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ABSTRACT

This study consists of three essays on electoral accountability and local public finance.

'A comprehensive test of Yardstick Competition in the Italian Municipalities' tests the Yardstick Competition hypotheses on a dataset of Italian Municipalities during the period 1995-2004, focusing on the local property tax rate on the main dwelling (*ICI abitazione principale*). First, a vote popularity equation is estimated with instrumental variables, including an original measure of inter-jurisdictional comparison between the domestic tax rate and the average neighbors' tax rate. The findings verify popularity concerns of the incumbent, robust to alternative definitions of popularity. Then, we estimate a spatial tax setting equation detecting interactions driven by the positive spatial lag coefficient. Given these evidence, we conclude that Yardstick Competition is present in the dataset.

'The time dynamics of Yardstick Competition in the Italian Municipalities' investigates the pattern of strategic interaction from 1995 to 2004. The literature identifies Yardstick Competition with the average interaction in time; we move forward, by estimating the spatial tax setting equation on subsequent time subsamples of the dataset to capture the variation of the interaction due to the introduction of a marginal year. The results show a converging trend towards the lowest level of spatial correlation. This pattern is especially evident in those Regions with a higher density of municipalities, where there are more opportunities to make inter-jurisdictional comparisons. This evidence suggests that the informational spillover generating Yardstick Competition, contrary to the assumption in the literature, changes over time.

'Do voters learn from past experience? Yardstick Competition and political selection' extends the model of Yardstick Competition by assuming that the stock of information available to voters accumulates over time. The theoretical results show that when past mimicking is observed there is a range of values of the weight attached to past experience for which the less competent incumbent would not be re-elected. If voters do not observe past mimicking, however, successful mimicking is always feasible. The predictions of the model are tested on an electoral cohort of Italian Municipalities by estimating a probit regression where the dependent variable is the dummy for re-election of the incumbent and the variables of interest are the voters' beliefs on the tax rate computed through dynamic Bayesian updating. The results, however, fail to verify the predictions of the model as the coefficient associated to the updated belief is never statistically significant.

'Asymmetric information and Political Budget Cycles: the effect of the local diffusion of newspapers' examines the expenditure cycles in the Italian Regions from 1984 to 2008 and their nexus with voters' awareness, proxied with the local diffusion of newspapers. We estimate a dynamic expenditure equation with Least Squares Dummy Variable Corrected (Bruno, 2005) accounting for the small size of the dataset. The results, robust to different specifications of the econometric model, find cycles in total expenditure and in capital expenditure before the electoral and fiscal reforms in the mid-90s. During this period the diffusion of newspapers constrains the electoral expenditure of those same items; the diffusion of generic newspapers is associated to a larger effect than the diffusion of economic newspapers, suggesting stronger popularity concerns towards the newly informed voters. The analyses does not detect neither expenditure cycles nor any effect of the diffusion of newspapers

after 1995, indicating a possible shift from a cycle in the size of expenditure to a less visible type of signaling, the cycle in the composition of expenditure.

Chapter 1.

Introduction

The subject of this study is the link between electoral accountability and local public finance. In particular, we investigate the presence and the time dynamics of electoral manipulations of fiscal policy in the Italian sub-national governments and the effect on them of a variation of voters' awareness.

This study is rooted in the field of the economic analyses of government, following the approach common to Political Economics and Public Choice assuming a non benevolent government pursuing his own private interests while ruling.

This environment is well described by political agency models in which the principal-agent relationship is characterized by citizens that have delegated the governmental authority to politicians who enjoy an informational advantage. As pointed out by Besley (2003), two problems emerge in this context: monitoring the policy makers' activity and selecting the competent politicians. In fact, politicians may implement the policies preferred by the voters and be *consonant*, or do not what voters want and be *dissonant*. In a democratic institutional setting in which the government is concerned about electoral popularity, strategic policy makers would behave differently according to the timing of the legislature.

This study focuses on two theories that treat the electoral manipulations of fiscal policy: the Political Budget Cycle theory (Rogoff, 1990) and the Yardstick Competition hypotheses (Besley and Case, 1995).

Both the theories assume a decentralized environment in which the incumbent may be one of two types, the less competent

(*dissonant*) one or the most competent (*consonant*) one. The competence level is an individual specific characteristic constant in time, and it usually represents the amount of the rent seeking activity or inefficiency in transforming tax revenues in public goods and services. In this framework the tax rate level of the less competent incumbent would be higher than the tax rate level set by the most competent incumbent, vice versa the level of public provision would be lower. As the cost of public provision is partly unobserved by voters, before an election they update their beliefs on the incumbents' competence with the fiscal performance they observe. When faced with re-election concerns, the less competent incumbent would find it optimal to be strategic and take a fiscal decisions that increases his popularity by reducing the tax rate or expanding the expenditure level.

The Political Budget Cycle theory predicts that the distortion would occur only in investment expenditure because its realization, unlike current expenditure, is observed by voters with one period lag. Aidt et al. (2011) proved that this game generates only separating equilibria. As the most competent incumbent is more efficient in providing public goods and services, he would always be able to spend more than the less competent incumbent, making the electoral strategy socially efficient because the voters observe an informative signal. The electoral manipulation thus preserves political selection, as only the most competent incumbent will be re-elected. Although the average quality of the politicians would improve, the distortion implies a cost, namely the deficit that voters would repay during the next legislature.

The Yardstick Competition hypotheses introduces an additional assumption to the model: beside the competence level of the incumbent, also the shock to the cost of public provision is unknown to voters, but it is spatially correlated among the

neighbors. This element allows voters to make inter-jurisdictional comparisons and judge the performance of the domestic incumbent by observing the performance of the neighbors' incumbents. The informational spillover generated by Yardstick Competition, however, reduces the asymmetric information between the incumbent and the voters but it does not remove it. Besley and Case (1995) illustrated the possibility of a pooling equilibrium in which the less competent incumbent exploits a domestic positive cost shock to mimic the performance of the neighbors hit by a negative cost shock. In this situation the fiscal decision observed is not informative of the competence level of the incumbent and under some conditions (derived by Bordignon et al., 2003) the mimicking incumbent would be re-elected because voters update their electoral beliefs with a misleading information. As a consequence, political selection is threatened and the quality of the politicians does not improve.

From this brief discussion two key elements emerge. First, the incentive to manipulate the fiscal decisions is motivated by the electoral concerns of the incumbent. Hence, the electoral mechanism introduces accountability between voters and politicians but it incentivizes the strategic behavior of the less competent incumbents by generating popularity matters.

Second, the fiscal manipulations are possible because there is asymmetric information on the true cost of the public provision. Voters in fact observe only the outcome of the decision, either the tax rate or the spending level or both, but they do not observe the process leading to these decisions. If more information is provided to voters, would they be able to judge the incumbent without incurring the cost of the fiscal manipulation? Would they unmask the mimicking incumbent? These are two recurring questions in this work, to which we

manage to answer both theoretically (Chapter 3) and empirically (Chapter 1, 2 and 4).

Chapter 1 tests Yardstick Competition on a newly assembled dataset of Italian Municipalities. The empirical analyses verifies both the responsibility hypotheses and strategic interaction in local tax setting during the period 1995-2004.

While the literature estimates only average effects during the period considered, the longitudinal dimension has been exploited in Chapter 2 to investigate the pattern of interaction in time. The results suggest a decreasing pattern of interaction, whose reductions are mainly during the electoral years. This result is consistent with the fact that Yardstick Competition improves political selection in time and not at once. A possible explanation for the observed pattern is the intensification of the informational spillover implied in Yardstick Competition.

This hypotheses is formalized in Chapter 3 by including in the model a process of voters' incremental learning from tax rates. The theoretical part of Chapter 3 expands the two-period models of the literature and assumes a dynamic update of the voters' beliefs. The results show that when voters observe a past mimicking they learn from their experience and reveal the electoral strategy of the current incumbent. The empirical part of the Chapter computes the dynamically updated beliefs on a sub-sample of electoral Municipalities and tests the effect of these beliefs on the re-election probability of the incumbent. The results, however, do not support the theoretical predictions.

Finally, Chapter 4 analyzes the presence of an expenditure cycle in the Italian Regions. The empirical results find a Rogoff cycle (Rogoff, 1990) driven by the distortion in investment expenditure during the period 1984-2008. The institutional innovations introduced in Italy in the mid-90s by the simultaneous fiscal and

electoral reforms affected the incentives to generate a cycle in the dataset. An analyses of the expenditure cycle in time finds a shift from a cycle in size to a possible cycle in the composition of expenditure (Drazen and Eslava, 2006). The same Chapter investigates the effect of voters' awareness on the electoral manipulation by introducing a variable measuring the local diffusion of newspapers. The results verify the prediction of a negative relationship between the share of informed voters and the cycle in capital expenditure; as expected, this relationship weakens as the Rogoff cycle decreases in time. Interestingly, the analyses of the effect of the press diffusion distinguishing the newspapers according to their news specificity shows that generic diffusion is more effective in reducing the cycle than economic diffusion, stressing the role of newly informed voters.

This study, hopefully, could give some contribution to the discussion on the link between electoral accountability and local public finance. Furthermore, it provides two original datasets to be exploited in related projects and it is a starting point for future theoretical and empirical investigation of the effect of the diffusion of information on the policy decisions and the voting behavior.

Chapter 2.

A comprehensive test of Yardstick Competition in the Italian Municipalities[1]

1. Introduction

Do fiscal decisions of incumbent mayors affect their probability of being re-elected? Do they consider the fiscal decisions of the other mayors when they face an election?

An affirmative answer to the first question, known in the literature as the "responsibility hypothesis" (Lewis-Beck and Paldam, 2000), is the logical and necessary presupposition for the analysis of the second, known as "Yardstick Competition hypothesis" (Salmon, 1987; Besley and Case, 1995; Brueckner, 2003). If voters do not include the incumbent mayors' fiscal choices in their electoral calculus, and these decisions do not affect the incumbent mayor's probability of being re-elected, mayors have no reason to look at what the neighboring colleagues are doing when they take their fiscal choices. Hence there will be no proper Yardstick Competition, at best some mimicking behavior that hinges on different motivations. Yet, in the empirical literature on Yardstick Competition this presupposition is often neglected, as many studies either draw conclusions about Yardstick Competition either without estimating this link (Elhorst and Frèret, 2008) or failing to find any empirical support for it (Bordignon et al., 2003).

[1] This Chapter has been published in the CREM-CNRS, Condorcet Center Working Paper 'From Taxes to Politics, from Politics to Taxes: Evidence of Yardstick Competition in the Italian Municipalities' (2011), coauthored with Prof. Fabio Padovano.

Here, we exploit a unique "natural experiment" offered by the Italian sample. In Italy, in 1993 the almost simultaneous introduction of the possibility for voters to directly elect their mayor and for mayors to decide the tax rate on property to finance municipal expenditures have created, for the first time, an institutional setting where inter-jurisdictional comparisons of fiscal performances became possible[2]. The analysis of the pattern of strategic interactions among municipalities in the years following this reform allows to verify how Yardstick Competition evolves in time from its very beginning.

This work contributes to this field of research by testing both the responsibility and the Yardstick Competition hypotheses on a newly assembled dataset of Italian municipalities for the 1995-2004 sample period. The time dimension allows us to relax the assumption that all variables are on their long-run equilibrium steady state, controlling for transitory departures from the equilibrium path.

The empirical strategy is organized in two steps. First, we estimate the correlation between the popularity of the mayor and his main fiscal decision. The voting decisions are modeled in a way consistent with Yardstick Competition theory, introducing the domestic tax rate, the spatial lag of the tax rate and a newly conceived variable that represents the tax difference between the domestic jurisdiction and its neighbors. By that we verify whether the responsibility hypothesis and the Yardstick Competition hypothesis represent the same process of voting decisions, which makes the two analyses directly comparable. In this respect, the new tax difference variable is especially

[2] Before 1993 in Italy mayors were selected by the national parties and local revenues consisted almost entirely of transfers from the central government. It is no accident that research on Yardstick Competition in Italy began after this reform (Brosio et al., 2007).

important, as it allows us to capture not only if two jurisdictions are becoming more or less different from each other, but also by how much. Some previous studies failed to find a link between responsibility and Yardstick Competition hypotheses because the inter-jurisdictional differences were too small to play a significant role in voters' electoral calculus. Second, we estimate a tax setting equation that distinguishes between the reaction of the domestic tax rates to the neighbors' tax rates ('spatial lag') and the spatial correlation of the unobservable variables in the error term ('spatial error'). Although the majority of the literature uses the spatial lag to estimate the spatial interaction of the tax rates, Bordignon et al. (2003) interpreted a positive spatial error coefficient as evidence of Yardstick Competition. We believe that the spatial error is a misleading indicator of tax competition because it is a compound of several unobserved factors. It includes variables relevant for Yardstick Competition, such as the mayor's competence level and the municipal cost shock, but also other unobserved, spatially correlated phenomena, such as government policies in favor of certain areas, the influence of local lobbies and so on, which affect the tax setting autonomy of the incumbent mayor. In the real world, moreover, it is more reasonable to believe that voters observe the tax rate levels and update their beliefs about the mayor's competence using observable rather than unobservable information. As a consequence, the proximity of the tax rates in the neighborhood is the relevant indicator of strategic interaction.

To anticipate the results, the analysis of the Italian municipalities shows that differences in fiscal performances among jurisdictions do affect the incumbent mayor's probability of being re-elected. These electoral concerns enable to interpret the main finding of the second step of the analysis, a statistically

significant strategic interaction among the fiscal decisions of neighboring municipalities, as proper Yardstick Competition.

The rest of the paper is organized as follows. Section 2 reviews the economic literature on the responsibility and the Yardstick Competition hypotheses. Section 3 introduces the empirical analyses, describing the methodologies adopted and the dataset. The estimation results of the vote popularity function and of the tax setting equation are presented respectively in Section 4 and Section 5. Finally, Section 6 concludes.

2. Review of the literature

Yardstick Competition has been proposed in the literature as a solution to the agency problem that arises when voters and incumbent officials have asymmetric information regarding the cost of public provision of goods and services (Besley and Case, 1995). When the cost shocks for the provision of a service are spatially correlated, voters may compare the fiscal performance in their jurisdiction with those in the neighborhood and draw information about the relative competence of their administrator. The decision to re-elect the incumbent depends on the outcome of this comparison; the fiscal decision of the incumbent in jurisdiction *i* represents the best reaction to the strategy played in the neighboring (or similar) jurisdictions *–i*. Formally, the incumbent in *i* maximizes an objective function that depends on the decisions taken in jurisdictions *-i* (Brueckner, 2003).

The Yardstick Competition model, however, supports a pooling equilibrium in fiscal decisions. There is a range of values of the cost shock for which the bad incumbent has an incentive to reduce the amount of his rent seeking activity to signal good competence to the voters. Bordignon et al. (2003) solved this signaling problem and derived the formal conditions for

successful mimicking to occur. Under equilibrium mimicking the fiscal instrument is no longer an informative signal of competence and the agency problem is not solved. In such case, the appeal of Yardstick Competition lies in limiting the rent appropriation by a bad incumbent during electoral year, rather than in the revelation of information.

The empirical literature on Yardstick Competition tested the prediction of a pooling equilibrium in tax rates in US (Besley and Case, 1995), Switzerland (Feld and Reulier, 2005), France (Dubois and Paty, 2008), Spain (Solé Ollé, 2003), Netherlands (Allers and Elhorst, 2004), Belgium (Heyndels and Vuchelen, 1998), Norway (Revelli and Tovmo, 2007), Sweden (Edmark and Agren, 2006) and Italy (Bordignon et al., 2003). Most of the empirical results, however, mix Yardstick Competition with tax competition *à la* Tiebout (1956). Both phenomena predict a reduction of tax rates for a given level of provision of public goods, but with two important differences. First, when the tax base is mobile, voters may simply relocate to jurisdictions with a better tax/services mix, thus taking advantage of the exit option (Hirschman, 1970). In this case, tax competition is predominant. Conversely, when the tax base is immobile, as is the case of the house tax rate, voters are basically left only with the voice option (Caplan, 2010). This situation reinforces the link between fiscal policy and voting decisions and the relevance of the Yardstick Competition model. Some empirical studies have also examined the strategic interactions between fiscal decisions and electoral results in samples where the fiscal instrument is rather mobile, such as the income tax rate or the business property tax (Bordignon at al., 2003; Padovano, 2008; Ermini and Santolini, 2007; Case and Rosen, 1992; Dubois et al., 2007; Buttner, 2001; Depalo and Messina, 2011), finding mostly interaction in the spatial error. The second difference is that Yardstick Competition is motivated

by popularity concerns of the incumbent, rather than by the maximization of the tax base, as in tax competition. As such, Yardstick Competition occurs in connection with electoral events and provided that voters do make inter-jurisdictional comparisons. Nonetheless, only in the last decade have scholars attempted to verify whether Yardstick Competition is supported by electoral popularity concerns[3] (Bordignon et al., 2003). Heyndels and Vuchelen (1998), Bosch and Solé-Ollé (2007) and Dubois and Paty (2010) find a significant impact of fiscal decisions on the electoral concerns of the incumbent, while Bordignon et al. (2003), in the context of the municipalities of the province of Milan, Italy, do not find evidence of a link of responsibility.

Another problem plaguing the literature is that all empirical analyses measure the popularity of the incumbent with the share of votes obtained at the elections. The same share of votes, however, can be obtained at different win margin levels; the confidence in re-election of the incumbent is therefore mis-specified and the estimates of the VPE are likely not to be robust to alternative measures of popularity. As for the impact of fiscal decisions on the incumbent's popularity, the empirical tests found that the electorally-induced incentives to mimic are stronger when the incumbent is allowed to run for re-election (Besley and Case, 1995; Bordignon et al., 2003), when the executive is backed by a large majority or enjoys a large electoral win margin (Solé-Ollé, 2007) and when the degree of local fiscal

[3] The early empirical literature estimated the effect of fiscal decisions on the re-election probability of the incumbent (Besley and Case, 1995). This variable is more generic than popularity because it does not specify the variation of the electoral support caused by a variation of the tax rate in case of re-election of the incumbent.

autonomy and electoral accountability is not higher than a fixed threshold (Schaltegger and Küttel, 2002).

The size of the datasets is another interesting variable, since scholars often choose samples of sub-national jurisdictions in an almost discretionally fashion: Bordignon et al., (2003) use 143 municipalities of the province of Milan; Ermini and Santolini (2007) consider the municipalities within the Marche Region in Italy; Solé Ollé, (2003) examines the Spanish municipalities with a population greater than 5000 inhabitants in the region surrounding Barcelona; and so on. As the Yardstick Competition is essentially a spatial phenomenon, borders of the subsample that do not coincide with the limits of the possibility for voters to make comparisons (as it may be the case when the sample is limited by national borders) may undermine the validity of the results, because some out-of-sample comparison are actually being made but are not accounted for.

Finally, the empirical literature on Yardstick Competition is heterogeneous also with respect to the econometric methods implemented. The spatial lag of the dependent variable introduces endogeneity in the tax setting equation and makes the OLS estimators biased and inconsistent and the estimate inefficient. Stemming from the work of Anselin (1988), the Yardstick Competition literature benefited from the development of the spatial econometrics research. The main innovation is the use of the simultaneous autoregressive (SAR) model, which introduces a spatially lagged dependent variable and the spatial correlation of the errors, both weighted by a matrix describing the neighborhood network among the observations. The weight matrix usually refers to geographical proximity, but it can be applied to any type of relationship, such as the socio-economic or demographic similarities. The regression models have been traditionally estimated through

Maximum Likelihood (Cliff and Ord, 1981), as in the papers of Besley and Case (1995), Revelli (2002), Bordignon et al. (2003), Delgado et al. (2011). In recent times the introduction of GMM estimation (Kelejian and Prucha, 1998; 2007) proved to be more efficient than ML, especially in large samples and more appropriate when the assumption of normality of the errors does not hold (Bartolini and Santolini, 2009). This is the model that we are going to mostly rely on in the second step of the analysis.

3. The data and the Italian municipalities' institutional setting

This work exploits an newly assembled database including all the 8101 Italian municipalities. The database is the outcome of a research project on 'Tax Competition among Italian municipalities' (Padovano, 2007), which aimed at collecting a comprehensive database of local jurisdictions in Italy. This database is an essential tool because the format of the original series has been harmonized for the first time so that they can be directly compared[4]. The time span of the dataset covers the years from 1995 to 2004. Data availability, broken down at the level of municipalities, conditions the time span for some electoral variables (before 1994) and some economic ones (beyond 2004). Moreover, as we shall see, the dependent variable was

[4] The original data, coming from different institutional sources, are highly heterogeneous: for example, the Italian Ministry of Interior (which provides the electoral and political data) and the National Statistic Institute (which collects most of the remaining information) use different numerical codifications for the municipalities, which made it extremely difficult, and sometimes altogether impossible, to compare data coming from the two sources as the sample size became large. That is the likely reason why empirical analyses about Italian municipalities rarely go beyond cross sectional analyses of a limited sample size.

introduced in 1995. Appendix A.1 provides a complete description of the dataset.

The municipalities that belong to the five special statute regions ('*Regioni a Statuto Speciale*') do not show a suitable degree of homogeneity with those of the remaining 15 regions, because of their different institutional and fiscal setting. In order to avoid comparing incomparable observation they have been excluded from the estimates[5]. The total number of cross sections is then 6695, 83% of the total of the Italian municipalities.

Italian municipalities represent a suitable environment for a joint test of the responsibility and the Yardstick Competition hypotheses. Municipalities are the lowest tier of local government in Italy, and the institutional reforms in the 1990s established a strong link of accountability between voters and local governments, especially in the domain of fiscal decisions. In 1993 the central government endowed the municipalities with the possibility to decide the house tax rate and, at the same time, allowed voters to directly elect the Mayor. In particular, fiscal decentralization at the municipal level has been implemented mainly through the introduction in 1993 of the local property tax rate (*ICI, Imposta Comunale sugli Immobili*), a tax that features a level *b* of fiscal autonomy according to the OECD tax autonomy scale[6], which ranges from *a* (the highest) to *e* (OECD, 1999). The prerequisite of the ICI is property in the form of buildings, building land, agricultural land located inside the municipal

[5] For the accuracy of the analyses also seven municipalities that do not border with anyone else (six single-municipality islands and Campione d'Italia, an *enclave* within Swiss territory) have also been removed from the estimations. However, running the regressions with their inclusion does not affect the results.

[6] The previous arrangement of Italian local finances was classified as a level *e*, as all fiscal decisions were taken by the central government.

area, regardless of their destination use. The tax base is the value of the property, set by national laws that are uniform across all jurisdictions. The Municipal Council sets the ICI tax rate with a resolution taken before the approbation of the yearly provisional budget. Each jurisdiction is free to choose the tax rate in range between 4‰ and 7‰. Although the choice range of the tax rate appears small, the large value of the tax base ensures that a marginal variation of the rate determines a consistent variation in the tax paid by the individual voter, as well as in the overall revenue. Since the tax base is fixed and the reassessment of the property value is a decision of the central government, the discretion of the mayor is reduced to one single dimension. This makes it quite easy for voters to include this information in their electoral preferences. On average, the revenues from ICI represent more than 50% of the total revenues of the municipalities revenue and cover more than 25% of local expenditures (ANCI).

In 1995 the central government has been introduced the possibility to differentiate the ICI tax rate between the 'house' tax rate, applied to the main living property of the family, and the 'business' tax rate, applied to holiday houses, offices, shops, and so on. The house ICI tax has been abolished in 2008 (Law 126/2008). In the period 1993-2007 the ICI house tax rate represented the most visible fiscal decision of Italian mayors because it is a cost that voters can directly link to the house and more than 80% of the residents in Italy are home-owner (ISTAT)[7]. As a consequence, the ICI tax rate can be considered a

[7] In 2008 70,2% of the population owned the house in which they lived, 18,3% lived in a rental and 11,5% retained the usufruct of the house or lived rent-free. Source: ISTAT, *L'abitazione delle famiglie residenti in Italia - Anno 2008*, published in Spring 2010.

relevant yardstick to compare the fiscal performance and the competence of the mayors.

The following figures illustrate the dynamics of the house ICI tax rate during the period 1995-2004. Table 1 reports the descriptive statistics for the house ICI tax rate in the period 1995-2004. The average tax rate is 5.2‰, with the highest average tax rates in the central regions of the country and the lowest in the north-eastern area. The standard deviation, on the contrary, is lower in the central area but higher in the south[8].

Table 1. Descriptive statistics, house ICI tax rate 1995-2004

	Obs	Mean (*1000)	Std	Min (*1000)	Max (*1000)
Italy	66950	5.255	0.647	3.5	7
North-east	9220	5.192	0.622	4	7
North-west	29860	5.243	0.627	3.5	7
Centre	9990	5.369	0.590	4	7
South	17880	5.244	0.712	3.5	7

Note. Italy: all the Ordinary Regions included in the following macro-areas; North-east: Veneto, Emilia Romagna; North-west: Piemonte, Lombardia, Liguria; Centre: Toscana, Marche, Lazio, Umbria; South: Abruzzo, Campania, Molise, Basilicata, Puglia, Calabria.

[8] Some municipalities in the North West and the South set a tax rate lower than the legal minimum, as they apply the provisions of a special law. These observations are only 16 (0.002% of the total dataset), referring to 7 municipalities. Their exclusion does not alter the estimates; yet, as the decision to apply a very low tax rate is a policy decision as well, we have kept them in the analysis.

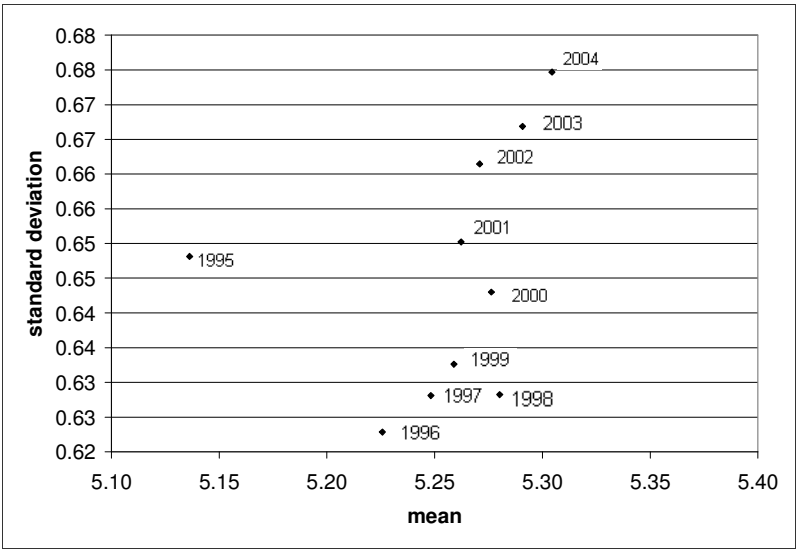
The analysis of the dynamics of the house ICI tax rate, reported in Table 2, shows an increasing but not monotonic trend in time characterized by decreasing averages in 1999 and in 2001. The maximum average value is reached in 2004, which is also associated with the highest standard deviation.

Table 2. House ICI tax rates by year, 1995-2004

	Obs	Mean	Std. Dev.	Min	Max
1995	6695	5.136	0.648	4	7
1996	6695	5.226	0.623	4	7
1997	6695	5.248	0.628	4	7
1998	6695	5.280	0.628	4	7
1999	6695	5.259	0.633	4	7
2000	6695	5.276	0.643	4	7
2001	6695	5.262	0.650	3.5	7
2002	6695	5.271	0.661	3.5	7
2003	6695	5.291	0.667	3.5	7
2004	6695	5.304	0.675	3.5	7

Graph 1 shows a positive mean-standard deviation relationship, which indicates a tendency toward greater homogeneity during the years when the tax rate is lower and to an increase in the volatility during the years in which the tax rate is higher. The initial year 1995 is an anomaly, as it likely reflects the lack of coordination of the mayors when choosing the tax rate for the first time: the mean is lower than in other years but the volatility among the municipalities is not.

Graph 1. Yearly mean-standard deviation, ICI tax rate, 1995-2004



Since mimicking is driven by popularity concerns, it is interesting to match the fiscal data with electoral and political factors. The Italian electoral system for local elections has been reformed in 1993 from proportional to majoritarian, with the explicit aim to increasing the government's accountability to voters. Since 1993 the mayor is directly elected by plurality rule in municipalities with less than 15000 inhabitants (less than 10% of the total number) and by majority rule with runoff elections in municipalities with more than 15000 inhabitants. The legislature lasts five years and the term limit is fixed to two mandates. In case of motion of no confidence both the mayor and the council must resign and new elections are held. This provision has produced a significant dispersion of the years when Italian municipalities hold elections. Table 3 shows a concentration of local elections in 1995, 1999 and 2004. In the rest of the paper

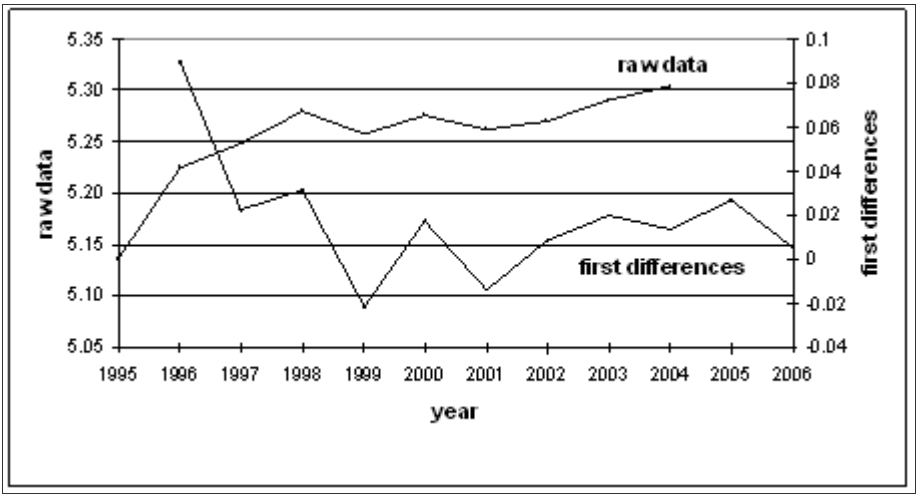
these three years are called 'first order electoral years', while 1997 and 2001 are called 'second order electoral years'.

Table 3. Number of electoral Municipalities by year

	Obs.	% Electoral Obs.
1995	4667	69.7
1996	246	3.7
1997	1243	18.6
1998	535	8.0
1999	4308	64.3
2000	315	4.7
2001	1062	15.9
2002	680	10.2
2003	300	4.5
2004	4054	60.5

According to rational political budget cycle models (Rogoff, 1990), when an election approaches the mayor wishes to signal its competence to the voters by either increasing the public expenditure or decreasing the tax rate. Graph 2 confirms that in 1999, the second 'first order' electoral year in the dataset, the variation of the local property tax rate is negative. A negative variation is registered in 2001 also, which is a 'second order' electoral year, and although in 1997 the variation is positive its magnitude is less than half than in 1996. The positive variation in 2004 is unexpected: although it is a local minimum point the magnitude is positive and not significantly different from the variation in 2003.

Graph 2. Average yearly ICI tax rate, 1995-2004.



The expenditure of the municipalities finances goods and services for the local community, mainly administrative costs, public transportation, services for the youngsters and the elderly, police. In 1999 the budget design has been constrained by the introduction of the Domestic Stability Pact, which reduced local expenditure and imposes a balanced budget (Bartolini and Santolini, 2009). Local tax rates and local expenditures levels are set simultaneously, so that the introduction of the local expenditure in the tax setting equation would create an obvious endogeneity problem. Furthermore, data on the local budget sheets are not available before 1999; henceforth the differences in observed expenditure levels are mainly driven by differences in the amount of grants per capita received (correlation = 0.71). Their consideration ensures that the level of expenditure is controlled for in the estimates[9].

