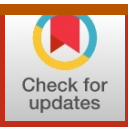

Tax mimicking in Spanish municipalities: expenditure spillovers, yardstick competition, or tax competition?

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Abstract

This paper evaluates whether the agency problem in public administration shapes Spanish municipalities' tax policy. To this aim, we have considered 2,431 Spanish municipalities for the period from 2002 to 2013.

We find significant evidence of tax mimicking of neighboring municipalities, in both property tax and car tax. However, incumbents are not signaling their competence through tax competition. Rather, expenditure spillovers explain this interaction. Municipalities seek to have the same services and infrastructures as their neighbors. The fact that there is not tax benchmarking does not mean that the agency problem is not present in Spanish municipalities. The agency problem is one of the reasons corruption is so widespread among Spanish municipalities. Regarding the further policy implications of our findings, legislation should direct municipal governments' decisions towards the real needs of their constituencies.

Keywords: property tax, car tax, tax mimicking, agency problem, municipal government

1 INTRODUCTION

This paper evaluates whether local governments make tax decisions just focusing on their economic or budgetary features or whether the tax rates of neighboring municipalities are also or mainly taken into account.

The theoretical framework surrounding this tax competition strategy would be the *principal-agent problem* (*agency problem*). This theory says that the agent is better informed than the principal in a political setting in which voters, as principals, elect politicians who, as agents, make policy choices that affect voters (Alt, Lassen and Shanna, 2006). The *principal-agent theory* shows that lack of transparency may create an advantage for policymakers in achieving their goals: incumbents may mimic neighboring tax rates to signal their competence with the aim of being re-elected. Electoral competition is an effective solution to the *principal-agent problem* among politicians and voters (Wittman, 1989). This author argues theoretically that competition, reputation and monitoring reduce opportunistic behavior on the part of politicians. Nevertheless, we assume that, in an environment of political competition, elected officials can be expected to exaggerate their accomplishments through budget manipulation (Mayper, Granof and Giroux, 1991). One way to signal their competence is to benchmark neighboring councils' tax rates.

Within the *agency theory*, the literature has used three specific mechanisms to explain this fiscal interaction or competition among local governments (municipalities, regions, or states): *expenditure spillovers*, *yardstick competition*, and *tax competition* (Manski, 1993).

First, according to the *expenditure spillovers* idea, since municipal expenditures tend to be correlated among neighboring municipalities, so will tax rates. In

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other words, expenditures on local public services can have an impact on nearby jurisdictions.

Second, the *tax competition theory*, posited by Tiebout (1956), shows that citizens will move to another town if taxes are much higher than those in neighboring municipalities.

Third, the logic of *yardstick competition*, was first shown by Salmon (1987), who states that *yardstick competition* is an issue stemming from information asymmetry, i.e. it is difficult or costly for voters to evaluate the performance of their government.

Each government has an incentive to do better than governments in other jurisdictions in terms of taxes and services. The strength of this incentive depends on the ability and willingness of citizens to assess comparative performance. If these conditions are met, comparisons will serve as a basis for assessing politicians in power. Thus, politicians in power will feel that a good relative performance will increase their probability of being re-elected.

In this respect, *yardstick competition* in Spanish municipalities would have a positive and a negative implication, simultaneously. Positive, for if incumbents try to signal their competence through fiscal policies, this means that citizens pay attention to municipal fiscal performance when voting. This is positive, since it means that tax payers care about the use of public funds and will not accept misuse of those funds. But if incumbents are setting tax policies according to their neighbors' tax levels instead of the real needs of their municipalities, the provision of public services will not be optimal.

The paper is organized as follows. Section 2 reviews the literature. Section 3 presents data, variables and the econometric model. Section 4 discusses results and section 5 concludes and suggests future research.

2 LITERATURE REVIEW

2.1 TAX MIMICKING AMONG GOVERNMENTS

Research on tax mimicking shows mixed evidence. Besley and Case (1995) find that if voters are against additional taxes, even a small increase may force them to look elsewhere. However, if taxes are rising everywhere, voters may be convinced that a tax increase is necessary. In this case, even a large increase may be politically acceptable. Provided that voters make comparisons among jurisdictions, incumbents may look at neighboring governments' taxing behavior before changing taxes at home. This would give rise to *yardstick competition* among jurisdictions, each caring about what the others are doing. Accordingly, tax changes seem to be a significant determinant of who is elected, rationalizing effort put into curbing tax increases that are not in line with those of the neighbors. Besley and Case (1995) also find that neighboring taxes only have an impact on tax decisions in

states where the governor runs for re-election, which is a clear indication that *yardstick competition* explains tax interaction. Solé-Ollé (2003) shows that tax rates are higher and the reaction to neighbors' tax rates is lower when the electoral margin is high and when left-wing parties control government. Delgado, Lago-Peñas and Mayor (2015), on a sample of 2,713 Spanish municipalities, find evidence of neighbor tax mimicking in the property tax and the motor vehicle tax.

Empirical analysis has found it difficult to identify which of the three possibilities (*expenditure spillovers*, *yardstick competition* or *tax competition*) is the main cause of tax mimicking strategy. The reasons for this research impediment arise from one (or both) of the following reasons (Bordignon, Cerniglia and Revelli, 2003): either the alternative theories may be observationally equivalent, or the available data set may not be rich enough to allow discrimination among their different predictions. Consequently, solving these problems requires the researcher either to re-examine carefully the implications of the theories to be tested, or to build a better data set. In this paper, we follow both strategies, checking evidence of tax mimicking on the most comprehensive dataset of Spanish local governments to date. Thus, our research question is to ascertain whether the *agency problem* in Spanish municipalities shapes tax mimicking with neighboring municipalities. According to Bordignon, Cerniglia and Revelli (2003), *yardstick competition* theory suggests that only incumbents that face uncertain electoral outcomes should interact strategically with their neighbors. If a local government is pretty confident of re-election regardless of its tax behavior, we should not expect to find its fiscal choices being affected by those of its neighbors.

Edmark and Ågren (2008) document a positive spatial dependence of local income taxes in Swedish municipalities. However, they find weak evidence supporting the proposition that the spatial correlation in taxes among Swedish local governments can be explained by incentives to attract mobile taxpayers (*Tiebout's tax competition* theory). Similarly, they find no support for the *yardstick competition* thesis.

