and model (2) –, and as long as the income tax surcharge is concerned, the spatial regressor in case of heterogeneous coalition becomes significantly positive and is larger than the spatial regressor for single party majority power – notice that, as previously observed, a majority of municipalities are ruled by coalitions. That confirms the results set forth by Bordignon *et al.* (2003) who – see above – find that the municipalities where the mayor is backed by a large majority – or, in their case, which is not relevant for Wallonia, – experiments a term limit, do not interact with the other ones. That result supports yardstick competition as the most likely source of fiscal interaction; as already mentioned Allers and Elhorst (2005) and Elhorst and Fréret (2009) have obtained similar results using Dutch cross-sectional and French panel data, respectively. The result observed in Table 6 confirms that of Table 5 in the sense that, for the surcharge on the property tax also, the coefficient of the spatial regressor for heterogeneous coalitions is larger than the one for single party majority.

In both case that specification leads to the highest value of the log-likelihood function which, in line with Elhorst (2010) recommendation, should support a preference for that model, the advantage is small.

Finally substituting a political weight matrix for the contiguity weight matrix does not improve the results; instead the value of the log-likelihood function slightly decreases. All in all, the results reported in Tables 4 and 5 seem to rather support the yardstick competition hypothesis and less in favor of the intellectual trend view.

4.2. Cross sectional investigation

The cross sectional investigation allows us to capture the possible impact of the monopoly power of a given party, measured by a number of successive legislatures in power. Table 6 provides the results of the specification tests. The LM tests and their robust counterparts reject the hypothesis of spatial

dependence among the cross-sectional data. Therefore, the models have been preferably estimated without spatial effects and using OLS.

Table 6 – Results of the specification tests (spatial panel analysis)

	Local income tax surcharge	Local property tax surcharge
LM test (error)	0.0426	0.8421
LM test (lag)	0.2106	1.1296
Robust LM test (error)	2.4138	0.3064
Robust LM test (lag)	2.5818	0.594

*Note: (i) significant at *0.10 **0.05 ***0.01*

Results for the estimations of the two taxes considered are reported in Table 7.

The first additional insight brought in by this model is the evidence of a leftist monopoly effect. Indeed Table 7 shows up that a long and sole presence of the *Socialist Party* at the head of a municipality pushes the local income tax surcharge upward. We do not observe a significantly symmetric effect for the longevity in power of the *Reforming Party* but we only have that party in power for up to three legislatures, and then in only one case. Moreover, we obtain such a significantly partisan monopoly effect for the local income tax only.

Table 7 – Municipal partisan monopoly power (I), OLS Estimations (cross-sectional)

Explanatory Variable	Local income tax surcharge	Local property tax surcharge
Population density	0.0074 (0.5624)	1.1915 (0.2512)
Per capita income	-0.0969*** (-3.2457)	-54.1914*** (-5.0246)
Left-wing parties monopoly	0.0852 (1.9021)*	21.7848 (1.3451)
Right-wing parties monopoly	-0.0004 (-0.0018)	-95.5453 (-1.1104)
R^2	0.0580	0.1009
Log L	-336.0628	-1879.226
AIC	680.1256	3766.452
BIC	706.3819	3792.7083

Notes: (i) t-values are in parentheses; (ii) constants are not provided;
*(iii) Two-tailed t-test significant at *0.10 **0.05 ***0.01.*

Such a monopoly effect might be interpreted in two different ways at least. On the one hand, one might consider that such a partisan monopoly effect – in French we could call that a *bastion socialiste* effect – discourages the municipal college to take care for efficiency, what translates into higher tax rates. On the other hand, such a monopoly power allows the left-wing party to behave in line with its preferences for redistribution and public provision of local goods and local facilities, which requires more revenue; and since those leftist municipalities most usually exhibit lower average income, that latter requirement needs higher tax rates. That second view is backed by our econometric results, in

line with Allers *et al.* (2001) finding that left-wing parties are associated with a higher tax burden. Finally the downward effect of the *per capita* income is confirmed.