[9] The quality of the public expenditures, which provide another dimension to identify the good from the bad incumbents cannot be used in empirical

4. The empirical strategy and the first stage of the analysis: the vote popularity equation

4.1. Empirical strategy.

A complete test of Yardstick Competition must detect strategic interaction in local tax setting once political consequences of tax setting have already been confirmed. In other words, the responsibility hypothesis must be confirmed to hold in the sample, before one can test for Yardstick Competition in the same sample. We thus organize the empirical strategy in the following two steps:

1. We estimate a vote popularity function to test the responsibility hypotheses;
2. We estimates a local tax setting equation to analyze the determinants of tax decisions and the presence of strategic interaction in the data.

4.2. The vote-popularity equation

The VPE estimated in this work takes the form:

[1] $P_{it} = \beta X_{it} + v_{it}$

The dependent variable P_{it} represents the electoral popularity of the mayor measured as the local win margin in jurisdiction i at time t. The choice between levels or differences is crucial in the estimation when the constant term and the trend change over

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analysis first because the available data cannot properly identify it; second, even distinguishing between a 'responsive' and an 'excessive' share of expenditures would make the signal related to the tax rate uninformative (Bordignon and Minelli, 2001). Hence the model assumes homogeneity in the quality of public goods and services provided.

time (Paldam and Nannestad, 1994). Since we deal with a panel dataset, we choose the specification in differences to control for the unobserved heterogeneity. The robustness of the results is tested in a subsequent set of regressions that adopts the share of votes obtained by the winner as an alternative measure of vote popularity.

The covariates included in the vector X represent both political and fiscal controls. The time lag of the share of votes (*popularity_lag*) controls for an eventual persistent shock or the presence of an autoregressive process in the popularity of the elected mayors. A dummy for the mayor re-running for election (*rerun*) is introduced in the empirical specification to test the fit of the 'cost of ruling' hypotheses (Paldam and Nannestad, 1994) versus the 'incumbency advantage' (Lowry et al., 1998). An incumbent running for a second term has in fact an advantage in terms of efficiency in office, but he may experience an erosion of the electoral popularity in case of unpopular decisions taken during the first term of office that lead voters to prefer a challenger to the incumbent. Because of these contrasting hypotheses, the expected sign of the *rerun* coefficient is uncertain. During the period 1995-2004 left wing and right wing coalitions have been alternately in and out of power at the national level in Italy, and a dummy for the ideological alignment of the local executive with the central government partnership (*alignment*) is included to control for the 'alignment effect' (Arulampalam et al., 2009).

As it is standard in the literature, we control for indicators of the state of the economy, chiefly the (provincial) rate of unemployment, which is commonly used in the literature for this purpose (Paldam and Nannestad, 1994). Inflation, being a national phenomenon, has been left out of the analysis.

The coefficient associated to the house property tax rate (*HICI*), which is one of the key variables in the equation, is expected to show a negative sign: an increase in the tax rate lowers the utility of the voters and reduces the electoral support of the mayor. This variable poses the main methodological issue in the estimation of the VPE. The tax rate is suspected to suffer from endogeneity caused by the reverse causality between the policy decisions and the vote decisions (Paldam, 1997): while voters choose a candidate on the basis of his economic performance, the incumbent takes fiscal decisions on the basis of his popularity. Following this reasoning, the incumbent decreases the tax rate to seek for votes when he feels unsecure about his re-election. This methodological problem has been solved in the literature through a instrumental variable estimation. Revelli (2002) proposed an alternative solution by estimating a Arellano and Bond (1991) type of GMM regression of the VPE, which uses as instruments the tax rate with the values of the endogenous tax variables lagged at least two periods. The most recent contribution comes from Aidt et al. (2011); they use a system of two simultaneous equations, a local expenditure and a VPE, estimated through GMM.

The structure of the electoral dataset used does not allow to calculate a sufficient number of lags for all the units, therefore the endogeneity problem has been tackled by a 2SLS regression. Specifically, the local tax rate has been instrumented with the fitted values and the residuals from an OLS tax setting equation. The tax setting equation is specified as in Equation 2:

[2] $tax_{it} = \beta' Z_{it} + u_{it}$

The fitted values of the tax setting equation are the linear combination of the variables correlated with the tax rate but not with popularity (e.g. population). The residuals include unobserved factors, like the combination of the cost shock and

the competency level, which are likely to be uncorrelated with the popularity, since the cost shock is random and the competency level is specific to the incumbent.

To verify the coherence between the responsibility hypothesis and the Yardstick Competition hypothesis it is important to check that the popularity of the incumbent major is affected by the process of inter-jurisdictional comparisons that the Yardstick Competition model describes. The VPE must therefore include the variables foreseen by the Yardstick Competition model. This assumes, first, that the neighboring tax rate (*HICI_neighbors*) should affect popularity. This variable is the spatial lag of the house tax rates; in the literature, a positive coefficient has been taken as evidence of comparison among jurisdictions performances. Here an increase in the tax rate of the neighbors is assumed to increase the popularity of the domestic incumbent. This fiscal variable may be endogenous, although it proved to be exogenous in other studies (Bosch and Solé Ollé, 2007). In the empirical analyses the fitted values and the residuals of a neighboring tax setting equation are used as instruments for it.

Finally, this work introduces a new variable, the difference from the tax rate in the neighbors (*tax difference*). The tax difference is the difference between the house tax rate in the domestic jurisdiction and the average house tax rate in the neighboring jurisdictions. The reasons to introduce this new variable are twofold. First, in the literature the domestic and the neighbors' tax rates are introduced separately and are therefore associated with two different coefficients. In the real world, however, it is reasonable to believe that voters do not consider the variation of the single tax rates separately, but they evaluate the outcome of both variations. An increase of the domestic tax rate is associated to a decrease of the electoral popularity only if the average tax rate in the neighborhood remains constant or decreases,

increasing the gap between the tax rate levels. Similarly, an increase of the neighbors' tax rate is associated to an increase of the electoral popularity of the domestic incumbent only if he does not increase the tax rate of the same proportion. Second, the separate variations of the domestic and the neighboring tax rates may result in a quantitatively small difference, too small to be relevant for the voters' electoral calculus. This might be a reason why some studies fail to find a correlation between inter-jurisdictional comparisons and mayors' probabilities of being reelected. The explicit consideration of the tax difference variable in the VPE allows to verify whether comparisons become electorally relevant only beyond a certain threshold. For these reasons the tax difference variable is consistent with the theory of Yardstick Competition and is more appropriate to estimate the inter-jurisdictional fiscal comparisons of the voters. The expected sign of this coefficient is negative, because the larger the tax difference, the lower the popularity of the incumbent.

The VPE is estimated on the subset of electoral observations extracted by the dataset on the Italian municipalities. The dataset for the VPE includes observations referring to the years 1996-2004. The year 1995 has been dropped to obtain the lagged value of the dependent variable. Unobserved heterogeneity is controlled by including the first differences of the variables. Table A.2 in the Appendix shows the descriptive statistics of the explanatory variables and table A.3 reports the correlation matrix of the explanatory variables; the pair wise correlation of the covariates is never too large, ruling out collinearity concerns.

Table 4. Vote popularity equation, expected signs of the coefficients

Variable	Definition	Expected sign
Popularity lag	Lagged share of popularity (ln)	?
Rerun	Incumbent running for re-election dummy	?
Alignment	Alignment with central government dummy	+
Unemployment	Provincial unemployment rate (ln)	-
HICI	Domestic house ICI tax rate (ln)	-
HICI_neighbors	Spatial lag of house ICI tax rate (ln)	+
Tax difference	Difference between domestic house tax rate and neighbors' house tax rate	+

4.3. Vote popularity estimation: the results

Table 5 shows the results of the second stage of the vote popularity estimation[10]. Five models have been estimated, differing among each other with respect of the specification of the endogenous variable and the instrument used to correct endogeneity. Specifically, Model 1 and Model 3 assume only the domestic tax rate as endogenous, but in Model 1 the domestic tax rate is instrumented with its own domestic fitted and residual values, while in Model 3 it is instrumented with the fitted and residual values of both the own and the neighbors' tax rates. Model 2 assumes also the neighbors' tax rate as endogenous, and implements the whole set of instruments. To improve the specification of the VPE, models 4-5 introduce the tax difference variable, instrumented, respectively, with only the domestic instruments and all the available instruments

[10] The first stage regression is reported in Appendix A.4.

Table 5. Vote popularity function, instrumental variable estimation

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p
Δ popularity lag	-0.195	***	-0.195	***	-0.194	***	-0.194	***	-0.193	***
Δ rerun	0.445	***	0.444	***	0.444	***	0.448	***	0.449	***
Δ alignment	0.059	**	0.059	**	0.059	**	0.068	**	0.068	**
Δ HICI	-0.470	**	-0.467	**	-0.469	**				
Δ HICI_neighbors	-0.899	**	-0.944	*	-0.899	**				
Δ unemployment	-0.194	***	-0.194	***	-0.193	***	-0.182	**	-0.183	**
Δ tax difference							-0.549	**	-0.240	
Constant	0.009		0.009		0.009		0.004		0.004	
Obs	5793		5793		5793		5793		5793	
R2	0.138		0.138		0.138		0.136		0.137	
Anderson canon. Corr. LR statistic	70000	***	5314	***	70000	***	8943	***	71000	***
Hansen J statistic	0.901		0.901		0.913		0.924		9.445	**
Endogenous regressors	HICI		HICI, HICI_neigh		HICI		Tax difference		Tax difference	
IV	domestic		All		All		All		All	

*Notes: dependent variable first difference of natural log of local win margin. Significance levels: *10%, **5%,***1%.*

The dependent variable is the local win margin, computed as the difference between the share of votes obtained by the winner and the share of votes obtained by his/her first opponent. The win margin is considered a more appropriate measure of popularity than the share of votes obtained by the mayor, the variable commonly used in the literature. The larger the win margin, the larger the confidence in re-election of the incumbent.

In the first step both the Anderson and the Cragg-Donald tests reject under-identification in all the models. However, the Sargan test for over-identifying restrictions rejects a correct specification of Model 5. Moreover, in Model 2 and Model 3 some excluded instruments are not statistically significant. The Pagan- Hall test rejects homoskedasticity in all the regressions, suggesting to use the GMM efficient option of the IV estimation.

The Hansen J statistic in Table 5 confirms the results from the Sargan test in the first stage regressions. In fact, Model 5 is over-identified. The fit of the models is about 0.14, and the coefficients of the non fiscal variables are stable over the models and verify the theoretical predictions. The negative coefficient of the lagged share of votes can be taken as evidence of an increase of the electoral competition in time, since the share of votes obtained by the winners are reduced. The dummy variable *rerun* estimates the impact on popularity of running for re-election. The results are in favor of the 'incumbency advantage', since the incumbent who runs for re-election gains about 4.4% of the popularity. The alignment effect is always positive and significant, confirming the electoral advantage of belonging to the same party of the central government. The unemployment rate is negative as expected, consistent with the hypotheses that voters punish the government for bad economic outcomes.

Modes 1-3 confirm the negative impact of a variation of the domestic tax rate, but the signs of the spatial lag of the tax rate are unexpectedly negative and significant, showing coefficients almost double than the domestic tax rate coefficients. This over-reaction of the incumbents' popularity to the neighbors' fiscal decisions – measured according to the standard practices in the literature - is difficult to interpret and is at odds with the theoretical prediction. On the contrary, when the tax difference is introduced (Model 4), the coefficient is negative and significant as expected, suggesting that a marginal increase in the difference generates a 54.9% decrease in the local win margin.

We have checked the robustness of these results by estimating a second set of VPEs, using as dependent variable the share of votes obtained by the winner candidate. The results from the first stage regression, presented in Appendix A.5, mirror the results obtained with the previous definition of popularity. The R^2 show very high fit of the models, always above 0.6, and a highly significant F statistic. Both the Anderson and the Cragg-Donald tests reject under-identification in all the models, and the Sargan test for over-identifying restrictions rejects a correct specification of Model 5. In Model 2 and Model 3 some excluded instruments are still not statistically significant. However, the Pagan-Hall test fails to reject homoskedasticity in all the regressions.

The results of the second stage regression, presented in Table 6, are very similar to the results of Table 5, both in terms of test significance and the signs of the coefficients obtained. However, the fit of the models increases to about 0.24, and the unemployment variable loses significance. The spatial lag of the tax rate is still negative but shows coefficients similar to the domestic tax rate coefficients. The coefficient associated to the tax difference in Model 4, finally, is negative and significant as

expected, suggesting that a marginal increase in the tax difference generates a 9.5% decrease in the share of votes obtained by the incumbent.

Table 6. Vote popularity function, robustness check, instrumental variable estimation

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p
Δ popularity lag	-0.437	***	-0.437	***	-0.437	***	-0.437	***	-0.436	***
Δ rerun	0.043	***	0.043	***	0.043	***	0.044	***	0.044	***
Δ alignment	0.005	*	0.005	*	0.005	*	0.006	*	0.006	*
Δ HICI	-0.085	***	-0.085	***	-0.085	***				
Δ HICI_neighbors	-0.085	**	-0.075		-0.085	**				
Δ unemployment	-0.006		-0.006		-0.006		-0.005		-0.005	
Δ tax difference							-0.095	***	-0.056	***
Constant	0.002		0.002		0.002		0.001		0.003	
Obs	6355		6355		6355		6355		6355	
R2	0.245		0.245		0.245		0.243		0.244	
Anderson canon. Corr. LR statistic	15000	***	5919	***	15000	***	8293	***	16000	***
Hansen J statistic	0.434		0.433		0.508		0.408		13.006	***
Endogenous regressors	HICI		HICI, HICI_neigh		HICI		Tax difference		Tax difference	
IV	domestic		all		All		domestic		All	

*Notes: dependent variable first difference of natural log of share of votes. Significance levels: *10%, **5%,***1%.*

As a general conclusion to the VPE estimation, the predictions of the theory are verified in the sample of the Italian municipalities. The findings show the expected correlation between the electoral popularity and the fiscal decisions of the mayor. Even more important for our purposes, the comparison of the neighboring jurisdictions' performances and not simply the levels of the domestic tax rates affect the voters' decisions whether to reelect the incumbent. In particular, an increase of the domestic tax rate significantly reduces the popularity of the incumbent, but an increase in the spatial lag of the tax rate does not increase his/her popularity, because the domestic tax rate may still be above the average level in the neighborhood. All in all, the responsibility hypothesis holds and voters seem to apply the electoral strategy described in the Yardstick Competition hypothesis. It is to its verification that we now turn.

5. The second stage of the analysis: the tax setting equation

5.1. Model specification

The spatial estimation follows the linear regression panel data model of Kapoor, Kelejian and Prucha (2007). Each observation $i=1,\ldots,N$ is observed for $t=1,\ldots,T$ periods. Data are generated according to the following process:

[3] $$tax_{it} = \beta' Z_{it} + u_{it}$$

where tax_{it} denotes the Nx1 vector of observations on the dependent variable in period t, Z_{it} denotes the NxK matrix of observations on exogenous regressors in period t, β' is the corresponding Kx1 vector of regression parameters, and u_{it} denotes the Nx1 vector of disturbance terms. The intercept is assumed to be included in the Zs. The disturbances are assumed to be both correlated over time and across spatial units, as well

as heteroskedastic; moreover, they follow a Cliff and Ord first order spatial autoregressive process (Cliff and Ord, 1981):

[4] $u_{it} = \rho W_i u_{it} + \varepsilon_t$

where $0<\rho<1$ is the spatial autoregressive coefficient, W_i is an NxN weighting matrix of known time independent constants whose diagonal elements are zero and the matrix (I- ρW_i) is assumed to be non singular. Finally, ε is an Nx1 vector of innovations following a one-way error component model grouped by time periods:

[5] $\varepsilon_{it,N} = \mu_{i,N} + \nu_{it,N}$

where $\mu_{i,N}$ is the vector of unit specific error components and $\nu_{it,N}$ is the vector of error components varying over both the cross-sectional units and the time periods. By assumption the error components are independent and identically distributed with mean zero and constant variance and they are independent to each other. In the proposed methodology ρ and the variance components terms $\mu_{i,N}$ and $\nu_{it,N}$ are estimated through GMM, then the vector of parameters is estimated through GLS. The theoretical contribution of Kapoor, Kelejian and Prucha (2007) applies to random effects panel models, but the same procedure has been applied to fixed effects panel models by estimating an OLS on the within transformation and subsequently performing GMM on the OLS residuals. This approach allows the introduction of a lagged dependent variable on the right hand side of the tax equation, which has been introduced to test for the significance of the spatial lag source of correlation.

Neighborhood is here specified as geographical proximity: the matrix of contiguity defines two jurisdictions as neighbors if they share at least one border. This specification presupposes that it is easier to share information with near jurisdictions than further ones. For example, the spread of news through local social

networks as families, workers commuting in the region, political groups, and action of the local press stimulate an intense but short-range information spillover. Many alternative specifications of the weight matrix to identify the yardstick competitors have been suggested by the literature, based on income, population, or other socio-economic indicators. Previous works (Bordignon et al., 2003; Solé Ollé, 2003) verify the universal suitability of the contiguity matrix, while the performance of alternative matrices has been proved to be specific to the tax rate analyzed. As a robustness check, we will use also a geographical distance weight matrix.

5.2. Independent variables

The vector of covariates Z includes fiscal, socio-demographic, political and electoral variables. Intergovernmental transfers are one of the main sources of revenues for Italian municipalities (about 45% of total revenue). This variable measures nominal values of transfers coming from the five funds created with D.Lgs.504/92, divided into current and investment grants. An increase in the amount of per capita transfers from the central government (*grants*) may be followed by a tax reduction or by an increase in the total expenditure, known in the literature as the 'flypaper effect' (Hines and Thaler, 1995). The rate of substitution between autonomous and non autonomous resources is not clear, therefore there is no prior on the sign of this coefficient.

In 1999 a normative instrument was introduced to constrain the municipal budget deficits, the Domestic Stability Pact (*DSP*). The entry requirements are modified on a yearly basis according to population size, and the Municipalities included in the Pact must follow its guidelines. This budget constraint are supposed to reduce local expenditures (Bartolini and Santolini, 2009) with a

consequent reduction of the revenues needed to finance expenditures. Other things being equal, the correlation between the *DSP* dummy and the dependent variable should be negative.

GDP per capita proxies the citizen's ability to pay, and it is expected to be positively correlated with the dependent variable. It refers to the provincial GDP real per capita in millions of euro. GDP data are expressed at 'market prices', adding the VAT revenue and other indirect production taxes revenue (net of central government grants) to the value added.

The demand for public provision is dependent on the size of the population (*pop*) and the size of the jurisdiction's territory (*area*)[11]. The composition of the population is a relevant issue in the tax setting decision because local governments are usually responsible for most of the services designed for youngsters and elderly people, like childcare and leisure centers. To capture this we use the dependency ratio (*depratio*), the ratio between youngsters and elderly over adult population. These geo-demographic variables have been included among the covariates, although the predicted sign of their coefficients is ambiguous, since it depends on the extent to which they show economies of scale (negative sign) or not (positive sign).

A qualitative binary variable has been included to control for the demand for public services coming from the non-resident population, the tourists (*touristic*). Data come from the *ACI-CENSIS* report of 2001, where touristic municipalities are defined as such by the presence of sea, mountain or artistic and cultural amenities. Touristic municipalities are 3123 (38% of the total). The predicted effect on the dependent variable is negative,

[11] Surface area is measured in hm^2. Data are available until 2001 by the census; from 2002 on, data have been adjourned with yearly territorial changes.

because the demand for holidays houses in many Italian touristic destinations may be quite price inelastic. In such a case demand for houses expressed by outsiders increases even though the business tax rate is relatively high, which gives the mayor the possibility to compensate residents with a lower house tax rate. The provincial capital dummy (*provcap*) has also been included to control for the effect of being a provincial capital jurisdiction. Provincial capitals are usually richer than other cities, and although the correlation coefficient between this dummy and GDP per capita is very low and negative (-0.01), a positive sign is expected since they can, in principle, count on a larger tax base.

The number of neighbors (*n_neighbors*) should directly capture interactions in fiscal decisions: the higher the number of neighbors, the greater the flow of inter-jurisdictional information and the stronger the constraint on the incumbent's tax setting decision. Following this reasoning, the expected sign of this coefficient is negative. Special attention is paid to the jurisdictions on the coast. First, given the geography of the Italian peninsula, many municipalities border with the sea. As the sea is an useless neighbor in terms of comparisons of fiscal performance, the information flow may slow down in coastal municipalities, supporting the expectation of a positive coefficient associated to the *coast* dummy. The coefficient of the local union dummy (*union*) is included in the estimation to control for the effect of agglomerations of jurisdictions (Ermini and Santolini, 2007). The members of a local union may exploit inter-jurisdictional economies of scale (a negative correlation) but they may also collude reducing the variance of the tax rate in the neighborhood (a positive correlation). The five macro-area dummies defined by ISTAT (named *north-west*, *north-east*, *center*, *south* and *islands*) have been included to control for the regional heterogeneity due to geographical affiliation of the local

governments. Finally, time dummies control for the effect of yearly shocks to the dependent variable.

The introduction of a binary variable, *elec_year*, captures the electoral cycle in tax setting. The expected sign decisions is negative, as incumbents are expected to reduce tax rates when elections are approaching (Rogoff, 1990). It is assumed that year is assumed to be an electoral one if the first ballot takes place in the last six months of the year or the first six months of the following year. In other words, value '1' signals that a local executive election has taken place between 01/07 and 31/12 of the current year, or between the 1/01 and 30/06 of the following year. The timeline of the approval of the municipal budget motivates this specification of the electoral dummy variable, which takes place at the very end of the year and may last until the first three months of the following year. This process may influence the citizen's beliefs in case they are called to vote in a early months of the year. Of course, the election date is exogenously given and decided before the tax rate is chosen.

The electoral status of the mayor is a relevant factor in determining the tax setting because, if the incumbent is term limited, he will not find it worthwhile mimic the "good neighbor incumbent" (Besley and Case, 1995; Bordignon et al., 2003). To account for that, we introduce a dummy (*term limit*) that takes the value of 1 if the mayor is elected for the second consecutive term, with a predicted positive sign. The interaction term between the electoral dummy and the term limit dummy (*elec_tl*) captures the fiscal behavior of the incumbent during the electoral year. Yardstick Competition predicts that term limited incumbents set higher tax rates than non term limited incumbents; the coefficient associated to the interaction term is again positive.

Several dummies referring to the partisanship of the executive have been included to control for the ideological affiliation of the incumbent. Since left-wing mayors (*left wing*) allegedly should spend more for redistributive policies than their right parties colleagues (*right wing*), the coefficient of this variable is expected to be positive (Alesina and Rosenthal, 1995); and vice versa, for right mayors. The local lists (*local list*) are generally ideologically neutral, and are usually municipality-specific. They focus their policy platforms on a single dimension, such as the utmost importance of municipal issues or the support to the electoral program of a local charismatic leader. They are a quantitatively relevant phenomenon, as 37% of the observations in the panel dataset are governed by a civic list executive. Previous studies either did not include this variable or handled this problem poorly, either by associating all local lists with left wing parties or by splitting them evenly between the two coalitions. We treat them as they are, i.e., as separate lists from those associated with the national parties.

Table A.6 in the Appendix shows the descriptive statistics and table A.7 reports the correlation matrix of the explanatory variables; the pair wise correlation of the covariates is never too large, ruling out collinearity issues. Table 7 below reassumes the expected signs of the coefficients.

Table 7. Tax setting equation, expected signs of the coefficients

Variable	Definition	Expected sign
BICI lag	ICI business tax rate lagged one period	+
Grants	Transfers from the central government	?
Area	Surface area	?
Pop	Population	?
Depratio	Dependency ratio	?
Touristic	Touristic dummy	-
GDP per capita	GDP per capita	+
Right wing	Partisanship of executive dummies	-
Left wing	Partisanship of executive dummies	+
Center wing	Partisanship of executive dummies	?
Local list	Partisanship of executive dummies	?
Elec_year	Electoral year dummy	-
Term limit	Term limit dummy	+
Elec_tl	Elec_year * Term limit	+
Union	Union dummy	?
DSP	Domestic Stability Pact dummy	-
N_neighbors	Number of neighbors	-
Provcap	Province capital dummy	+
Coast	Coast dummy	+

5.3. Tax setting equation: results

The spatial correlation among the observed units is inherent to the theoretical model of Yardstick Competition, where the mimicking behavior of the bad incumbent during the electoral year increases the correlation among the tax rates of the neighboring jurisdictions. The presence of spatial correlation in the data has been tested through the Lagrange Multiplier tests for panel datasets (Elhorst, 2010)[12]. The four LM statistics test the null hypotheses of a non significant spatial lag (spatial error), both unconditional and conditional on the presence of the other source of spatial correlation. The results are presented in Table 8[13].

As a robustness check, the Italian dataset has been splitted into the five macro-areas and the LM tests have been computed on each macro-area. The smaller dimension of these dataset allow the implementation of a geographic distance matrix, to verify the robustness of the results on different geographical areas of the country[14]. Specifically, while the contiguity matrix considers all the bordering jurisdictions as neighbors, the distance weight matrix used here considers only the 5 closest jurisdictions estimated at the level of the respective centers[15]. The results from

[12] The LM tests have been computed using *Matlab*, version 2007b. The author thanks Prof. Elhorst for the code's correction for the large sample size.

[13] The spatial correlation is usually tested by means of the cross-sectional Moran test (Moran, 1950). Since the Moran test is a cross-sectional statistics and it does not distinguish the spatial lag from the spatial error correlation, it is not appropriate as a foundation of this analyses. Nonetheless the Moran I has been computed as a robustness check and the results, presented in Appendix A.8, are consistent with the LM test results.

[14] The weight matrices have been built using the software *R, version 2.11*.

[15] The choice of the 5 k-nearest neighbors is motivated by the fact that the average number of neighbors in Italy is between 5 and 6.

Table 8 suggest that in the Italian dataset the absence of spatial error correlation cannot be rejected and a spatial regression analyses is appropriate. The results, as the disaggregation in macro-areas suggest, are sensible to the definition of neighborhood used.

Table 8. LM tests of spatial correlation on the panel dataset

		Contiguity weight matrix									
	Null Hypotheses	ITALY		N-West		N-Eeast		Center		South	
LM spatial lag	spatial lag coeff not significant	2890.48	***	569.29	***	326.18	***	338.42	***	320.28	***
LM spatial error	spatial error coeff not significant	2874.83	***	563.77	***	318.15	***	335.27	***	317.86	***
	spatial lag coeff not significant	27.97	***	15.48	***	18.18	***	5.75	**	4.70	**
robust LM spatial lag	conditional on spatial lag										
	spatial error coeff not significant	12.32	***	9.96	***	10.15	***	2.60	ns	2.28	ns
robust LM spatial error	conditional on spatial error										
		Distance weight matrix									
	Null Hypotheses	ITALY		N-West		N-East		Center		South	
LM spatial lag	spatial lag coeff not significant	na		204.38	***	167.87	***	327.28	***	251.57	***
LM spatial error	spatial error coeff not significant	na		203.37	***	179.88	***	322.90	***	247.30	***
	spatial lag coeff not significant	na		3.05	*	1.83		10.84	***	12.88	***
robust LM spatial lag	conditional on spatial lag										
	spatial error coeff not significant	na		2.05		13.84	***	6.47	**	8.61	***
robust LM spatial error	conditional on spatial error										

Note: test based on space-time fixed effects regression on the panel 1996-2004

Table 9 shows the results of the tax setting estimations[16]. The models presented are different in terms of the distinction between non spatial estimations (Model 1-3) and spatial estimations (Model 4 and 5).

[16] Regressions are run using *R* version 2.11, package *splm.*

Table 9. Estimation of the tax setting equation

Model:	1: OLS		2: Random Effects		3: Fixed Effects		4: Spatial Random Eff.		5: Spatial Fixed Eff.	
BICI lag	0.584	***	0.298	***	0.219	***	0.286	***	0.226	***
Grants	0.001	***	0.0004	***	0.0004	***	0.0005	***	0.0003	***
Area	0.001		0.0002		0.017	***	0.004	**	-0.003	
Pop	-0.014	***	-0.015	***	0.003		-0.014	***	-0.003	
Depratio	0.025	***	0.009	**	-0.006		0.005	.	-0.0003	
Tur	-0.010	***	-0.004				-0.005	*		
GDP per capita	-0.019	***	0.008	**	-0.024	***	-0.026	***	0.006	.
Left wing	-0.003	**	0.002		0.003	*	0.001		0.001	
Right wing	-0.007	***	-0.007	***	-0.009	***	-0.012	***	-0.007	***
Local list	0.003	*	0.003	**	0.001		-0.002		0.002	.
Elec_year	-0.008	***	-0.006	***	-0.004	***	-0.005	***	-0.006	***
Term limit	-0.001		-0.003	***	-0.004	***	-0.005	***	-0.004	***
Elec*tl	0.005		0.003	*	-0.0003		-0.0002		0.003	*
Union	0.012	***	0.005	***	0.001		0.0001		0.003	*
Dsp	-0.027	***	-0.024	***	-0.009	***	-0.011	***	-0.021	***

Table 9. Estimation of the tax setting equation (continued)

N_neighbors	0.0004		0.001				-0.001			
Provcap	0.003		0.012				0.012			
Coast	-0.034	***	-0.017	***			-0.023	***		
North-west	-0.009	***	-0.017	***						
Nort-east	-0.009	**	-0.013	***						
Center	-0.010	***	0.002							
Time dummies	yes		yes		no		no		no	
Constant	-1.880	***	-3.639	***	-4.042	***	-2.979	***		
Spatial lag							0.083	***	0.280	***
Spatial error							0.225		-0.160	
Observations	60255		60255		60255		60255		60255	
R-squared	0.377									
within			0.081		0.080					
between			0.443		0.201					
overall			0.350		0.171					
Hausman test p-value					0.000					

*Notes: dependent variable natural log of ICI house tax rate, continuous variables in log. 6695 observations per year. Robust estimations. Significance levels: *10%, **5%,***1%.*

Model 1 is obtained through an OLS estimation, Model 2 and 3 are the results from static non spatial panel estimations, and Model 4 and 5 are the results from static spatial estimations. Among them only Model 5 considers both the unobserved heterogeneity in the error term and the endogeneity caused by the spatial correlation of the observations. However, Model 1 has been used to test for the presence of heteroskedasticity and the normality of the residuals (post-estimation tests reject both homoskedasticity[17] and the normality of the residuals[18]). The Hausman test comparing Model 2 and Model 3 gives mixed results[19] consistent with the presence of a non linear relationship between the error variances and the covariates, as the pattern of spatial dependence suspected in the data. Models 4 and 5 give unbiased and consistent coefficients. The choice between fixed and random effect is based upon the considerations that the Italian dataset includes observations belonging to a closed geographical area, a case in which the fixed effect approach is suggested by the spatial literature (see Arbia et al., 2005). The econometric specification, moreover, includes both time fixed and space fixed effects, for example the region-based dummies for macro-areas, province capital, coast, and so on. The coefficients of Model 4 are therefore less reliable than those of Model 5, but they have included in Table 9 for the sake of completeness.

The results of the estimation of Model 5 verify the theoretical predictions. The socio-demographic variables are not significant, probably because of their limited variance in time, while the GDP per capita is associated with the expected significant and

[17] Breusch-Pagan studentized test value =4569.438, df = 29, p=0.

[18] Jarque-Bera X^2 = 12236.44, df = 2, p=0.

[19] Hausman test: X^2=3547.16, Prob>X^2=0; Breusch-Pagan test X^2 (1) = 92509.95, Prob > X^2 = 0.

positive sign. The coefficient for right wing government is significantly negative; also the other political variables show the expected sign. In particular, the interaction term *elec*tl* confirms that term limited ones set higher taxes than non term limited incumbents before elections. This result is one of the main predictions of Yardstick Competition theory because incumbents allowed to run for re-election are associated with lower tax rates. This result reinforces the verification of the responsibility hypotheses, showing that tax decisions are consistent with the prediction of the vote popularity estimation.

