FISCAL COMPETITION AMONG PORTUGUESE MUNICIPALITIES

A CONCORRÊNCIA FISCAL ENTRE OS MUNICÍPIOS PORTUGUESES

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ABSTRACT/RESUMO

In this paper we try to answer to two major research questions: Are there signs of fiscal competition among Portuguese municipalities? In which taxes are Portuguese municipalities more likely to engage in fiscal competition? According to the results obtained in this research there is a strategic interaction among municipalities when deciding on the rate of IRS that is fiscal revenue for the municipality. For property tax (CA) the empirical evidence is not conclusive because when we consider spatial fixed effects the coefficients of the variable that captures fiscal competition is not statistically significant. For property tax (IMI), both for non-evaluated and evaluated urban property, the empirical evidence is that there is fiscal competition among municipalities when the period 2004-2007 is considered. Identical result is obtained for evaluated urban property in the period 2008-2009. However, for non evaluated urban property the results are not conclusive in this period of 2008-2009. For municipal business tax (DERRAMA) we also find evidence of fiscal competition for the period 2000-2007, as well as for the period 2008-2009. With the exception of *Contribuição Autárquica* (CA), the evidence on municipal fiscal competition is not substantially different by type of taxes, which may be explained by the fact that it's a subject municipalities are recently introducing in their political agenda. Despite differences in the estimations by type of tax and period of analysis, the results do not contradict the hypothesis

Neste artigo pretendemos responder a duas questões de investigação principais: Há sinais de concorrência fiscal entre os municípios portugueses? Em que imposto é mais provável os municípios portugueses se envolverem em concorrência fiscal? De acordo com os resultados obtidos nesta investigação, há interacção estratégica entre os municípios quando decidem a taxa de IRS que reverte para a receita fiscal do município. Para a Contribuição Autárquica (CA) a evidência empírica não é conclusiva porque quando consideramos efeitos fixos espaciais o coeficiente da variável que capta a concorrência fiscal não é estatisticamente significante. Para o imposto municipal sobre imóveis (IMI), tanto para propriedade urbana não avaliada como para a propriedade urbana avaliada, a evidência empírica é de que ocorre concorrência fiscal entre os municípios no período de 2004-2007. Idêntico resultado é obtido para a propriedade urbana avaliada quando se considera o período de 2008-2009. Contudo, para o período de 2008-2009, a evidência empírica relativa a propriedade urbana não avaliada é inconclusiva. Para a DERRAMA encontrámos também evidência empírica de concorrência fiscal nos períodos de 2000-2007 e 2008-2009. Com excepção da Contribuição Autárquica (CA), a evidência empírica sobre concorrência fiscal entre municípios não é muito diferente para os diferentes impostos analisados, o que pode ser explicado pelo facto de este ser um assunto recente na agenda política dos municípios. Apesar das diferenças nas

that political-business cycle management influences the choice of rates of municipal taxes.

Keywords: Fiscal competition; Local Governments; Portugal.

JEL Classification: H71, H73

estimações por tipo de imposto e período de análise, os resultados não contradizem a hipótese de que a gestão do ciclo político-económico influencia escolha das taxas dos impostos municipais.

Palavras-chave: Concorrência fiscal; Governos Locais; Portugal.

Classificação do JEL: H71, H73

1. INTRODUCTION

Portuguese municipalities have been playing an increasing role in the provision of local public goods and local merit goods. To provide local public goods and local merit goods, municipalities rely mainly on central government unconditional transfers (revenue sharing formula) and on own fiscal revenue. Because central government unconditional transfers have a redistributive nature, the importance of municipal fiscal revenue in total municipal revenue is correlated with the level of development of the municipalities (in less developed municipalities the importance of fiscal revenue is low but in most developed municipalities it accounts for about 60% of total revenue). The lack of infra-structures and equipments, as well as the availability of central government transfers that have to be used as capital expenditures, created the conditions for a political orientation of local executives towards public investment. This orientation was further reinforced by the high electoral visibility of public investment and the low visibility of other components of local executive performance, such as level of debt and other indicators of good management.

The satisfaction of most needs concerning infra-structure and equipments, the new perception of local executives and local voters on the importance of sustainability, the tightening of financial conditions accompanied by the increase in fiscal competencies at local level, contributed for a new agenda of management at local level. Now, local executives pay more attention to quality of management and attribute substantial importance to transparency and accountability. So, it is no surprise that, in such a new environment, municipalities pay more attention to competition, not only on the expenditure side, but also on the revenue side, namely when setting rates of municipal taxes. Moreover, it is likely that competition for new resources will be accompanied by "yardstick competition" since voters are more sophisticated and have access to more information on local executive's performance.

Considering these changes, municipal executives face now new political concerns on which fiscal strategy to adopt, namely whether to compete on the expenditure side or to diminish rates of municipal taxes. Besides, there is political concern on the emergence of a fiscal war between local governments with a zero or a negative sum game result.

Strategic interaction among Portuguese municipalities and in particular fiscal competition among Portuguese municipalities is therefore a new subject for politicians as well for academics, despite being for a long time a subject of research in countries where local governments traditionally have more fiscal competences. The emergence of fiscal competition among Portuguese municipalities is still recent, a fact that may have implications on the empirical results especially mainly on those taxes where the legislative changes occurred more recently.

In this paper we try to answer to two major research questions: Are there signs of fiscal competition among Portuguese municipalities? In which taxes are Portuguese municipalities more likely to engage in fiscal competition? In this paper we report preliminary results on these research questions. In a near future we intend to expand this research to determine if there is yardstick competition when local executives set the rates of municipal taxes.

This paper is organized in five sections. In a second section we present a brief overview of the literature on strategic interaction among municipalities when they set rates of taxes. In a third section we analyze the evolution of municipal fiscal competences in Portugal. In a fourth section we present the model to be estimated and the empirical results obtained. Finally, in the last section we derive some conclusions and we present further research to be done in the near future.