Gérard, Jayet and Paty (2010) document the absence of interactions between Belgian neighboring municipalities in terms of property tax rates. These authors explain their result through the immobility of the property tax base. However, this result contrasts with Heyndels and Vuchelen (1998), who, for the same sample, find that tax rates are indeed copied among neighboring municipalities.

One tool incumbents may use is tax diversification, as explained by Heyndels and Smolders (1994) on a sample of Flemish municipalities. This means that, following the fiscal illusion hypothesis, municipal politicians could try to align with neighbors' taxes, so that their voters do not punish them for setting higher taxes than the neighbors. Accordingly, if expenditures raise above the neighbors' levels and they must be funded with extra tax liabilities, incumbents will diversify taxes to diminish the impact on taxpayers. This strategy is not feasible in Spain, since taxes are limited by law and no municipality can create new taxes and the tax rate is the only variable at stake.

2.2 OTHER FACTORS AFFECTING MUNICIPAL TAX RATES (CONTROL VARIABLES)

This section reviews literature on the control variables for the proposed models. All these variables are shown in table 1.

According to Brett and Pinkse (2000), the political alignment of the municipal ruling party with the national government and regional government can have an influence on the municipal budget (variables *nation* and *region*).

Another control variable is the population of the municipality (variable *lnpopul*), which has an impact on tax rates. Bordignon, Cerniglia and Revelli (2003) find that population has a negative and significant impact on tax rates, which suggests economies of scale. Heyndels and Vuchelen (1998) and Delgado, Lago-Peñas and Mayor (2015) find that municipal tax rates are higher when population increases. However, Brett and Pinkse (2000) report no impact of population on municipal taxes. We take population in log, to reduce the scale differences (Brett and Pinkse, 2000).

The political literature posits that, in general, left-wing parties favor public spending increases while right-wing parties aim at budget reductions (Tellier, 2006) and smaller government size (variable *MCideology*). Cusack (1997) defines this idea as the "partisan politics matters" thesis.

We control for the electoral cycle through three dummy variables, *munpreelection*, *munelectionyear* and *munpostelection*, which take value 1 in the year before elections, in the election year and in the year after elections, respectively (Gérard, Jayet and Paty, 2010; Isen, 2014). Bordignon, Cerniglia and Revelli (2003), find opportunistic behavior on the part of municipal incumbents: tax rates tend to be systematically lower in election years.

Unemployment can be treated as a proxy of the local economic situation. A higher unemployment rate has a negative effect on tax rates (variable *unemploy*), as shown by Bordignon, Cerniglia and Revelli (2003), Gérard, Jayet and Paty (2010) and Cassette, Di Porto and Foremny (2012). However, Edmark and Ågren (2008) and Lyytikäinen (2012) find the unemployment rate has a positive impact on local tax rates.

Bordignon, Cerniglia and Revelli (2003) posit that theory does not univocally predict the effect of lump-sum grants on local tax rates. For instance, the existence of a "flypaper effect" would require a very small (negative) effect of grants on the local tax rate. Bucovetsky and Smart (2006) show theoretically how federal grants, measured in per capita terms (variable *r_transfpc*), can limit tax competition among subnational governments, correct fiscal externalities, and increase government spending. The previous section documented the neighbors' property tax as a regressor, to account for tax mimicking, i.e. interaction effects across municipalities (horizontal effect). Taking grants as right hand variable tackles the influence of central and regional government on municipal expenditure behavior (vertical effect). Delgado, Lago-Peñas and Mayor (2015) show negative and

significant coefficients for per capita grants, supporting the median voter model and rejecting the "flypaper effect".

Regarding income, Brett and Pinkse (2000) propose income as determinant of municipal property tax base (variable *income*). Specifically, they include it as an indicator of the willingness to pay for public services. Bordignon, Cerniglia and Revelli (2003) find that income does not appear to have any systematic impact on the tax rate. Gérard, Jayet and Paty (2010) show that higher income has a positive effect on local property tax, which agrees with the empirical literature, where demand for public services is often positively correlated with income. Edmark and Ågren (2008) also report a positive impact of income on local income tax.

Oates (1969) finds that local real estate values bear a significant negative relationship to the effective tax rate (variable *r_housevalue*).

Our variable *autcom* controls for the impact of the regional shocks on municipal taxes (Isen, 2014).

The majority enjoyed by a municipal government has also an impact on taxes. Increased council fragmentation is associated with higher taxes (Roubini and Sachs, 1989; Fiva and Rattsø, 2007; Delgado, Lago-Peñas and Mayor, 2015). If a one-party majority applies the local coefficient, voters know exactly who to blame for it, but if there are many different parties, it will be the fault of all of them and the voter is going to make his choice based on other factors than the local coefficient application. Similarly, the higher the number of government changes, the weaker the political situation of the incumbents (Edmark and Ågren, 2008). These authors assume that an incumbent with a weak political majority will pay closer attention to the neighbors' tax policy than an incumbent with a strong majority, who is likely to win the election irrespective of neighbors' policies. Thus, tax rate mimicking is expected to be stronger in municipalities where the ruling majority is weak. In the presence of *yardstick competition*, these interaction coefficients should be positive and statistically significant, and should be higher the more changes in government take place. This theoretical issue is controlled for with variables *cgov_1*, *cgov_2* and *cgov_3*, which will interact with the key independent variables *neig_uproptaxrate* and *neig_cartaxaveragerate*.

We also control for three additional factors with an impact on municipal taxes. First, Revelli (2002) finds that incumbent popularity is damaged by own tax increases and enhanced by neighbors' tax increases. However, after controlling for the influence of national politics, the estimated electoral consequences of local tax increases become less significant. Accordingly, we control whether the municipal party belongs to one of the two main national parties (variable *bipartisan*). Second, we check if there was a cadastral value revaluation (*dumm_yearvaluerev*). The third factor is the total fiscal burden of the municipality (*r_revenue1pc*), which determines to some extent how much municipalities can increase tax rates.

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3 ECONOMETRIC MODEL, DATA AND VARIABLES

Our initial sample consists of a panel data of 2,431 observations, which covers the vast majority of Spanish municipalities over 1,000 inhabitants in the 2002 to 2013 period. This is the largest Spanish sample on tax mimicking to date. This panel data approach overcomes the drawbacks shown by Bordignon, Cerniglia and Revelli (2003) on cross-sectional data. First, panel data allow us to control for fixed jurisdiction effects (unobserved heterogeneity). Second, the potential endogeneity of the mayor status and other variables may be controlled.