Although the spatial coefficients from Model 5 show opposite signs, their interpretation does not contradict the Yardstick Competition hypotheses. First, the positive and significant spatial lag coefficient is in line with the literature (Brueckner, 2003). Secondly, the coefficients associated to the electoral dummy and the interaction term *elec*tl* are consistent with a pattern of Yardstick Competition. Third, as already explained in the literature review, the error coefficient includes unobserved variables that go beyond the Yardstick Competition theory and cannot be disentangled from the cost shock and the competence of the incumbent. The negative coefficient (spatial error = -0.16), thus, may be driven by factors impossible to measure that determine unpredictable effects. Some examples include regulatory interventions of the central government or the regional government, as special law provisions to face the risk of bailing out frequent in the Italian dataset (Bordignon and Turati, 2003), or the power of the system of local political patronage (Golden, 2000)[20]. The asymmetric information problem in the

[20] Being the spatial error coefficient an average effect over the whole dataset, the role of the outliers in determining the negative sign of the coefficient cannot be excluded but unfortunately they cannot be empirically detected and excluded from the analyses.

dataset is therefore more complex and severe than the economic model predicts.

The results of the analyses show that the domestic tax rate is positively correlated with the average tax rate in the neighborhood. The positive coefficient (spatial lag = 0.28) suggests that an increase of the average tax rate in the bordering municipalities is associated with a one-third increase of the domestic tax rate. This coefficient does not give insights on the variation of the tax difference, as it that depends on the sign of the difference. If difference was positive, a positive spatial lag increases it; if difference is negative, a positive spatial lag decreases it.

A set of spatial panel regressions have been estimated on the subsamples of the five macro-areas to control for the dynamics of the spatial coefficients in different geographical areas, using alternatively the contiguity and the distance weight matrix. Table 10 reports the results; they roughly confirm the pattern of interaction already found at the national level. The spatial lag is always positive and significant in the Northwest, in the Northeast when using the contiguity matrix and in the South when using the distance matrix is used. The spatial error coefficient is negative and significant when using the contiguity matrix and the South dataset associated to the distance weight matrix[21]; it is positive in north-eastern and central subsamples when the distance matrix is used. As a conclusion, these estimates suggest that the average national pattern of spatial correlation in the whole time period is determined mainly by the interaction among the Northern Municipalities.

[21] The significance of the spatial error coefficient refers to the p-value of the LM robust spatial error coefficient in Table 8.

Table 10. Tax setting equation, robustness check, spatial panel regression with time and space fixed effects

	Northwest				Northeast				Center				South			
	Cont		Dist		Cont		Dist		Cont		Dist		Cont		Dist	
BICI lag	0.163	***	0.174	***	0.156	***	0.161	***	0.193	***	0.194	***	0.346	***	0.346	***
Grants	0.000	**	0.000	**	0.001		0.001		0.001	**	0.001	**	0.000	.	0.000	.
Area	-0.009		-0.010		0.004		0.004		0.038		0.032		0.008		0.006	
Population	0.002		0.003		-0.005		-0.006		-0.029		-0.029		-0.081	***	-0.080	***
Depratio	-0.001		0.000		0.001		0.000		0.000		-0.002		-0.035	**	-0.035	**
GDP	0.044	***	0.056	***	0.002		0.001		-0.005		0.001		0.016		0.018	
Left wing	0.002		0.002		-0.004		-0.005		0.006	.	0.006		-0.002		-0.002	
Right wing	-0.007	***	-0.008	***	-0.008	*	-0.008	*	-0.006		-0.006		-0.007	**	-0.008	**
Local list	0.003	**	0.003	*	-0.002		-0.003		0.003		0.003		-0.006	*	-0.006	*
Elec_year	-0.005	***	-0.005	***	-0.009	***	-0.009	***	-0.006	**	-0.006	**	-0.006	***	-0.006	***
Term limit	-0.004	***	-0.004	***	-0.003	*	-0.003	.	-0.003	.	-0.003	.	-0.004	*	-0.004	*
Elec*tl	0.005	**	0.005	*	0.003		0.003		0.000		0.000		0.002		0.002	
Union	0.009	***	0.009	***	0.003		0.004		0.003		0.004		-0.011	**	-0.011	***
DSP	-0.020	***	-0.021	***	-0.009	***	-0.009	***	-0.020	***	-0.020	***	-0.025	***	-0.025	***

Table 10. Tax setting equation, robustness check, spatial panel regression with time and space fixed effects (continued)

Spatial lag	0.427	***	0.322	***	0.356	*	0.192	0.032	0.036	0.208	**	0.213
Spatial error	-0.412		-0.220		-0.134		0.024	0.073	0.072	-0.162		-0.182
Obs	2986		2986		922		922	999	999	1788		1788

*Notes: dependent variable natural log of ICI house tax rate, continuous variables in log. 6695 observations per year. Cont=contiguity spatial weights matrix; Dist= distance spatial weight matrix. Significance levels: *10%, **5%,***1*

6. Conclusions

This Chapter analyzed strategic interactions in tax competition on a comprehensive dataset of Italian Municipalities during the period 1995-2004.

The dataset represents a 'natural experiment', and it has never been considered in a comprehensive way before. The time dimension, moreover, allow us to relax the assumption that all the observations are observed at they steady state equilibrium.

The results of the vote popularity estimation confirm that differences in fiscal performances among jurisdictions do affect the incumbent mayor's probability of being re-elected. The findings are robust to the alternative definition of popularity, and they confirm that an increase of the domestic tax rate significantly reduces the popularity of the incumbent. An increase in the spatial lag of the tax rate, however, does not increase his popularity. This result is motivated with a domestic tax rate still above the average in the neighborhood, as the tax difference does affect the incumbents' popularity in the expected negative way. This result highlights the role of the comparison of the neighboring jurisdictions' performances and it is consistent with the theory of Yardstick Competition.

At the same time the spatial tax setting equation finds significant strategic interaction among the fiscal decisions of neighboring municipalities. Although the unobserved variables are negatively correlated among neighbors, similar tax rates are observed in the neighborhood.

These results taken together verify both the responsibility hypotheses and the presence of strategic interactions in local tax setting, allowing us to classify strategic interaction in the dataset as proper Yardstick Competition.

7. Appendix

A.1. Dataset description

Variable	Definition	Source
HICI	Domestic house ICI tax rate	IFEL, Institute for Local Public Finance and Economics
HICI_neighbors	Spatial lag of house ICI tax rate	Own calculations on IFEL data
Tax difference	Difference between domestic house tax rate and neighbors' house tax rate	Own calculations on IFEL data
BICI	ICI business tax rate one period	IFEL, Institute for Local Public Finance and Economics
Grants	Transfers from the central government	Italian Ministry of the Interiors
Area	Surface area	ISTAT, Italian Institute of Statistics
Pop	Population	ISTAT, Italian Institute of Statistics
Depratio	Dependency ratio	Own calculation on ISTAT data
Touristic	Touristic dummy	ACI - Censis 2001 survey
GDP per capita	GDP per capita	Institute G.Tagliacarne
Unemployment	Provincial unemployment rate	Institute G.Tagliacarne
Union	Union dummy	ISTAT, Italian Institute of Statistics
DSP	Domestic Stability Pact dummy	Own calculations on ISTAT data

A.1. Dataset description (continued)

N_neighbors	Number of neighbors	ISTAT, Italian Institute of Statistics
Provcap	Province capital dummy	ISTAT, Italian Institute of Statistics
Coast	Coast dummy	ISTAT, Italian Institute of Statistics
Mayor	Name and Surname of the winner candidate	Italian Ministry of the Interiors
Share votes 1	Share of votes of the local winner candidate	Italian Ministry of the Interiors
Share votes 2	Share of votes of the first main opponent	Italian Ministry of the Interiors
Win margin	Difference between the share of the votes of the local winner and the share of the votes of his first opponent	Italian Ministry of the Interiors
Rerun	Incumbent running for re-election dummy	Italian Ministry of the Interiors
Right wing, Left wing, Center wing, Local list	Partisanship of executive dummies	Italian Ministry of the Interiors
Alignment	Alignment with central government dummy	Italian Ministry of the Interiors
Elec_year	Electoral year dummy	Italian Ministry of the Interiors
Term limit	Re-elected incumbent dummy	Italian Ministry of the Interiors

Table A.2. Descriptive statistics, 12743 electoral observations, 1996-2004

Variable	Obs	Mean	Std. Dev.	Min	Max
Δ popularity (share of votes)	6355	-0.018	0.191	-0.710	0.714
Δ popularity (win margin)	6298	-0.135	1.572	-8.455	6.908
Δ rerun	6355	-0.293	0.857	-1.000	1.000
Δ unemployment	6355	-0.022	0.033	-0.169	0.163
Δ alignment	6355	0.362	0.648	-1.000	1.000
Δ tax difference	6355	0.000	0.104	-2.245	0.635
Δ domestic tse fitted	6355	0.017	0.060	-0.255	0.482
Δ domestic tse residuals	6355	-0.013	0.088	-0.523	0.488
Δ neighbors tse fitted	6355	0.016	0.031	-0.120	0.182
Δ neighbors tse residuals	6355	-0.012	0.046	-0.362	0.268
Δ HICI	6355	0.003	0.099	-2.303	0.559
Δ HICI_neighbors	6355	0.004	0.047	-0.371	0.405

Table A.3. Correlation among the explanatory variables, vote popularity equation

	Perc. Votes*	Wm*	% Votes lag*	Wm lag*	Rerun	Unemp*	Align
Perc. Votes*	1.00						
Wm*	0.67	1.00					
% Votes lag*	-0.44	-0.31	1.00				
Wm lag *	-0.15	-0.26	0.41	1.00			
Rerun	0.25	0.24	-0.11	0.01	1.00		
Unemp*	0.00	-0.02	-0.04	-0.06	-0.03	1.00	
Alignment	0.03	0.04	0.02	0.00	0.07	-0.01	1.00
Tax difference	-0.03	-0.01	0.01	-0.05	-0.02	0.01	0.00
Domestic Fitted	-0.02	-0.03	0.00	-0.02	-0.03	0.06	-0.15
Domestic Residuals	-0.05	-0.01	0.01	-0.04	-0.03	-0.04	0.05
Neighbors Fitted	-0.02	-0.02	0.00	0.02	-0.01	0.02	-0.19
Neighbors Residuals	-0.04	-0.03	0.01	-0.02	-0.06	-0.03	0.03
HICI	-0.06	-0.03	0.01	-0.05	-0.05	0.00	-0.05
HICI_neighbors	-0.05	-0.04	0.00	-0.01	-0.06	-0.02	-0.10

Table A.3. Correlation among the explanatory variables, vote popularity equation (continued)

	Tax difference	Dom. fitted	Dom. residuals	Neigh. fitted	Neigh. residuals	HICI	HICI_neigh
Perc. Votes*							
Wm*							
% Votes lag*							
Wm lag *							
Rerun							
Unemp*							
Alignment							
Tax difference	1.00						
Domestic Fitted	0.35	1.00					
Domestic Residuals	0.70	-0.25	1.00				
Neighbors Fitted	-0.12	0.18	-0.06	1.00			
Neighbors Residuals	-0.28	-0.06	0.13	-0.31	1.00		
HICI	0.89	0.41	0.78	0.06	0.08	1.00	
HICI_neighbors	-0.35	0.06	0.08	0.37	0.77	0.12	1.00

Note: all variables are in first-differences; the asterisk indicates that it is the variation in the log (Δlog) of the variable.

Table A.4. Vote popularity function (win margin), first stage regression

	Model 1-IV		Model 2-IV		Model 3-IV		Model 4-IV		Model 5-IV	
	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p
Dep-Var.	*HICI*		*HICI*		*HICI neigh*		*HICI*		*Tax distance*		*Tax distance*	
Δ popularity lag	0.000002		0.000002		0.0002		0.000002		0.0001		0.000002	
Δ rerun	-0.000005		-0.000005		-0.0003		-0.000005		0.003	***	-0.000005	
Δ alignment	-0.000003		-0.000003		-0.008	***	-0.000003		0.006	***	-0.000003	
Δ ICI_neighbors	0.000068						0.000041					
Δ unemployment	-0.000009		-0.00001		-0.005	***	-0.000009		0.008	***	-0.000009	
Δ domestic TSE fitted	0.999	***	0.999	***	0.075	***	0.999	***	0.941	***	0.999	***
Δ domestic TSE residuals	0.999	***	0.999	***	0.007		0.999	***	0.945	***	0.999	***
Δ neigh TSE fitted			0.0001		0.79	***	0				-1	***
Δ neigh TSE resid											-1	***
Constant	0	***	-0.00001	***	0.014	***	-0.00001	***	-0.004	***	-0.00001	***

Table A.4. Vote popularity function (win margin), first stage regression (continued)

Obs	5793		5793		5793		5793		5793		5793	
R^2	1		1		0.615		1		0.787		1	
F (all instruments)	$72*10^6$	***	$72*10^6$	***	725	***	$63*10^6$	***	8943	***	$91*10^6$	***
F (excluded variables)	$25*10^7$	***	$17*10^7$	***	1667	***	$17*10^7$	***	21331	***	$18*10^7$	***
Pagan-Hall heteroskedasticity test	2.435		2.365				2.435		2.138		2.147	
Anderson	69908.36	***	5314.29	***			69908.49	***	8943.13	***	70712.29	***
Cragg-Donald	10^9	***	8705.05	***			10^{10}	***	21331.36	***	$12*10^8$	***
Sargan N*R-sq test	0.941		0.94				0.957		0.925		12.623	***
Endogenous regressors	HICI		HICI, HICI_neigh		HICI				Tax difference		Tax Difference	
IV	domestic		all		All				domestic		All	

*Notes: popularity specified as the local win margin. Significance levels: *10%, **5%,***1%. TSE=tax setting equation.*

Table A.5. Vote popularity function (share of votes), first stage regression

	Model 1-IV		Model 2-IV			Model 3-IV		Model 4-IV		Model 5-IV	
	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p
Dep-Var.	Δ *HICI*		Δ *HICI*		Δ *HICI neigh*		Δ *HICI*		Δ *tax distance*		Δ *tax distance*	
Δ popularity lag	0.001		0.001		-0.001		0.001		0.002		0.001	
Δ rerun	-0.0001		-0.0001		-0.0005		-0.0001		0.003	***	-0.0001	
Δ alignment	0.001		0.001		-0.007	***	0.001		0.007	***	0.001	
Δ HICI_neighbors	0.012						0.015					
Δ unemployment	0.001		0.001		-0.007	***	0.001		0.009	***	0.001	
Δ domestic TSE fitted	1.002	***	1.003	***	0.075	***	1.002	***	0.944	***	1.002	***
Δ domestic TSE residuals	0.998	***	0.998	***	0.002		0.998	***	0.944	***	0.998	***
Δ neighbors TSE fitted			0.008		0.801	***	-0.004				-0.985	***

Table A.5. Vote popularity function (share of votes), first stage regression (continued)

Δ neighbors												
TSE residuals											-0.989	***
Constant	-0.001		-0.001		0.013	***	-0.001		-0.004	***	-0.001	
Obs	6355		6355		6355		6355		6355		6355	
R^2	0.914		0.914		0.630		0.914		0.729		0.930	
F (all instruments)	5600000	***	7000000	***	783	***	4800000	***	2832	***	5000000	***
F (excluded variables)	$19*10^6$	***	$16*10^5$	***	1812	***	$12*10^6$	***	8484	***	$95*10^5$	***
Pagan-Hall heteroskedasticity test	12.949	***	12.093	***			12.951	***	11.641	***	10.079	***
Anderson	15486.68	***	5918.51	***			15486.76	***	8292.59	***	16278.80	***
Cragg-Donald	6632.56	***	9773.02	***			66333.48	***	17077.75	***	75981.02	***
Sargan N*R-sq test	0.394		0.393				0.466		0.371		12.881	***
Endogenous regressor	HICI		HICI, HICI_neigh				HICI		Tax distance		Tax difference	
IV	domestic		All				All		domestic		all	

*Notes: popularity specified as the winner's share of votes. Significance levels: *10%, **5%,***1%. TSE=tax setting equation.*

Table A.6. Tax setting equation dataset, descriptive statistics, 66950 observations, 1995-2004

	Mean	Minimum	Maximum
Grants per capita	118695.2	0	439000000
BICI	0.0056	0.004	0.007
HICI	0.00525	0.0035	0.007
GDP	18407.8	6964.22	35865.3
Population	7235.26	30	2653253
Depratio	0.540	0.002	17.634
Area	3388.813	10	130771
Left wing	0.286	0	1
Center wing	0.136	0	1
Right wing	0.205	0	1
Local list	0.373	0	1
Elec_year	0.208	0	1
Term limit	0.314	0	1
N_neighbors	5.832	1	30
Touristic	0.352	0	1
Union	0.045	0	1
North-west	0.446	0	1
North-east	0.138	0	1
Center	0.149	0	1
South	0.267	0	1
Provcap	0.013	0	1
Coast	0.065	0	1
DSP	0.317	0	1

Table A.7. Correlation among the explanatory variables, tax setting equation

	BICI lag	Grants	Area	pop	depratio	Tur	GDP	Left wing
BICI lag	1							
Grants	-0.03	1						
Area	0.07	-0.28	1					
Pop	0.08	-0.12	0.39	1				
Depratio	0.02	-0.20	0.19	-0.44	1			
Tur	0.10	-0.13	0.41	0.11	0.13	1		
GDP	0.18	0.24	-0.15	-0.03	-0.14	-0.16	1	
Left wing	-0.02	-0.11	0.18	0.23	-0.04	0.06	-0.15	1
Right wing	0.09	-0.01	0.05	0.16	-0.04	0.04	0.08	-0.32
Local list	0.03	0.10	-0.13	-0.27	0.08	-0.07	0.19	-0.49
Elec	0.02	0.00	0.00	0.01	0.00	0.01	0.00	0.06
DSP	0.19	-0.07	0.11	0.30	-0.09	0.05	0.10	0.01
Term limit	0.14	0.00	-0.03	-0.03	0.04	-0.02	0.15	-0.03
Union	0.09	-0.01	-0.08	-0.07	0.06	-0.06	0.09	-0.08
N_neigh	0.06	0.00	0.42	0.30	0.01	0.12	0.04	0.05
Provcap	0.05	-0.03	0.21	0.32	-0.04	0.12	-0.01	0.06
Coast	0.12	-0.16	0.12	0.25	-0.05	0.34	-0.21	0.06

Table A.7. Correlation among the explanatory variables, tax setting equation (continued)

	Right wing	Local list	Elec	DSP	Term limit	Union	N neigh	Prov Cap	Coast
BICI lag									
Grants									
Area									
Pop									
Depratio									
Tur									
GDP									
Left wing									
Right wing	1								
Local list	-0.39	1							
Elec	-0.10	0.00	1						
DSP	0.05	0.06	-0.10	1					
Term limit	-0.03	0.15	-0.02	0.26	1				
Union	0.06	0.08	0.01	-0.03	0.06	1			
N_neigh	0.04	-0.05	0.00	0.08	-0.01	-0.03	1		
Provcap	0.05	-0.07	0.00	0.07	0.00	-0.02	0.30	1	
Coast	0.07	-0.10	0.01	0.08	-0.01	-0.02	-0.15	0.12	1

Table A.8. Spatial correlation tests: Moran I

Panel a: test based on raw HICI, contiguity spatial weights matrix

	Italy		North West		North East		Centre		South	
1995	0.199	***	0.178	***	0.244	***	0.158	***	0.159	***
1996	0.19	***	0.179	***	0.261	***	0.146	***	0.162	***
1997	0.179	***	0.173	***	0.282	***	0.176	***	0.145	***
1998	0.187	***	0.178	***	0.303	***	0.205	***	0.139	***
1999	0.19	***	0.19	***	0.322	***	0.226	***	0.121	***
2000	0.194	***	0.2	***	0.315	***	0.232	***	0.105	***
2001	0.209	***	0.216	***	0.334	***	0.228	***	0.122	***
2002	0.214	***	0.216	***	0.368	***	0.232	***	0.123	***
2003	0.216	***	0.225	***	0.396	***	0.212	***	0.117	***
2004	0.223	***	0.234	***	0.398	***	0.177	***	0.142	***

Panel b: test based on raw HICI, distance spatial weights matrix

	North West		North East		Centre		South	
1995	0.194	***	0.255	***	0.132	***	0.155	***
1996	0.187	***	0.28	***	0.132	***	0.161	***
1997	0.181	***	0.303	***	0.156	***	0.148	***
1998	0.184	***	0.331	***	0.199	***	0.149	***
1999	0.196	***	0.35	***	0.212	***	0.134	***
2000	0.202	***	0.34	***	0.218	***	0.116	***
2001	0.214	***	0.357	***	0.207	***	0.122	***
2002	0.219	***	0.369	***	0.216	***	0.13	***
2003	0.232	***	0.393	***	0.198	***	0.126	***
2004	0.24	***	0.391	***	0.171	***	0.144	***

Note: Distance weight matrix computed with the 5knn criterion of neighborhood.

Panel c: test based on residual from OLS HICI equation, contiguity spatial weights matrix

	Italy		North West		North East		Centre		South	
1996	0.122	***	0.089	***	0.146	***	0.066	***	0.139	***
1997	0.106	***	0.095	***	0.184	***	0.131	***	0.081	***
1998	0.121	***	0.108	***	0.2	***	0.133	***	0.088	***
1999	0.129	***	0.135	***	0.218	***	0.165	***	0.065	***
2000	0.122	***	0.13	***	0.219	***	0.161	***	0.039	***
2001	0.146	***	0.154	***	0.251	***	0.157	***	0.068	***
2002	0.152	***	0.158	***	0.281	***	0.169	***	0.062	***
2003	0.163	***	0.168	***	0.318	***	0.173	***	0.064	***
2004	0.171	***	0.173	***	0.304	***	0.165	***	0.094	***

*Note: OLS regression includes as covariates: lagged Business Tax Rate,Grants,Area,Pop,Depratio,Tur,GDP,Left wing,Right wing,Local list,Elec,Term limit,Elec*term limit,Union,Dsp,N_neighbors,Provcap, Coast, Time dummies, macro-area dummies.*

Panel d: test based on residual from OLS HICI equation, distance spatial weights matrix

	North West		North East		Centre		South	
1996	0.085	***	0.157	***	0.054	***	0.144	***
1997	0.106	***	0.189	***	0.112	***	0.092	***
1998	0.121	***	0.201	***	0.14	***	0.09	***
1999	0.142	***	0.212	***	0.151	***	0.068	***
2000	0.129	***	0.204	***	0.153	***	0.035	**
2001	0.154	***	0.233	***	0.146	***	0.063	***
2002	0.163	***	0.25	***	0.156	***	0.068	***
2003	0.178	***	0.288	***	0.154	***	0.068	***
2004	0.183	***	0.275	***	0.153	***	0.085	***

*Note: OLS regression includes as covariates: lagged Business Tax Rate,Grants,Area,Pop,Depratio,Tur,GDP,Left wing,Right wing,Local list,Elec,Term limit,Elec*term limit,Union,Dsp,N_neighbors,Provcap, Coast, Time dummies, macro-area dummies. Distance weight matrix computed with the 5knn criterion of neighborhood.*

Chapter 3.

The time dynamics of Yardstick Competition in the Italian Municipalities[22]

1. Introduction

The previous Chapter tested the Yardstick Competition hypotheses (Salmon, 1987; Besley and Case, 1995; Brueckner, 2003) in local public finance in Italy, finding evidence of strategic interactions in local tax setting driven by the incumbent's popularity concerns.

The longitudinal dimension of the dataset allows us to investigate the dynamics of strategic interaction during the period 1995-2004. A number of factors may change the pattern of strategic interactions among jurisdictions as time goes by, like the improvements in the diffusion of information, changes in the number of municipalities and therefore of the possibilities for voters to make comparisons, learning processes of the voters to adopt a comparative strategies and by incumbents to resort to mimicking strategies.

All the empirical studies in the literature, on the contrary, assume that interaction remains constant election after election, even those studies using long time series. The informational spillover generating Yardstick Competition and mimicking, in particular, has always been implicitly assumed to expire after the election and every time voters repeat the process from scratch. If

[22] This Chapter has been published in the CREM-CNRS, Condorcet Center Working Paper 'From Taxes to Politics, from Politics to Taxes: Evidence of Yardstick Competition in the Italian Municipalities' (2011), coauthored with Prof. Fabio Padovano.

this assumption holds, we should observe spatial coefficients of the tax setting equation that remain stable over time.

In this Chapter, on the contrary, we relax this potentially implausible assumption and we investigate the dynamics of strategic interaction in the ten years considered, looking for a pattern in the data. The research question we aim at answering is: do strategic interactions in local tax setting remain stable over time, or do voters become more/less alert of, and incumbent mayors more/less reactive to, the decisions taken in nearby jurisdictions in successive electoral rounds?

The question arises from the comparative static structure of theories that underlie both the responsibility and the Yardstick Competition hypotheses. In these models agents are supposed to implement their best response to other agents' actions and to react to exogenous shocks so to immediately attain the new equilibrium. Real world situations, instead, are characterized by dynamic adjustments to equilibrium values whose time dimension may be relevant and variable. For instance, the cost for voters to extract information about the quality of their mayor from the performance of other jurisdictions may increase if "bad" mayors become more effective at mimicking the "good" type behavior (Bordignon et al., 2003), or if they obfuscate voters' possibilities to make comparisons by progressively implementing collusive behaviors (Charlot and Paty, 2010). Alternatively, Yardstick Competition may become more intense and widespread, as the circulation of information about mayors' fiscal performance improves (Franzese, 2001), or as voters "learn" how to implement the comparative electoral strategy envisaged in Yardstick Competition models (Meseguer, 2009).

So far the literature has never investigated the dynamics of strategic interactions among jurisdictions through time. Previous panel studies have usually estimated the average panel

correlation; yet, this can be a poor indicator of strategic interaction if the assumption that all observations reflect equilibrium values is in fact not verified. Here, we exploit a unique "natural experiment" offered by the Italian sample. The analysis of the pattern of strategic interactions among municipalities in the years following the fiscal and the electoral reforms allows to verify how Yardstick Competition evolves in time from its very beginning. The time dimension of the Italian dataset, moreover, allows us to relax the assumption that all variables are on their long-run equilibrium steady state. By that we can control for transitory departures from the equilibrium path and investigate the dynamics of strategic interaction.

The empirical strategy estimates the spatial correlation in local tax setting among the Municipalities on subsequent time subsamples. This empirical design allows us to capture the variation of the interaction due to the introduction of a marginal year.

The analyses is presented for the whole Italian dataset and for the subsamples of the four macro-areas and of the 15 Regions considered. This close examination allows us to describe the evolution of the time dynamics of strategic interaction in different geographical areas, characterized by different levels of electoral competition and efficiency of the political market.

The results show that both the spatial lag and the spatial error coefficients change in time, converging towards the lowest level of correlation. This evidence suggests that the probability of observing pooling equilibrium decreases as time goes by, for example because the disciplining force of Yardstick Competition wanes off; yet, as the spatial errors become more similar, Yardstick Competition seems to have selected a pool of better mayors through time. This pattern is especially evident in

Regions with a higher density of municipalities, i.e., where there are more opportunities to make inter-jurisdictional comparisons.

The rest of the paper is organized as follows. Section 2 describes the empirical specification adopted and the data, Section 3 presents the results and Section 4 concludes.

2. Methodology and data

The evolution in time of Yardstick Competition is tested analyzing the time dynamics of spatial interactions. The methodology adopted is the estimation of a spatial tax setting equation on subsequent time datasets. Starting from the period 1996-1998, we have introduced one year at a time until 2004, estimating seven regressions. The choice of the subsample 1996-1998 as the initial dataset is motivated by the fact that at least three years are needed to build the instruments for the GMM model that we apply.

This incremental approach is usually adopted in the analyses of the pattern of growth convergence (Arbia et al., 2005), and it is able to capture the variation of the dynamics before and after a break. We use a yearly specification of the breaks because *a priori* there are not evident breaks in the Yardstick Competition theory to control for and because we are interested in exploiting the whole information that the dataset provides us.

For the purpose of being consistent with the analyses in the previous Chapter, the spatial estimation follows the linear regression panel data model of Kapoor, Kelejian and Prucha (2007). In particular, we apply the time and space fixed effects specification of Model 5 in Table 9 in Chapter 2. Each observation $i=1,\ldots,N$ is observed for $t=1,\ldots,T$ periods. Data are generated according to the following process:

[3] $tax_{it} = \beta' Z_{it} + u_{it}$

where tax_{it} denotes the Nx1 vector of observations on the dependent variable in period t, Z_{it} denotes the NxK matrix of observations on exogenous regressors in period t, β' is the corresponding Kx1 vector of regression parameters, and u_{it} denotes the Nx1 vector of disturbance terms. The intercept is assumed to be included in the Zs. The disturbances are assumed to be both correlated over time and across spatial units, as well as heteroskedastic; moreover, they follow a Cliff and Ord first order spatial autoregressive process (Cliff and Ord, 1981):

[4] $u_{it} = \rho W_i u_{it} + \varepsilon_t$

where $0<\rho<1$ is the spatial autoregressive coefficient, W_i is an NxN weighting matrix of known time independent constants whose diagonal elements are zero and the matrix (I- ρ W_i) is assumed to be non singular. Finally, ε is an Nx1 vector of innovations following a one-way error component model grouped by time periods:

[5] $\varepsilon_{it,N} = \mu_{i,N} + \nu_{it,N}$

where $\mu_{i,N}$ is the vector of unit specific error components and $\nu_{it,N}$ is the vector of error components varying over both the cross-sectional units and the time periods. By assumption the error components are independent and identically distributed with mean zero and constant variance and they are independent to each other. In the proposed methodology estimates ρ and the variance components terms $\mu_{i,N}$ and $\nu_{it,N}$ are estimated through GMM, then the vector of parameters is estimated through GLS. The estimated regressions consider unobserved fixed effects and include the lagged dependent variable on the right hand side of the tax equation. Neighborhood is here specified as geographical proximity: the matrix of contiguity defines two jurisdictions as neighbors if they share at least one border.

The vector of covariates Z includes fiscal, socio-demographic, political and electoral variables. Intergovernmental transfers are one of the main sources of revenues for Italian municipalities (about 45% of total revenue). This variable measures nominal values of transfers coming from the five funds created with D.Lgs.504/92, divided into current and investment grants. An increase in the amount of per capita transfers from the central government (*grants*) may be followed by a tax reduction or by an increase in the total expenditure, known in the literature as the 'flypaper effect' (Hines and Thaler, 1995). The rate of substitution between autonomous and non autonomous resources is not clear, therefore there is no prior on the sign of this coefficient.

In 1999 a normative instrument was introduced to constrain the municipal budget deficits, the Domestic Stability Pact (*DSP*). The entry requirements are modified on a yearly basis according to population size, and the Municipalities included in the Pact must follow its guidelines. This budget constraint are supposed to reduce local expenditures (Bartolini and Santolini, 2009) with a consequent reduction of the revenues needed to finance expenditures. Other things being equal, the correlation between the *DSP* dummy and the dependent variable should be negative.

GDP per capita proxies the citizen's ability to pay, and it is expected to be positively correlated with the dependent variable. It refers to the provincial GDP real per capita in millions of euro. GDP data are expressed at 'market prices', adding the VAT revenue and other indirect production taxes revenue (net of central government grants) to the value added.

The demand for public provision is dependent on the size of the population (*pop*) and the size of the jurisdiction's territory

(*area*)[23]. The composition of the population is a relevant issue in the tax setting decision because local governments are usually responsible for most of the services designed for youngsters and elderly people, like childcare and leisure centers. To capture this we use the dependency ratio (*depratio*), the ratio between youngsters and elderly over adult population. These geo-demographic variables have been included among the covariates, although the predicted sign of their coefficients is ambiguous, since it depends on the extent to which they show economies of scale (negative sign) or not (positive sign).