2. OVERVIEW OF THE LITERATURE

In the last two decades a significant number of papers studying strategic interaction and in particular fiscal competition among local government level have been published in the specialized journals. Seminal works on strategic interaction among local governments date back to the end of the decade of the eighties (Salmon, 1987) and the decade of the nineties in the last century (Case, Rosen and Hines, 1993; Besley and Case, 1995).

Brueckner (2003) presents an overview of empirical literature on strategic interaction among governments and organizes the studies in two different models. A first the-

oretical approach is the "spillover model". In this model each government chooses the level of a decision variable z but it is also influenced by the level of z in other jurisdictions. The reaction function of each jurisdiction depends on the level of z in the other jurisdictions as well as on its characteristics. A second theoretical approach is the "resource-flow model". In this model the jurisdiction is not affected by the level of z in the other jurisdictions, but is affected by the amount of resources in the jurisdiction which is influenced by its choice of z. The reaction function of each jurisdiction is similar to the reaction function in the previous model. Two special cases of the "resource-flow model" are the "tax competition model" (where local governments compete setting rates of local taxes) and the "welfare competition model" (where local governments compete for residents offering welfare benefits).

A subject in this literature is to determine if tax competition is determined by "yardstick competition" or by competition for resources. As we referred above, the reaction function is identical in the "spillover model" and in the "resource-flow model". Therefore, to gather empirical evidence on the existence of yardstick competition many authors incorporate as explanatory variables in their models political variables. Some authors use electoral outcomes as dependent variable establishing this way a close relationship between the literature on strategic interaction among local governments and electoral and political-business cycle studies.

Using different theoretical approaches the specialized literature concentrates the analysis on taxes where strategic interaction is more likely to occur (business tax and income tax) but also on property tax and user charges, given the central role these taxes play in many local fiscal systems. In general, the literature does not disclaim the hypothesis of strategic interaction among local executives. In many studies it is provided evidence that there is competition for mobile resources. In some of them there is empirical evidence of yardstick competition (Case *et al.* (1993) and Besley and Case (1995) for municipalities in USA; Vermeir and Heyndels (2006) for Flemish municipalities; Sollé-Ollé (2003); Bosh and Sollé-Ollé (2007) for Spanish municipalities; Elhorst and Fréret (2009) for French municipalities; Allers and Elhorst (2005) for German municipalities; Fiva and Ratso (2007) for Norwegian municipalities; Bordignon *et al.* (2003) for Italian municipalities; Revelli (2002) for United Kingdom municipalities; etc).

In Portugal there is also an increasing interest on the subject. For example, *Jornal de Negócios*, a daily economics newspaper, published several articles showing which municipalities set rates of local taxes below the maximum level and created a ranking data base with rates of local taxes. Despite this interest and the publication of descriptive reports on the subject, we do not have knowledge of empirical studies testing the existence of strategic interaction among municipalities when setting rates of local taxes, a gap in the specialized literature this paper intends to fill.

3. FISCAL COMPETENCES OF PORTUGUESE MUNICIPALITIES

Portuguese municipalities benefit from receipts of the following municipal taxes: property tax (IMI); tax on transactions of real estate (IMT); tax of circulation (IUC); municipal tax on businesses (DERRAMA). The revenue of these taxes reverts to municipalities with the exception of IMI where the tax collected from rural property reverts 50% to municipalities and 50% to *freguesias* (lowest level of local government in Portugal). The municipalities receive also 5% of income tax collected by central government from their resident tax payers, amount that municipalities can decide to return in part or totally to tax payers. As referred before, an important source of revenue for municipalities is central government transfers (revenue sharing scheme). Municipal taxes and other fiscal receipts namely user charges are more important in developed municipalities (above 60% of total receipts). In average, fiscal receipts account for 38% of total receipts of Portuguese municipalities.

Portuguese municipalities can set rates of property tax (IMI) and municipal business tax (DERRAMA) in a predefined range, to decide to return till 5% of income tax (IRS) collected by central governments to their residents. Concerning user charges, municipal fiscal competences are much larger, but are subject to economic demonstration that user charges are in proportion with costs of provision or benefit of users. In table 1 we present the maximum and the minimum rate that municipalities can choose for taxes where municipalities have the competence to set the rate.

TABLE 1. MUNICIPAL FISCAL COMPETENCES (CHOICE OF RATES)

Tax		Incidence	Minimum rate	Maximum rate
Property Tax	From 2003 till 2007	Rural land	0.80%	
		Non- evaluated urban property	0.40%	0.80%
		Evaluated urban property	0.20%	0.50%
	Since 2008	Rural land	0.80%	
		Non- evaluated urban property	0.40%	0.70%
		Evaluated urban property	0.20%	0.40%
Derrama	From 1998 till 2006	Business tax	0%	10%
	Since 2007	Profit	0%	1.50%
Income Tax	Since 2007	Income	0%	5%

3.1. INCOME TAX (IRS)

In the years of 2007 and 2008, by legal imposition, all Portuguese municipalities received 5% of collected

income tax from their residents. Only in 2009, did Portuguese municipalities have the possibility to decide to return income tax to their residents. In 2009, 44 and 9 municipalities returned, respectively, part and the totality of the 5% of collected income tax. In 2010 the number of municipalities returning collected income tax to residents has increased (see table 2 and 3). Municipalities that have returned collected income tax to residents tends to be less developed municipalities (see table 3). This result was expected because in these municipalities the loss of fiscal revenue is small.