Our sample is more comprehensive than the two most relevant tax mimicking papers on Spanish municipalities to date. In the first, Solé-Olle (2003) considers the panel data (1992-1999, 8 years) of municipalities of over 5,000 inhabitants from one Spanish province (105 municipalities). In the second, Delgado, Lago-Peñas and Mayor (2015) use cross-sectional data for the year 2005 for Spanish municipalities of over 1,000 inhabitants (2,713 municipalities). Our data also cover the whole country for 12 years (2002-2013), being a bit smaller because municipalities should be greater than 1,000 inhabitants for the whole time window.

Our Generalized Method of Moments (GMM) general equation is:

$$y_{it} = \alpha y_{it-1} + \sum \beta_j x_{jit} + c_i + \varepsilon_{it} \quad (1)$$

Where y_{it} represents either property tax rate or car tax rate. These two taxes were chosen because they are the most important considering the non-financial revenues of Spanish municipalities. Thus, as of 2013, property tax accounts for 29.02%, and car tax rate represents 5.12% of total non-financial revenues.

Budget figures usually follow an incremental approach (Dezhbakhsh, Tohamy and Aranson, 2003). To control for this budgetary inertia, we include the lagged dependent variable as regressor (αy_{it-1}) (Revelli, 2001).

X_{jit} is the vector of explanatory variables, i.e. socio-economic characteristics and further control variables (see section 2.2)

Unobservable heterogeneity is represented by c_i, and ε_{it} stands for random disturbances.

Starting from this general equation, we include the spatial effect:

$$y_{it} = \alpha y_{it-1} + \rho \left(\sum y_{jt}/n\right) + \sum \beta_k x_{kit-1} + c_i + \varepsilon_{it} \quad (2)$$

As indicated by Manski (1993), social forces act on the individual with a lag (Edmark and Ågren, 2008), thus, socio-economic features of municipalities are one year retarded ($\sum \beta_k x_{kit-1}$). However, neighboring tax rates are introduced without time lag. Neighboring tax rates are known by the neighboring politicians in

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advance of the fiscal year, since they are shown on the budget. Therefore, all neighboring municipalities know the tax rates of the remaining municipalities before the fiscal year starts, and they can react to that information in their own taxes and budgets. Neighbors are defined as those municipalities sharing a common geographical border, in agreement with the literature. Information about local tax rates is spread mainly through local and regional newspapers and television (Allers and Elhorst, 2005). Heyndels and Vuchelen (1998) and Edmark and Ågren (2008) show that municipalities that share borders with immediate neighbors exert an influence on these neighbors' tax choices. Similarly, Isen (2014) shows that among the theories of spillovers, spatial proximity is particularly relevant. Besley and Case (1995) provide two arguments to support this definition of neighborhood. First, geographic neighbors are quite likely to experience similar shocks to their tax bases. This, besides, is controlled through time dummies and regional dummies in our regressions, to absorb the impact of changes in national economic climate and changes in national fiscal behavior or regional fiscal behavior. Second, geographic neighbors belong to the same media market, thus they have good information about what is happening close by.

Following Edmark and Ågren (2008), we take the average tax rates of neighbors: $\rho\ (\sum y_{jt}/n)$, where y_{jt} stands for the property tax rate of municipality j in year t (there are 1…n "j" neighboring municipalities per municipality "i").

Pinkse, Slade and Brett (2002) point out as GMM valid instruments those continuous variables that are different at each location. Accordingly, we take some municipal economic continuous variables as instruments. Among the endogenous variables, we must consider own taxes and neighbors' taxes (y_{it} and y_{jt}). As Isen (2014) indicates, there is a correlation between the fiscal behavior of neighbors that cannot be interpreted causally, i.e. there is a reciprocal influence.

As Cassette, Di Porto and Foremny (2012) show, GMM specification with time lagged dependent variable remains the most reliable specification based on our data. Table 1 presents variables and depicts descriptive statistics.

Table 1

Information on variables and descriptive statistics

Variable	Calculation	Literature	Mean	Std. dev.	Min.	Max.
uproptaxrate	Tax rate to be multiplied by tax base (urban property value)	Solé-Ollé (2003), Lyytikäinen (2012), Baskaran (2014), Allers and Elhorst (2005), Isen (2014), etc.	.62	.17	.2	1.23
neig_uproptaxrate	Average neighboring uproptaxrate		.62	.13	.35	1.14
cartaxaveragerate	Vehicle tax liability of municipality *i*, year *t* /minimum vehicle tax liability according to law 2/2004, year *t*	Besley and Case (1995), Solé-Ollé (2003), Delgado, Lago-Peñas and Mayor (2015)	1.35	.29	1	2
neig_cartaxaveragerate	Average neighboring cartaxaveragerate		1.36	.23	1	2.00
r_revenue1pc	Municipal direct and indirect taxes per capita (real 2002 €)	Solé-Ollé (2003)	251.76	199.26	23.37	5633.85
r_transfpc	Transfers received from upper-level governments per capita (real 2002 €)	Revelli (2001), Bordignon, Cerniglia and Revelli (2003), Bucovetsky and Smart (2006), Lyytikäinen (2012), Delgado, Lago-Peñas and Mayor (2015), Edmark and Ågren (2008), Baskaran (2014)	377.75	203.29	45.24	4228.01
income	Per capita income of the municipality (real 2002 income levels). Ranging from 1 (lowest) to 10 (highest)	Besley and Case (1995), Brett and Pinkse (2000), Bordignon, Cerniglia and Revelli (2003), Gérard, Jayet and Paty (2010), Edmark and Ågren (2008), Lyytikäinen (2012), Cassette, Di Porto and Foremny (2012)	5.15	2.30	1	10
unemploy	Unemployment rate (%)	Besley and Case (1995), Revelli (2001), Bordignon, Cerniglia and Revelli (2003), Gérard, Jayet and Paty (2010), Lyytikäinen (2012), Cassette, Di Porto and Foremny (2012), Edmark and Ågren (2008), Delgado, Lago-Peñas and Mayor (2015)	8.56	4.97	.5	36.97
lnpopul	Natural logarithm of municipality population	Bordignon, Cerniglia and Revelli (2003), Heyndels and Vuchelen (1998), Delgado, Lago-Peñas and Mayor (2015), Brett and Pinkse (2000), Edmark and Ågren (2008)	8.63	1.21	6.90	15.00
r_housevalue	Tax base (real estate value) according to municipal government's urban property value (real 2002 thousand €)	Oates (1969)	30.43	23.11	2.65	196.83
MCideology	Municipal Council political sign (0 left; 1 right)	Bordignon, Cerniglia and Revelli (2003), Edmark and Ågren (2008), Delgado, Lago-Peñas and Mayor (2015)	.49	.49	0	1