A qualitative binary variable has been included to control for the demand for public services coming from the non-resident population, the tourists (*touristic*). Data come from the *ACI-CENSIS* report of 2001, where touristic municipalities are defined as such by the presence of sea, mountain or artistic and cultural amenities. Touristic municipalities are 3123 (38% of the total). The predicted effect on the dependent variable is negative, because the demand for holidays houses in many Italian touristic destinations may be quite price inelastic. In such a case demand for houses expressed by outsiders increases even though the business tax rate is relatively high, which gives the mayor the possibility to compensate residents with a lower house tax rate. The provincial capital dummy (*provcap*) has also been included to control for the effect of being a provincial capital jurisdiction. Provincial capitals are usually richer than other cities, and although the correlation coefficient between this dummy and GDP per capita is very low and negative (-0.01), a positive sign is expected since they can, in principle, count on a larger tax base.

[23] Surface area is measured in hm^2. For the years in which a census has not been conducted, data have been adjourned with the yearly territorial changes calculated by ISTAT.

The number of neighbors (*n_neighbors*) should directly capture interactions in fiscal decisions: the higher the number of neighbors, the greater the flow of inter-jurisdictional information and the stronger the constraint on the incumbent's tax setting decision. Following this reasoning, the expected sign of this coefficient is negative. Special attention is paid to the jurisdictions on the coast. First, given the geography of the Italian peninsula, many municipalities border with the sea. As the sea is an useless neighbor in terms of comparisons of fiscal performance, the information flow may slow down in coastal municipalities, supporting the expectation of a positive coefficient associated to the *coast* dummy. The coefficient of the local union dummy (*union*) is included in the estimation to control for the effect of agglomerations of jurisdictions (Ermini and Santolini, 2007). The members of a local union may exploit inter-jurisdictional economies of scale (a negative correlation) but they may also collude reducing the variance of the tax rate in the neighborhood (a positive correlation). The five macro-area dummies defined by ISTAT (named *north-west*, *north-east*, *center*, *south* and *islands*) have been included to control for the regional heterogeneity due to geographical affiliation of the local governments. Finally, time dummies control for the effect of yearly shocks to the dependent variable.

The introduction of a binary variable, *elec_year*, captures the electoral cycle in tax setting. The expected sign decisions is negative, as incumbents are expected to reduce tax rates when elections are approaching (Rogoff, 1990). It is assumed that year is assumed to be an electoral one if the first ballot takes place in the last six months of the year or the first six months of the following year. In other words, value '1' signals that a local executive election has taken place between 01/07 and 31/12 of the current year, or between the 1/01 and 30/06 of the following year.

The timeline of the approval of the municipal budget motivates this specification of the electoral dummy variable, which takes place at the very end of the year and may last until the first three months of the following year. This process may influence the citizen's beliefs in case they are called to vote in a early months of the year. Of course, the election date is exogenously given and decided before the tax rate is chosen.

The electoral status of the mayor is a relevant factor in determining the tax setting because, if the incumbent is term limited, he/she will not find it worthwhile mimic the "good neighbor incumbent" (Besley and Case, 1995; Bordignon et al., 2003). To account for that, we introduce a dummy (*term limit*) that takes the value of 1 if the mayor is elected for the second consecutive term, with a predicted positive sign. The interaction term between the electoral dummy and the term limit dummy (*elec_tl*) captures the fiscal behavior of the incumbent during the electoral year. Yardstick Competition predicts that term limited incumbents set higher tax rates than non term limited incumbents; the coefficient associated to the interaction term is again positive.

Several dummies referring to the partisanship of the executive have been included to control for the ideological affiliation of the incumbent. Since left-wing mayors (*left wing*) allegedly should spend more for redistributive policies than their right parties colleagues (*right wing*), the coefficient of this variable is expected to be positive (Alesina and Rosenthal, 1995); and vice versa, for right mayors. The local lists (*local list*) are generally ideologically neutral, and are usually municipality-specific. They focus their policy platforms on a single dimension, such as the utmost importance of municipal issues or the support to the electoral program of a local charismatic leader. They are a quantitatively relevant phenomenon, as 37% of the observations in the panel

dataset are governed by a civic list executive. Previous studies either did not include this variable or handled this problem poorly, either by associating all local lists with left wing parties or by splitting them evenly between the two coalitions. We treat them as they are, i.e., as separate lists from those associated with the national parties.

Table 1 below reassumes the expected signs of the coefficients.

Table 1. Tax setting equation, expected signs of the coefficients

Variable	Definition	Expected sign
BICI lag	ICI business tax rate lagged one period	+
Grants	Transfers from the central government	?
Area	Surface area	?
Pop	Population	?
Depratio	Dependency ratio	?
Touristic	Touristic dummy	-
GDP per capita	GDP per capita	+
Right wing	Partisanship of executive dummies	-
Left wing	Partisanship of executive dummies	+
Center wing	Partisanship of executive dummies	?
Local list	Partisanship of executive dummies	?
Elec_year	Electoral year dummy	-
Term limit	Term limit dummy	+
Elec_tl	Elec_year * Term limit	+
Union	Union dummy	?
DSP	Domestic Stability Pact dummy	-
N_neighbors	Number of neighbors	-
Provcap	Province capital dummy	+
Coast	Coast dummy	+

3. The time dynamics of strategic interaction: the results

This Section presents the spatial correlation coefficients resulting from the spatial panel regressions on subsequent time datasets. A progressive increase of the coefficients reveals an increase in strategic interaction; on the contrary, a decrease of the

spatial coefficients over time is interpreted as a reduction of strategic interaction.

Table 2 shows the results of these set of estimates on the Italian dataset.

Table 2. Estimation results of the spatial correlations coefficients in time, Italian dataset

	Spatial lag		Spatial error	
	Coef.	p-value	Coef.	LM test p-value
1995-1998	0.799	***	-0.783	***
1995-1999	0.479	***	-0.354	***
1995-2000	0.414		-0.317	***
1995-2001	0.471	***	-0.351	***
1995-2002	0.459	***	-0.337	***
1995-2003	0.431	***	-0.307	***
1995-2004	0.280	***	-0.160	***

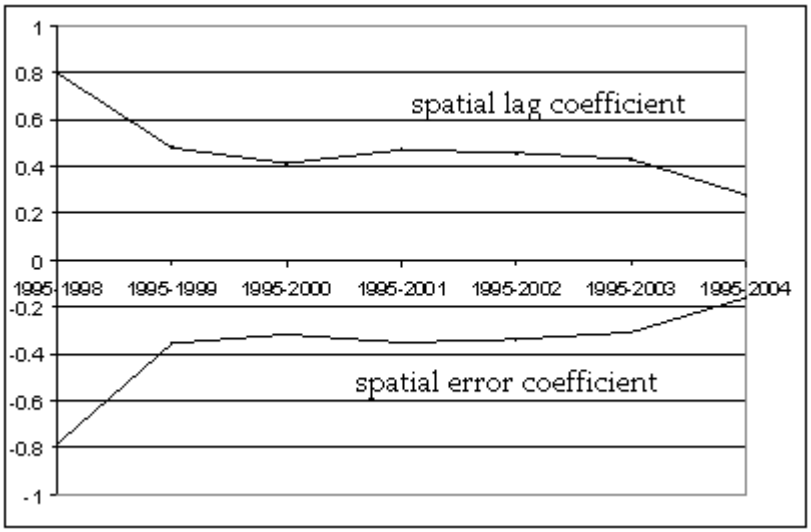
*Notes: Spatial panel regression with time and space fixed effects. Dependent variable natural log of ICI house tax rate, continuous variables in log. 6695 observations per year. Years before 1997 have been dropped to build instruments for the regression. Significance levels: *10%, **5%,***1%.*

The spatial coefficients obtained are always statistically significant, safe for the spatial lag coefficient estimated on the sample 1995-2000. This result, apparently contradictory, is due to the consideration of the year 2000, a post-electoral year. In fact in 2000 less than 5% of the Municipalities held elections while in 1999 64.3% of the Municipalities did (Source: Electoral Database of the Ministry of the Interiors). As the year 2000 is the furthest away from the next election, the incentive for the incumbent to

mimic in 2000 is lowest. As a consequence, the lack of significance of the coefficients is not in contrast with the theory.

The signs of the coefficients are robust to the time length of the dataset used, confirming the general pattern of interaction in the outcome and not in the residuals. The absolute value of the coefficients decreases as the time length increases. Graph 1 depicts the spatial coefficients of Table 1. The resulting pattern reveals that strategic interaction among municipalities decreases over time. Within such pattern especially remarkable are the drop of the coefficients when we move from the sample 1995-1998 to the sample 1995-1999, and from the sample 1995-2003 to the sample 1995-2004.

Graph 1. The dynamics of the spatial correlations coefficients in time



This dynamics is consistent with the hypothesis of a progressive reduction of spatial interaction caused by reduced incentives to mimic. The reduction of the spatial lag coefficients indicates that

a lower share of the domestic tax rate is determined by the neighbors' tax rate. Municipalities with high (low) tax rates are still observed near Municipalities with high (low) tax rates, but these similarities become less evident. It is interesting to note that both 1999 and 2004 are 'first order' electoral years[24]; the large reductions are likely to be due to the behavior of the incumbents governing the municipalities that face an election in those two years (more than 60% of the dataset). These years, therefore, emerge as structural breaks in the dataset, suggesting that interaction decreases as a consequence of the election. This evidence is consistent with the Yardstick Competition theory as it is the electoral mechanism that both creates incentives for the incumbent to mimic and for the voters to gather information and monitor the incumbent's decisions.

On the other hand, the result on the spatial error coefficient is more complex to explain. The absolute value is always negative, but it decreases over time, especially in the first order electoral years 1999 and 2004. Assuming that the residuals include only the cost shock and the competence level of the incumbents, the increasing pattern of the spatial error coefficient could be explained either by increased economic integration (more similar cost shocks) or by increased spatial correlation of the competence levels, or both. As it is quite unlikely that economic integration changes especially in electoral years, the pattern must be driven by greater similarities in the behavior of the mayors. In other words, election after election we still observe incumbents of bordering Municipalities characterized by different competence levels, but these differences decrease. In principle this result is consistent with the selection effect of Yardstick Competition predicted by the theory; but once more it highlights the limit of a static model, since selection occurs gradually and slowly in time.

[24] For the definition, see Chapter 1, Section 3.

The effect on political selection, however, is not conclusive and must be treated with caution, since the residuals may include also other unobserved variables whose dynamics are not known a priori.

Overall the results suggest the presence of a decreasing pattern of mimicking over time and an increasing effectiveness of political selection. The reduction of the strategic interaction, in fact, generates more and more separating equilibria at the municipal level and determines the re-election of good incumbents only.

The robustness and generality of the results of Table 1 has been tested by estimating the dynamics of the spatial coefficients on the geographic subsamples of the four macro-areas and the 15 Italian Ordinary Regions.

3.1 The time dynamics in the macro-areas

The macroares are agglomerations of Regions defined by ISTAT (*Italian Institute of Statistics*). Table 3 presents the spatial coefficients estimated on the four macro-areas on dataset including subsequent time periods; panel *a-d* of Graph 2 depict the coefficients.

Among the macro-areas in the Central and Southern Regions it is found a pattern similar to the national one. In these subsamples the reduction of strategic interaction is evident and easy to interpret. In the Northern Regions, on the other hand, the decrease of strategic interaction is not clear. In the North East the quasi monotonic decrease of the spatial lag coefficient suggests lower strategic interaction, converging to negative values close to zero. The spatial error coefficient, however, shows a quasi monotonic increase and it outstrips the spatial lag coefficient

reaching high values (0.4). This results is interpreted as an increase of the efficiency of the political market, but the unobservable content of the residuals entails the risk of underestimating other determinants of the error term.

In the North Western macro-area, on the other hand, the reduction of the absolute value of the coefficients resulting from the introduction of the 'first order' electoral year 1999 in the dataset is followed by an increase of the coefficients in the subsequent time periods. The absolute values remain quite stable over time around 0.4, and they do not decrease introducing the 2004 data, suggesting that they reached their equilibrium values.

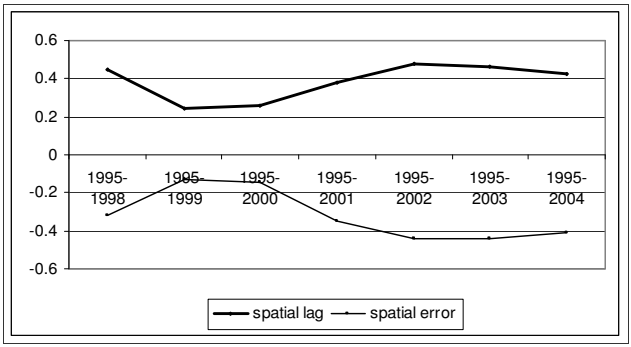
Table 3. Estimation results of the spatial correlations coefficients in time by macro-areas

	Northwest			Northeast			Center			South		
	spatial lag		*spatial error*	*spatial lag*		*spatial error*	*spatial lag*		*spatial error*	*spatial lag*		*spatial error*
1995-1998	0.451		-0.315	-1.093		0.187	0.363		-0.167	0.931	**	-0.76
1995-1999	0.246		-0.128	-0.381		0.165	0.272		-0.124	0.345		-0.208
1995-2000	0.245		-0.145	-0.015		0.174	0.352		-0.217	0.588	***	-0.494
1995-2001	0.38	**	-0.346	-0.123		0.174	0.19		0.051	0.489	***	-0.406
1995-2002	0.479	***	-0.439	0.219		0.199	0.253	*	-0.095	0.362	***	-0.293
1995-2003	0.467	***	-0.444	0.419	*	0.213	0.148		-0.015	0.283	***	-0.226
1995-2004	0.427	***	-0.412	0.356	*	0.215	0.032		0.073	0.208	***	-0.162

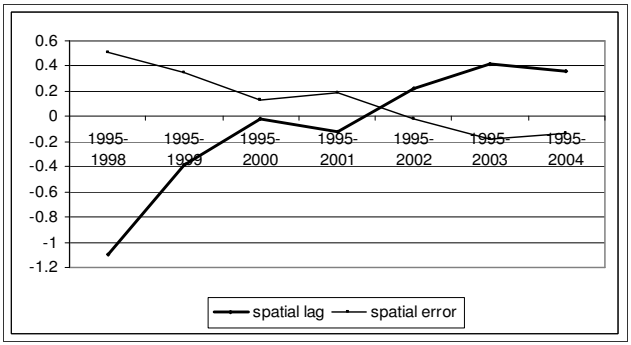
*Notes: Spatial Fixed effects with time and space fixed effects, contiguity neighborhood criterion. Dependent variable natural log of ICI house tax rate, continuous variables in log. Years before 1997 have been dropped to build instruments for the regression. North-east: Veneto, Emilia Romagna; North-west: Piemonte, Lombardia, Liguria; Centre: Toscana, Marche, Lazio, Umbria; South: Abruzzo, Campania, Molise, Basilicata, Puglia, Calabria. Significance levels: *10%, **5%,***1%.*

Graph 2. The dynamics of the spatial correlations coefficients in time by macro-area

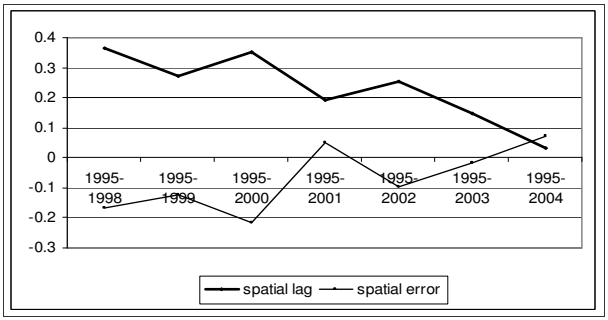
a. North West



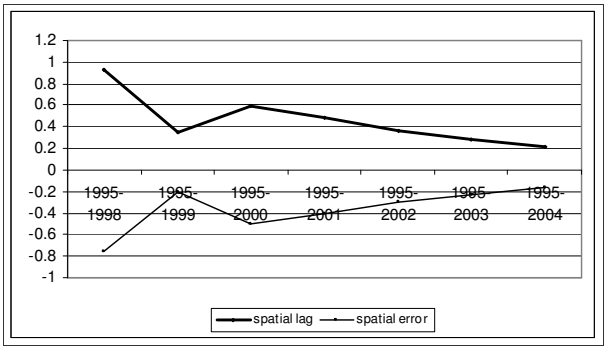
b. North East



c. Centre



d. South



3.2 The time dynamics in the Regions

Table 4 presents the results of the regional regressions on the dataset including subsequent time periods[25].

[25] The Region Umbria has not been included since it is the smallest Region of the dataset and the matrix of spatial weights, once cut, showed more than one Municipality without any neighbor.

Table 4. Estimation results of the spatial correlations coefficients in time by Region

	1995-1998		1995-1999		1995-2000		1995-2001	
Region	Spatial lag	Spatial error	Spatial lag	Spatial error	Spatial lag	Spatial error	Spatial lag	Spatial error
Piemonte	0.531	-0.464	0.758	-0.713	0.640	-0.555	0.341	-0.272
Lombardia	0.289	-0.146	-0.298	0.214	-0.185	0.178	0.148	-0.056
Veneto	-0.037	0.095	-0.164	0.171	0.062	0.033	0.261	-0.089
Liguria	0.287	-0.103	0.461	-0.248	0.383	-0.188	0.753	-0.556
Emilia Romagna	1.159	-1.105	0.742	-0.301	0.783	-0.349	0.166	0.018
Toscana	-0.564	0.311	0.555	-0.296	0.448	-0.206	0.419	-0.211
Marche	0.387	-0.204	0.403	-0.194	0.420	-0.215	0.105	-0.004
Lazio	0.092	0.056	-0.001	0.057	0.193	-0.080	0.545	-0.359
Abruzzo	0.636	-0.310	0.486	-0.240	0.557	-0.417	0.379	-0.307
Molise	0.916	-0.459	0.380	-0.255	-0.014	0.076	0.421	-0.149
Campania	0.427	-0.230	0.336	-0.159	0.584	-0.445	0.154	-0.067
Puglia	1.183	-0.957	0.943	-0.767	0.773	-0.545	0.645	-0.553
Basilicata	1.057	-0.768	0.705	-0.508	0.561	-0.298	0.905	-0.469
Calabria	0.652	-0.497	-0.348	0.174	0.401	-0.317	0.270	-0.223

Table 4. Estimation results of the spatial correlations coefficients in time by Region (continued)

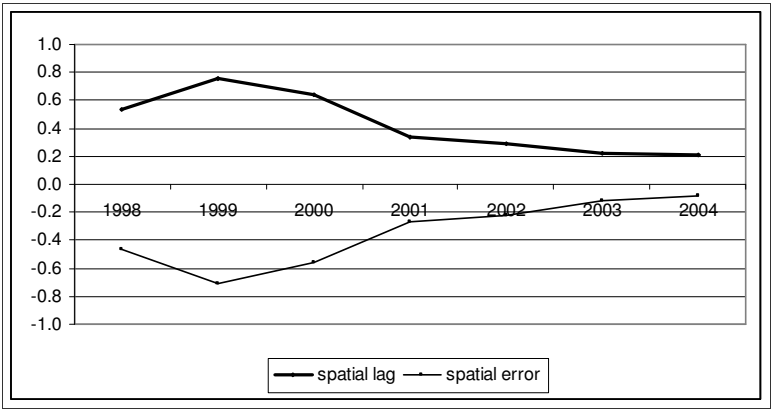
	1995-2002		1995-2003		1995-2004	
Region	Spatial lag	Spatial error	Spatial lag	Spatial error	Spatial lag	Spatial error
Piemonte	0.294	-0.226	0.225	-0.117	0.210	-0.085
Lombardia	0.451	-0.345	0.453	-0.382	0.328	-0.284
Veneto	0.609	-0.350	0.796	-0.563	0.702	-0.507
Liguria	0.791	-0.624	0.668	-0.484	0.426	-0.235
Emilia Romagna	0.318	-0.096	0.474	-0.226	0.358	-0.143
Toscana	0.469	-0.260	0.350	-0.146	0.280	-0.094
Marche	-0.070	0.092	-0.211	0.179	-0.287	0.208
Lazio	-0.643	-0.462	0.574	-0.407	0.503	-0.353
Abruzzo	0.263	-0.238	0.271	-0.284	0.289	-0.294
Molise	-0.347	0.213	0.650	-0.016	-0.152	0.069
Campania	0.140	-0.072	0.133	-0.072	0.086	-0.032
Puglia	0.464	-0.434	0.370	-0.361	0.356	-0.351
Basilicata	0.834	-0.636	0.771	-0.579	0.813	-0.594
Calabria	0.219	-0.163	0.207	-0.153	0.178	-0.146

*Notes: Spatial Fixed effects with time and space fixed effects, contiguity neighborhood criterion. Significance levels: *10%, **5%,***1%*

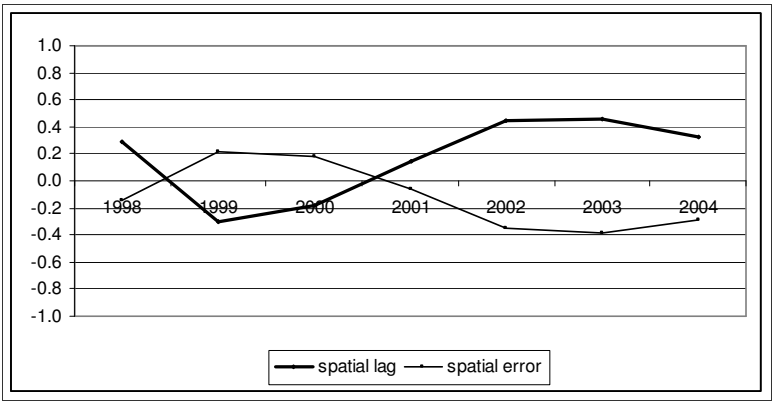
The spatial coefficients of the regional estimations illustrated in panel from *a* to *n* of Graph 3.

Graph 3. The dynamics of the spatial correlations coefficients in time by Region

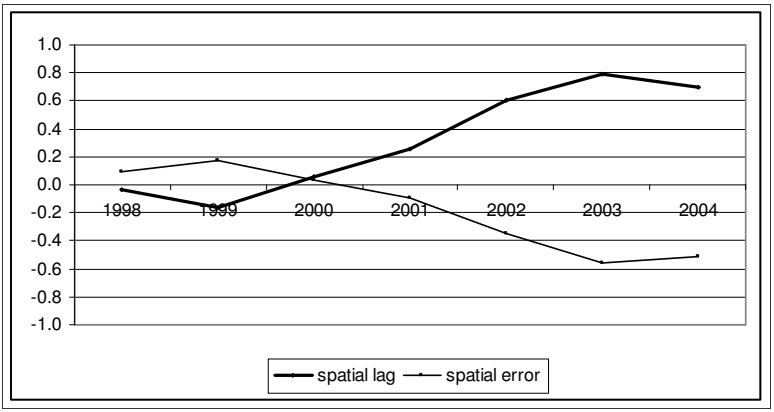
a. Piemonte



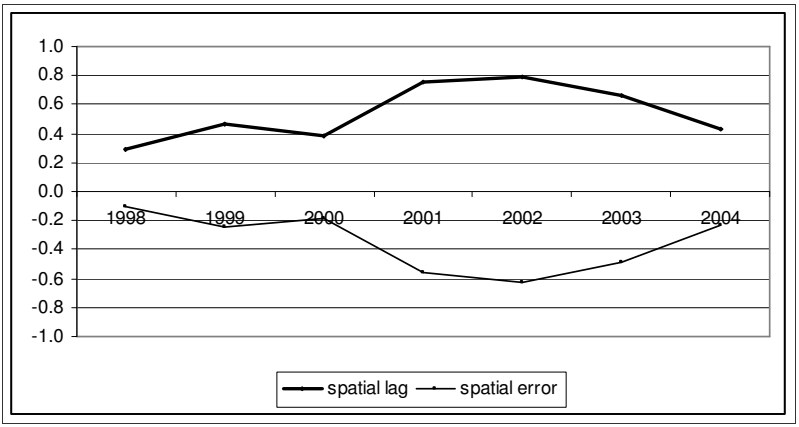
b. Lombardia



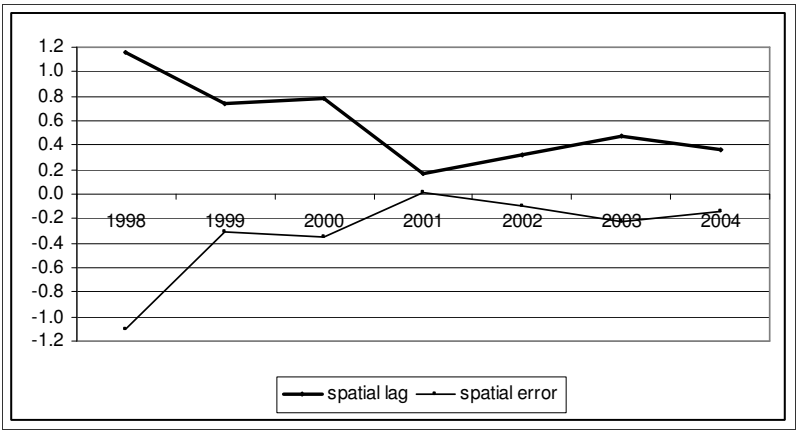
c. Veneto



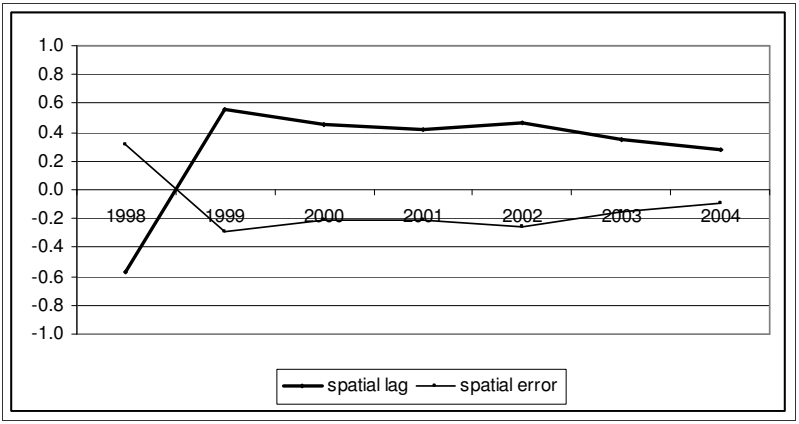
d. Liguria



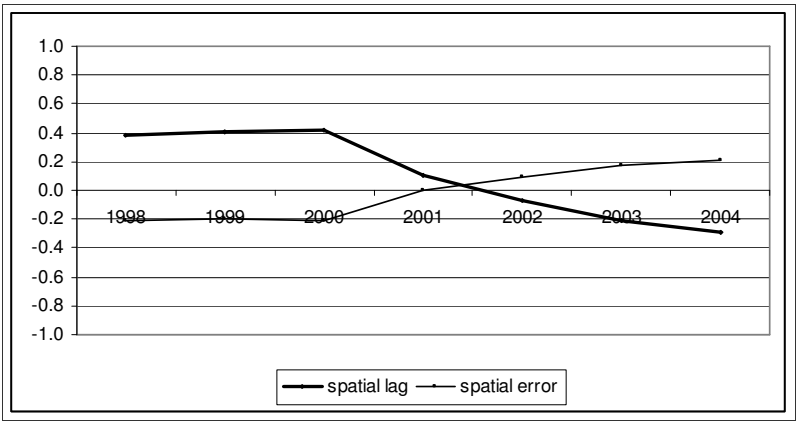
e. Emilia Romagna



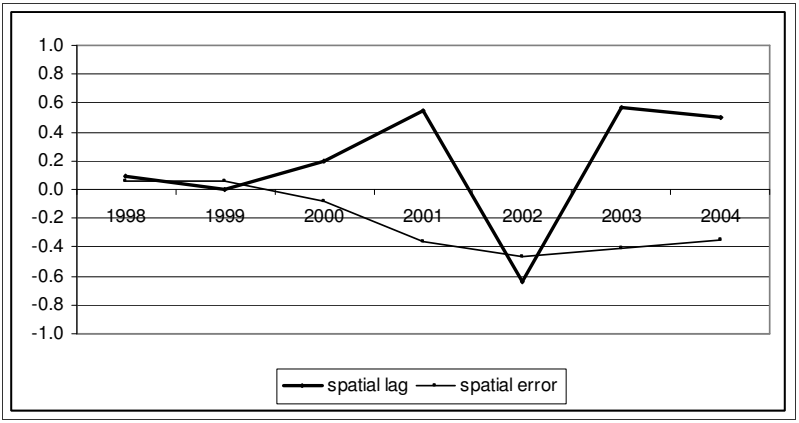
f. Toscana



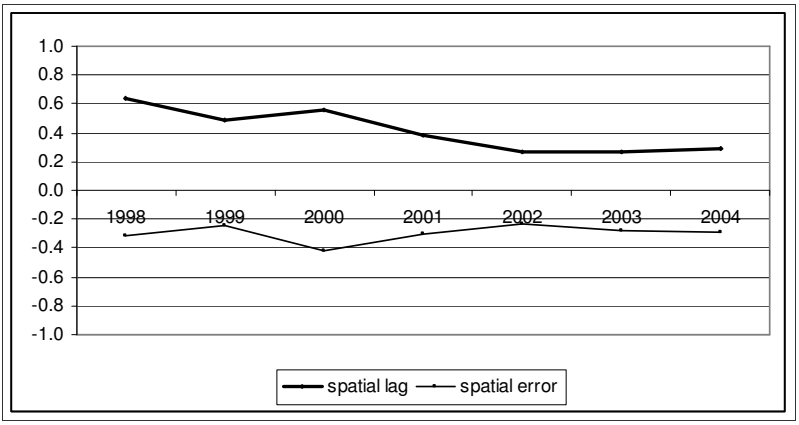
g. Marche



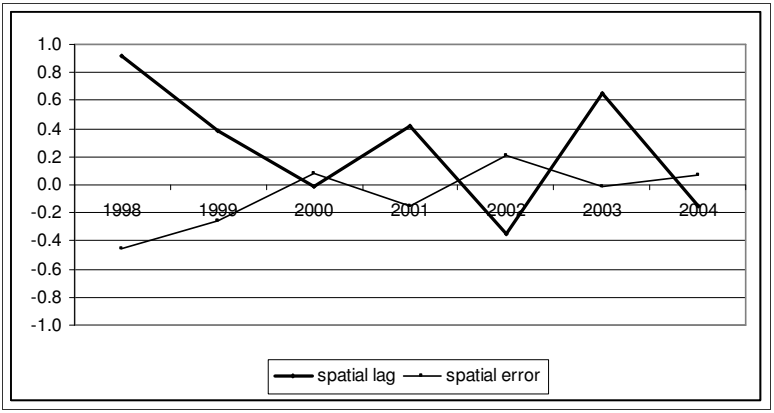
h. Lazio



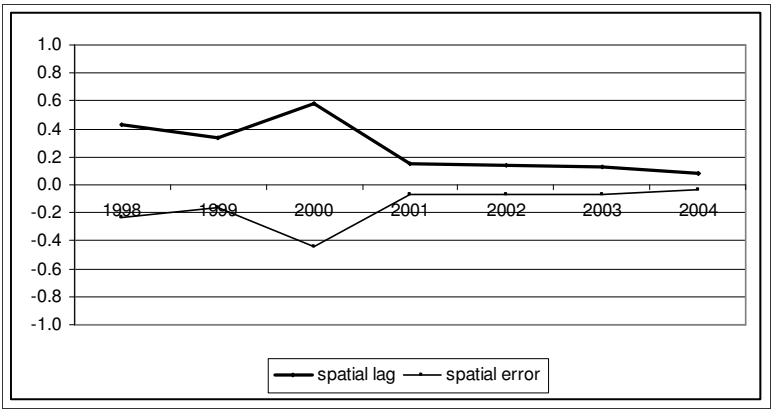
i. Abruzzo



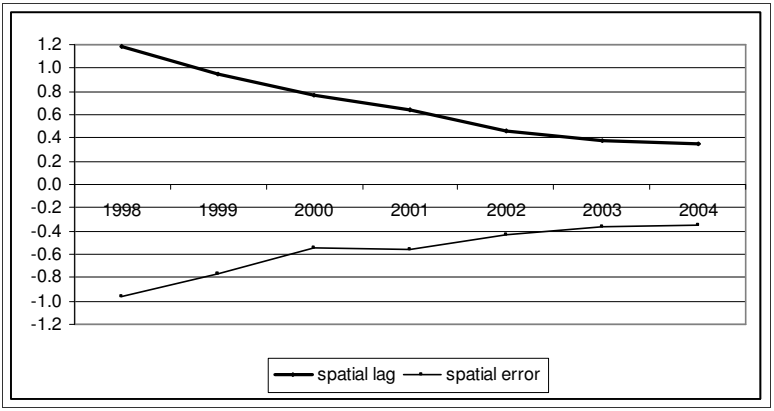
j. Molise



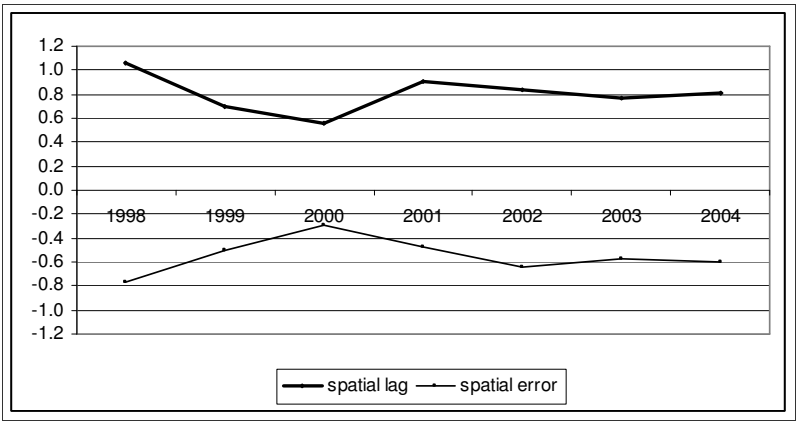
k. Campania



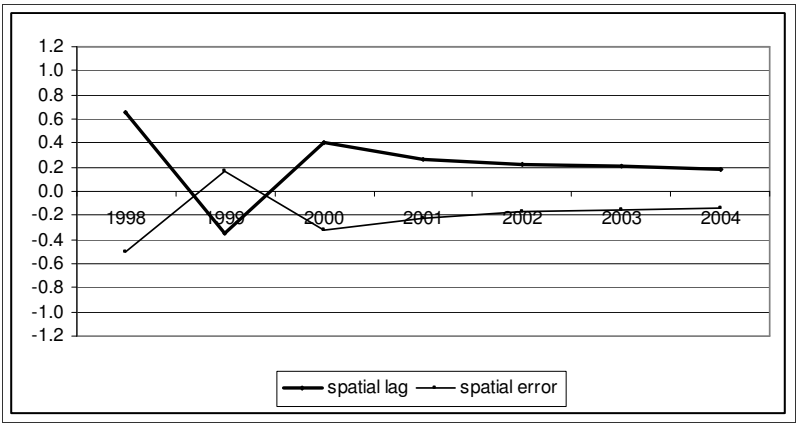
l. Puglia



m. Basilicata



n. Calabria



Most of the Regions follow the national pattern (Piemonte, Emilia Romagna, Toscana, Abruzzo, Campania, Puglia). Among them, there are the Regions with the largest density of Municipalities[26] (Piemonte) and the highest average of neighbors (Piemonte, Emilia Romagna).