TABLE 2. STATISTICS ON THE RETURN OF INCOME TAX (IRS) TO RESIDENTS

	2009	2010
Mean	4.586	4.427
Median	5	5
Mode	5	5
Standard deviation	1.098	1.273
Maximum rate	5	5
Mínimum rate	0	0

TABLE 3. RETURN OF INCOME TAX (IRS) TO RESIDENTS BY PORTUGUESE MUNICIPALITIES

Devolution of Income tax	IRS 2009				IRS 2010			
	Number	Size			Number	Size		
		1	2	3		1	2	3
5%	9	8	1	0	13	10	3	0
4%	0	0	0	0	1	1	0	0
3.25%	0	0	0	0	1	0	1	0
3%	5	4	1	0	7	1	6	0
2,50%	8	5	3	0	9	7	2	0
2%	13	7	6	0	13	4	9	0
1.50%	1	0	1	0	1	0	1	0
1%	7	4	3	0	14	8	6	0
0.50%	1	0	1	0	4	1	2	1
Subtotal	44	28	16	0	63	32	30	1
0%	264	152	89	23	215	121	72	22
Total	308	180	105	23	308	153	102	23

Size 1 ≤ 20000 residents; 20.000 residents < size 2 ≤ 100.000 residents; 100.000 residents < size 3

As a matter of fact, the municipalities that have returned 5% of collected income tax have a low cost with such decision (in 2009, income tax received from central government represents between 0.66% e 4.63% of transfers received from central government). The same happen with the other municipalities that have returned collected income tax to their residents (in 2009, income tax received from central government represents between 0.32% and 11.65% of central government transfers).

3.2. URBAN PROPERTY TAX (IMI)

In table 4, for the years 2004-2009, we present the number of municipalities that have increased or diminished the rates of IMI, both on evaluated and non-evaluated urban property. In this table we can observe that an increasing number of municipalities opt to change rates of IMI. The number of municipalities diminishing rates is larger than the number of municipalities increasing rates.

TABLE 4. NUMBER OF MUNICIPALITIES THAT HAVE CHANGED RATES OF IMI IN THE YEARS 2004-2009

Year	Rate unchanged	Rates changed			Total
		Total	Increased	Diminished	
2004 (1)	196	112	5	107	308
2005 (1)	241	67	12	55	308
2005 (2)	243	65	15	50	308
2006 (1)	231	77	20	57	308
2006 (2)	212	96	21	75	308
2007 (1)	258	50	27	23	308
2007 (2)	254	54	19	35	308
2008 (1)	267	41	11	30	308
2008 (2)	252	56	7	49	308
2009 (1)	280	28	2	26	308
2009 (2)	255	53	2	51	308

(1) Non-evaluated urban real-estate; (2) Evaluated urban real-estate.

3.3. MUNICIPAL BUSINESS TAX (DERRAMA)

In the period 2000-2009 there are small changes in the rates of DERRAMA (municipal tax on business income) (see table 5).

TABLE 5. MUNICIPALITIES ACCORDING TO CHANGES IN RATES OF DERRAMA (2001-2009)

Year	Municipalities not changing rates	Municipalities changing rates			Total
		Total	Increasing	Diminishing	
2001	301	7	2	5	308
2002	295	13	5	8	308
2003	282	26	20	6	308
2004	292	16	6	10	308
2005	297	11	4	7	308
2006	283	25	6	19	308
2007	286	22	12	10	308
2008	142	166(*)	12	154(*)	308
2009	282	26	3	23	308

(*) Legislative change in the rate of IMI

4. MODEL AND EMPIRICAL RESULTS

As shown by Brueckner (2003), both in the "spill over model" as well as in "the resource-flow model" we derive a similar reaction function. The reaction function is of the type

$$Zi = C + \beta \sum_{j \neq i} Wij \,.\, Zj + Xi\theta + \varepsilon i$$

where *Zi* represents the strategic variable in jurisdiction *i* and *Zj* the strategic variable in the other jurisdictions. *Wij* is a non-negative weight, capturing the importance of the interaction between jurisdiction *i* and jurisdiction *j*. This interaction is expected to be negatively correlated with the distance between the two jurisdictions. *Xi* is a vector of jurisdiction's *i* characteristics and εi the error term. *C* is a constant. To observe strategic interaction among municipalities the parameter β has to be positive. θ is a vector of parameters.

In our empirical work we try to identify to what degree Portuguese municipalities take into consideration rates of taxes of municipalities in the neighbors when setting their own rates of municipal taxes (RATE). To that purpose, we use as an independent variable the average rate of municipal taxes for the municipalities with frontiers with the municipality (AV_RATE). This solution has been used by Kangasharju *et al.* (2006); and it equivalent to set *Wij* equal to zero when jurisdictions *i* and *j* do not have common borders and each *j* neighbor jurisdiction has a similar strategic influence on jurisdiction *i*. In order to control for jurisdiction's *i* characteristics we consider as independent variables the per capita central government unconditional transfers (TRANSF), the gross income declared in the income tax (INC), the population density (POP_DENS), and the age composition of population resident in the municipality [percentage of population under or equal to 14 years of age (POP14), and percentage of population equal or above 75 years of age (POP75)]. We also consider a dummy variable to account for the political-business cycle when municipalities set the rates of municipal taxes (ELECT). This variable assumes the value 1 in the year of election as well as in the previous years and zero for the other years. For return of income tax we also consider as an independent variable the rate of unemployment in the municipality (UNEMP). In order to avoid the problem of the endogeneity of rates of taxes in jurisdictions *i*, AV_RATE refers to year *t*-1. All other independent variables refer also to year *t*-1. The variables TRANSF and INCOME are expressed in euros, the variable POP_DENS as population per square km, and the variable UNEMP as the ratio of unemployed workers and population with or above 15 years of age.