TABLE 1

Information on variables and descriptive statistics (continued)

Variable	Calculation	Literature	Mean
majority	Majority of one party in municipal council=1, 0 otherwise	Solé-Ollé (2003), (2016), Delgado, Lago-Peñas and Mayor (2015), Fiva and Rattsø (2007), Roubini and Sachs (1989)	.66
munelectionyear	Dummy election year (1 election year; 0 no election year)	Besley and Case (1995), Bordignon, Cerniglia and Revelli (2003), Edmark and Ågren (2008), Gérard, Jayet and Paty (2010), Isen (2014)	.25
munpreelection	Dummy pre-election year (1 pre-election year; 0 no pre-election year)		.26
munpostelection	Dummy post-election year (1 post-election year; 0 no post-election year)		.23
dumm_yearvaluerev	Property values have been updated by the municipality *i* in year *t*=1, 0 otherwise	Revelli (2002), Solé-Olle (2003)	.03
bipartisan	Municipal ruling party belongs to the two main national parties (1 belongs to one of the two main political parties; 0 doesn't belong)	Revelli (2002)	.74
nation	National government alignment with municipal government. If both are conservative or both are progressive, dummy takes value 1. Value 0 otherwise	Brett and Pinkse (2000)	.52
region	Regional government alignment with municipal government. If both are conservative or both are progressive, dummy takes value 1. Value 0 otherwise		.62
cgov_1	Takes 1 if there was one change in municipal government stemming from elections in 2002-2013. Takes 0 otherwise	Edmark and Ågren (2008)	.28
cgov_2	Takes 1 if there were two changes in municipal government stemming from elections in 2002-2013. Takes 0 otherwise		.29
cgov_3	Takes 1 if there were three changes in municipal government stemming from elections in 2002-2013. Takes 0 otherwise		.13
autcom	Autonomous community (region) where the municipality is located	Besley and Case (1995), Isen (2014)	Non reported

Variable income *is only available as a discrete variable in levels 1-10 for the time window. It was constructed by the Klein Institute (Autonomous University of Madrid). Descriptive statistics of variable* autcom *are not reported because they are not relevant for the analysis. They are N-1 dummy variables representing the region where the municipality is located. Thus, 16 more rows would make the table more complex, without adding meaningful information for the reader.*

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4 TAX MIMICKING IN SPANISH MUNICIPALITIES

Tables 2a and 2b show our models (equation 2). As Edmark and Ågren (2008) document, a positive coefficient for neighbors' tax rates, i.e. ρ in equation (2), is consistent with the theories of *tax competition* and *yardstick competition*. As explained in the introduction, we also consider the *spillover* hypothesis. In our regressions, these coefficients are represented by variables *neig_uproptaxrate* and *neig_cartaxaveragerate* on tables 2a and 2b, respectively.

Columns two to five of tables 2a and 2b show GMM regressions. Hansen tests on tables 2a and 2b indicate weak instruments, therefore we provide robustness checks: instrumental variable (IV) regressions (columns six to nine on tables 2a and 2b). We report the corresponding regression, either random or fixed effects, after checking with Hausman test. The fixed effects IV equation and random effects IV equation are, respectively:

$$y_{it} - \bar{y} = \alpha y_{it-1} - \bar{y} + \rho[(\sum y_{jt}/n) - (\overline{\sum y_{jt}}/n)] + \sum[\beta_k x_{kit-1} - \bar{x}] + \sum[\beta_k \widehat{x_{kit-1} - \bar{x}}] + \varepsilon_{it} \quad (3)$$

$$y_{it} - y_i = \alpha y_{it-1} + \rho\,(\sum y_{jt}/n) + \sum \beta_k x_{kit-1} + \sum \beta_k \widehat{x_{kit-1}} + c_i + \varepsilon_{it} \quad (4)$$

As Baskaran (2014) points out, the evidence for tax mimicking found in much of the previous literature might be questionable. One explanation for Baskaran's finding is that intergovernmental transfers reduce the incentives to engage in tax competition. To control for this issue, we add inter-governmental transfers as independent variable (*r_transfpc*), as explained on section 2.2.

The second criticism Baskaran (2014) raises is that local governments might set their tax rates primarily according to the preferences of their citizens and consider their neighbors' tax policies negligible. Such an explanation is consistent with Tiebout (1956).

The third shortcoming cited by Baskaran (2014) has to do with the weak instruments used by the literature. In fact, we report the same problem with Spanish municipalities, and accordingly, we present IV regressions as robustness checks.

Lyytikäinen (2012) finds that the standard spatial econometrics methods may have a tendency to overestimate the degree of interdependence in tax rates. This problem appears in our regressions, since property tax mimicking coefficients in GMM regressions are 2 to 12 times bigger than IV property tax regressions (variable *neig_uproptaxrate* on table 2a). However, in the car tax regressions, results appear the other way: IV coefficients are higher than their GMM counterparts. In agreement with all the above mentioned, we present the coefficients of both GMM and IV regressions and both estimations should be considered when drawing conclusions about our regression coefficients.