A large density of Municipalities in a Region is associated to a decrease of interaction. While in Piemonte the trend is monotonic after 1999, in Lombardia the decrease is in the 'first order' electoral years only. The Regions with the lowest density of Municipalities (Toscana, Basilicata and Puglia), on the contrary, show a much slower decrease of interaction. This evidence suggests that the density of Municipalities intensifies the informational spillover, reducing mimicking and stimulating political selection.

The exceptions to this pattern are Regions Molise, Liguria and Basilicata that follow an unclear patter. The spatial coefficients obtained with the full time period (1995-2004) in those Regions are similar to those obtained with the initial time period (1994-1998) after a temporary variation in the middle of the time period analyzed. The spatial coefficients estimated in the Region Marche, on the other hand, do not converge to lower absolute values. The same unexpected pattern, however, is found in the Lazio Region that takes a median position with respect the density of municipalities and the average number of neighbors per Municipality. The presence of Rome in the Region Lazio, that is Italian's largest Municipality and the national capital, surrounded by much smaller Municipalities, may explain this rather odd result.

[26] Measured as the number of Municipalities per square kilometers. Tables A.1, A.2 and A.3 in the Appendix reports the classification of Regions by number and density of municipalities and by the average number of neighbors per Municipality.

All in all, we illustrated that the pattern of strategic interaction, contrary to what the literature says, changes over time. Consistent with the theory, Regions in which the potential informational spillover is larger are associated to a decreasing pattern of Yardstick Competition in time.

4. Concluding remarks

This Chapter analyzed the time dynamic of strategic interactions in tax competition on the dataset of the Italian municipalities from 1995 to 2004, looking for a pattern in the data. The Italian sample is an appropriate environment to conduct this analyses as it constitutes a unique "natural experiment", allowing us to observe the effect of Yardstick Competition since its introduction.

The main findings is that interactions in local tax setting do not remain stable over time. The regression analyses verified that the common assumption in the literature of an informational spillover expiring after each election is not plausible, suggesting a development of the theory in this direction.

The empirical strategy adopted uncovered the evolution of strategic interaction through time drawing a pattern of convergence of the spatial correlation coefficients towards the lowest levels of interaction. At the national level the spatial lag is always positive and the spatial error is always negative, but their absolute values decrease in the 'first order' electoral years 1999 and 2004. Those years emerge as structural breaks in the dataset, and they are the years in which more than 60% of the Municipalities held elections, and reasonably drove the national pattern of interaction. This reasoning is consistent with the view of Yardstick Competition as a mechanism to overcome the informational spillover between voters and politicians in time:

election after election, the information flow intensifies and strategic behavior becomes less likely.

Finally, the results on the geographical subsamples associate a larger effectiveness of Yardstick Competition with those Regions with the larger density of Municipalities, that is with the larger potential to create more intense informational spillovers. A rigorous analyses of this correlation and of the determinants of the decreasing pattern of interaction is an issue left for future research.

5. Appendix

Table A.1 Classification of Regions by number of Municipalities

Rank	Region	Number of municipalities
1	Lombardia	1545
2	Piemonte	1206
3	Veneto	581
4	Campania	550
5	Calabria	409
6	Lazio	376
7	Emilia-Romagna	341
8	Abruzzo	305
9	Toscana	285
10	Puglia	257
11	Marche	246
12	Liguria	235
13	Molise	136
14	Basilicata	131
15	Umbria	92

Table A.2 Classification of Regions by density of Municipalities

Rank	Region	Density of municipalities (number of Municipalities/regional area in hm2)
1	Lombardia	0.065
2	Piemonte	0.047
3	Liguria	0.043
4	Campania	0.040
5	Veneto	0.032
6	Molise	0.031
7	Abruzzo	0.028
8	Calabria	0.027
9	Marche	0.026
10	Lazio	0.022
11	Emilia-Romagna	0.015
12	Puglia	0.013
13	Basilicata	0.013
14	Toscana	0.012
15	Umbria	0.011

Table A.3 Classification of Regions by the average number of neighbors per Municipality

Rank	Region	Average number of neighbors per Municipality
1	Basilicata	6.115
2	Umbria	5.989
3	Emilia-Romagna	5.988
4	Molise	5.971
5	Piemonte	5.949
6	Marche	5.947
7	Abruzzo	5.944
8	Veneto	5.907
9	Lazio	5.891
10	Lombardia	5.860
11	Toscana	5.811
12	Campania	5.685
13	Puglia	5.533
14	Calabria	5.472
15	Liguria	5.336

Chapter 4.

Do voters learn from past experience? Yardstick Competition and political selection

1. Introduction

Yardstick Competition in local public finance is one of the proposed solutions to the agency problem between voters and politicians (Besley and Case, 1995). Yardstick Competition works as a mechanism of informational spillover in which voters benchmark the fiscal performance of their incumbent with the fiscal performance of the other incumbents in the region. When the cost of public provision is correlated among neighbors, in fact, the comparison of the tax rates set in the domestic jurisdiction and in the neighborhood reveals information about the incumbent's competence level.

In the theoretical literature, however, asymmetric information is not fully removed because the less competent incumbent still has the possibility to mimic the good incumbents' decision and be re-elected. The existence of a pooling equilibrium has been either theoretically proved (Besley and Case, 1995; Bordignon et al., 2003) and empirically tested (for a comprehensive survey see Delgado et. al, 2011). The literature emphasizes the advantage of Yardstick Competition as a constraint to the incumbents' rent during the electoral year, focusing on the incumbents' incentives to mimic (Bordignon et al., 2003; Solè Ollè, 2008; Shaltegger and Kuttel, 2002) and disregarding the effect of Yardstick Competition on voter's selection powers.

The present work contributes to the literature by calling into question asymmetric information again, investigating its persistence. Specifically, this Chapter poses the question: when

Yardstick Competition is repeated over time, is mimicking always efficient for the incumbents?

The answer is provided by considering the evolution of the informational spillover in time. The literature on Yardstick Competition assumes that the informational capital perishes every time the game is repeated and voters update their beliefs with the current fiscal information only. This setting allows the mimicking strategy to be optimal during every electoral period. In this chapter, on the contrary, we assume that the stock of information accumulates over time and the learning process of the voters is modeled as a dynamic updating of their electoral beliefs. The introduction of the longitudinal dimension of the information is crucial because it makes it possible for voters to observe the true competence level of the past incumbent, the realization of the past cost shocks and compute the correlation of the shocks among the neighbors. Once obtained these information, voters are able to infer the electoral strategy of the current incumbent.

The learning process proposed is determined by three factors: an exogenous possibility to learn, an endogenous willingness to gather information and the weight attached to past experience. This chapter shows that when past mimicking is observed and voters learn from the past, there is a range of values of the weight attached to past experience for which the less competent incumbent would not be re-elected. If voters do not observe past mimicking, on the contrary, voters do not learn and successful mimicking is always possible.

The predictions of the model are tested empirically on a dataset of Italian Municipalities. The comparative analyses of the beliefs correctly supports the hypotheses of a dynamic learning from tax rates when the updating process uses as priors the average experience and its variability in the neighborhood. When we

estimate the effect of the dynamically updated beliefs on the probability of re-election of the incumbent, however, the expected negative coefficient associated to the updated belief on the average tax rate is never statistically significant.

The rest of the paper is organized as follows. Section 2 reviews the contributions in the literature that refer to Yardstick Competition and learning. Section 3 describes the timing, the object and the exogenous conditions for learning to occur. The model is presented in Section 4, providing formal results of the effect of the dynamic learning process on selection powers. Section 5 describes the methodology, the data and the results of the empirical analyses. Finally, Section 6 concludes.

2. Related literature

Learning from tax rates has been mainly studied by the literature on local public finance. The baseline model of Yardstick Competition developed by Besley and Case (1995) shares the common view in economics that decentralized jurisdictions are 'local laboratories' in which policies are experimented and the observed outcomes determine the citizens' judgment of the policy makers (Salmon, 1987). Yardstick Competition is a mechanism of informational spillover exploited by voters to overcome the agency problem between citizens and politicians regarding the cost of public provision. Since the cost is correlated among neighbors, the relative performance of the incumbent in the region reveals information about the size of his rent seeking activity. Voters learn the true type of the incumbent only if a separating equilibrium in tax rates is observed, because the good incumbent will always set a lower tax rate level than the bad incumbent. The baseline model of Yardstick Competition, however, proves the existence of a pooling equilibrium in tax

rates when a bad incumbent observes lower tax rates in nearby jurisdictions and he experiences a positive cost shock. In such a situation the bad incumbent mimics the neighbors by setting their same tax rate, renouncing to a share of his ego rent to seek for re-election.

When mimicking occurs voters receive a deceiving signal of good competence, they update their electoral preferences with a misleading information and the incumbent's probability of being re-elected is distorted upwards. As a consequence tax mimicking advantages the bad incumbent to the detriment of voters' selection powers. The re-elected less competent incumbent, in fact, will set a tax rate higher than voters' expected tax rate conditional on good competence. The increase of voters' utility coming from the reduction of the incumbents' rent during the electoral year is offset by the decrease of voters' utility coming from the increase of the tax rate during the following term of office.

The assumptions of the model, however, are quite stringent. The prerequisite for static learning from Yardstick Competition to work is that voters gather and exploit information on the fiscal performance only during the current electoral year. This assumption is not trivial and should not be underestimated since voters' incentives to be informed are small. The change of regime, in fact, is a pure public good and the probability of being pivotal is reasonably close to zero, generating free riding concerns that discourage voters from acquiring information (Schnellenbach, 2005).

Assuming that voters obtain enough information, there is a set of exogenous conditions that make it possible a successful mimicking behavior of the bad incumbent. Bordignon et al. (2003) derived these conditions, referred to the probability of a negative cost shock q, the ratio $s=(1-\sigma)q/(1-q)$ where σ is the

degree of correlation of the cost shocks between the neighbors, the share of resources diverted into rents k, and the pooling tax rate level $t^*+\Delta$. Proposition 1 in Bordignon et al. (2003) states: *<<Suppose $q<1/2$, $s>1/2$ and $k<k^*$. Then for $\theta[\theta^*, 1)$ and $\delta[\delta^*, 1)$ there exists a unique perfect Bayesian equilibrium in pure strategies where bad type's first period choices in both economies upon observing a positive shock are $t^*+\Delta$."*>>.

Similar results have been obtained in the industrial organization literature studying learning from prices (Benabou and Gertner, 1992). Assuming strategic competition in a market with two sellers of different types selling a homogeneous good to a customer, the price is a performance indicator revealing the true type of the seller. The scholars obtained the same theoretical results as Besley and Case (1993) as the bad seller mimics the good seller by reducing the markup. What is interesting in this strand of the literature is that, contrary to the Yardstick Competition literature, it developed dynamic models of learning. Bar-Isaac (2003) proved that when learning from prices occurs in the dynamic game, only the good seller survives in the market. By similarity, in the Yardstick Competition setting only the good incumbent should find it optimal to run for re-election.

The analytical policy literature predicts that the same selection of the good type in time occurs when looking at the diffusion of policy decisions. In particular, if several policy makers face a decision and they are exposed to the same stock of information, their beliefs on the performance of the policy converge and they will select the best performing policy among the feasible set of alternatives. The contribution of this strand of the literature is the introduction of empirical methodologies to test the presence of a learning process. Meseguer (2009), in particular, developed a model that can easily be adapted to the Yardstick Competition framework. In her model a government faces a decision between

two alternative policies; he learns in light of experience and then makes rational choices. Beliefs are updated with the information about own and neighboring past experiences according to the Bayes' rule. Since every agent in the model is exposed to the same information, the performance of each policy decision is common knowledge and the learning process is stimulated. Meseguer (2009) tests the model to a sample of south-American countries during the 90s, finding that the implementation of institutional and economic reforms has been driven by a learning process consistent with her theory.

3. The dynamics of the incremental learning process

This Section expands the two-period model of Yardstick Competition developed by Bordignon et al. (2003), showing how do voters solve the problem of asymmetric information when the game is repeated.

Consider a world made of two jurisdictions. Jurisdiction i is assumed to be a neighbor of $-i$ and vice versa. The game lasts for N periods, ($t=1, 2, \ldots, N$). Each period an election is held between the incumbent and a challenger.

The utility of the voters in each jurisdiction during the period t depends on the consumption of both private (C) and public goods (g):

[1] $u_{it}^{v} = C_{it} + g_{it}$

where private consumption is the amount of income (y) net of taxes (T):

[2] $C_{it} = y_{it} - T_{it}$

The tax rate proxies the cost of the public provision of goods and services, T:

[3] $T_{it} = p_t + \theta_{it} - \varepsilon_i$

where i refers to the jurisdiction and t refers to time. T_{it} is determined by the observed national price of the public provision (p_t), and by two factors that are observed by the incumbent but not by the voters: a random cost shock (θ_{it}) and the competence level of the incumbent (ε_i). The competence of the incumbent is an individual specific characteristic, constant in time, representing a measure of efficiency in providing public goods. The incumbent in each jurisdiction may be competent (good type) or not (bad type) where competence is inversely related with the undertaken rent-seeking activity:

[4]

$$\varepsilon_i = \begin{cases} \varepsilon_H & if \quad 'good' \\ \varepsilon_L & if \quad 'bad' \end{cases}$$

such that $\varepsilon_H > \varepsilon_L > 0$ and Prob ($\varepsilon_i = \varepsilon_H$)= φ.

Substituting Equation 2 and Equation 3 in Equation 1 we obtain:

[5] $u_{it}^V = g_{it} + y_{it} - p_t - \theta_{it} + \varepsilon_i$

Esquation 5 establishes the positive relation between the electoral decision of the voters and the voters' utility.

Voters are rational agents who choose between re-electing or not the incumbent with the purpose to maximize their expected utility. Information is costly, this is why the existing models assume that voters gather information about the performance of the incumbent only before elections. Furthermore, information is now assumed to entirely depreciate every period and before the next election voters begin the process from scratch. The

performance indicator considered by voters is the domestic local tax rate applied on a non mobile tax base (the house, as an example), which is benchmarked with the neighbors' tax rate. The incumbent is aware of this inter-jurisdictional comparison, and he chooses the tax rate as a best response to the performance of his neighbors.

The good incumbent does not extract any ego rent from being in office and his tax rate depends on the cost shock realization. When a negative shock occurs ($\theta_{it}>0$), an additional amount of resources ($\Delta>0$) is needed to finance the public provision. The good incumbent thus sets $T_{it} = T+\Delta$ when the shock is negative and $T_{it} = T$ otherwise.

The bad incumbent, on the contrary, sets the tax rate to finance both the public provision of goods and services and his private rent seeking activity. As a consequence, he will always – *ceteris paribus* - set a higher tax rate than the good incumbent does. Let us define the bad incumbents' tax rate as $T_{it} = T+k\Delta$, where k is the share of additional resources diverted to rents. When the shock is positive, $k=1$; when the shock is negative $1<k\leq R$, assuming some finite upper bound to the rent extraction R, which is determined by technology constraints or the fact that the size of the rent is so high that the incumbent is unmasked[27].

The tax rate level $T_{it} = T+\Delta$ is an alternative for both the types of incumbents, the so called pooling tax rate level. When this tax rate is chosen, voters cannot infer the incumbent's competence level by observing only the current performances in the neighborhood.

[27] Assuming a Laffer curve for the rent extraction of the type $L=k\Delta+ k\Delta^2$, the value R that maximizes L is $R=1/2\Delta$. For k>R as the share of the revenue diverted to rents increases the effective rent received by the incumbent decreases.

The timing of the game is set as follows:

1. At the beginning of period t Nature selects a competence level of the incumbent (ε_i) and a cost shock level (θ_{it});

2. The incumbent in i observes his competence level and his cost shock realization and sets a tax rate;

3. Voters in i observe the tax rates (T_{it}) and (T_{-it}), the realized tax rates (T_{it-1}) and (T_{-it-1}) conditional on the past electoral decisions, then they update their beliefs on the relative competence level of the incumbent in the neighborhood;

4. At the end of period t an election is held between the incumbent and a challenger with a majoritarian electoral rule;

5. At the beginning of period $t+1$ Nature selects a cost shock and the game restarts; if the challenger has been elected his competence level is randomly selected by Nature.

Assume that during period $t-2$ the incumbent set a pooling tax rate was and was re-elected. If the conditions for a successful mimicking hold during the period t of the game, the bad incumbent in jurisdiction i sets $T_{it} = T_{it-2} = T+\Delta$. The information on the tax rates set in both i and $-i$ during both $t-1$ and $t-2$ are now available to voters. This information triggers the incremental learning process.

As a first step, by comparing the tax rates set at $t-1$ with the tax rate set at $t-2$ voters learn about their past incumbent's true type and the past neighbor's true type. Tax rates in the non electoral period $t-1$ are not strategic, therefore the bad incumbent will set $T_{it-1}=T+k\Delta$ regardless of the cost shock realization while the good incumbent will set $T_{it-1}=T+\Delta$ if the shock is negative and $T_{it-1}=T$ if the shock is positive. The tax rate decisions in period $t-1$ are shown in Table 1.

Table 1. The incumbent's tax rate strategies during period t-1 (non electoral)

	Bad i; Good –i	Bad i; Bad -i	Good i; Good -i
Ni; N-i	T+kΔ, T+Δ	T+kΔ, T+kΔ	T+Δ, T+Δ
Ni; P-i	T+kΔ, T	T+kΔ, T+kΔ	T+Δ, T
Pi; P-i	T+kΔ, T	T+kΔ, T+kΔ	T, T
Pi; N-i	T+kΔ, T+Δ	T+kΔ, T+kΔ	T, T+Δ

Note: N=negative cost shock, P=positive cost shock; i refers to the domestic jurisdiction, -i to the neighbor(s).

If voters in *i* observed an increase of the tax rate from the past electoral to the past non electoral year, $T_{it-1} > T_{it-2}$, they know for sure that the incumbent mimicked at *t-2* and he is the bad type ($\varepsilon_i = \varepsilon_L$). Otherwise, if they observe $T_{it-1} < T_{it-2}$ they infer that the past incumbent's true type is good ($\varepsilon_i = \varepsilon_H$).

Voters know that the cost shock is spatially correlated in the region, according to the socio-economic interdependence of the jurisdictions[28]. The degree of correlation among neighbors is allowed to change over time but slowly and monotonically, that is either increasing or decreasing, but keeping the same sign. This assumption is reasonable because the technological interdependence between neighboring economies is based on the geographical nearness, common natural resources, possible joint

[28] As an example, the cost of streets maintenance depends on weather conditions which are similar among neighbors, but the cost is unknown to laymen because the extent of the damage is difficult to gauge without expertise. Moreover, while the local government controls the whole territory of the jurisdiction, voters reasonably have not enough information on every street condition.

public provision and other factors which are unlikely to unexpectedly change the correlation.

The cost shock is specified as:

[6] $\theta_{it} = \sigma\theta_{-it}$

where σ is a correlation parameter, $\sigma=(-1,1)$.

Given this setting, during the period *t-2* voters ignore θ_{it-2} and ε_i. In period *t-1* the tax rates set reveal the strategy played by of the incumbent, the past cost shocks θ_{it-2} and θ_{-it-2}, and voters infer σ. The true type of the incumbent is correctly observed during period *t-1* only if a pooling equilibrium occurred at *t-2* and the good incumbent experiences a positive cost shocks during period *t-2*. In fact, this is the only situation in which all the three tax rates are observed: $T+\Delta$ at *t-2*, T and $T+k\Delta$ at *t-1*. Hence, voters recognize the true type of the incumbent with no doubt. The conditions for the disclosure of σ are stated in Lemma 1.

Lemma 1*: "Voters infer the value of θ_{it} and θ_{-it} and the spatial correlation parameter σ only if mimicking occurred during period t-2 and the good incumbent experienced a positive shock during period t-1"*

As shown in Table 2, Lemma 1 holds in five cases over twelve.

Table 2. The tax rates in period t-1 *and Proposition 1.*

	Bad-Good	*Bad-Bad*	*Good-Good*
NN	Does not hold	Does not hold	Does not hold
NP	Holds *	Does not hold	Holds *
PP	Holds *	Does not hold	Holds *
PN	Does not hold	Does not hold	Holds *

N=negative cost shock, P=positive cost shock; the first letter (or word) refers to i, the second to –i; starred cells indicate the cases in which Lemma 1 holds.

During the next electoral period, *t*, voters know the cost shock correlation between the economies. If they observe a pooling equilibrium again, they are now able to infer the electoral strategy of the pooling incumbent. If the correlation is positive, in fact, the similar fiscal decision is explained with a similar cost shock. Vice versa, if the correlation is negative the incumbent is behaving strategically. This mechanism of learning is stated in Proposition 1.

Proposition 1. *If σ is positive both the neighbors incumbents are competent and faced a negative cost shock, and the pooling incumbent is competent; otherwise, the neighbors incumbents face opposite cost shocks and the pooling incumbent is mimicking.*

When Lemma 1 holds, the bad incumbent would not find it optimal to mimic the good incumbent behavior not anymore because he would be unmasked and his strategic behavior would not increase his probability of being re-elected. As a consequence, a separating equilibrium would be observed. Eventually, the bad incumbent would not run for re-election and renounce to his future ego rent. On the contrary, if the bad incumbent is not aware of the voters' learning process he would mimic the good neighbors, but this time he will be unmasked and turned down. In both cases, the electoral competition would select only competent incumbents in time and entail an improvement in the quality of the political class.

The incremental learning entails an improvement of political selection with respect to the baseline model of static learning from tax rates. Graph 1 illustrates this result by depicting the graphical solution of the model by Besley and Case (1995). The

cost shock level is measured on the horizontal axis while the tax rate level is measured on the vertical axis[29].

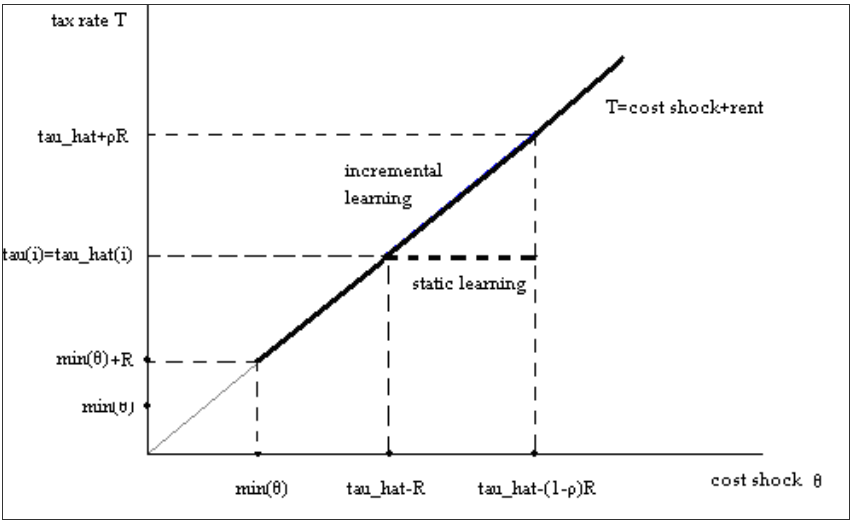
When the cost shock assumes values too low or too high a separating equilibrium arises because the bad incumbent can either signal good competence while maximizing his ego rent (low cost), or he finds it too costly to seek for votes and he sets the highest tax rate no matter the electoral consequences (high cost). The tax function in this situation is a positive sloping line depending on the cost shock level and the amount of rent diverted *R*. When the cost shock takes intermediate values, the bad incumbent faces a trade off between vote seeking and rent seeking. The horizontal dotted segment of the tax function represents the mimicking tax level set to signal good competence to voters.

When the incremental learning process occurs, on the contrary, successful mimicking becomes much more difficult to implement because voters learn the degree of economic integration with the neighbors and they infer the incumbents' strategy. The bad incumbent running for re-election would not find it optimal to behave strategically because he would renounce to a share of rent without increasing the probability of re-election. As a consequence a separating equilibrium will be observed also for intermediate values of the cost shock. In the Graph below, this result is represented by the bold continuous segment of the tax function. The same segment indicates the interval of values for

[29] The model of Besley and Case (1995) assumes a positive cost shock taking different values, while the model of Bordignon et al. (2003) assumes a positive/negative cost shock of given magnitude. Both the models lead to similar results regarding the spatial interaction of the fiscal decisions and the electoral concerns underlying the mimicking strategy. The notation in this paper refers to Bordignon et al. (2003), but since the most popular illustration of Yardstick Competition is the one by Besley and Case (1995), we decided to present this Graph.

which selection powers are enhanced and Yardstick Competition is effective in improving accountability at the local level.

Graph 1. Dynamic learning and bad incumbent's tax rate decision



Note: tau_hat: highest tax rate still granting re-election; R=ego rent; ρ=share of ego rent to which the incumbent renounces.

4. A model of incremental learning from tax rates

4.1 The learning function

Voters are rational agents that during the electoral period maximize the following inter-temporal utility function:

[7]

$$V_t(\varepsilon_i) = \max_j \left(u_t^V(T_t) + \beta\left(I_L * V_{t+1}^{VI}(\omega_t) + (1 - I_L) * V_{t+1}^{VI}(\mu_t) \right); u_t^V(T_t) + \beta(V_{t+1}^{VC}) \right)$$

The present utility of the voters u_t^V depends on the tax rate T_t, as already stated in Equation 5. The future utility is discounted

according to the factor $0<\beta<1$, and it depends on the politician in office during the next period. Specifically, V_{t+1}^{VI} is the expected utility from re-electing the incumbent while V_{t+1}^{VC} is the expected utility from electing the challenger. The expected performance of the incumbent is updated according to his observed fiscal performance. When the incremental learning occurs the updated beliefs consider both the present and the past performance (ω_t); otherwise, they consider only the present information (μ_t).

The mechanism of updating of the voters' beliefs depends on the completion of the incremental learning process. For this purpose the indicator function I_L has been introduced. When I_L = 1 the incremental learning function has been maximized and voters learn from past experience. For I_L = 0, on the contrary, incremental learning does nor occur and the static updating of the existing model of Yardstick Competition is restored. Given a pooling equilibrium during period *t*, this means that the bad incumbent will be re-elected as long as successful pooling is feasible.

The incremental learning is modeled as a function *L* assumed to be bounded between zero and a maximum value $\overline{L}$, and it depends on both the feasibility of learning ($1 - q_{t-1}$) and the probability of gathering enough information (π). These two factors represent respectively the rational ignorance (Downs, 1957) and the rational irrationality (Caplan, 2007) hypotheses on voters' behavior. The two factors are independent from each other, e.g. a variation in the propensity to learn does not affect the realization of the cost shock and vice versa. Hence, *L* can be expressed as a product function:

[8] $L_t = (1 - q_{t-1})\pi$

The feasibility of the incremental learning refers to the conditions stated in Lemma 1: if they do not hold, any information is useful in inferring the incumbent's strategy. As a pooling equilibrium is observed during the first period of the game, the respect of Lemma 1 relies on the realization of a positive cost shock in the neighborhood at *t-1*. Defining $0 \leq q_{t-1} \leq 1$ as the probability of the realization of a negative cost shock at *t-1* in the jurisdiction governed by the good incumbent, incremental learning is a decreasing function of q_{t-1}. As it shows, the feasibility of the incremental learning is a factor exogenous to the model because voters' decisions cannot affect it. However, as pointed out, it is a necessary condition for the process to work.