$$\mathbf{RATE}_{j,t} = f(\mathbf{AV\_RATE}_{j,t-1}, \mathbf{TRANSF}_{j,t-1}, \mathbf{INCOME}_{j,t-1}, \mathbf{POP\_DENS}_{j,t-1}, \mathbf{POP14}_{j,t-1}, \mathbf{POP75}_{j,t-1}, \mathbf{ELECT}_{j,t-1}, \mathbf{UNEMP}_{j,t-1})$$

We expect that the estimated coefficients to be negative for TRANSF and UNEMP and positive for AV_RATE, POP_DENS, INC, POP14 and POP75. Municipalities with larger per capita transfers depend less on fiscal revenue and therefore may set lower rates of municipal taxes. Municipalities with higher rates of unemployment have less possibility to set higher rates of municipal taxes. Municipalities are expected to respond in the same direction as neighbor municipalities when setting their own rates of municipal taxes. More populated municipalities benefit from agglomeration economies and therefore may be able to set higher rates in municipal taxes. Municipalities with higher income residents are expected to be able to set higher rates of municipal taxes. Finally, municipalities with higher costs need to set higher rates of municipal taxes (municipal costs are captured by the variables POP14 and POP75).

The model is estimated for RATE_IRS, RATE_DERRAMA, RATE_CA, and RATE_IMI. When the dependent variable is the return of IRS, we use spatial autoregressive methods (LeSage, 1999; Anselin, 1995): general spatial model (adjustment SAC); mixed autoregressive-regressive model (adjustment SAR); and spatial errors model (adjustment SEM). For the other dependent variables we have used spatial autoregressive panel data estimation methods.

In our estimates we use panel data for the 278 municipalities of Mainland Portugal for the period 2000-2009. When the dependent variable is the rate of IMI we only consider the period 2004-2009 because IMI is only collected since 2004 (IMI substituted another property tax named Contribuição Autárquica- CA). For DERRAMA we consider the period 2000-2009. For IRS we use data for 2009. Data sources are: *Direcção-Geral das Autarquias Locais (DGAL), Direcção-Geral dos Impostos (DGCI), Direcção-Geral do Orçamento (DGO), Instituto Nacional de Estatís-*

tica (INE), Instituto de Emprego e Formação Profissional (IEFP) and *Comissão Nacional de Eleições (CNE).*

We start our empirical work by analyzing the degree of multicolinearity between the independent variables and its potential influence over the econometrics results. Inspecting the correlation matrix we concluded that the variable TRANSFER is highly and negatively correlated with the demographic variables POP14 and POP75. The same situation occurs between the two demographic variables. Despite these high correlations our evaluation is that the empirical results are not strongly influenced by the referred correlations.

4.1. RATES OF INCOME TAX (IRS)

In table 6 we present the estimates when the dependent variable is RATE_IRS.

TABLE 6. DEPENDENT VARIABLE: RATE_IRS

Variables	Autoregressive spatial models			
	OLS	SAR	SEM	SAC
Constant	1.8017 (1.1997)	1.7891 (1.1748)	0.6001 (0.4317)	-1.5222 (-2.4734)
AV_RATE	0.3582 (2.4264)	0.3258 (2.2298)	0.5863 (4.3251)	0.4196 (5.8824)
TRANSF	-0.0004 (-1.0913)	-0.0004 (-1.1209)	-0.0003 (-0.9212)	-4E-06 (-0.0207)
INCOME	-3E-06 (-0.0541)	-3E-06 (-0.0551)	-8E-06 (-0.1570)	-2,5E-05 (-1.1231)
POP_DENS	7.9E-05 (0.7171)	7.7E-05 (0.7051)	7.8E-05 (0.7864)	3.8-5E (0.9415)
POP14	6.6202 (1.0274)	6.4926 (1.0222)	6.9371 (1.1512)	3.2794 (1.1732)
POP75	3.8614 (0.7865)	3.8346 (0.7927)	4.4861 (0.9711)	2.2320 (1.0004)
UNEMP15	-3.2829 (-0.6055)	-3.2739 (-0.6126)	-2.7157 (-0.5444)	-3.2401 (-1.4659)
Rho	___	0.0419 (0.4253)	___	0.814 (20.7089)
Lambda	___	___	-0.2010 (-1.8974)	-1.9637 (-121.1134)
p-value of the spatial auto-correlation test	0.8653 (1)	0.0381 (2)	___	___
R^2	5.54%	5.75%	6.56%	47.81%
Adjusted R^2	3.09%	3.31%	4.14%	46.45%

Test I of Moran; (2) Test LM.

Using Moran's test we did not detect spatial autocorrelation on OLS model. Such evidence is confirmed by SEM model, with a non significant lambda factor of spatial autocorrelation. Nevertheless, SAC, as the most performing adjustment, reveals the influence of spatial dependency factors. Both coefficients "rho" e "lambda" are significant, which means that the consideration of a spatial autoregressive component require that a spatial autocorrelation hypothesis shall considered for the structure of disturbance. The coefficient of AV_RATE is significant and its estimate has the expected sign. This result is important because provides empirical evidence for municipal interaction when deciding on the IRS devolution to residents.

4.2. RATES OF PROPERTY TAX

Under the assumption that all explanatory variables are exogenous we use in our estimates OLS and spatial autoregressive models with and without spatial and temporal fixed coefficients.

For the period 2000-2009, the tests provide empirical evidence that we have temporal fixed effects with the coefficients of the dummy variables for years after 2004 showing a decrease of rates which were influenced by legislative changes in the property tax (first change in 2004 and second change in 2008).

Because of the legislative change we run separate regressions for the periods 2000-2003 (CA), 2004-2007 (IMI) and 2008-2009 (IMI). For the periods 2004-2007 and 2008-2009 we estimate different regressions for rates of evaluated and non-evaluated property.