Table 2a
Property tax regressions

Dependent variable	*uproptaxrate*							
Estimation method	**GMM**				**IV**			
Sample	**Whole sample**		**Sub-samples**		**Whole sample**		**Sub-samples**	
	Basic model	**Interaction**	**Majority=0**	**Majority=1**	**Basic model**	**Interaction**	**Majority=0**	**Majority=1**
	2	3	4	5	6	7	8	9
neig_uproptaxrate	*** .2576 8.90	*** .2466 9.65	*** .1772 3.78	*** .2366 7.10	*** .0196 3.29	*** .0211 3.41	.0239 0.37	** .1207 2.50
uproptaxrate $_{(t-1)}$	*** .9543 39.83	*** .9292 41.92	*** .9125 32.30	*** .9327 31.53	*** .9411 198.27	*** .9407 199.42	*** .7594 24.09	*** .6557 18.25
r_revenue1pc $_{(t-1)}$	-.0000 -0.98	-.0000 -0.33	.0000 0.60	.0000 0.14	.0001 1.14	.0001 0.95	* -.0001 -1.95	*** -.0001 -4.28
r_transfpc $_{(t-1)}$	*** -.0000 -2.83	*** -.0000 -3.62	-.0000 -1.52	*** -.0000 -3.65	.0000 0.51	.0000 0.44	.0000 0.30	** .0001 2.33
income $_{(t-1)}$	*** -.0027 -5.88	*** -.0027 -6.36	*** -.0037 -4.03	*** -.0034 -5.87	*** -.0263 -2.79	*** -.0265 -2.81	** -.0261 -2.39	.0007 0.14
unemploy $_{(t-1)}$	* .0003 1.77	*** .0006 4.09	** .0008 2.51	*** .0006 3.36	*** -.0213 -3.18	*** -.0213 -3.16	.0056 0.38	** -.0224 -2.25
lnpopul $_{(t-1)}$	* .0022 1.95	*** .0026 2.69	*** .0047 3.41	* .0020 1.66	-.0014 -1.00	-.0014 -0.97	-.1580 -1.63	-.0186 -0.29
r_housevalue $_{(t-1)}$	*** -.0004 -6.49	*** -.0004 -7.83	*** -.0006 -7.44	*** -.0003 -5.00	*** -.0005 -7.92	*** -.0005 -8.10	*** -.0005 -3.80	-.0004 -1.45
MCideology $_{(t-1)}$	*** .0298 4.76	*** .0175 3.58	* .0131 1.82	.0012 0.16	-.0011 -0.78	-.0014 -0.94	.0015 0.30	-.0072 -1.09
majority $_{(t-1)}$	-.0023 -0.31	-.0059 -1.12			.0016 1.36	.0012 1.06		
munelectionyear	*** -.0083 -9.19	*** -.0097 -11.50	*** -.0147 -8.35	*** -.0075 -7.14	** .0373 2.57	*** .0377 2.60	-.0184 -0.98	-.0094 -0.81
munpreelection	*** -.0082 -8.98	*** -.0092 -10.83	*** -.0107 -6.26	*** -.0071 -7.16	*** .0397 2.78	*** .0398 2.78	.0104 0.44	** .0401 2.05

munpostelection	.0003 0.37	-.0001 -0.15	*** -.0050 -2.79	** .0026 2.23	*** .0351 3.88	*** .0354 3.92	-.0045 -0.35	-.0212 -1.33
dumm_yearvaluerev $_{(t-1)}$	** -.0105 -2.13	-.0073 -1.45	-.0085 -1.14	-.0044 -0.74	*** -.0078 -2.81	*** -.0078 -2.81	.0044 0.55	.0061 0.90
bipartisan $_{(t-1)}$	** .0150 2.36	** .0103 2.41	.0058 0.93	** .0220 2.49	.0006 0.42	.0003 0.21	-.0046 -0.66	.0004 0.05
nation $_{(t-1)}$	*** .0163 4.89	*** .0102 4.28	.0040 0.77	*** .0121 4.28	*** -.0040 -2.63	*** -.0041 -2.67	** -.0103 -2.10	.0014 0.44
region $_{(t-1)}$	.0030 0.74	.0016 0.51	* -.0089 -1.88	.0042 1.41	-.0006 -0.56	-.0007 -0.67	.0031 0.58	-.0003 -0.07
cgov_1xneig_uptaxrate		-.0049 -0.81				-.0024 -1.18		
cgov_2xneig_uptaxrate		-.0060 -0.99				-.0016 -0.75		
cgov_3xneig_uptaxrate		-.0025 -0.32				-.0032 -1.21		
m(2) test	z=1.89 Pr=.059	z=1.81 Pr=.070	z=0.68 Pr=.500	z=1.15 Pr=.251				
Hansen test	chi2=808 Prob=.000	chi2=1016 Prob=.000	chi2=454 Prob=.002	chi2=595 Prob=.000				
Hausman					chi2=20 Prob=0.467 RE	chi2=22 Prob=0.455 RE	chi2=877 Prob=0.000 FE	chi2=474 Prob=0.000 FE
R-sq overall					0.8933	0.8937	0.2313	0.4531

All models include:

– A constant, which is not shown.

*– Dummy variables for Spanish regions, which are not shown. This variable adds to the income variable (*income*) to control for differences in economic development among Spanish regions (autonomous communities).*

Below each coefficient, z *value is reported. Significance: *10%, **5%, ***1%.*

RE=random effects IV regression. FE=fixed effects IV regression.

IV regression: Instrumented variables=neig_uproptaxrate r_revenue1pc r_transfpc income unemploy. *Instruments*=lnpopul, munelectionyear, munpreelection, munpostelection, r_debtpc cartaxaveragerate, propimmigrants, dumm_yearvaluerev.

Table 2b
Car tax regressions

Dependent variable	*cartaxaveragerate*							
Estimation method	GMM				IV			
Sample	Whole sample		Sub-samples		Whole sample		Sub-samples	
	Basic model	Interaction	Majority=0	Majority=1	Basic model	Interaction	Majority=0	Majority=1
	2	3	4	5	6	7	8	9
neig_cartaxaveragerate	*** .0571 4.47	*** .0520 4.41	* .0362 1.80	** .0346 2.35	*** .7573 2.93	*** .1813 4.89	*** .2608 4.83	*** .4249 8.20
cartaxaveragerate $_{(t-1)}$	*** .8943 48.48	*** .9026 52.87	*** .9431 43.05	*** .9165 44.93	*** .4317 9.60	*** 1.1178 28.39	*** .6133 31.85	*** .6093 45.62
r_revenue1pc $_{(t-1)}$	** -.0000 -2.51	* -.0000 -1.86	*** -.0000	* -.0000 -1.82	* .0005 1.66	*** -.0004 -4.96	.0082 1.23	** -.0109 -2.56
r_transfpc $_{(t-1)}$	-.0000 -1.60	*** -.0000 -2.64	.0000 0.18	** -.0000 -2.36	*** -.0002 -2.92	* .0003 1.71	.0015 0.43	** -.0059 -2.38
income $_{(t-1)}$	*** -.0014 -3.44	** -.0010 -2.50	** -.0024 -2.44	*** -.0016 -2.84	-.0353 -1.60	*** .0987 4.70	.0004 0.37	* .0016 1.77
unemploy $_{(t-1)}$	* -.0004 -1.87	*** -.0005 -2.69	*** -.0018 -4.80	-.0003 -1.22	-.0047 -1.15	*** -.0298 -5.49	-.0000 -0.05	-.0002 -0.41
lnpopul $_{(t-1)}$	*** .0153 7.95	*** .0137 7.79	*** .0116 4.63	*** .0139 7.07	.1141 1.06	-.0236 -1.29	** .0485 2.34	-.0173 -1.19
r_housevalue $_{(t-1)}$	*** -.0001 -4.75	*** -.0002 -5.57	*** -.0002 -4.00	*** -.0001 -2.78	-.0002 -1.05	** -.0004 -2.33	*** -.0085 -2.80	*** -.0090 -4.04
MCideology $_{(t-1)}$	*** -.0195 -3.74	*** -.0170 -3.78	.0023 0.31	*** -.0225 -2.99	.0015 0.22	-.0078 -1.23	-.0037 -1.44	*** -.0093 -3.07
majority $_{(t-1)}$	.0025 0.41	-.0048 -1.01			-.0038 -0.64	-.0076 -1.39		
munelectionyear	*** -.0126 -14.54	*** -.0115 -13.59	*** -.0148 -7.62	*** -.0107 -10.05	.0032 0.27	*** .0633 3.49	*** -.0134 -4.68	*** -.0088 -3.85
munpreelection	*** -.0086 -9.05	*** -.0079 -8.56	*** -.0091 -4.21	*** -.0073 -6.45	.0171 1.45	** .0237 2.15	*** -.0085 -3.18	*** -.0062 -3.02