The probability that voters gather enough information to learn, π, is indeed an endogenous factor shaping *L*. Incremental learning requires a stock of information P^* including the tax rates set in the neighborhood during each period and the probability π depends on the propensity to gather the sufficient information. Voters are rational agents and they acquire new information when costs are no larger than benefits. The costs of obtaining information are represented by the marginal cost of obtaining both the domestic and the neighbors' tax rate information. The marginal cost of observing the domestic tax rate is assumed to be small and constant, since a tax rate is a piece of information that the government must periodically release and make visible to claim its payment. The marginal cost of observing the neighbors' tax rate, on the contrary, is supposed to increase depending on the size of the neighborhood. The information spillover created by the inter-jurisdictional comparison of citizens, however, may generate economies of scale in the diffusion of the information. Following this alternative reasoning the marginal cost of the information decreases as the number of neighbors increase. Finally, there is a cost attached to the action of retaining

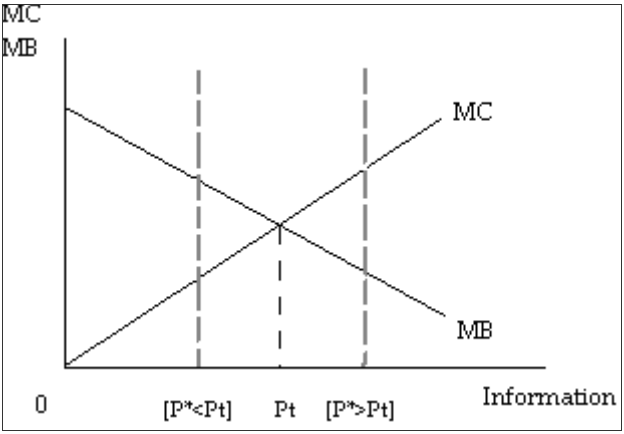
information, implying the effort of storing information in memory and being able to recall it when an election is approaching. The marginal information needs a larger memory capacity, therefore its cost increases with the size of the information stock retained.

The marginal benefit of being informed, on the contrary, is determined by the difference between the realized fiscal performance of the past incumbent during his second period of office, T_{t-1}, and the updated belief of the fiscal performance before his re-election, $E(T_{t-1})$. To understand the reason for this specification, assume that the realization of the tax rate set by the past incumbent is higher than its expectation. Voters infer if the incumbent was strategic (bad) during the first period and they attach a larger marginal benefit to new information if compared with a situation in which the incumbent was non strategic (good). In other words, voters find it more convenient to improve their monitoring powers when they realize that their past beliefs have been mistaken and they become more prone to obtaining new information to correct them in time. The slope of the marginal benefit curve is assumed to be negative because voters may come out with a clear idea about the incumbent after having acquired the first pieces of information. In such a situation, the utility from the marginal information decreases.

Graph 2 depicts information (quantitatively measured) as a function of the marginal cost and the marginal benefit of gathering information. When the cost is larger than the benefit, voters do not to search for new information. When the benefit is larger than the cost voters find it profitable to gather new information up to the critical level P_t pinned down by the intersection of the two curves. The quantity P_t represents the maximum amount of information that voters would gather given the shape of the cost and benefit curves. The probability that

voters obtain enough information to learn is the probability that P_t is at least as large as a critical value P^*, $\pi = Pr\ (P_t \geq P^*)$.

Graph 2. Costs and benefit of gathering information



The function L is maximized when the conditions π=1 and q_{t-1}=0 jointly hold. On the contrary, if π=0 or q_2=1, that is if voters do not want or they cannot learn, incremental learning does not occur.

4.2 Voting decision and mimicking

Voters' expectations about the fiscal performance of the incumbent at *t+1* are:

[9]

$$E(T_{t+1}) = \rho E(T_{t+1})_{t-1} + (1-\rho)T_t$$

The electoral belief, updated with both present and past information, is:

[10] $\omega_t = \rho\mu_{t-1} + (1-\rho)\mu_t$

Where $0<\rho<1$ is the weight attached to past experience, μ_{t-1} is the updated belief at time *t-1* and μ_t is the updated belief at time *t*.

The mimicking incumbent is re-elected if the pooling tax rate successfully signals good competence to voters and the updated belief about his competence level is larger or equal the prior belief φ:

[11] $\rho\mu_{t-1} + (1-\rho)\mu_t \geq \varphi$

The belief μ_{t-1} reveals the past incumbents' true type and it is computed as the statically updated belief at *t-1*: $\mu_{t-1} = f(\varphi_{t-1}, T_{i,t-1}, T_{-1,t-1})$.

Define:

[12] $$\mu_{t-1} = \begin{cases} \geq \varphi \rightarrow \mu^G & \textit{if the past incumbent was good} \\ < \varphi \rightarrow \mu^B & \textit{if the past incumbent was bad} \end{cases}$$

with $\mu^G > \mu_t > \mu^B$. This condition reflects the fact that voters know the past incumbents' true type with certainty, while they cannot be sure of the correctness of their present belief, therefore they never consider the extreme values of the scale of competence.

If the updated beliefs during period *t* are the same as in period *t-1* ($\mu_{t-1} = \mu_t \equiv \mu$), Equation 10 states that the dynamically updated beliefs equal the statically updated beliefs ($\omega_t = \mu_t$) and the model comes back to the baseline static signaling model. Following the literature, successful mimicking is possible only under the conditions stated by Bordignon et al. (2003). In fact, Equation 11 would lead to the condition:

[13] $\mu_t \geq \varphi$

If the updated beliefs during period *t* are different from the updated beliefs at period *t-1* ($\mu_{t-1} \neq \mu_t$), the parameter ρ becomes crucial.

In particular, if the past incumbent was the good type, substituting $\mu_{t-1} = \mu^G$ in equation 11 and solving it, we get:

[14] $$\rho \geq \frac{\varphi - \mu_t}{(\mu^G - \mu_t)}$$

The right hand side of Equation 14 is negative. The numerator is negative since the pooling tax rate observed during period *t* signals good competence and $\mu_t \geq \varphi$ indicates that successful mimicking is feasible if voters update their beliefs statically; the denominator is positive because $\mu^G > \mu_t$ by definition. Since ρ is bounded between zero and unity, the inequality in [14] always holds. Following the same reasoning we obtain the condition for the pooling incumbent not to be re-elected at time *t* conditional on a good incumbent at time *t-1*:

[15] $$\rho < \frac{\varphi - \mu_t}{(\mu^G - \mu_t)}$$

Equation 15 never holds for the same motivations explained above. As a consequence, when the past incumbent was good successful mimicking at time *t* can always occur because voters are faced with a history of efficient signaling.

On the other hand, if the past incumbent was the bad type and he mimicked, substituting $\mu_{t-1} = \mu^B$ in Equation 12 we get the condition:

[16] $$\rho \leq \frac{\varphi - \mu_t}{(\mu^B - \mu_t)}$$

The pooling incumbent at time *t*, conditional on a good incumbent at time *t-1*, is not re-elected if:

[17] $$\rho > \frac{\varphi - \mu_t}{(\mu^B - \mu_t)}$$

The right hand side of Equation 16 and Equation 17 is positive because $\mu^B < \mu_t$ by definition and also the denominator of the ratio is negative. Being ρ bounded between zero and unity, the weight attached to past experience plays now a crucial role in determining the electoral success of the mimicking strategy.

Table 3 illustrates all the possible outcomes of the dynamic game.

Table 3. Conditions for successful mimicking in the dynamic game

Period: t-2	*Period: t-1*	*Period: t*
Incumbent/ Challenger electoral competition	Challenger/ Challenger electoral competition	Incumbent/ Challenger electoral competition
- Pooling tax rates observed - Beliefs statically updated	-Term limited incumbent -Competence level is revealed	
- $\mu_1 \geq \varphi$ the incumbent is re-elected	Good incumbent: $\mu_2 = \mu^G$	Incumbent reelected if: $\rho \geq \frac{\varphi - \mu_t}{(\mu^G - \mu_t)}$
		Incumbent reelected if: $\rho < \frac{\varphi - \mu_t}{(\mu^G - \mu_t)}$ (Condition not feasible)
	Bad incumbent: $\mu_2 = \mu^B$	Incumbent reelected if: $\rho \leq \frac{\varphi - \mu_t}{(\mu^B - \mu_t)}$
		Incumbent not reelected if: $\rho > \frac{\varphi - \mu_t}{(\mu^B - \mu_t)}$

The formal conditions for successful mimicking in the dynamic game are summarized in Proposition 2.

Proposition 2. *"When mimicking was not observed in the past, the contribution of past experience on voters' updated beliefs does not affect the conditions for a successful mimicking in the present. When mimicking was observed in the past, successful mimicking in the present is feasible only if, in addition to the conditions for a successful mimicking with statically updated beliefs, the inequality* $\rho \leq \frac{\varphi - \mu_t}{(\mu^B - \mu_t)}$ *holds."*

As a conclusion, the theory suggests that when Yardstick Competition is repeated over time and voters consider past experience in forming their electoral beliefs, the probability that a bad incumbent mimics the good incumbent and he is re-elected decreases as the weight attached to the past mimicking experience increases.

5. An empirical test of the dynamic learning from tax rates

5.1 Italian Municipalities: institutional setting, accountability system and Yardstick Competition

Municipalities are the lowest tier of government in Italy, and they are a suitable framework for an empirical test of dynamic learning from tax rates. In the early 1990s, in fact, an institutional reform introduced a link of local accountability by implementing tax decentralization and by reforming the electoral rule. This newly established setting represents a favorable framework for Yardstick Competition to arise.

The local property tax rate (*ICI, Imposta Comunale sugli Immobili*), introduced in 1993, increased the tax autonomy of local

governments and in the period 1993-2007 it accounted for more than 55% of total Municipality revenue and more than 25% of local expenditure. *ICI* is a highly autonomous tax rate, specifically a level '*b*' in the *OECD* tax autonomy scale ranging from *'a'* to *'e'* (*OECD*, 1999). The previous setting was characterized by the lowest degree of tax autonomy, the level *e*, being the tax rate and the tax base both set by the central government. In 1995 the tax rate has been differentiated between the house tax rate applied to the main living property and the business tax rate applied to holiday houses, offices, shops, and so on. Local house property taxation accounts only for 6% of local tax revenues, but it is a cost that voters directly link to the house and makes it clear to the citizens the relationship between the costs and the benefits of local public services in a certain jurisdiction. In addition to this, more than 80% of the residents in Italy are home-owner[30], making the local house tax rate the main indicator of jurisdictional performance. Since the tax base is fixed and property value reassessments are nationally implemented, local autonomy is restricted to only one dimension, the tax rate level. The tax rate can be set in a range between 4‰ and 7‰. Although the tax interval is small, a marginal variation of the tax rate determines a consistent variation in the per capita tax paid by the citizen and in the overall tax revenue[31]. Moreover, the single dimension of the decision makes it easier for the voters to exploit this information when forming their voting preferences.

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[30] Source: ISTAT, *L'abitazione delle famiglie residenti in Italia - Anno 2008*, published in Spring 2010.

[31] The average value of the house properties in Italy was 182000 euro in 2008 (source: Dipartimento delle Finanze and Agenzia del Territorio, *Gli Immobili in Italia,* published in 2010). Using this value as a proxy for the tax base of *ICI*, a marginal variation in the tax rate leads to a variation of 182 euro of the individual tax burden. In turn, this amount accounts for a 7‰ of the he average yearly income of an employee in 2009 (ISTAT).

Regarding election, the Italian local electoral rule has been reformed in 1993 from proportional to majoritarian, introducing the direct election of the mayor according to the plurality rule in Municipalities with less than 15000 inhabitants (9% of the total number of Municipalities) and according to the majority rule with runoff elections in the others. The local legislature has been extended in 1999 from four to five years, and a two term limitation has been introduced. In case of motion of no confidence both the mayor and the council must resign and new elections are held. Because of the early fall of many executives in the past Italian Municipalities hold elections in different years. There is, however, a concentration of local elections in 1995, 1999 and 2004, when more than 60% of the jurisdictions are called to the ballot.

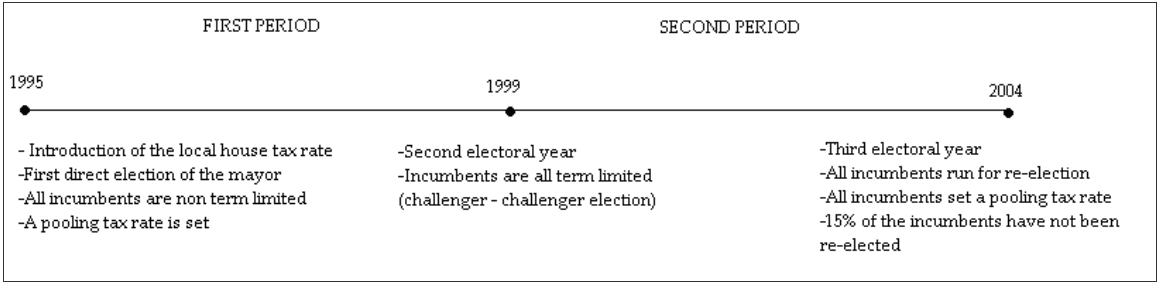
The data used for the empirical estimation come from a comprehensive dataset of Italian Municipalities (Padovano, 2007). The considered observations are those 227 Municipalities meeting the following requirements:

- They are members of the cohort of Municipalities that held local elections in 1995, 1999 and 2004;
- The local house tax rate set in 1995 was at most equal than the average tax rate set by its neighbors (defined as a 'pooling' tax rate);
- The local house tax rate set in 1999 was higher than the average tax rate set by its neighbors (defined as 'non pooling' tax rate);
- The incumbent ran for re-election in 2004;
- The local house tax rate set in 2004 was at most equal than the average tax rate set by its neighbors ('pooling' tax rate).

As the following graph shows, the selected observations in 2004 are in their third electoral year since the fiscal and electoral local system has been reformed, and they belong to a cohort of jurisdictions experiencing two full local legislatures (1995-1999, 1999-2004). Among them, in 2004 the incumbent was defeated in 33 Municipalities (about the 15% of the sub-sample) while in the remaining 194 Municipalities he was re-elected.

There is evidence of strategic tax setting among Italian Municipalities, as studied by Bordignon et al. (2003), Padovano (2008), Santolini (2007), Bartolini and Santolini (2009). The model in Section 4 predicts that, election after election, voters learn the incumbents' strategy and they can correctly update their voting preferences. As a consequence, Yardstick Competition decreases over time. The next paragraph tests this hypothesis.

Graph 3. Electoral dynamics of the 227 Municipalities in the dataset



5.2 Empirical methodology

The methodology applied stems from the model of learning from economic policies by Meseguer (2009). This section adapts the original cross-countries economic policy decision setting to the sub-national electoral decision setting.

The analyses includes three-steps:

1. calculation of the posterior beliefs using dynamic Bayesian updating;
2. comparison of posterior beliefs conditional on the voting decision;
3. regression estimation using the voting decision as dependent variable and the updated beliefs as independent variables.

For a clear presentation of the analyses and its results, the following sub-paragraphs deal with the three steps separately.

5.2.1 First step: posterior beliefs

During the electoral period voters observe both the past and present fiscal performance of the incumbent in the domestic and the neighboring jurisdiction, and they update their electoral beliefs according to this information.

The dynamic update of the beliefs implies the following setting. Assume the fiscal performance T to be a random variable normally distributed with an unknown mean M and an unknown variance V. M and V are random variables, and voters learn them by observing the performance of other incumbents under alternative past voting decisions j. The conditional distribution of the mean is Normal while the conditional

distribution of the variance is scaled-Inverse X^2. The decision of these distributions is a classical assumption in Bayesian updating and allows the mean and the variance to be interdependent. Formally,

[18]

$$T_j = N(M_j, V_j)$$
$$M_j = N(m_j, \sigma_j^2 / \tau_j)$$
$$V_j = ScaledInv - \chi^2(v_j, \sigma_j^2)$$

Where m is the location of the mean, σ_j^2 / τ_j is the variation of the mean, v are the degrees of freedom and σ_j^2 is the scale of the variance, τ is the factor that relates the prior variance of the mean to the sampling variance.

During the period t the information available to voters is $T_t^j \mid j$, the performance of the incumbent under alternative voting decisions for all the jurisdiction that re-elected ($j_t = 1$) or did not re-elect ($j_t = 0$) the incumbent during the period t-2. The information is assumed to be a random variable independent and identically distributed. Hence, the sample mean and the sample sum of squares are sufficient statistics to summarize the information in the sample of countries under each of the alternative voting decisions. When prior beliefs are combined with new information, by applying the Bayes' rule the posterior belief about the mean of the tax difference is[32]:

[19] $\omega_t = \rho\omega_{t-1} + (1-\rho)\bar{x}_t$

[32] For a detailed description of how to obtain this result, see Meseguer (2009), Appendix to Chapter 2.

where $0<\rho<1$, ω_2 is the updated belief on the performance of the past incumbent at the end of *t-1*, $\bar{x}_3$ is the current observed performance of the incumbent and $\omega_{t-1}=\mu_{t-1}$ if *t-1* is the first year for which data are observed in the dataset.

The posterior belief about the variation of the tax difference is:

$$[20]\quad s^2_3=\frac{S_3}{v_3}$$

where S_3 is the posterior for the sum of squares, and v_3 is the posterior for the degrees of freedom.

As Equation 19 shows, although extreme values of ρ are ruled out, when that parameter is close to zero the past experience has a negligible influence on the updating process and voters hardly learn the determinants of the public cost function; vice versa, when ρ tends to one the belief hardly takes into account new information.

When the electoral rule prescribes a term limitation, the past incumbent is a different person than the current incumbent and voters may find it useless to gather information. Competence is in fact an individual specific characteristic, and if voters believe that the electoral strategy of the past incumbent does not affect the electoral strategy of the current incumbent in any possible way, ρ is close to zero. The probability that the current incumbent is strategic, however, is not independent from the probability that past incumbents have been strategic. If a bad incumbent knows that his predecessor mimicked and he was re-elected (incumbents know the performance of the past incumbents), it is likely that he would play the same strategy, especially if the correlation between the economies does not change significantly in the short period. As a consequence, voters always gain positive utility from the marginal information

since that is the only way to come out with a distribution of the type of the past pooling incumbents.

In the empirical analyses several sets of priors have been used to calculate different updated beliefs. The first set considers as priors the average of the tax difference in the dataset and its variability, measured as the standard deviation from the possible interval of values of the tax difference. The tax difference is measured as the difference between the domestic tax rate and the average tax rate in the neighborhood. This set of priors (*UPTD*) is closer to the specification of the model presented in this paper, but since the literature on Yardstick Competition focuses separately on the domestic and the neighbors' tax rate, alternative sets of priors have been investigated.

The alternative sets of priors calculate updated beliefs with respect to the average and the variation of the domestic tax rate, taking as priors the average and the variation from the possible interval (*UP1*) or from the average and the variation from the observed values in the neighborhood (*UP2*).

Summary statistics for the posterior point estimates for the location and the scale are reported in Table 4.

Table 4. Posterior beliefs using different sets of priors

	Priors	*Obs*	*Mean*	*Std. Dev.*	*Min*	*Max*
Updated average, μ	UPTD	227	-0.504	0.372	-1.696	0.159
Updated variance, s		227	0.497	0.741	0.000	5.768
ϱ		227	0.353	0.022	0.333	0.43
1-ϱ		227	0.647	0.022	0.573	0.67
Updated average, μ	UP1	227	4.776	0.477	4.000	5.880
Updated variance, s		227	0.894	0.953	0.000	2.638
ϱ		227	0.364	0.026	0.333	0.4
1-ϱ		227	0.636	0.026	0.595	0.67
Updated average, μ	UP2	222	4.769	0.485	4.000	5.878
Updated variance, s		222	0.331	0.273	0.020	2.024
ϱ		223	0.351	0.012	0.334	0.41
1-ϱ		223	0.649	0.012	0.594	0.67

Note: UP1: beliefs on the tax rate updated with domestic priors; UP2: beliefs on the tax rate updated with neighborhood priors; UPTD: beliefs on the tax difference updated with domestic priors.

The mean updated domestic tax rate using the sets of priors *UP1* and *UP2* is about 4.77 (the tax rates are scaled between 4 and 7), but the variation is smaller when using the set of priors exploiting the neighbors' information. These figures suggest that benchmarking the domestic performance with the neighboring performance provides voters with a more precise expectation of the future performance.

When voters' belief are updated with the priors on the tax difference, μ ranges from -1.696 to 0.159, with a mean negative tax difference of -0.504. These figures indicates that in some Municipalities voters expect a bad performance (positive tax difference) and in other Municipalities they expect a good performance (non positive tax difference).

From these results we can also see that the contribution of past information to the updating process is stable at about 35% regardless the specification of the priors. These results for ρ is interpreted as if voters form their electoral beliefs taking into account both the current incumbents' performance and the past performance. Meseguer (2009) argues that a low value of ρ indicates that the learning process has already occurred, while a high value tells that new information is still relevant for voters and in time they will complete the learning. We can comment that a learning process started in the analyzed sample, but we cannot say if this is the level of ρ that grants re-election. Consequently, to answer the question if a learning process took place or not we need to proceed in the analyses.

5.2.2 Second step: comparison of posterior beliefs

Table 5 reports the posterior beliefs conditional on the voting decision.

The comparison of the updated beliefs on the tax levels does not support the learning hypotheses since the level of the posterior belief about the performance of the incumbent re-elected in 2004 is always higher than those associated to the incumbent non re-elected in 2004.

The results regarding the variation of the updated beliefs disaggregated by the incumbent status indicate as expected that the re-elected incumbent is always associated with a smaller or equal variation than the non re-elected incumbent. An explanation for these results is that voters behave as risk adverse agents and prefer fiscal stability than the lowest tax rates.

Table 5. Posterior beliefs conditional on voting decision

re-elected incumbent in 2004				*not re-elected incumbent in 2004*			
Variable	*priors*	*Obs*	*Mean*	*Variable*	*priors*	*Obs*	*Mean*
Updated average, μ	UPTD	194	-0.50	Updated average, μ	UPTD	33	-0.53
Updated variance, s		194	0.49	Updated variance, s		33	0.55
Updated average, μ	UP1	194	4.79	Updated average, μ	UP1	33	4.71
Updated variance, s		194	0.89	Updated variance, s		33	0.89
Updated average, μ	UP2	189	4.78	Updated average, μ	UP2	33	4.71
Updated variance, s		189	0.33	Updated variance, s		33	0.35

At this stage of the analyses it is interesting to perform a comparison based on the history of voting decision. If a learning process occurred we expect that the average updated beliefs in the jurisdictions switching from re-election in 1995 to not re-election in 2004 (coded as *´RNR´*) should be higher than the updated beliefs in the jurisdictions that re-elected the incumbent in 2004 (coded as *´NRR´*). The summary statistics in Table 6 support this hypothesis only when the updating process exploits the set of priors *UP2*, (column 8). This figure suggests that a learning process have occurred if voters updated their beliefs based on the tax rate performance benchmarked with the neighborhood.

Table 6. Comparison of posterior beliefs with respect to the history of voting decisions

						RNR>NRR
Variable	*priors*	*RR*	*NRR*	*NRNR*	*RNR*	*Column 8*
Updated average, μ3	UP1	4.792	4.775	4.507	4.769	FALSE
Updated variance, s3		0.895	0.893	1.324	0.748	FALSE
Updated average, μ3	UP2	4.785	4.763	4.506	4.769	**TRUE**
Updated variance, s3		0.326	0.337	0.634	0.253	FALSE
Updated average, μ3	UPTD	-0.493	-0.521	-0.560	-0.525	FALSE
Updated variance, s3		0.467	0.559	0.796	0.473	FALSE
Observations		*150*	*44*	*8*	*25*	

Notes: Rr=re-elected in both 1995 and in 2004; Nrr=not re-elected in 1995 and re-elected in 2004; Rnr=re-elected in 1995 and not re-elected in 2004; Nrnr = not re-elected in both 1995 and in 2004. 227 total observations.

5.2.3 Third step: regression estimation

This Section estimates the effect of the voters' beliefs updated according to the incremental learning process on the re-election probability of the incumbent[33].

[33] The regression estimation of this Section differs from the one of Meseguer (2009). Meseguer, in fact, estimates a learning process from the past experience of the neighbors, while here we estimate the learning from past own experience. Learning from the past experience of the neighbors does not match the predictions of the incremental learning from tax rates proposed in this

The function estimated is:

[21] $j_t = \beta_1 \mu_t + \beta_2 s_t + \beta_3 X_t + \xi_t$

where j=(0,1) is the re-election dummy, μ is the dynamically updated beliefs on the average, s is the dynamically updated belief on the variance, X is a vector of covariates and ξ is the disturbances term.

The empirical predictions are that β_1 and β_2 should be significantly negative because both a high average and a high volatility of the fiscal performance reduce the voters' utility. A large mean of the tax difference is associated with an incumbent extracting rent, while a large volatility of the tax difference is associated with an ambiguous fiscal outcome. If voters are risk averse and they prefer certainty of policy outcomes rather than uncertainty, also β_2 is expected to be negative.

When the incremental learning process does not take place, updated beliefs on the tax difference do not have a negligible influence on the decision to re-elect the incumbent. If this occurs, the coefficients in Equation 21 will be not statistically significant.

Table 7 presents the marginal effects estimated from a probit model without covariates (Model 1-3) and with covariates (Model 4-9).

The explanatory variables included consider those factors that may explain the variation in the dependent variable. The political affiliation of the government (*right wing dummy*) controls for the ideological bias of the voters, while the unemployment rate lagged one period (*unemp lag*) controls for the state of the economy (Paldam and Nannestad, 1994). Finally, the lagged popularity of the incumbent (*popularity lag*), measured

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Chapter; moreover the structure of the available dataset does not allow to conduct that type of analyses.

as the share of votes obtained during the previous election, controls for an eventual persistent shock or the presence of an autoregressive process in the popularity of the elected mayors.

The variables of interest are the updated belief on the average (μ)and the variability (s) of the fiscal performance of the incumbent. The set of priors *UP1*, *UP2* and *UPTD* have been alternatively used to investigate the fit of each updating process.

The fit of the model is very limited, and the coefficients do not show a high degree of significance. The coefficients on the variables of interest are significant only when using the priors UP1, but the signs are unexpectedly positive. In all the other specifications, the coefficients are non significant and updated variability is negative only in Models 2 and 3. These results indicate that a incremental learning process did not occur in the dataset analyzed, suggesting a pattern opposite to the one predicted by the model.

Table 7. Dynamic learning from tax rates, probit regression, marginal effects

	Model 1	p	Model 2	p	Model 3	p	Model 4	p	Model 5	p	Model 6	p
	UP1		UP2		UPTD		UP1		UP2		UPTD	
μ UP1	0.364	**					0.379	***				
s UP1	0.162	**					0.180	***				
μ UP2			0.041						0.029			
s UP2			-0.006						0.009			
μ UPTD					0.028						0.035	
s UPTD					-0.001						0.006	
Right wing							-0.052		-0.062		-0.065	
Unempl lag							-0.398		-0.180		-0.135	
Popularity lag							0.075		0.081		0.065	

Note: dependent variable is a binary variable equal to one if incumbent re-elected in 2004 and zero otherwise.

6. Concluding remarks

The political economics literature recognized that the re-election mechanism is an imperfect device to select good politicians when the candidate incumbent exploits information advantages and behaves strategically. This chapter investigated the persistency of asymmetric information in the Yardstick Competition model when information spillovers accumulate over time.

The model presented suggests that the less competent incumbent cannot successfully mimic the most competent incumbent when mimicking occurred in the past and voters accumulate information over time.

The predictions of the model are tested empirically on a dataset of Italian Municipalities, estimating the effect of the dynamically updated beliefs on the probability of re-election of the incumbent. The results reject the presence of a voters' learning process in the data because the regression coefficient associated to the variable of interest are positive when significant.

These results may be explained with stringency of the set of conditions necessary for an incremental learning to occur, as the exogenous conditions on the cost shock realization that may have not occurred in the real world. Another limitation of the dataset is the length of the legislature, 5 years, that may incentivize the dispersion of information from one election to the next one.

This paper represented the first attempt at analyzing the consequences of Yardstick Competition on political selection in time, therefore its nature and the unsatisfactory empirical results call for future research. In particular, it should be useful to investigate the effect of different stock of information on learning, as the whole term fiscal performance of the candidate

incumbent or exploit alternative datasets characterized by shorter legislatures.

Chapter 5.

Asymmetric information and Political Budget Cycles: the effect of the local diffusion of newspapers

1. Introduction

The economic literature on the Political Budget Cycles associates this phenomenon to unobservable policy making decisional processes. The state of the art is summed up with the expression 'the cycle is where you can't see it' (Alt and Lassen, 2006). The questions that the present work poses is: does an increased diffusion of newspapers reveals the cycle by providing information about the fiscal decisional process? Is specific press more informative than generalized press? Which items of expenditure are more influenced by the diffusion of newspapers?

The relevance of these questions is based on the role of the diffusion of information in the generation of electoral cycles. In the baseline model of Political Budget Cycles (Rogoff, 1990) the incumbent has an informational advantage over voters regarding his competence level and the true cost of public provision. Voters infer the incumbents' unobservable competence level by observing his fiscal decisions, and based on this information they choose whether to re-elect him or not. The fiscal manipulation before the election is a signaling device; Aidt el al. (2011) proved the existence of a separating equilibrium in which only the good incumbent has the opportunity to increase his probability of being re-elected by generating a cycle.

Information is a crucial element in the model because it produces the incentive to generate a cycle but it also determines the effectiveness of the signal by either increasing the visibility of the

fiscal decision or clarifying the process leading to the decision or both. In the literature more information leads to more aware voters. Political economists found that awareness is positively affected by the degree of democracy (Gonzales, 2002), by the transparency of fiscal rules (Alt and Lassen, 2006), and finally by the diffusion of the mass media (Snyder and Stromberg, 2008). In particular, jurisdictions with a larger share of informed voters are associated to smaller cycles (Shi and Svensson, 2006). According to the theoretical model of Shi and Svensson (2006), it is the information on the fiscal decision that determines the awareness of voters and the size of the cycle. Most of the mass media, however, treat several other issues and contribute to give a multidimensional signal. If the theory predicts a clear negative relation between the diffusion of fiscal information and the cycle, the effect of the diffusion of generic information remains ambiguous.

This work focuses on this issue and analyzes the impact of the diffusion of newspaper per capita on the electoral expenditure cycle, separating the effect of economic and generic newspapers. The dataset used is a panel of Italian Regions during the period 1984-2009. The fiscal and institutional environment of the Italian Regions, in fact, makes the observations suitable for a test of the electoral expenditure cycle. The expenditure decisions have always been decentralized, and Regions have the competence over relevant items of expenditure as health and investments. During the 90s the institutional reforms reduces the amount of transfers received from the Central Government and introduced tax autonomy of the Regions limited to the value added tax and the personal income tax surcharge. The electoral system, at the same time, moved from a full proportional system with the President of the Region elected by the Council to a mixed system (1/5 majoritarian) with the President of the Region directly

elected by the citizens. This simultaneous variation in the institutional and electoral characteristics of the Regions allow to observe the possible variation of the expenditure cycles as a consequence of a the introduction of a strong accountability system.

Beside these characteristics, the availability of an original dataset on the local diffusion of newspapers (Sobbrio, 2011) allows to control for the voters' awareness of the policy decisions.

The local diffusion of newspapers has never been used in the empirical literature on Political Budget Cycles before. We included this variable as a proxy for voters' awareness because the higher is the amount of per capita newspapers the higher is the probability that voters gather information about the policy decisions. According to the theory, an increase of the diffusion of newspapers during the electoral year constrains the magnitude of the cycle.

In the empirical analyses of this chapter the newspapers have been distinguished between economic newspapers, focusing on economic issues only, and generic newspapers covering also news stories and current affairs. The electoral cycle is expected to be more reactive to a variation of the diffusion of economic newspapers because they provide voters with specialized comments and insights increasing their awareness. On the contrary, non economic newspapers provide surface information on a variety of issues and they influence the voting decision through information on the private life of the candidates, political scandals and ideological debates, news stories referred to public expenditure outcomes (as an example health services or public transportation).

The empirical analyses verifies the presence of a 'Rogoff cycle' (Rogoff, 1990) during the period 1984-2008 by detecting electoral

expenditure cycles in total expenditure of about 7.5%. The same pattern is found in the capital expenditure but not in current expenditure. In particular, the pre-electoral year is associated to an increase of capital expenditure of around 19%. The replication of the analyses on time subsamples of the dataset reveals that these results are driven by the presence of expenditure cycles during the first half of the period; the cycle of expenditure size disappears after 1995, when the electoral and fiscal reforms have been implemented.