The estimates for the period 2000-2003 (CA) indicate that there is spatial autocorrelation providing evidence that municipalities interact when deciding on the rates of property tax. The explanatory capacity of the model increases substantially when we use spatial fixed effects. Adjustments without fixed effects and temporal fixed effects have spatial autoregressive negative estimates, contrary to expected. Also when we take both spatial and temporal fixed effects the adjustment doesn't perform better than the model with spatial fixed effects.

The adoption of the model with spatial fixed effects means that municipal specificities are relevant when they set the rates of property tax. In this estimate, beside the spatial autoregressive factor, the coefficients of ELECT and POP_DENS are statistically significant and have the expected sign (see table 7).

The coefficient estimated for the variable ELECT is negative providing evidence of political-business cycle. In this estimate the coefficient of AV_RATE is not statistically significant. According to this result, the consideration of municipal specificities collapses the capacity to determinate the influence of this variable. However the significance of the spatial autoregressive component makes evidences of the presence of municipal interaction when setting rates of property tax.

In table 8 we present the estimates for RATE_ IMI for non-evaluated urban property (2004-2007). Results show that there is no significant spatial autocorrelation when we consider spatial fixed effects. However this coefficient is significant in all other spatial autoregressive models. Furthermore, all the models reveal coefficients of AV_RATE statistically significant.

TABLE 7. DEPENDENT VARIABLE: RATE_CA (2000-2003)

Independent variables	OLS	Autorregressive Spatial Models			
		Without fixed effects	With Spatial fixed effects	With temporal fixed effects	With spatial and temporal fixed effects
Constant	0.4626 (5.5217)	0.1184 (1.7840)	___	___	___
ELECT	-0.0307 (-3.5419)	-0.0328 (-5.8704)	-0.0221 (-5.4591)	-0.0306 (-6.5935)	-0.0203 (-7.2751)
AV_RATE	0.6147 (12.9837)	0.8421 (23.6016)	-0.0320 (-0.4176)	0.8423 (23.4411)	-0.0464 (-0.6026)
TRANSF	-0.0002 (-5.6274)	-8.8E-05 (-3.3950)	6E-06 (0.1364)	-7.8E-05 (-3.0631)	5E-06 (0.1100)
INCOME	4,81E-06 (1.6711)	1,3E-05 (4.2099)	9E-06 (1.5554)	1,5E-05 (5.1768)	1E-05 (1.8886)
POP_DENS	-2.6E-6E (-0.4762)	-1.5E-05 (-3.0991)	0.0003 (2.6643)	-1.5E-05 (-3.0798)	0.0003 (2.7213)
POP14	-0.1158 (-0.3856)	0.1411 (0.5816)	-0.2780 (-0.5514)	0.2521 (1.0477)	-0.2654 (-0.5227)
POP75	0.1931 (0.6683)	0.3273 (1.4219)	-0.7430 (-1.5383)	0.3903 (1.6885)	-0.6709 (-1.3776)
Spatial Autocorrelation	___	-0.4810 (-8.8735)	0.1199 (2.4977)	-0.4780 (-8.8179)	0.1140 (2.3660)
R^2	24.73%	30.70%	88.18%	30%	87.97%
Adjusted R^2	24.26%	30.26%	84.11%	29.37%	83.78%

TABLE 8. DEPENDENT VARIABLE: RATE_IMI (2004-2007)
(NON-EVALUATED URBAN PROPERTY)

Independent variables	OLS	Autorregressive Spatial Models			
		Without fixed effects	With Spatial fixed effects	With temporal fixed effects	With spatial and temporal fixed effects
Constant	0.7309 (12.2778)	0.7208 (11.0929)	___	___	___
ELECT	0.0067 (0.9244)	0.0021 (0.2182)	-0.0102 (-2.154)	-0.0019 (-6.5935)	-0.0117 (-3.2431)
AV_RATE	0.1403 (6.3452)	0.1147 (3.9977)	0.0441 (1.9601)	0.0913 (4.7195)	0.0423 (2.2305)
TRANSF	-8.99E-05 (-5.1213)	-7.5E-05 (-3.8824)	7.8E-05 (0.7685)	-7.7E-05 (-3.9747)	8.1E-05 (0.7981)
INCOME	1.81E-06 (0.9751)	4E-06 (1.3507)	-1.1E-05 (-1.1124)	4E-06 (1.3460)	-1.3E-05 (-1.4813)
POP_DENS	-2.66E-06 (-0.6756)	-3E-06 (-0.5819)	-0.0001 (-0.6892)	-2E-06 (-0.4401)	-7.4E-05 (-0.7630)
POP14	-0.2880 (-1.1148)	-0.2014 (-0.7557)	0.8461 (1.7448)	-0.1903 (-0.7126)	0.8849 (1.8391)
POP75	-0.6040 (-2.8418)	-0.5549 (-2.5853)	-0.2242 (-0.4386)	-0.5445 (-2.5264)	-0.2246 (-0.4400)
Spatial Autocorrelation	___	0,3010 (6,9287)	0,0610 (1,2382)	0,3110 (7,2081)	0,0580 (1,1755)
R^2	20.21%	24.72%	80.4%	24.74%	80.41%
Adjusted R^2	19.70%	24.24%	73.66%	24.05%	73.58%

All the perspective of analysis, considering or not a spatial autoregressive component, with or without spatial and temporal fixed effects, indicate that there is interaction among municipalities when setting the rate of IMI. The estimated coefficient of ELECT is statistically significant and has the expected sign only in the spatial fixed effects model.

For the RATE_ IMI of non-evaluated urban property in the period 2008-2009, the estimates indicate the existence of spatial autocorrelation when we do not use spatial fixed effects. Reason why we do not present the estimates for the OLS model without fixed effects.