munpostelection	*** .0044 3.80	*** .0053 5.27	.0000 0.02	*** .0067 4.80	.0079 1.53	*** .1072 5.62	.0007 0.27	*** .0071 3.93
dumm_yearvaluerev $_{(t-1)}$	** .0079 2.52	*** .0108 3.42	.0054 0.91	.0033 1.01	.0044 0.89	-.0108 -1.12	** .0103 2.44	.0052 1.58
bipartisan $_{(t-1)}$	*** -.0200 -3.73	-.0037 -0.79	-.0080 -1.37	-.0050 -0.59	.0115 1.58	* .0113 1.86	-.0048 -1.70	-.0065 -1.71
nation $_{(t-1)}$	-.0019 -0.76	-.0033 -1.59	-.0047 -0.93	-.0038 -1.60	-.0002 -0.05	*** -.0159 -3.28	.0006 0.31	** -.0034 -2.27
region $_{(t-1)}$	-.0033 -0.91	.0019 0.64	.0052 1.04	** .0058 2.00	-.0003 -0.06	-.0011 -0.17	* .0044 1.90	-.0012 -0.53
cgov_1xneig_cartaxrate		-.0009 -0.50				-.0022 -0.61		
cgov_2xneig_cartaxrate		-.0004 -0.20				.0013 0.29		
cgov_3xneig_cartaxrate		-.0026 -0.94				-.0052 -1.14		
m(2) test	z=-0.02 Pr=0.983	z=-0.04 Pr=0.966	z=-1.00 Pr=0.318	z=0.99 Pr=0.321				
Hansen test	chi2=607 Prob=.000	chi2=840 Prob=.000	chi2=440 Prob=.006	chi2=464 Prob=.001				
Hausman					chi2=7584 Prob=.000 FE	chi2=11 Prob=.885 RE	chi2=1843 Prob=.000 FE	chi2=665 Prob=.000 FE
R-sq overall					0.6487	0.6693	0.9134	0.8221

All models include:

– A constant, which is not shown.

– Dummy variables for Spanish regions, which are not shown. This variable adds to the income variable to control for differences in economic development among Spanish regions (autonomous communities).

*Below each coefficient, z value is reported. Significance: *10%, **5%, ***1%.*

IV regression: Instrumented variables=neig_uproptaxrate r_revenue1pc r_transfpc income unemploy. *Instruments*=lnpopul, munelectionyear, munpreelection, munpostelection, r_debtpc cartaxaveragerate, propimmigrants, dumm_yearvaluerev.

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Regarding property tax (table 2a), *neig_uproptaxrate* is significant in all regressions except majority=0 IV regression (column eight). As far as car tax is concerned (table 2b), *neig_cartaxaveragerate* is significant in all regressions, both GMM and IV. This indicates the existence of tax competition in Spanish municipalities, in both property tax and car tax. However, the quantitative impact is limited, because we should be prudent and take the minimum coefficient between GMM and IV. Our data show that a 10% increase in a neighboring municipality's property tax rate leads to a 1.3% increase in property tax rate or 2.3% for car tax rate. Therefore, our coefficients are lower than the average found by the literature, which ranges from .2 to .9. For example, Revelli (2001) reports that a 10% increase in the local property tax rate of a UK district's neighbors leads to an increase of 4-5% in its own property tax rate.

Regarding the robustness of our estimations, both GMM and IV show that there is tax mimicking, both in property tax and in car tax. Another point that confirms the robustness and economic rationality of our regressions is the value of the lagged dependent variable, which in all regressions except one, ranges from .43 to .95 (less than unity), which indicates that the time series are stationary, i.e. that the process converges in expectation (Blundell and Bond, 1998).

In all regressions the lagged dependent variable (*uproptaxrate* $_{(t-1)}$ and *cartaxaveragerate* $_{(t-1)}$, respectively) shows the highest explanatory power, which agrees with the budgetary incrementalism predicted by Dezhbakhsh, Tohamy and Aranson (2003).

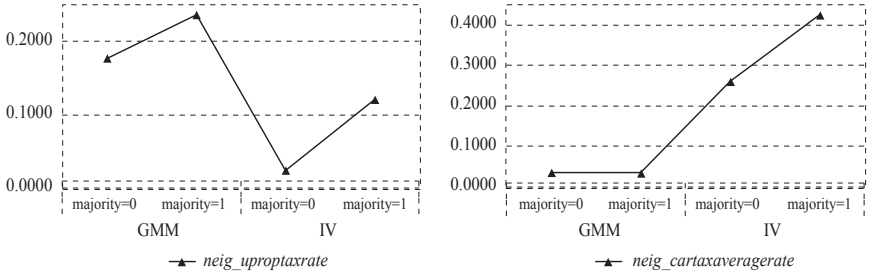
The *yardstick competition* hypothesis is checked through two sets of regressions (Bordignon, Cerniglia and Revelli, 2003). First, columns three and seven in tables 2a and 2b show the regressions with interaction coefficients (*cgov_1xneig_uptaxrate*, *cgov_2xneig_uptaxrate* and *cgov_3xneig_uptaxrate*; *cgov_1xneig_cartaxrate*, *cgov_2xneig_cartaxrate* and *cgov_3xneig_cartaxrate*), which account for the interaction between the number of government changes after municipal elections (*cgov_1*, *cgov_2* and *cgov_3*) and neighbors' tax rates (*neig_uptaxrate* and *neig_cartaxrate*). As discussed in section 2.2., Edmark and Ågren (2008), expect tax rate mimicking to be stronger in municipalities where the ruling majority is weak. In the presence of *yardstick competition*, these interaction coefficients should be positive and statistically significant, and should be higher the more changes in government take place (*cgov_1xneig_uptaxrate* < *cgov_2xneig_uptaxrate* < *cgov_3xneig_uptaxrate*; *cgov_1xneig_cartaxrate* < *cgov_2xneig_cartaxrate* < *cgov_3xneig_cartaxrate*). We find the opposite, i.e. coefficients of these three interaction variables are negative and not significant. Our interaction regressions, therefore, reject the *yardstick competition* hypothesis.