The estimated effect of the diffusion of newspapers has been tested on both the full time period and on the two sub-samples before 1995 and after 1995. The results on the full dataset indicate that the local diffusion of newspapers has the expected negative effect on the electoral capital expenditure and a positive average effect on current expenditure. This results is consistent with the fact that capital expenditure shows a cycling pattern and incumbents are concerned about their popularity when voters become more informed during the pre-electoral year, thus they reduce the fiscal manipulation. Generic newspapers, moreover, show a larger coefficient; this result is in line with the existing literature stressing the role of newly informed voters (Prat and Stromberg, 2006). The positive average effect on current expenditure is motivated with the visibility that newspapers give to public expenditure and the willingness of the incumbent to be associated with a large public expenditure (proxy for large public provision) during the whole legislature.

The rest of the paper is organized as follows: Section 2 reviews the literature on Political Budget Cycles and the role of voters' awareness. Section 3 introduces the empirical analyses by describing the institutional and political characteristics of the dataset and the econometric specification applied. Section 4 presents the results of the analyses and Section 5 concludes.

2. Related literature

There is a general agreement that electoral concerns of the incumbent government generate manipulations of fiscal policy in presence of asymmetric information. The effect of the electoral cycles on political selection is a more debated aspect. If the mimicking behavior of incumbents in the Yardstick Competition model preserves the possibility of a pooling equilibrium to arise (Besley and Case, 1995), the modern theory of Political Budget Cycles predicts a separating equilibrium only (Rogoff, 1990). The electoral budget cycle, thus, represents a socially efficient signal of competence to the voters (Aidt et al., 2009) as it removes asymmetric information.

The existence of budget cycles has been confirmed by the empirical literature, finding stronger increases of electoral public expenditure in less developed countries (Shi and Svennson, 2003; Brander and Drazen, 2005). The scholars motivated this evidence with the different level of sophistication of the voters: large public deficit in developed countries reduce the re-election probability of the incumbent, decreasing the incentive to generate a cycle. The fiscal manipulation may occur also when the budget is balanced and the resources are redistributed among different expenditure items. This type of distortion signals the incumbents' preference towards the spending composition preferred by the groups of voters that increase his probability of re-election (Drazen and Eslava, 2005).

Similar results have been obtained in within-country analyses, detecting Political Budget Cycles in Turkey, (Krueger and Turan, 2993), Western Germany (Rossi and Galli, 2002), Mexico (Gonzalez, 2002), Sweden (Petterson-Lidbom, 2003), Portugal (Veiga and Veiga, 2007; Aidt et al., 2011) and other countries. The only exceptions are represented by Israel (Rosenberg, 2002) and

Colombia, where the cycles affect the composition of the expenditure ('pork barrel cycles', Drazen and Eslava, 2010).

The accountability mechanism between voters and politicians is a prerequisite for the cycle, since the political responsibility of the fiscal decision must be clear and citizens must express their opinion through the vote. Gonzales (2002) analyzed the impact of a change in the level of democracy in Mexico during the period 1957-1997, finding the emerging of electoral cycles in more democratic periods.

The electoral rule shapes the accountability mechanism determining the type of spending that is most favorable before elections. A proportional system is usually associated to a larger redistribution and a larger share of 'universal' expenditure as welfare expenditure; in a majoritarian system, on the contrary, the candidates compete in a smaller district by targeting spending redistribution programs on the local interests of a smaller group (Persson and Tabellini, 1999). Santolini (2011) finds that a marginal increase of the dis-proportionality of the electoral rule is associated to a larger heterogeneity of expenditure in the Italian Regions, being expenditure skewed towards current spending. Her results suggest the emerging of a composition cycle, but she does not investigate the presence of cycles in the size of the expenditure.

Another determinant of the cycle is voters' information. Cycles are signals, therefore they are more prominent where incumbents are more able to hide fiscal policy from the public. Empirical results confirmed this hypotheses detecting the presence of smaller electoral cycles in countries with more transparent fiscal rules and larger party polarization (Alt and Lassen, 2006).

In recent years the scholars turned their attention to the role played by the mass media. The mass media have a twofold effect: they reduce the voters' cost of gathering information and they increase the visibility of policy decisions and of the outcomes of public provision of goods and services. When mass media provide news about a politician, his public behavior is easily observed. The causal link of popularity suggests that the politics covering of media affects public spending. Snyder and Stromberg (2008) test this hypotheses on a dataset of US districts, finding lower federal spending in areas where there is less press coverage of the local members of the Congress. Besley and Burgess (2002) verify a larger responsiveness in India for public food production and calamity relief expenditure associated to a larger diffusion of local newspapers.

Of course, the informational content of the mass media is not always free and unbiased. When freedom of press is granted the government has not any influence on the press release as censorship right or propaganda campaigning. The mass media act as a sounding-board for any kind of news, affecting the decisions of both voters and incumbents. Akhmedov and Zhuravskaya (2004) analyzed the relationship between the development of freedom of press and Political Budget Cycles in Russia finding results consistent with the theory. Following this line of research, Shi and Svensson (2006) introduced the concept of media access, measured by radio ownership multiplied by freedom of broadcasting. They find that a greater share of informed voters leads to smaller Political Budget Cycles in a large cross-country dataset during the period 1975–1995.

When the mass media is biased, that is news are filtered through some partisan point of view, the pandering incentives of the incumbent are affected. If the bias is towards the government, the pandering incentives are reduced, while if the bias is against

the government, the incumbent needs to manipulate fiscal policy to increase his electoral popularity. Ashwort and Shotts (2010) study the effect of the media on the incumbents' pandering incentives proving that, surprisingly, even an unbiased media can aggravate pandering incentives when the challenger is strong. The content of the media, moreover, is relevant since news providers are differentiated with respect to the informational content that they entail. Some media are associated to news directly connected to the theoretical model of Political Budget Cycles as fiscal indicators, while others are not. As an example, Prat and Stromberg (2006) test the detrimental effect of the introduction of commercial television in Sweden on voters' political knowledge. They base their hypotheses on the idea that 'viewers receive more political information from public service broadcasters than from their commercial counterparts' (Prat and Stromberg (2006), page 2). Their results do not confirm the predictions, showing that commercial television surprisingly increased voters' knowledge by providing information to ex ante uninformed voters.

3. The empirical analyses: methodology and data

3.1 Italian Regions: expenditure, elections and the diffusion of newspapers

In Italy there are three tiers of sub-national government: Regions, Provinces and Municipalities. The Italian Constitution provides each Region with statute autonomy (art.123), legislative and ruling autonomy (art. 117), administrative autonomy (art. 118) and financial autonomy (art. 119).

The dataset chosen for this work includes the 15 Ordinary Statute Regions during the period 1984-2008. The exclusion of the five Special Statute Regions is motivated by the

heterogeneous institutional and electoral setting of those Regions. The time period selected is the longest time series available for the observations.

From the perspective of the present analyses the Italian Regions represent an interesting environment for studying electoral cycles. When the Regions were established in 1978, expenditure was mainly financed through intergovernmental grants and the electoral rule was fully proportional. The reforms of the 90s aimed at introducing financial autonomy and changed the electoral rule to a mixed system and introduced the direct election of the Governor, strengthening the link of accountability between voters and politicians. The presence of soft budget constraint (Bordignon, 2000), moreover, provided incentives to distort expenditure without incurring the risk of being punished for generating large budget deficit.

The financial autonomy of the Regions has been implemented in the 90s through a reduction of intergovernmental transfers and the simultaneous introduction of equalization funds. Own tax revenue is limited to the definition of the production tax rate (*IRAP*) introduced in 1997 and the regional *PIT* surcharge, accounting respectively for 55% and 29% of total Regional revenues in 2008[34]. Expenditure autonomy is stronger since it includes health expenditure (79% of the total health expenditure) and investment expenditure, accounting for 40% of Italian investment expenditure[35].

Total expenditure is made of a 66% of current expenditure (personnel, transfers to Municipalities and local health units), a 7.1% of capital expenditure, a 4.2% of loans and borrowings and a 22% of 'partite di giro'(third-party payments). Since third-party

[34] Source: ISTAT, *Bilanci delle Regioni e delle Province Autonome*

[35] Source: ISTAT, *Bilanci delle Regioni e delle Province Autonome*

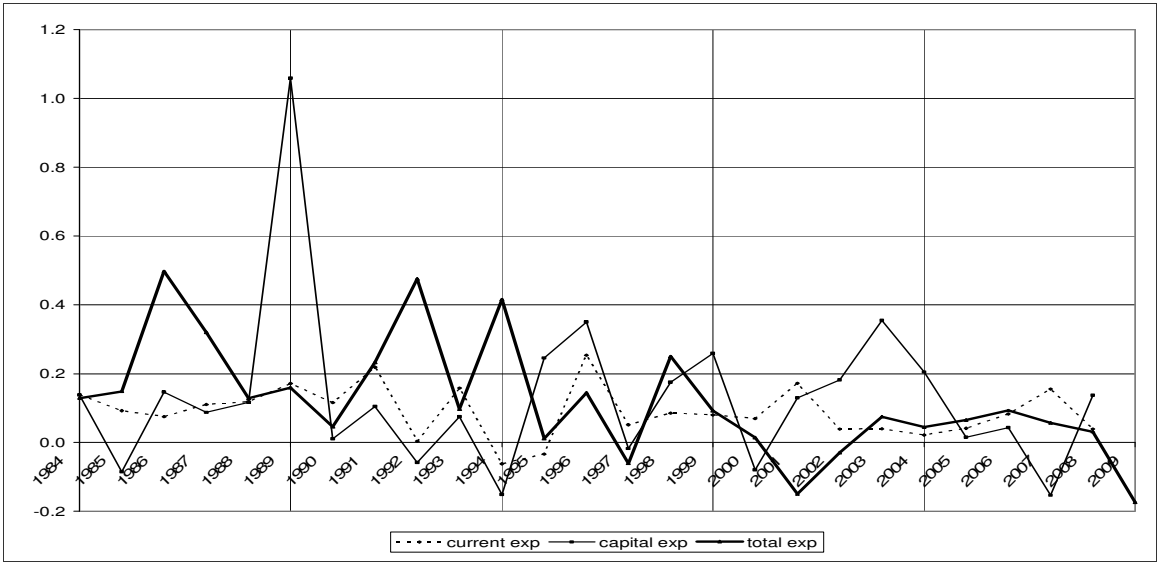
payments are not visible, the analyses will focus on current and capital expenditure[36].

The Regions hold exogenous elections every 5 years to elect the Regional Council and the Governor. Before 1995 the Council was elected with a proportional rule and the President of the Region was elected by the Councilors. After 1995 the electoral rule turned to a mixed system (1/5 majoritarian) and it has been introduced the direct election of the Governor.

The incentive given by the reform promoting accountability on the emerging of an expenditure cycle of size is thus contrasted by the mixed electoral rule that gives incentives to generate a cycle in the composition rather than in the size of expenditure. The evolution of the variation of expenditure depicted in Graph 1 seems to support this hypotheses. The vertical lines indicate the years before an election. The figure shows evident cycles of expenditure until 1994 and an unclear pattern after that year. The dynamics that this picture suggests, however, must be controlled for the determinants of the expenditure and voters' awareness.

[36] It is assumed that there is not any pattern of Yardstick Competition among the Regions. This assumption cannot be tested given the smallness of the dataset, but it is supported by reasonable motivations. First, the economy of the Regions is not much integrated because, beyond national shocks, each Region has an economic system and a different specialization (manufacturing, public services, tourism and so on). Secondly, Regions represent large geographical areas and the informational spillovers among Regions are not strong enough to stimulate interregional performance comparison.

Graph 1. Average expenditure variation in the dataset



Source: own calculations on data from ISTAT (Italian Institute of Statistics)

With respect to the proxy for voters' awareness used in this work, the diffusion of information in Italy is mainly channeled through the television news, but survey evidence indicates a stronger reliability of the voters on newspapers journalists rather than tv journalists[37].

Italian newspapers can be divided into national and local newspapers depending on their geographical diffusion. A more interesting distinction is between economic and non economic newspapers. Most of the newspaper are generic news providers, publishing a variety of issues as the private life of the candidates, political scandals and ideological debates, news stories referred to public expenditure outcomes (as an example health services or public transportation). Economic newspapers, on the contrary, provide voters with specialized comments and insights that directly increase their awareness of the fiscal decision. There is one newspaper in Italy, *Il Sole - 24 Ore*, that is commonly classified as economic newspaper. Its editor is the General Confederation of Italian Industry (*Confindustria*), and it is the reference point for readers that wish to deepen their knowledge on national economic and fiscal issues. Furthermore, it is considered a reliable updating tool for practitioners, entrepreneur, bureaucrats and financial investors. Regional expenditure, as already said, is a relevant issue at the national level, therefore voters can find on *Il Sole - 24 Ore* also detailed news on Regional public policies[38].

The empirical analyses uses a dataset on the diffusion of newspaper (Sobbrio, 2011) assembled from official data released

[37] *ACI-CENSIS, 9° Rapporto sulla Comunicazione in Italia, 2011*

[38] There is another economic newspaper, *ItaliaOggi*, that provides even more detailed information. Its diffusion, however, is extremely limited and the available time series starts from 1987. For this reason it has been excluded from the present analyses.

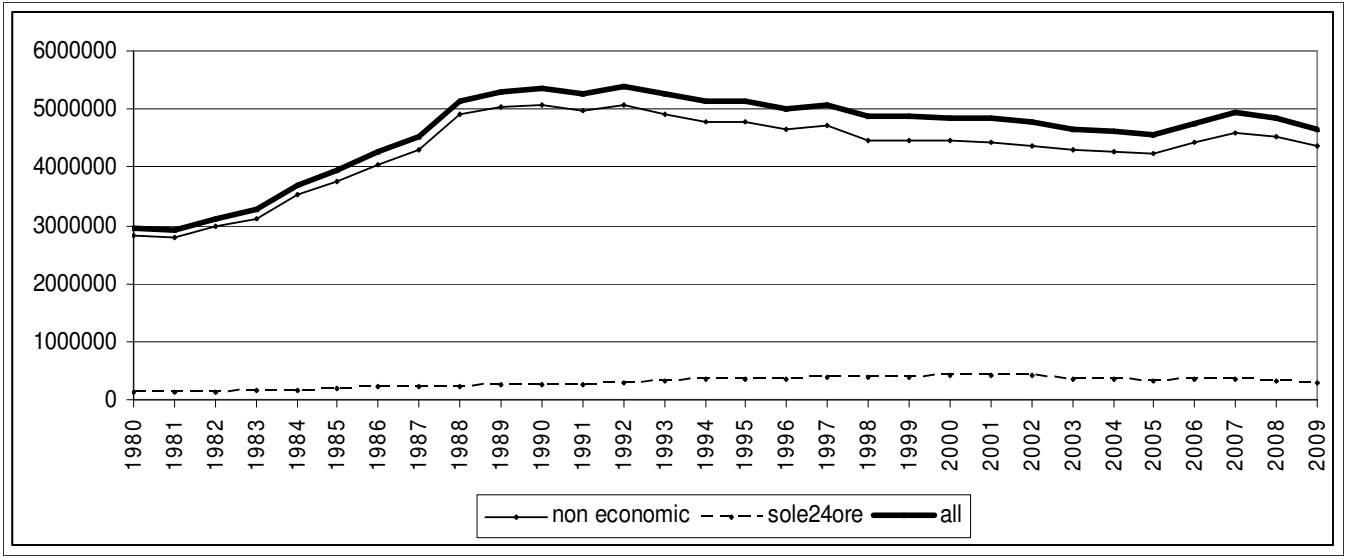
by ADS (*Accertamenti Diffusione Stampa*). ADS includes the main agencies collecting data on the diffusion of newspapers (*Utenti Pubblicità Associati, Federazione Italiana Editori Giornali, Federazione Professionale della Pubblicità, Federazione Italiana Pubblicità*). It is a source of proved reliability, and it is the only agency providing the regional and provincial disaggregation of the data.

The ADS regulation defines 'diffusion' as the number of copies of a newspaper diffused in Italy and abroad including sales, subscriptions, wholesales and free copies. The definition is quite broad, but there is a lack of data on sales and subscriptions only that makes this variable the best available proxy.

The following graphs describe the dynamics of the average yearly newspaper diffusion per capita in the fifteen Regions analyzed. The list of the newspapers included in the dataset is reported in Appendix A.1.

As Graph 2 shows, the diffusion of economic newspapers is much lower than the diffusion of generic newspapers. This evidence is motivated with the fact that only one newspaper is classified as economic newspaper in the dataset, and that the larger specificity of the news requires a larger informational background of the readers. The average diffusion of newspapers increases in the 80s and remains quite stable during the following years.

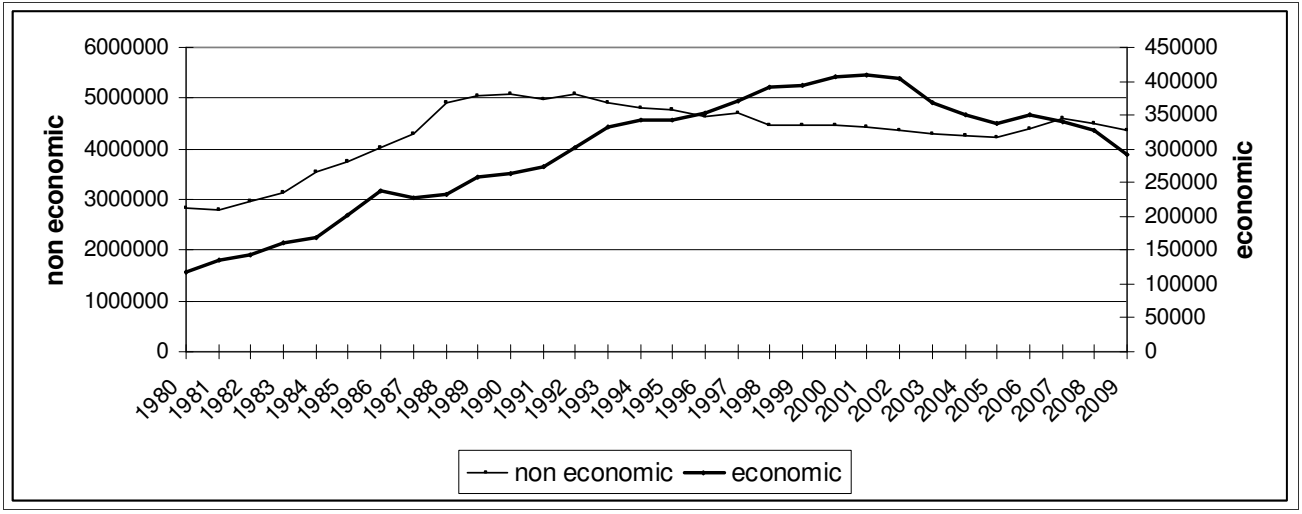
Graph 2. Yearly diffusion of newspapers in the dataset



Source: own calculations on data from ADS (Accertamenti Diffusione Stampa)

Graph 3 focuses on economic and generic newspapers. Given the high variability of the data, the diffusion has been measured separately for generic newspapers (on the left *y* axes) and for economic newspapers (on the right *y* axes). The dynamics of the diffusion of economic newspapers, clearer on this graph, shows a quasi monotonic increase until 2002, followed by a slow decrease. A hypotheses explaining this patters is the gradual substitution of the press with other sources of news (internet, for example), the so called 'press divide'. This phenomenon represents a gradual substitution of newspapers with non-press sources of information. Survey evidence detected this phenomenon in Italy starting from the year 2009 (source: *UCI-CENSIS, 8° Rapporto sulla Comunicazione in Italia, 2010)*. For the purpose of the present analyses the press divide reduces the role of the diffusion of newspapers as a proxy for voters' awareness, but given that the dataset analyzed ends in the first year in which the phenomenon has been detected it is not considered a problem affecting the estimates.

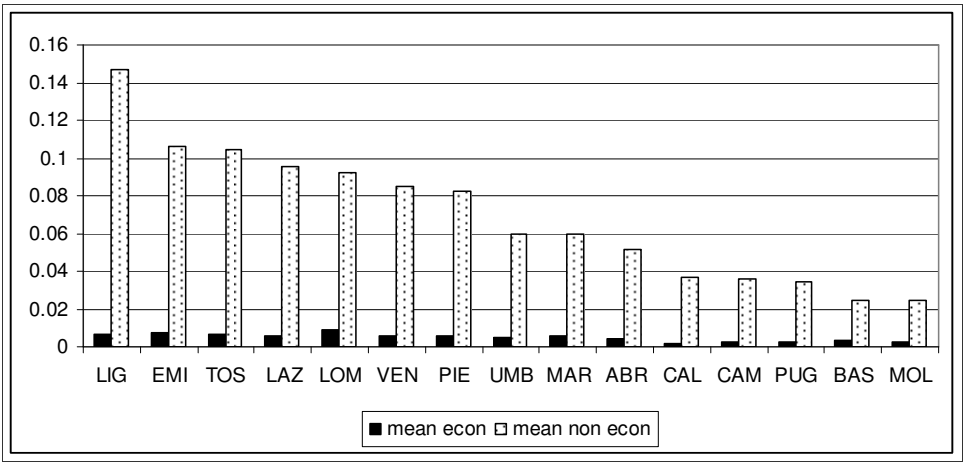
Graph 3. Average diffusion of newspapers in the dataset



Source: own calculations on data from ADS (Accertamenti Diffusione Stampa)

The diffusion of the newspapers is not homogeneous among the Regions analyzed. Graph 4 depicts the Regional per capita average diffusion of newspapers, indicating a clear pattern being the highest values associated to the Northern Regions (Liguria, Emilia Romagna, Toscana, Lombardia, Veneto and Piemonte) and Lazio, the Region where the country capital, centre of political and institutional networks, is located. On the contrary, the lowest levels are associated to the Southern Regions (Abruzzo, Calabria, Campania, Puglia, Basilicata and Molise).

Graph 4. Per capita average diffusion of newspapers in the dataset



Note: The Regions in the dataset are: LIG=Liguria, EMI=Emilia Romagna, TOS=Toscana, LAZ=Lazio, LOM=Lombardia, VEN=Veneto, PIE=Piemonte, UMB=Umbria, MAR=Marche, ABR=Abruzzo, CAL=Calabria, CAM=Campania, PUG=Puglia,BAS=Basilicata,MOL=Molise. Source: own calculations on data from ADS (Accertamenti Diffusione Stampa)

3.2 Empirical specification and data

The empirical analyses follows two steps. First, the presence of expenditure cycles in the dataset is tested, estimating a dynamic

expenditure equation. Then, the effect of information is controlled augmenting the empirical specification with the variables measuring the diffusion of newspapers.

The baseline expenditure equation is:

[1] $$Exp_{it}^{s} = \beta_0 + \beta_1 Exp_{it-1}^{s} + \beta_2 X_{it} + \beta_3 preelec_{it} + \beta_4 elec_{it} + \beta_5 postelec_{it} + f_i + u_{it}$$

The dependent variable *Exp* measures expenditure per capita in thousands of euros, where the index *s* indicates the type of spending (*total, current, capital*).

The vector *X* includes explanatory variables representing demographic, socio-economic, political and institutional variables determining the expenditure level.

The demographic variables capture the effect of variations of the demand of public services. The density of population (*density*) is a proxy of the demand of public goods and services in a Region. The more densely populated is a Region, the higher its internal demand. Given that Regional expenditure is highly influenced by welfare expenditure as health and education, the dependency ratio (*depratio*) measures the demand from the share of young and old population. These two variables are expected to show a positive sign, but in case of the achievement of economies of scale an increase in the demand decreases the expenditure and the coefficient associated to these variables show the negative sign.

One fiscal variable, the received transfers per capita in thousands of euros (*grants*), has been included to control for the amount and the nature of available resources of the local government. Intergovernmental transfers are one of the main sources of Regional resources, although its share has decreased due to the reform provisions in the 90s, aiming at increasing the efficiency

of the expenditure. Nonetheless, the central government still transfers resources to the Regions for equalization purposes. This variable has been included with a one period lag to avoid simultaneity with the dependent variable. An increase in the amount of the received per capita transfers from the central government changes the rate of substitution between autonomous and non autonomous resources and may generate the so called 'flypaper effect' (Hines and Thaler, 1995). Although previous studies verified an increase of health expenditure following a marginal increase in the amount of transfers received in the Italian Regions (Levaggi and Zanola, 2003) during a shorter time period (1989-1993), there is no prior on the sign of this variable.

The political variables control for the partisanship effect of the government on the expenditure (*left*), and the effect of the fragmentation of the Regional Council (*frag)*. A larger fragmentation, measured with the Herfindhal index, is associated to larger intra-group redistribution and larger expenditure.

An institutional dummy (*maj*) has been included, , equal to one for the years after 1995, when the electoral reform has been implemented. The effect of the introduction of the majority rule, usually associated to targeted redistribution rather than welfare redistribution (Persson and Tabellini, 1999), leads to the prediction of a negative sign associated to this coefficient.

The dummies *preelec, elec* and *postel* are the variables of interest in Equation 1 as they detect the dynamics of the electoral cycle. In particular, *elec* is equal to one in the year in which the cycle is expected to be generated. Given that the Regional budget is approved by the end of each fiscal year (December) and the exogenous date of election in the dataset is between May and June, a cycle is expected to occur during the year previous to the

election (as an example, if an election has been held in 2000, the cycle is expected in 1999). The theory predicts a negative sign associated to the *elec* dummy. The dummies *preelec* and *postel*, on the other hand, are equal to one during the year anticipating and the year following the cycle (following the example above, *preelec* equal to one in 1998, *postel* equal to one in 2000). Their coefficients, therefore, are expected to be non significant or negative.

Finally, f are region-fixed effects capturing time constant characteristics of the observations and u is an error term.

The second step of the empirical analyses includes the newspapers' diffusion variable in the specification, estimating the equation:

[2] $$Exp_{it}^{s} = \beta_0 + \beta_1 Exp_{it-1}^{s} + \beta_2 X_{it} + \beta_3 preelec_{it} + \beta_4 elec_{it} + \beta_5 postelec_{it} + \beta_6 news_{it}^{j} + \beta_7 news_{it}^{j} * elec_{it} + f_i + u_{it}$$

The variable *news* is the variables of interest in Equation 2, as it measures the Regional per capita diffusion of newspapers. This variable is introduced both non interacted and interacted with the electoral dummy to estimate its average effect in the dataset and its electoral effect compared to the non electoral effect. The index j indicates the type of press considered among economic (*Eco_n*), generic (*Gen_n*) and all the newspapers (*News*). The coefficients of the interacted term are the most relevant, and the theory predicts that an increase in the share of informed voters is associated to smaller cycles (Shi and Svennson, 2006). If the specificity of the information affects the size of the cycle, economic newspapers are expected to be associated to a larger effect than generic newspapers, and a larger absolute value of its coefficient is predicted. If the opposite situation is observed, and the larger effect is associated to generic newspapers, the

uttermost relevance of newly informed voters suggested by the literature (Prat and Stromberg, 2008) is confirmed.

The coefficient of the non interacted variable, however, has no prior. If the coefficient is negative the predicted average constraining effect is observed also during non electoral years. If the coefficient is positive, on the contrary, an average visibility effect is detected. Also this result is consistent with the theory because the non interacted term includes years during which voters are not called to express their preference for the incumbent. Therefore, the incumbent might aim at building a 'good reputation' by increasing the visibility of public expenditure. Finally, if the coefficient associated to the non interacted term is not significant, the diffusion of the newspapers does not show any impact on the expenditure level during the whole period, consistent with the fact that the incumbent does not consider the degree of voters' information when he does not face re-election concerns.

Table 1 reports the variables in the dataset, their name, their description and the expected signs of the coefficients. Tables A.2 and A.3 in the Appendix contains the data sources and the descriptive statistics.

Table 1. The description of the dataset

	Name	*Description*	*Calculation*	*Sign*
Dependent	Texp	Total expenditure per capita	Total expenditure/population	
Variables	Cexp	Current expenditure per capita	Current expenditure/population	
	Kexp	Capital expenditure per capita	Capital expenditure/population	
Independent	Texp lag	Lag of total expenditure per capita	Total expenditure(t-1)/population(t-1)	+
Variables	Cexp lag	Lag of current expenditure per capita	Current expenditure(t-1)/population(t-1)	+
	Kexp lag	Lag of capital expenditure per capita	Capital expenditure(t-1)/population(t-1)	+
	Density	Density of population	Population/surface area in hm2	+/-
	Depratio	Dependency ratio	(Population 0-15years + population over 65years)/population 16-64years	+/-
	Grpc	Lag of per capita grants received	Grants received(t-1)/population(t-1)	+
	Preel	Pre-electoral year	1 if elec(t+1) =1	+
	Elec	Electoral year	1 if a cycle is expected	-
	Postel	Post-electoral year	1 if elec(t-1) =1	+

Table 1. The description of the dataset (continued)

Termcount	Legislature counter	Values 1to 5 from the year in which the election has been held to the pre-electoral year	-
Left	Left dummy	1 if the government is left-winged, 0 otherwise	+
Maj	Majority dummy	1 after the electoral reform in 1995, 0 otherwise	-
Frag	Fragmentation index	Herfindhal index calculated on the seats of the Regional Council	+
News	Diffusion of newspaper pc	Diffusion of newspaper/population	+/-
News*elec	Diffusion of newspaper pc*elec		-
Eco_n	Diffusion of economic press pc	Diffusion of IlSole24Ore/population	+/-
Eco_n*elec	Diffusion of economic press pc*elec		-
Gen_n	Diffusion of generic press pc	Diffusion of non economic newspaper/population	+/-
Gen_elec	Diffusion of generic press pc*elec		-

4. Results

4.1. The expenditure cycle and the effect of the local diffusion of newspapers

This Section presents the results from the estimation of Equation 1 and Equation 2 on the full dataset. Section 4.2 will replicate the analyses separately for the sample 1984-1995 and the sample 1996-2008.

Public expenditure is characterized by persistence in time, therefore the expenditure equation must be estimated through a dynamic model controlling for the endogeneity caused by the lagged dependent variable. A popular econometric method to account for this type of endogeneity is the Arellano and Bond (1991) GMM estimator for dynamic panel data in which the dependent variables in differences are instrumented with the variables in levels. In particular, the System GMM estimator proposed by Blundell and Bond (1998), introducing also an equation in levels instrumented with the differences, increases the efficiency of the estimator. The application of these econometric model to small samples is problematic as the number of instruments over-fits the endogenous variables and it generates the so called 'instrument proliferation' (Roodman, 2008). This problem is usually signaled by a p-value of the Hansen test close to 1 (as an example, the GMM estimates of Shi and Svennson (2006) are affected by the small sample bias). The main implication of 'instrument proliferation' is the risk of generating false positive results, that is observing significant coefficients that are not truly significant.

In the case of small samples where GMM cannot be applied efficiently the Least Squares Dummy Variable Corrected (LSDVC) has been proposed. This estimator is based on the LSDVC estimator of Kiviet (1995 and 1999), further developed by

Judson and Owen (1999), Bun and Kiviet (2001 and 2003) and extended by Bruno (2005) to unbalanced panels.

The LSDVC estimator is obtained by wiping out the small sample bias from a LSDV estimator computed on the original model. Bruno (2005) specifies three bias corrections, corresponding to increasing levels of precision. The bias correction depends on an unknown parameter whose estimate is obtained selecting an initial procedure among the Anderson-Hsiao, the Arellano-Bond and the Blundell-Bond estimator. In particular, the Anderson-Hsiao estimator instruments the original model in first differences with the first two lags of the dependent variable; the Arellano-Bond and the Blundell-Bond estimators apply to the original model respectively the Difference GMM and the System GMM with no intercept.

Finally, the standard errors take into account the small size of the sample and they are estimated with a bootstrap procedure, whose number of repetitions is selected by the researcher.

Table 2.1 presents the results from the estimation of Equation 1 using total expenditure as dependent variable[39].

[39] The LSDVC estimator used for the empirical analyses of this Chapter is implemented in Stata with the command *xtlsdvc* (Bruno, 2005).