Given that only two years are present in the panel data and that Elect = 1 for 2009 and Elect = 0 for 2008, it's not possible to estimate models with temporal fixed effect (with or without spatial fixed effects), due to perfect multicolinearity. Thus, comparisons are established only for OLS with spatial fixed effects and spatial autoregressive with and without spatial fixed effects models. The coefficients of TRANSF and ELECT are statistically significant for all adjustments. Elect estimates have the expected sign, confirming that there is a political-business cycle influence on the choice of rates of IMI. TRANSF estimates have the expected sign only in the spatial autoregressive model without fixed effects.

In what concerns the influence of AV_RATE, their estimates are statistically significant and have the expected sign only for the spatial autoregressive model without fixed effects. However, in this model the spatial autoregressive coefficient estimate is contrary to expected sign. Therefore results are not conclusive in view of the hypothesis of spatial interaction among municipalities when they set the rates of IMI.

TABLE 9. DEPENDENT VARIABLE: RATE_IMI (2008-2009) (NON-EVALUATED URBAN PROPERTY)

Variables	OLSwith spatial fixed effects	Spatial autoregressive models	
		Without fixed effects	With spatial fixed effects
Constant	0.0765 (0.1753)	0.2286 (3.5071)	___
ELECT	-0.06612 (-7.9832)	-0.0411 (-7.3803)	-0.0682 (-11.9672)
AV_RATE	-0.0407 (-0.2002)	0.6211 (11.3738)	-0.0805 (-0.5664)
TRANSF	0.0004 (2.5983)	-5.1E-05 (-2.9370)	0.0004 (3.6866)
INCOME	8.9E-06 (0.4286)	2E-06 (1.0666)	-1E-06 (-0.0403)
POP_DENS	-0.0001 (-0.7577)	-3E-06 (-0.6540)	-0.0001 (-1.2261)
POP14	0.7152 (0.3770)	0.1809 (0.6474)	-0.1012 (-0.1519)
POP75	3.3226 (1.4054)	0.1473 (0.7241)	3.2611 (1.9812)
Spatial autocorrelation	___	-0.2450 (-3.2472)	-0.0420 (-0.5818)
R^2	89.05%	30.01%	89.05%
Adjusted R^2	77.57%	29.12%	77.57%

TABLE 10. DEPENDENT VARIABLE: RATE_IMI (2004-2007) (EVALUATED URBAN PROPERTY)

Variables	OLS with spatial fixed effects	Spatial autoregressive models			
		Without fixed effects	With spatial fixed effects	With temporal fixed effects	With spatial and temporal fixed effects
Constant	0.0976 (0.4778)	0.0964 (1.7010)	___	___	___
ELECT	-00133 (-2.3332)	0.0037 (1.7354)	-0.0068 (-0.3740)	0.0009 (0.1937)	-0.0141 (-3.7872)
AV_RATE	0.1297 (1.6626)	0.3372 (5.3475)	0.1653 (2.9407)	0.3594 (6.1556)	0.1729 (2.6869)
TRANSF	0.0006 (2.8829)	-6.6E-05 (-3.9755)	0.0005 (2.7474)	-6.7E-05 (-4.0174)	0.0004 (2.6141)
INCOME	-3.93E-05 (-3.5458)	1.1E-05 (4.9299)	-1.9E-05 (-1.8295)	1E-05 (4.6528)	-3.1E-05 (-3.35)
POP_DENS	-4.73E-05 (-0.3277)	-5E-06 (-1.1569)	-0.0002 (-1.2813)	-4E-06 (-1.0592)	-0.0002 (-1.6555)
POP14	2.5770 (2.6634)	0.7163 (2.9934)	1.3358 (2.9006)	0.7188 (2.9999)	1.4142 (3.0755)
Pop75	-1.1694 (-0.9444)	0.3927 (1.4994)	-1.3998 (-1.3815)	0.4004 (2.1128)	-1.5373 (-1.5139)
Spatial autocorrelation	___	-0.0660 (-1.1121)	0.0530 (0.9289)	0.0780 (1.3100)	0.0470 (0.7150)
R^2	85.66%	22.32%	85.34%	21.84%	85.27%
Adjusted R^2	78.25%	21.66%	77.76%	20.98%	77.57%

The estimates for evaluated urban property and for the period 2004-2007 provide evidence of inexistence of spatial autocorrelation. All the spatial autoregressive coefficients are not significant. The estimated coefficients of POP14, INCOME, and TRANSF are statistically significant although the sign of the estimated coefficients of TRANSF and INCOME is only the expected when we do not use spatial fixed effects. The estimated coefficient of ELECT is not statistically significant in all the models. On the contrary the estimated coefficient of AV_RATE is statistically significant and has the expected sign in all the estimates providing strong evidence of interaction among municipalities when deciding on the rate of IMI.

In table 11 we present the estimates for RATE_IMI for evaluated urban property for the period 2008-2009. According to our estimates when we consider spatial fixed effects we have spatial autocorrelation. The estimated coefficients of ELECT and TRANSF are statistically significant. The signs are the expected for the estimated coefficient of ELECT. In the case of the estimated coefficient of TRANSF, the sign is the expected only when we consider municipal specificities. AV_RATE is not statistically significant only for the models with spatial fixed effects. However, without spatial fixed effects, there is strong evidence of spatial autocorrelation. The spatial autoregressive model with spatial effects presents the best performing results. Its spatial autoregressive component is clearly significant. Thus, there is clearly evidence of fiscal competition among municipalities.