Second, we split the sample into two sub-samples, depending on whether or not the mayor has a majority in the municipal council (columns four, five, eight and nine on tables 2a and 2b). In the subsample with a majority, there should not be tax mimicking (majority=1: columns five and nine on tables 2a and 2b). As Bordignon,

Cerniglia and Revelli (2003) and Costa-Font, De-Albuquerque and Doucouliagos (2015) point out, politicians with a majority in government have no incentives to benchmark their neighbors' tax policies. In other words, only incumbents that face uncertain electoral outcomes interact strategically with their neighbors. In our regressions, both in property tax and car tax, we get exactly the opposite coefficients: municipalities with a majority in the council mimic their neighbors' tax policies more (figure 1). Only in one case, car tax GMM, is the majority coefficient slightly smaller than the no-majority coefficient. Even in this case, first, the difference in the coefficient is only .0016, and second, the significance of the majority sample is higher than the no-majority sample (*z* values 2.35 vs 1.80, respectively).

Figure 1

Majority impact on tax mimicking



These two additional checks (interactions and majority subsamples) clearly reject the *yardstick competition* hypothesis. Therefore, our data confirm tax competition, but the explanation does not seem to constitute *yardstick competition*.

To check whether *tax competition* explains the tax mimicking, we run an additional GMM regression where the dependent variable is the average population change of the neighboring municipalities divided by the population change of each municipality (variable *movetoneigh*). If this variable is higher than one, it means that on average, the neighboring municipalities' populations are growing more than that of the municipality at stake. As independent variables related to the *Tiebout* hypothesis, we take the neighboring municipalities' average urban property tax rate and car tax rate divided by the municipality at stake: *uproptax_rel*, *cartax_rel*, respectively. Other factors that could influence this population change are the municipal income level, municipality unemployment and real house value of neighbors divided by the municipality at stake: *income_rel*, *unemploy_rel*, *r_housevalue_rel*, respectively. Finally, other control variables are included in the regression (see table 3).

TABLE 3

Tax competition (Tiebout) regression

		Variable description
Dependent variable	*movetoneigh*	Neighbors' population change/municipality$_i$ population change. Population change=population$_t$/population$_{t-1}$
uproptax_rel $_{(t-1)}$	.0061 0.92	Average of neighbors' urban property tax rate/ municipality$_i$ urban property tax rate
cartax_rel $_{(t-1)}$	-.0003 -0.48	Average of neighbors' car tax rate/municipality$_i$ car tax rate
income_rel $_{(t-1)}$	.0013 0.63	Average of neighbors' income level/ municipality$_i$ income level
unemploy_rel $_{(t-1)}$	.0034 1.25	Average of neighbors' unemployment rate/ municipality$_i$ unemployment rate
r_housevalue_rel $_{(t-1)}$	.0000 0.24	Average of neighbors' real house value/ municipality$_i$ real house value
r_transfpc $_{(t-1)}$	-.0000 -1.22	See table 1
MCideology $_{(t-1)}$	.0056 1.18	
majority $_{(t-1)}$	-.0021 -0.49	
munelectionyear	*** .0020 2.78	
munpreelection	*** .0022 2.84	
munpostelection	*** .0017 2.83	
dumm_yearvaluerev $_{(t-1)}$	-.0048 -1.29	
bipartisan $_{(t-1)}$	*** .0182 2.62	
nation $_{(t-1)}$	.0049 1.63	
región $_{(t-1)}$	.0006 0.18	
propimmigrants $_{(t-1)}$	.0142 0.66	Municipality$_i$ immigrant population/ municipality$_i$ total population
m(2) test	z=0.45 Pr=0.656	
Hansen test	chi2=82.65 Prob=.338	

All models include:
– A constant, which is not shown.
– Dummy variables for Spanish regions, which are not shown.
*Below each coefficient, z value is reported. Significance: *10%, **5%, ***1%.*

As table 3 indicates, there is no impact of either property tax rates or car tax rates relative to those of the neighbors on population changes, which means that people are not "voting with their feet" and leaving the town because its property and car

taxes are higher than in neighboring municipalities. We confirm this feature with two univariate analyses. Correlation between *movetoneigh* and *uproptax_rel*: -0.0038, p value 0.5034; correlation between *movetoneigh* and *cartax_rel*: -0.0058, p value 0.3064 (correlation table available upon request to the authors). These results again reject the relationship of differences of tax rates among neighbors and population changes. These results make sense because in Spain it is not plausible for someone to move to another municipality, considering all the costs connected with this move, just because in the other municipality there are lower property and car tax rates. It does happen in Spain, though, that drivers fill their fuel tank in a region with lower gasoline tax, because in this case, the tax base can be easily moved just by driving some additional kilometers. However, changing residence is much more costly and would not withstand a simple cost-benefit analysis.

The last hypothesis that could reasonably explain this tax mimicking is the *expenditure spillovers* idea, i.e. since municipal expenditures tend to be correlated among neighboring municipalities, so will tax rates. From our point of view, this is the hypothesis that explains the Spanish municipalities' tax mimicking. The Spanish quasi-federal system that has led regions to mimic their neighbors has been replicated at the municipal level, according to our data. As an example of what has happened in the regions, we have the case of airports built by regional governments. Currently, Spain has many regional airports that either do not work because they were not necessary, or the number of flights is so small that regional governments have to subsidize them so much that in fact they are not feasible from a budgetary point of view. Most of them were built in order for one region to have the same infrastructure as a neighboring region, without any rational economic analysis. This behavior has been mimicked by municipalities, who want to have, for example, a swimming pool like the neighboring municipality, a sports center, and so on. This has led to a huge number of infrastructure facilities that municipalities keep closed because they cannot afford their operating costs. It is worth noting that the property bubble that brought billions of euro to the revenues of municipal budgets helped municipalities to start this *infrastructure race* among neighboring cities and towns.