That a socialist monopoly generates higher tax rates in line with the second view mentioned above is confirmed by the results reported in Table 8. Those results only refer to the local income tax surcharge.

Table 8 – Municipal partisan monopoly power (II), OLS Estimations (cross-sectional)

Explanatory Variable	Local income tax surcharge	Local income tax surcharge	Local income tax surcharge
Population density	0.0074 (0.5624)	0.0028 (0.2109)	0.0028 (0.2080)
Per capita income	-0.0969*** (-3.2457)	-0.0925*** (-3.1207)	-0.0930*** (-3.1388)
Left-wing parties monopoly	0.0852* (1.9021)	0.0745* (1.6660)	0.1507*** (2.7435)
Right-wing parties monopoly	-0.0004 (-0.0018)		
Center parties monopoly		-0.0769** (-2.0277)	
All monopolies			-0.0768** (-2.0259)
R^2	0.0580	0.0729	0.0729
Log L	-336.0628	-333.9836	-333.9873
AIC	680.1256	679.96270	679.9746
BIC	706.3819	702.2235	702.2309

*Notes: (i) t-values are in parentheses; (ii) constants are not provided; (iii) Two-tailed t-test significant at *0.10 **0.05 ***0.01.*

The first columns reproduce the corresponding one of Table 7. In the second column the variable *right-wing parties monopoly* is replaced by *center parties monopoly* and in the last columns it is similarly replaced the aggregate of left-wing, right-wing and center parties monopoly. The aggregate is dominated by center and right-wing parties and since each of those groups pushes tax rates down, it is not surprising that the aggregate also does. But, especially in that latter case, the effect of a left-wing monopoly is significantly contrasted at a 0.05 level.

Since left-wing monopoly pushes tax rate up while other partisan monopolies push that rate down, we conclude to a typical leftist social preference effect rather than to an inefficiency monopoly one.

5. Conclusion

In this paper we have attempted to go beyond the explanation of the evolution of local surcharges to both the income tax and the property tax by standard interjurisdictional competition, using a spatial regressor and controlling for variables like population density and *per capita* income.

Using panel data covering the period 1983-2008 and four municipal legislatures in the Walloon Region of Belgium, we have first set forth the presence of an electoral cycle characterized by lower tax rates during the electoral year as well as during the year before and the year after; evidence of a positive trend possibly related to increased budgetary needs has also been put forward. Moreover the spatial regressor itself is not significantly different from zero while an interaction between municipalities is illustrated by the effect of the *per capita* income in the neighboring jurisdictions.

More interestingly, though not significantly positive in the standard model, the spatial regressor for the local income tax becomes significantly positive when a distinction is operated between municipalities governed by a single party and municipalities ruled by a coalition; then it is only significantly positive in that latter case. That result confirms a finding of Bordignon *et al*. (2003) and supports the yardstick competition argument that mayors or coalitions whose power is more fragile are more sensitive to the tax rates experimented by other municipalities. In contrast the only argument we have obtained in favor of the intellectual trend hypothesis is that using a political weight matrix instead of a first order contiguity one makes significantly different from zero the spatial regressor for the local property tax surcharge.

All those results are based on the use of the spatial Durbin method tested against sole spatial lags and spatial errors in the framework of a specific-to-general approach

The cross sectional investigation conducted then and based on an OLS estimation similarly justified, first confirms the role of *per capita* income.

More interestingly again is the evidence of a leftist monopoly effect for the local income tax, pushing that surcharge upward in those municipalities where the *Socialist Party* is in power since several legislatures. Such an effect might be interpreted in at least two ways. On the one hand, such a partisan monopoly might discourage the municipal college to take care for efficiency, what translates into higher tax rates. On the other hand, such a monopoly enables the left to act in line with its preferences for redistribution and public provision of local goods and facilities, which call for more revenue; and since those municipalities most usually exhibit lower average income, that requirement needs higher tax rates. That second view is supported by our results.

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