TABLE 11. DEPENDENT VARIABLE: RATE_IMI (2008-2009) (EVALUATED URBAN PROPERTY)

Variables	OLS without fixed effects	OLS with spatial fixed effects	Spatial autoregressive models	
			Without fixed effects	With spatial fixed effects
Constant	0.1389 (2.6524)	0.5685 (1.8972)	0,1053 (2.1988)	___
ELECT	-0.0328 (-5.8249)	-0.546 (-9.1521)	-0.0329 (-6.3489)	-0.0487 (-10.7164)
AV_RATE	0.4379 (7.2694)	0.0056 (0.0351)	0.4140 (6.8366)	0.1199 (1.0457)
TRANSF	-7.50E-05 (-5.2846)	0.0004 (3.8710)	-5.8E-05 (-4,0169)	0.0004 (4.9736)
INCOME	8.55E-07 (0.5269)	2.41E-06 (0.1643)	6E-06 (3.0915)	1.9E-05 (1.6345)
POP_DENS	9.40E-07 (0.2552)	-0.0001 (-0.8761)	-5E-06 (-1.1984)	-0.0001 (-1.3521)
POP14	0.4808 (1.9214)	-2.6893 (-2.0193)	0.5411 (2.2816)	-0.1657 (-0.03534)
POP75	0.3597 (2.0456)	0.1167 (0.0704)	0.3235 (1.1985)	0.1018 (0.0919)
Spatial autocorrelation	___	___	-0.0700 (-0.9622)	0.1900 (2.8933)
R^2	31.07%	91.84%	32.51%	91.95%
Adjusted R^2	30.19%	83.28%	31.65%	83.51%

4.3. RATES OF MUNICIPAL BUSINESS TAX (DERRAMA)

In the estimates for RATE_DERRAMA we used OLS with and without specific effects, and spatial autoregressive models. In the estimates for the period 2000-2009 we used temporal dummy variables to determine which years were decisive to decrease rates of DERRAMA. According to our results only in 2008 and 2009 there is a decrease in rates because of legislative changes, reason why we consider in our estimates two different periods (2000-2007 and 2008-2009).

The estimates presented in table 12 indicate that when we use spatial autoregressive effects there is no evidence of spatial autocorrelation. The results provide evidence of temporal fixed effects, reason why we consider temporal dummy variables to detect years with significant changes in the rates of DERRAMA. The dummy variables for 2003 and 2007 are statistically significant and have a positive sign. Eliminating the dummy variables one by one when they were statistically non significant, we end up with the dummy variable for 2003, year corresponding to the first decision on rates by executives elected in 2001.

TABLE 12. DEPENDENT VARIABLE: RATE_DERRAMA (2000-2007)

Variables	OLS with fixed effects			Spatial autoregressive models			
	OLS With Spatial Effects	OLS with Spatial and Temporal Fixed Effects	OLS with Spatial Fixed Effects and Temporal dummies	Without Fixed effects	With Spatial Fixed Effects	With Temporal Fixed Effects	With Temporal and Spatial Fixed Effects
Constant	5.2643 (3.0639)	6.7459 (3.6241)	6.2118 (3.4765)	2.6955 (2.1808)	___	___	___
ELECT	-0.1251 (-1.8971)	___	___	-0.1214 (-0.9655)	-0.1284 (-2.1227)	-0.2271 (-1.1871)	-0.1339 (-3.0855)
AV_RATE	0.1284 (2.9815)	0.1215 (2.7814)	0.1215 (2.7814)	0.6916 (26.5588)	0.1323 (3.3081)	0.6980 (27.0095)	0.1322 (3.3265)
TRANSF	-0.0014 (-2.1650)	-0.0022 (-3.1309)	-0.0022 (-3.1309)	-0.0018 (-4.1121)	-0.0015 (-2.4512)	-0.0020 (-4.4800)	-0.0009 (-1.5406)
INCOME	-5.21E-05 (-0.7045)	-0.0003 (-2.4201)	-0.0003 (-2.4201)	0.0006 (11.1298)	-5.2E-05 (-0.8015)	0.0006 (11.5941)	8.8E-05 (1.4331)
POP_DENS	-0.0003 (-0.2591)	-0.0002 (-0.1949)	-0.0002 (-0.1949)	-0.0004 (-4.2244)	-0.0004 (-0.3692)	-0.0004 (-4.0361)	-0.0003 (-0.2641)
POP14	-15.8317 (-1.8900)	-13.9882 (-1.6323)	-13.9882 (-1.6323)	-11.6827 (-2.1473)	-13.1517 (-2.1340)	-11.9100 (-2.2097)	-12.5864 (-2.0486)
POP75	23.5505 (2.2888)	22.3200 (1.9935)	22.3200 (1.9935)	-13.6083 (-2.7702)	15.4829 (1.5768)	-13.3216 (-2.7271)	8.0699 (0.8578)
D1	___	___	0.1509 (0.9953)	___	___	___	___
D2	___	___	0.2750 (1.3625)	___	___	___	___
D3	___	___	0.7574 (3.1008)	___	___	___	___
D4	___	___	0.7225 (2.5814)	___	___	___	___
D5	___	___	0.7502 (2.3401)	___	___	___	___
D6	___	___	0.7464 (2.0208)	___	___	___	___
D7	___	___	0.8708 (2.1691)	___	___	___	___
Spatial Autocorrelation	___	___	___	-0.2860 (-7.5414)	-0.0160 (-0.4468)	-0.3050 (-8.0251)	-0.0160 (-0.4469)
R^2	90.98%	91.04%	91.04%	37.54%	90.98%	37.45%	90.94%
Adjusted R^2	89.66%	89.7%	89.7%	37.35%	89.66%	37.06%	89.58%

The estimated coefficient of ELECT is statistically significant and has the expected sign only in the spatial autoregressive model with spatial fixed effects or both spatial and temporal fixed effects. The estimated coefficient of AV_RATE is statistically significant and has the expected sign, providing evidence of fiscal competition among municipalities.