The *expenditure spillovers* found confirm previous literature on tax competition, such as Baicker (2005), who shows that individual state spending has spillover effects on its neighbors' spending. Finally, our results are in line with Costa-Font, De-Albuquerque and Doucouliagos (2015), who find inter-jurisdictional expenditure interdependence among municipalities. This means that, for example, if one government increases the supply of public schools, this is likely to impact on school supply decisions in neighboring jurisdictions.

Regarding political variables, only *munpostelection* shows an unambiguous pattern in both property tax and car tax, with coefficients on eight regressions being positive and significant (only property tax GMM majority=0 regression shows a negative coefficient). These positive and significant coefficients indicate that municipalities engage in political budget cycles, by increasing tax rates one year

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after the election. Increasing taxes this year allows three years till the next election year, so that tax payers forget about this tax rise and it has little or no impact on the electoral outcome. Our results are in line with Gérard, Jayet and Paty (2010) and Bordignon, Cerniglia and Revelli (2003), who support the hypothesis of an electoral cycle on property tax rates.

The municipal council ideology (*MCideology*) shows mixed results if we compare GMM and IV regressions and property tax and car tax. To provide a specific insight on the effect of ideology, table 4 presents a t-test of mean difference in variables *uproptaxrate* and *cartaxaveragerate*.

Table 4
Impact of municipal council ideology

		uproptaxrate			
Group	**Obs.**	**Mean**	**Std. err.**	**Std. dev.**	**Significance**
0 (left-wing)	11,683	*** .6333	.0015	.1627	t=8.3309
1 (right-wing)	11,427	*** .6151248	.0016	.1694	Pr(T > t)=0.0000
		cartaxaveragerate			
0 (left-wing)	11,683	*** 1.3852	.0026	.2840	t=13.8303
1 (right-wing)	11,427	*** 1.3328	.0027	.2919	Pr(T > t)=0.0000

*Significance: *10%, **5%, ***1%.*

As table 4 indicates, right-wing parties set lower property tax rates and lower car tax rates. This finding agrees with the general political literature, which states that left-wing parties set higher tax rates than their conservative counterparts (Cusack, 1997; Tellier, 2006). If we focus on the tax mimicking literature, our results confirm Delgado, Lago-Peñas and Mayor (2015), who show that leftist governments tend to set higher taxes.

5 CONCLUSIONS, LIMITATIONS AND FURTHER RESEARCH

Our research questions are whether tax mimicking exists in Spanish municipalities, and, if so, the identification of the source of this interaction. We consider the largest sample of Spanish municipalities used so far: 2,431 municipalities over 1,000 inhabitants for 2002-2013.

Within the general framework of the *agency problem*, we find significant evidence of tax mimicking, in both property tax and car tax. Subsequently, we add analyses to check whether *yardstick competition* hypothesis or *tax competition* (*Tiebout hypothesis*) is the source of this tax mimicking. These further analyses reject both hypotheses.

Therefore, our results point to *expenditure spillovers*. In that respect, it seems municipalities are behaving like Spanish regional governments, which following the Spanish quasi-federal system, try to match central government's institutions and services. Here, municipalities seek to have the same services and infrastruc-

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tures of their neighbors. Thus, municipalities seek to set similar levels of taxes and expenditures as their neighboring municipalities.

The fact that incumbents are not signaling competence through neighbor-benchmarking tax policies does not mean that the *agency problem* is not present in Spanish municipalities. In fact, it is indicating another problem, i.e. incumbents do not think this strategy is worthwhile because they think that citizens do not pay attention to their municipal fiscal indicators when making voting decisions or when evaluating their politicians. This is something the central government is trying to change by teaching young generations about the importance of public goods and the need to pay taxes fairly so that public services are funded. As a government policy, further steps should be taken in this regard. Unfortunately, in Spain, parties involved in corruption have not been penalized by voters in the elections. Thus, there is still a long way until the Spanish population demands fiscal performance and appropriate use of public funds from politicians. This lack of concern about public funds misuse is one of the reasons corruption is so widespread among Spanish municipalities.

Regarding another policy implication of our findings, we must bear in mind that local governments are under reform in several European countries. For example, The Netherlands is merging municipalities; France simplified the local government sector to increase efficiency and to limit taxes. Knowing if *yardstick competition* is a real phenomenon may help them design a better institutional framework. In this point, as Bordignon, Cerniglia and Revelli (2003) indicate, *Tiebout's "voting with your feet"* (*tax competition*) is less relevant in Europe than in the United States, for example. In Spain, legislation should be aimed in such a way as to direct municipal governments' decisions towards the real needs of their constituencies, rather than allowing incumbents to compete with neighboring municipalities' tax and spending policies. In this respect, participatory budgets should be used as a way to empower tax payers about spending priorities of their municipality. However, getting citizens involved in municipal issues is complicated (McKenna, 2011).

As limitations, we can point out that it is difficult to identify whether tax mimicking stems from *tax competition*, from *yardstick competition*, or both, because the spatial reaction function of both theories is the same (Allers and Elhorst, 2005). This is a problem common to all papers on tax competition. In our case, these two theories have been rejected. As for the *tax competition theory*, our available data did not allow us to distinguish, within the population change, any city from which people were moving to other cities, as a way to clearly identify *Tiebout's "voting with your feet"* phenomenon. Besides, a questionnaire would have had to have asked why each and every citizen moved from one city to another, which is almost impossible.

As far as further research is concerned, we will investigate whether municipal tax base revisions (cadastral values revaluation) follow a tax competition strategy. In other words, check whether municipalities decide to postpone the revaluation

until their neighbors have already revalued, and therefore, the former are not penalized in a comparative assessment with the latter. Besides, further research should investigate if these revaluations follow an electoral budget cycle. Also, the expenditure patterns among Spanish municipalities could be investigated further. The idea would be to explore what determines expenditure patterns of municipalities (for example the ratio of material and employee expenses, etc.) in a spatial context (the effect of space, time and space-time parameters). Finally, as Manski (1993) points out, future research could add new experimental data to the analysis, such as questionnaires sent to municipal incumbents. This would overcome, at least partially, the limitation stated above.

Disclosure statement

No potential conflict of interest was reported by the authors.

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