The estimates for the period 2008-2009 show evidence of spatial autocorrelation when we do not consider spatial fixed effects. The coefficient of AV_RATE is statically significant and its estimate has the correct sign only for the OLS model without fixed effects. In the spatial autoregressive model, the significance of the spatial autoregressive coefficient also makes evidence of fiscal competition among municipalities. Nevertheless, Fiscal competition is not evident in the models with spatial fixed effects as they seem to be assimilated by municipal specificities.

5. CONCLUSIONS

In this paper we investigated if there is strategic interaction among municipal executives when they set rates of municipal taxes. To answer these questions we gathered empirical evidence on the rates of municipal taxes for 278 municipalities of Mainland Portugal for the period 2000-2009.

TABLE 13. DEPENDENT VARIABLE: RATE_DERRAMA (2008-2009)

Variables	OLS			Spatial autoregressive models	
	Without fixed effects	With spatial fixed effects	With spatial and temporal fixed effects	Without fixed effects	With spatial fixed effects
Constant	9,8469 (6,9697)	4,1051 (2,0536)	4,1072 (2,0536)	0,6288 (1,3690)	___
ELECT	-0,0873 (-0,5159)	0,0040 (0,0792)	___	0,1196 (1,1914)	0,0288 (0,8531)
AV_RATE	0,6197 (20,5068)	0,0029 (0,4464)	0,0029 (0,4464)	0,0282 (1,8530)	0,0043 (0,9861)
TRANSF	-0,0034 (-6,6406)	-0,0002 (-0,2218)	-0,0002 (-0,2218)	-0,0003 (-2,3637)	-0,0005 (-0,9326)
INCOME	6,5E-05 (1,3148)	-9,49E-05 (-1,0950)	-9,49E-05 (-1,0950)	0,0001 (7,0587)	7E-05 (1,1223)
POP_DENS	0,0001 (1,0754)	-0,0001 (-0,1964)	-0,0001 (-0,1964)	-6E-05 (-1,4346)	-0,0001 (-0,2586)
POP14	-31,6846 (-4,9777)	-9,7017 (-1,2245)	-9,7017 (-1,2245)	-2,2631 (-1,0180)	-3,4245 (-1,2392)
POP75	-24,9757 (-4,3440)	-12,3519 (-1,2611)	-12,3519 (-1,2611)	-3,3702 (-2,0715)	-8,3915 (-1,2840)
Spatial autocorrelation	___	___	___	0,3570 (6,0502)	-0,0570 (-0,7866)
R^2	31,86%	96,58%	96,58%	37,15%	96,57%
Adjusted R^2	31,64%	93%	93%	36,35%	92,98%

We studied separately the rates of three major municipal taxes [rates of income tax (IRS), rates of property tax (IMI) and rates of municipal business tax (DERRAMA)]. For rate of income tax (IRS) we used data for 2009. For rates of property tax (CA) we used in our estimates panel data for the period 2000-2003. For rates of property tax (IMI) we used in our estimates panel data for the periods 2004-2007 and 2008-2009. For rates of municipal business tax (DERRAMA) we also used in our estimates panel data for the period 2004-2009.

A first question in our research was to know if there signs of fiscal competition among Portuguese municipalities? To answer this research question we have constructed a model where the rate of municipal tax is the dependent variable. The explanatory variables capture the influence of fiscal competition among municipalities, elections, per capita transfers from central government, per capita income; population density and costs. In the estimation of the equations for RATE_IRS we have used spatial autoregressive methods: general spatial model (adjustment SAC); mixed autoregressive-regressive model (adjustment SAR); and spatial errors model (adjustment SEM). For the other municipal taxes we have used OLS (with and without fixed effects) and spatial autoregressive models (with and without fixed effects). According to the results obtained in this research there is a strategic interaction among municipalities when deciding on the rate of IRS that is fiscal revenue for the municipality. For property tax (CA) the empirical evidence is not conclusive because when we consider spatial fixed effects the coefficients of the variable that captures fiscal competition is not statistically significant. For property tax (IMI), both for non-evaluated and evaluated urban property, the empirical evidence is that there is fiscal competition among municipalities when the period 2004-2007 is considered. The same result is obtained for evaluated urban property in the period 2008-2009. However, for non evaluated urban property the results are not conclusive in this period of 2008-2009. For municipal business tax (DERRAMA) we also find evidence of fiscal competition for the period 2000-2007, as well as for the period 2008-2009.

Despite low fiscal competences of Portuguese municipalities, our results do not disclaim, in general, the existence of strategic interaction among municipalities when choosing rates of local taxes. Most estimated coefficients for strategic interaction have similar magnitude of the estimated coefficients in other empirical studies for other countries.

A second research question is to determine in which taxes are Portuguese municipalities more likely to engage in fiscal competition? Theoretical expectations would say that fiscal competition should be stronger on taxes where resources are more mobile (municipal business tax) or where electoral perception is stronger (income tax). In general, and with the exception of *Contribuição Autárquica* (CA), the evidence on municipal fiscal competition is not substantially different by type of taxes, which may be explained by the fact that it's a subject municipalities are recently introducing in their political agenda.

Although with some differences by type of tax and period of analysis, it is important to highlight the influence of political-business cycle management when municipal executives set the rates of municipal taxes.

Further research needs to be done. First, in this paper we do not test the yardstick hypothesis. To test the yardstick hypothesis we need to consider more political variables to try to separate strategic interaction among municipalities when they compete for mobile resources from strategic interaction determined by the need to keep electoral majorities in an environment where voters compare rates in different jurisdictions. Second, given the instability of some empirical results, there is a need to consider other characteristics of the jurisdictions in our estimates. Third, we are using data for a period where strategic interaction concerning rates of municipal taxes is taking its first steps. Therefore, our estimates may be influenced by the small amplitude the rate variable. To use percentage of variation in rates instead of rates is a development we have to consider in future research.

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LEGISLATION

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