Table 2.1 Total expenditure LSDVC estimation – baseline specification

Dep. Var. :ln total expenditure pc	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Lntxppclag	0.644	***	0.669	***	0.650	***	0.644	***	0.669	***	0.650	***
Lndensity	-0.146		-0.199		0.015		-0.146		-0.199		0.015	
Lndepratio	1.726	***	1.840	***	1.775	***	1.726	***	1.840	***	1.775	***
Lntgrpclag	0.029	***	0.027	***	0.030	***	0.029	***	0.027	***	0.030	***
Preel	0.035		0.032		0.037		0.035		0.032		0.037	
Elec	0.075	**	0.074	*	0.075		0.075	**	0.074	*	0.075	
Elecy	-0.021		-0.022		-0.015		-0.021		-0.022		-0.015	
Left	0.022		0.022		0.028		0.022		0.022		0.028	
Maj	-0.128	**	-0.144	**	-0.118		-0.128	**	-0.144	**	-0.118	
Frag	0.504	***	0.482	**	0.538		0.504	***	0.482	***	0.538	
Observations	375		375		375		375		375		375	
Initial estimator	AB		BB		AH		AB		BB		AH	
Repetitions	50		50		50		100		100		100	

*Note: Time period: 1984-2008. AB: Arellano and Bond; BB: Blundell and Bond; AH: Anderson and Hsiao. * p<0.05, ** p<0.01, *** p<.001*

The six models presented are all LSDVC estimations, but they differ among each other with respect to the initial estimator used and the number of bootstrap repetitions selected, as specified in the lowest rows of the Table. The bias has been corrected according to the third level of precision proposed by Bruno (2005), that is the most precise.

The results show a positive and significant coefficient on the lagged expenditure, confirming persistency in the pattern of expenditure. The dependency ratio shows a positive sign indicating the lack of economies of scale in the provision of goods and services to the dependent population, and the coefficient associated to the transfers per capita reveal a flypaper effect of about 3%. The institutional dummy *maj* is negative, indicating a decrease of total expenditure after the electoral reform in 1995. These results are robust to the different specification of the models, while the coefficient associated to the political dummy and the electoral dummies are not that robust. The political variable *frag* is positive and significant indicating that more fragmented councils are associated, as expected, to Regions with a larger expenditure level. The coefficient associated to the *elec* variable, that represents the year in which a cycle is expected to be generated, is positive and signals a cycle of a magnitude of about 7.5%. This result, however, is not significant when the estimator is initialized with the Anderson-Hsiao procedure, probably due to the insufficient number of lags of the instruments. The *preel* and *postel* variables are non significant as expected in all the models, verifying the absence of expenditure variation before and after an election.

As the evidence of a cycle in the dimension of total public expenditure is not robust, an investigation of the cycle in the two main items of expenditure – current and capital expenditure – is presented in Table 2.2 and Table 2.3.

Table 2.2 Current expenditure LSDVC estimation – baseline specification

Dep. Var. :												
ln current expenditure pc	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Lncxppclag	0.532	***	0.547	***	0.543	***	0.532	***	0.547	***	0.543	***
Lndensity	0.305		0.287		0.445		0.305		0.287		0.445	
Lndepratio	1.839	***	1.941	***	1.844	***	1.839	***	1.941	***	1.844	***
Lntgrpclag	0.038	***	0.038	***	0.038	***	0.038	***	0.038	***	0.038	***
Preel	0.048		0.046		0.048		0.048		0.046		0.048	
Elec	0.046		0.046		0.045		0.046		0.046		0.045	
Postel	-0.009		-0.009		-0.005		-0.009		-0.009		-0.005	
Left	-0.007		-0.010		0.001		-0.007		-0.010		0.001	
Maj	-0.077		-0.089		-0.071		-0.077		-0.089		-0.071	
Frag	0.460	**	0.448	**	0.501	*	0.460	***	0.448	**	0.501	*
Observations	375		375		375		375		375		375	
Initial estimator	AB		BB		AH		AB		BB		AH	
Repetitions	50		50		50		100		100		100	

*Note: Time period: 1984-2008. AB: Arellano and Bond; BB: Blundell and Bond; AH: Anderson and Hsiao. * p<0.05, ** p<0.01, *** p<.001*

Table 2.3 Capital expenditure LSDVC estimation – baseline specification

Dep. Var. :												
ln capital expenditure pc	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Lnkxppclag	0.670	***	0.711	***	0.665	***	0.670	***	0.711	***	0.665	***
Lndensity	-1.332		-1.352		-0.421		-1.332		-1.352		-0.421	
Lndepratio	2.202	***	2.322	***	2.308	***	2.202	***	2.322	***	2.308	***
Lntgrpclag	0.014		0.009		0.012		0.014		0.009		0.012	
Preel	0.048		0.043		0.046		0.048		0.043		0.046	
Elec	0.200	***	0.193	***	0.189	**	0.200	***	0.193	**	0.189	**
Postel	-0.042		-0.047		-0.046		-0.042		-0.047		-0.046	
Left	0.104		0.103		0.107		0.104		0.103		0.107	
Maj	-0.161		-0.168		-0.133		-0.161		-0.168		-0.133	
Frag	0.748	**	0.687	*	0.721	*	0.748	**	0.687	*	0.721	*
Observations	375		375		375		375		375		375	
Initial estimator	AB		BB		AH		AB		BB		AH	
Repetitions	50		50		50		100		100		100	

*Note: Time period: 1984-2008. AB: Arellano and Bond; BB: Blundell and Bond; AH: Anderson and Hsiao. * p<0.05, ** p<0.01, *** p<.001*

As the results show, the coefficients of the estimation of Equation 1 on the two main items of expenditure are robust to all the six specifications proposed.

The coefficients of the lagged dependent variable, the dependency ratio and the fragmentation index show their positive and significant effect on both current and capital expenditure. The flypaper effect has been detected only in current expenditure (3.8%), while the electoral cycle of expenditure is present only in capital expenditure. The magnitude of the cycle is about 19%, much larger than the one of the suspected cycle in total expenditure. This results, all in all, indicate the presence of a cycle *à la* Rogoff in the Italian Regions during the period 1995-2008, determined by the electoral manipulation of capital expenditure, the more visible spending item.

To control the robustness of these results to voters' awareness we introduce in the specification the variable measuring the local diffusion of newspapers and we estimate Equation 2 using total expenditure as the dependent variable.

The new variables is introduced both alone and interacted with the *elec* dummy, to estimate both the average effects of the diffusion of newspapers and the effect during the electoral year compared to the effect during the non electoral years.

Moreover, tree different variables are alternatively included to capture the effects of the local diffusion of all the newspapers (model *ALL*), of the economic newspapers (model *ECO*) and of the non economic newspapers (model *GEN*).

As Models *ALL1*, *ECO1* and *GEN1* of Table 3.1 show, the interacted terms conflict with the electoral dummies. In fact, running the regressions without the interacted term we obtain a

pattern of cycling during the period 1984-2008 consistent with the results obtained so far[40]. To solve this problem, in models *ALL2*, *ECO2* and *GEN2* the dummies have been substituted with a counter of the legislature (*termcount*), taking value 5 during the year in which the cycle is expected to be generated. As we can see the coefficient associated to *termcount* is positive but never significant, as probably the conflict is not completely wiped. Finally, in models *ALL3*, *ECO3* and *GEN3* the electoral variables are omitted. However, the interacted term is included and we can estimate the effect of the local diffusion of newspapers on the average expenditure and the comparative electoral expenditure.

[40] These estimates are presented in Table A.4. Table A.5 and Table A.6 in the Appendix.

Table 3.1 Total expenditure LSDVC estimation: augmented model, 375 observations

	ALL1		ECO1		GEN1		ALL2		ECO2		GEN2		ALL3		ECO3		GEN3	
Lntxppclag	0.650	***	0.622	***	0.655	***	0.653	***	0.628	***	0.658	***	0.662	***	0.636	***	0.668	***
Lndensity	-0.131		0.016		-0.147		-0.107		-0.033		-0.122		-0.096		-0.020		-0.112	
Lndepratio	2.129	***	2.142	***	2.085	***	2.154	***	2.122	***	2.109	***	2.161	***	2.129	***	2.117	***
Lntgrpclag	0.025	***	0.025	***	0.026	***	0.026	***	0.025	***	0.026	***	0.026	***	0.025	***	0.026	***
Preel	0.025		0.028		0.026													
Elecy	-0.067		-0.615	*	-0.056													
Postel	-0.028		-0.020		-0.028													
Termcount							0.010		0.008		0.010							
Left	0.018		0.008		0.021		0.019		0.008		0.021		0.019		0.008		0.022	
Frag	0.523	***	0.445	**	0.520	***	0.535	***	0.455	**	0.531	***	0.537	***	0.457	**	0.533	***
Maj	-0.140	**	-0.173	**	-0.138	*	-0.151	**	-0.185	***	-0.147	**	-0.158	**	-0.192	***	-0.155	**
LnNews	0.252	*					0.248	*					0.251	*				
LnNews*elec	-0.050						-0.019						-0.028	*				
LnEcon_n			0.185	*					0.187	*					0.189	*		
LnEcon_n*elec			-0.130	*					-0.012						-0.016	**		
LnGen_n					0.217	*					0.212	*					0.215	*
LnGen_n*elec					-0.045						-0.018						-0.027	*

*Note: Time period: 1984-2008. LSDVC estimation initialized with BB estimator, 50 bootstrap repetitions. * p<0.05, ** p<0.01, *** p<.001*

The results of Table 3.1 indicate that a marginal increase in the local diffusion of newspapers is associated to a 25% increase of the total expenditure. This evidence supports the role of the press as a showcase for the policies implemented by the government, increasing the visibility of the expenditure when voters are not called to the polls and incumbents are not concerned with popularity matters. During the year in which the cycle is generated, on the contrary, a marginal increase in the diffusion of local newspapers is associated to a small but significant decrease of total expenditure if compared to the effect during the other years (2.8%). This result confirms the role of press in increasing the transparency of the incumbents' decisions and the awareness of the voters. The coefficients associated to economic newspapers are always smaller than the coefficient associated to generic newspapers; this result, although non expected, highlights the role of generic press as information provider to voters that were not previously informed. It is reasonable to assume that economic newspapers are complement and not substitutes of generic newspapers, therefore that economic readers have already the stock of information that generic readers have. These results suggest that the marginal utility from information decreases as the news becomes more specific.

Table 3.2 and Table 3.3 replicate the estimation using current and capital expenditure as dependent variable.

Table 3.2 Current expenditure LSDVC estimation: augmented model, 375 observations

	ALL1		ECO1		GEN1		ALL2		ECO2		GEN2		ALL3		ECO3		GEN3	
Lncxppclag	0.527	***	0.514	***	0.531	***	0.529	***	0.518	***	0.533	***	0.543	***	0.530	***	0.547	***
Lndensity	0.377		0.463		0.360		0.394		0.438		0.377		0.394		0.446		0.377	
Lndepratio	2.211	***	2.151	***	2.168	***	2.229	***	2.140	***	2.185	***	2.242	***	2.153	***	2.198	***
Lntgrpclag	0.035	***	0.033	***	0.036	***	0.035	***	0.032	***	0.036	***	0.035	***	0.032	***	0.036	***
Preel	0.038		0.040		0.040													
Elecy	-0.017		-0.274		-0.013													
Postel	-0.017		-0.009		-0.016													
Termcount							0.013		0.012		0.013							
Left	-0.013		-0.024		-0.010		-0.012		-0.024		-0.009		-0.011		-0.023		-0.008	
Frag	0.499	**	0.412	*	0.495	**	0.507	**	0.415	**	0.502	**	0.507	**	0.417	**	0.503	**
Maj	-0.084		-0.119	*	-0.081		-0.089		-0.124	*	-0.086		-0.099		-0.135	*	-0.096	
LnNews	0.262	*					0.265	*					0.268	*				
LnNews*elec	-0.021						-0.002						-0.014					
LnEcon_news			0.188	*					0.191	*					0.194	*		
LnEcon_news*elec			-0.060						-0.002						-0.008			
LnGeneric_news					0.221	*					0.223	*					0.226	*
LnGeneric_news*elec					-0.019						-0.001						-0.013	

*Note: Time period: 1984-2008. LSDVC estimation initialized with BB estimator, 50 bootstrap repetitions. * p<0.05, ** p<0.01, *** p<.001*

Table 3.3 Capital expenditure LSDVC estimation: augmented model, 375 observations

	ALL1		ECO1		GEN1		ALL2		ECO2		GEN2		ALL3		ECO3		GEN3	
Lnkxppclag	0.698	***	0.670	***	0.702	***	0.697	***	0.662	***	0.701	***	0.699	***	0.663	***	0.703	***
Lndensity	-1.344		-1.172		-1.340		-1.297		-1.294		-1.295		-1.222		-1.234		-1.217	
Lndepratio	2.690	***	2.845	***	2.648	***	2.738	***	2.837	***	2.694	***	2.794	***	2.879	***	2.750	***
Lntgrpclag	0.007		0.006		0.007		0.009		0.006		0.009		0.010		0.007		0.010	
Preel	0.034		0.034		0.035													
Elecy	-0.140		-1.647	**	-0.104													
Postel	-0.053		-0.039		-0.053													
Termcount							0.017		0.012		0.018							
Left	0.096		0.086		0.098		0.097		0.086		0.100		0.097		0.085		0.100	
Frag	0.720	*	0.625	*	0.721	*	0.740	*	0.646	*	0.738	*	0.746	**	0.649	*	0.744	**
Maj	-0.167		-0.218	*	-0.163		-0.184		-0.245	*	-0.178		-0.194	*	-0.254	**	-0.189	
LnNews	0.298						0.288						0.301					
LnNews*elec	-0.121						-0.059						-0.077	***				
LnEcon_news			0.245						0.265						0.273			
LnEcon_news*elec			-0.345	**					-0.035	*					-0.042	***		
LnGeneric_news					0.271						0.260						0.272	
LnGeneric_news*elec					-0.105						-0.056						-0.074	***

*Note: Time period: 1984-2008. LSDVC estimation initialized with BB estimator, 50 bootstrap repetitions. * p<0.05, ** p<0.01, *** p<.001*

The results show that the local diffusion of press influences current expenditure and capital expenditure through different channels. In Table 3.2 the interacted variables show non significant coefficients while the level coefficients are positive and significant. This result indicates an average visibility effect of information on current expenditure but not any transparency effect constraining electoral current spending. This is consistent with the fact that we have not found any electoral cycle in current expenditure during the period 1984-2008, therefore incumbents do not use current expenditure as a signal and they are not affected in a different way by the degree of awareness of the voters on this item of expenditure before and after an election.

The negative sign associated to the interaction coefficients in Table 3.3, on the contrary, tells us the opposite story: as the incumbents use capital expenditure as a signal when an election is approaching, their decision is affected by the degree of voters' awareness only according to the different timing of the legislature. The coefficient of the interacted term in Model GEN3, moreover, is always larger than the coefficient of the interacted term in Model ECO3, confirming the key role played by newly informed voters.

4.2. From the cycle of size to the cycle of composition

The electoral and fiscal reforms of the mid-90s, as already said, changed the Italian mechanism of accountability introducing a stronger link of responsibility between incumbents and politicians. At the same time, the introduction of the mixed electoral rule generated incentives to signal competence targeting those groups that are decisive for re-election, reducing the amount of universalistic – or 'welfare' – expenditure. This

Section clarifies the ambiguity of the theory regarding the effect of the reforms on the electoral expenditure manipulation by estimating Equation 1 and Equation 2 on the time subsamples 1984-1995 and 1996-2008. Total expenditure and its main components – current and capital expenditure – are considered separately as dependent variables, and the robustness of the results has been tested as in Section 4.1.

The results of the estimation of Equation 1 are presented in Table 4.1, Table 4.2 and Table 4.3.

Table 4.1 Total expenditure LSDVC estimation: baseline model on the time subsamples 1984-1995 and 1996-2008

Panel a: Dataset 1984-1995

Dep. Var. :	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
ln total expenditure pc												
Lntxppclag	0.5558	***	0.5665	***	0.5528	***	0.5558	***	0.5665	***	0.5528	***
Lndensity	-1.4971		-1.83		-1.629		-1.4971		-1.83		-1.629	
Lndepratio	0.4934		0.4348		0.2559		0.4934		0.4348		0.2559	
Lntgrpclag	0.0431	***	0.0423	***	0.0437	***	0.0431	***	0.0423	***	0.0437	***
Preel	0.0806	*	0.0802	*	0.0821	*	0.0806	*	0.0802	*	0.0821	
Elec	0.2485	***	0.2494	***	0.247	***	0.2485	***	0.2494	***	0.247	***
Postel	0.1409	**	0.1402	**	0.1462	**	0.1409	**	0.1402	**	0.1462	**
Left	-0.1671		-0.1754	*	-0.1685		-0.1671		-0.1754	*	-0.1685	
Maj	-0.3005	***	-0.3082	***	-0.2926	***	-0.3005	***	-0.3082	***	-0.2926	***
Frag	0.3766		0.419	*	0.3938		0.3766		0.419	*	0.3938	
Observations	180		180		180		180		180		180	
Initial estimator	AB		BB		AH		AB		BB		AH	
Repetitions	50		50		50		100		100		100	

Table 4.1 Total expenditure LSDVC estimation: baseline model on the time subsamples 1984-1995 and 1996-2008 (continued)

Panel b: Dataset 1996-2008

Dep. Var. :	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
ln total expenditure pc												
Lntxppclag	0.525	***	0.993	***	1.263	***	0.525	***	0.993	***	1.263	***
Lndensity	-1.111		-0.855		-3.094		-1.111		-0.855		-3.094	
Lndepratio	1.958	***	0.114		-1.442		1.958	***	0.114		-1.442	*
Lntgrpclag	-0.005		0.010		0.026		-0.005		0.010		0.026	
Preel	-0.001		-0.014		-0.001		-0.001		-0.014		-0.001	
Elec	0.023		-0.004		0.001		0.023		-0.004		0.001	
Postel	-0.062		-0.099	*	-0.123	**	-0.062		-0.099	*	-0.123	**
Left	-0.007		-0.021		-0.099	*	-0.007		-0.021		-0.099	*
Frag	-0.676		-0.651		-2.235	**	-0.676		-0.651		-2.235	**
Observations	196		196		196		196		196		196	
Initial estimator	AB		BB		AH		AB		BB		AH	
Repetitions	50		50		50		100		100		100	

*Note: AB: Arellano and Bond; BB: Blundell and Bond; AH: Anderson and Hsiao. * p<0.05, ** p<0.01, *** p<.001*

Table 4.2 Current expenditure LSDVC estimation: baseline model on the time subsamples 1984-1995 and 1996-2008

Panel a: Dataset 1984-1995

Dep. Var. :												
ln current expenditure pc	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Lncxppclag	0.335	***	0.336	***	0.350	***	0.335	***	0.336	***	0.350	***
Lndensity	-2.541		-2.725		-2.521		-2.541		-2.725		-2.521	
Lndepratio	-0.664		-0.748		-0.695		-0.664		-0.748		-0.695	
Lntgrpclag	0.055	***	0.055	***	0.055	***	0.055	***	0.055	***	0.055	***
Preel	0.101	**	0.101	**	0.100	**	0.101	**	0.101	**	0.100	*
Elec	0.193	***	0.193	***	0.192	***	0.193	***	0.193	***	0.192	***
Postel	0.139	**	0.139	**	0.143	**	0.139	**	0.139	**	0.143	**
Left	-0.260	**	-0.261	**	-0.261	**	-0.260	**	-0.261	**	-0.261	**
Maj	-0.176	**	-0.177	**	-0.178	*	-0.176	**	-0.177	**	-0.178	**
Frag	0.175		0.188		0.199		0.175		0.188		0.199	
Observations	180		180		180		180		180		180	
Initial estimator	AB		BB		AH		AB		BB		AH	
Repetitions	50		50		50		100		100		100	

Table 4.2 Current expenditure LSDVC estimation: baseline model on the time subsamples 1984-1995 and 1996-2008 (continued)

Panel b: Dataset 1996-2008

Dep. Var. :	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
ln current expenditure pc												
Lncxppclag	0.643	***	0.974	***	1.965	***	0.643	***	0.974	***	1.965	***
Lndensity	-0.115		-0.152		-9.121	***	-0.115		-0.152		-9.121	***
Lndepratio	1.296	*	0.181		-2.107	**	1.296	*	0.181		-2.107	***
Lntgrpclag	0.011		0.027		0.116	***	0.011		0.027		0.116	***
Preel	-0.006		-0.011		0.026		-0.006		-0.011		0.026	
Elec	-0.022		-0.037		-0.018		-0.022		-0.037		-0.018	
Postel	-0.029		-0.042		-0.099	**	-0.029		-0.042		-0.099	**
Left	-0.033		-0.031		-0.112	***	-0.033		-0.031		-0.112	***
Frag	-0.700		-0.447		-0.828		-0.700		-0.447		-0.828	
Observations	196		196		196		196		196		196	
Initial estimator	AB		BB		AH		AB		BB		AH	
Repetitions	50		50		50		100		100		100	

*Note: AB: Arellano and Bond; BB: Blundell and Bond; AH: Anderson and Hsiao. * p<0.05, ** p<0.01, *** p<.001*

Table 4.3 Capital expenditure LSDVC estimation: baseline model on the time subsamples 1984-1995 and 1996-2008

Panel a: dataset 1984-1995

Dep. Var. :	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
ln capital expenditure pc												
Lnkxppclag	0.707	***	0.767	***	0.768	***	0.707	***	0.767	***	0.768	***
Lndensity	0.216		-0.033		-2.31		0.216		-0.033		-2.307	
Lndepratio	1.029		1.393		3.190		1.029		1.393		3.190	
Lntgrpclag	0.023		0.019		0.021		0.023		0.019		0.021	
Preel	0.048		0.048		0.059		0.048		0.049		0.059	
Elec	0.458	***	0.463	***	0.516	***	0.458	***	0.463	***	0.516	***
Postel	0.169	*	0.167	*	0.124		0.169	*	0.167	*	0.124	
Left	0.136		0.099		0.106		0.136		0.099		0.106	
Maj	-0.473	***	-0.489	***	-0.590	***	-0.473	***	-0.489	***	-0.590	***
Frag	0.976	**	1.059	**	1.910	***	0.976	**	1.059	**	1.910	***
Observations	180		180		180		180		180		180	
Initial estimator	AB		BB		AH		AB		BB		AH	
Repetitions	50		50		50		100		100		100	

Table 4.3 Capital expenditure LSDVC estimation: baseline model on the time subsamples 1984-1995 and 1996-2008 (continued)

Panel b: dataset 1996-2008

Dep. Var. : *ln capital expenditure pc*	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Lnkxppclag	0.393	***	0.614	***	0.426	***	0.393	***	0.614	***	0.426	***
Lndensity	-4.270		-4.362		-4.603		-4.270		-4.362		-4.603	
Lndepratio	1.977		1.332		2.012		1.977		1.332		2.012	
Lntgrpclag	-0.094		-0.096		-0.097		-0.094		-0.096		-0.097	
Preel	0.083		0.070		0.074		0.083		0.070		0.074	
Elec	0.185	**	0.151		0.175	*	0.185	**	0.151		0.175	*
Postel	-0.164		-0.205		-0.160		-0.164		-0.205		-0.160	
Left	0.036		0.049		0.042		0.036		0.049		0.042	
Frag	-1.218		-1.562		-1.027		-1.218		-1.562		-1.027	
Observations	196		196		196		196		196		196	
Initial estimator	AB		BB		AH		AB		BB		AH	
Repetitions	50		50		50		100		100		100	

*Note: AB: Arellano and Bond; BB: Blundell and Bond; AH: Anderson and Hsiao. * p<0.05, ** p<0.01, *** p<.00*

As the tables show, before 1995 evident cycles of expenditure are present in total expenditure and also in current and capital expenditure, as the positive and significant coefficients on the *elec* variable indicates. Although also the *preel* and the *postel* variables are often positive and significant, the largest coefficients are associated to the year in which the cycle is expected to be observed. From 1996 onwards, however, the coefficients do not detect an expenditure cycle anymore in total and current expenditure. Capital expenditure is the only item showing a persistent cycling pattern, smaller than in the pre-95 period and not robust to alternative initial estimators.

This time investigation suggest that in time the cycles in the size of public expenditure have decreased up to the point that they have disappeared. This evidence is consistent with a shift towards a 'pork barrel cycle' (Drazen and Eslava, 2005) affecting the composition of the expenditure. Pork barrel cycles in the dataset, however, should not imply a modification of the composition between current expenditure and capital expenditure as expected, as the analyses detected weak cycles in capital expenditure without finding a significant anti-cyclical pattern in current expenditure. Given these facts, we suppose that pork barrel affects the internal composition of current and capital expenditure and not their reciprocal substitution[41].

Finally, the pork barrel cycles have been motivated in the literature by the sophistication of the voters and their increased monitoring powers in time. The final step of the empirical analyses tests the effect of the local diffusion of press on public expenditure separately for the two time sub-samples.

[41] As the budget data disaggregated by function are not available for a sufficient time period, this hypotheses cannot be tested.

Table 5.1 Total expenditure LSDVC estimation: augmented model (180 observations)

Panel a: 1984-1995	ALL1		ECO1		GEN1		ALL2		ECO2		GEN2		ALL3		ECO3		GEN3	
Lntxppclag	0.495	***	0.527	***	0.500	***	0.531	***	0.582	***	0.537	***	0.537	***	0.586	***	0.544	***
Lndensity	-2.229		-2.300		-2.196		-2.522		-2.369		-2.491		-2.045		-1.959		-2.023	
Lndepratio	0.272		0.720		0.226		0.320		0.852		0.264		0.575		1.070		0.518	
Lntgrpclag	0.041	***	0.040	***	0.042	***	0.034	***	0.032	***	0.034	***	0.032	***	0.030	***	0.033	***
Preel	0.057		0.073	*	0.059													
Elec	0.118		-0.385		0.125													
Postel	0.124	**	0.136	**	0.125	**												
Termcount							-0.024		-0.025		-0.023							
Left	-0.188	*	-0.206	*	-0.183	*	-0.183	*	-0.191	*	-0.175		-0.176		-0.182		-0.169	
Frag	0.392		0.362		0.388		0.427		0.448	*	0.424		0.478	*	0.499	*	0.474	*
Maj	-0.271	***	-0.297	***	-0.271	***	-0.225	**	-0.277	***	-0.223	**	-0.204	**	-0.250	***	-0.202	**
LnNews	0.313	**					0.387	***					0.361	**				
LnNews*elec	-0.038						-0.076	***					-0.050	*				
LnEco_n			0.146						0.166						0.155			
LnEco_n*elec			-0.113						-0.042	***					-0.028	**		
LnGen_n					0.286	**					0.358	***					0.333	**
LnGen_n*elec					-0.035						-0.074	***					-0.049	*

Table 5.1 Total expenditure LSDVC estimation: augmented model (continued) (196 observations)

Panel b: 1996-2008	ALL1		ECO1		GEN1		ALL2		ECO2		GEN2		ALL3		ECO3		GEN3	
Lntxppclag	0.992	***	1.021	***	0.995	***	0.917	***	0.948	***	0.919	***	0.891	***	0.896	***	0.893	***
Lndensity	-0.789		-0.683		-0.811		-0.952		-1.005		-0.976		-0.837		-0.960		-0.852	
Lndepratio	0.255		0.073		0.233		0.399		0.240		0.403		0.431		0.333		0.451	
Lntgrpclag	0.011		0.010		0.011		0.001		0.004		0.001		-0.010		-0.008		-0.010	
Preel	-0.013		-0.012		-0.013													
Elec	-0.113		-0.323		-0.110													
Postel	-0.099	*	-0.106	*	-0.098	*												
Termcount							0.018		0.021		0.018							
Left	-0.020		-0.022		-0.020		-0.012		-0.014		-0.011		-0.001		0.000		0.000	
Frag	-0.623		-0.662		-0.623		-0.609		-0.640		-0.601		-0.506		-0.498		-0.496	
LnNews	0.088						0.100						0.093					
LnNews*elec	-0.041						0.002						-0.013					
LnEco_n			0.064						-0.008						-0.067			
LnEco_n*elec			-0.062						0.003						-0.006			
LnGen_n					0.067						0.092						0.098	
LnGen_n*elec					-0.038						0.002						-0.012	

*Note: LSDVC estimation initialized with BB estimator, 50 bootstrap repetitions. * p<0.05, ** p<0.01, *** p<.001*

The comparison between the coefficients presented in panel *'a'* and panel *'b'* of Table 5.1 show that the effect of the press diffusion on total expenditure is significant only before 1995. There are two channels of influence: the average visibility effect during all the years and the transparency effect during the year in which the cycle is generated. The average effect is determined by generic newspapers as the economic newspapers don't show any significant effect on total expenditure.

If we estimate Equation 2 on current and capital expenditure separately for the two time subsamples, we obtain the results in Table 5.2 and Table 5.3.

Table 5.2 shows that current expenditure is influenced by the diffusion of the newspapers only before 1995 and only through the average effect from generic newspapers. This results matches the previous results in Table 4.2 of a cycle in current expenditure before 1995: if the incumbent manipulates current expenditure to signal competence, his decision is affected by the degree of awareness of the population. However, the effect is an average effect and not an electoral effect; this result is explained with the rigidity of current expenditure, mainly made of personnel wages and transfers to Municipalities (*Comuni*) and Local Health Units (*ASL*). As the personnel expenditure is rigid over the legislature and the transfers to lower levels of government are subject to political determinants (partisan alignment, as an example) and reputational concerns (because the local government observes the transfer received every year and prefers an average more generous regional government to an average opportunistic one), it is reasonable that current expenditure finances targeted programs spread during the whole legislature.

On the contrary, capital expenditure shows a different pattern. Table 5.3 shows in fact that expenditure is influenced by the

diffusion of newspapers only when we compare the electoral and the non electoral years through the interactive term. The negative coefficients indicate a transparency effect associated with all the types of newspapers either before and after 1995. This is an expected result as the cycle in capital expenditure is observed in the full dataset 1984-2008; the magnitude of the effect, however, has almost halved through time from 13% to 7.3%.

Table 5.2 Current expenditure LSDVC estimation: augmented model on the period 1984-1995 (180 observations)

Panel a: 1984-1995	ALL1		ECO1		GEN1		ALL2		ECO2		GEN2		ALL3		ECO3		GEN3	
Lncxppclag	0.266	***	0.322	***	0.265	***	0.283	***	0.357	***	0.282	***	0.276	***	0.35	***	0.276	***
Lndensity	-2.91		-2.97		-2.91		-3.26		-3.22		-3.25		-3.05		-3.03		-3.04	
Lndepratio	-0.91		-0.43		-1		-0.94		-0.38		-1.06		-0.87		-0.31		-0.99	
Lntgrpclag	0.051	***	0.052	***	0.052	***	0.044	***	0.044	***	0.045	***	0.044	***	0.043	***	0.044	***
Preel	0.07	*	0.094	**	0.071	*												
Elec	0.155		0.033		0.153													
Postel	0.109	*	0.135	**	0.109	*												
Termcount							-0.01		-0.01		-0.01							
Left	-0.28	**	-0.29	**	-0.28	**	-0.28	**	-0.27	**	-0.27	**	-0.27	**	-0.27	**	-0.26	**
Frag	0.193		0.181		0.183		0.219		0.233		0.208		0.244		0.259		0.232	
Maj	-0.12		-0.18	**	-0.12		-0.07		-0.14	*	-0.07		-0.06		-0.12	*	-0.05	
LnNews	0.414	***					0.502	***					0.497	***				
LnNews*elec	0.004						-0.04						-0.02					
LnEco_n			0.118						0.147						0.144			
LnEco_n*elec			-0.03						-0.02	*					-0.02			
LnGen_n					0.398	***					0.483	***					0.478	***
LnGen_n*elec					0.003						-0.04						-0.02	

Table 5.2 Current expenditure LSDVC estimation: augmented model on the period 1984-1995 (continued) (196 observations)

Panel b: 1996-2008	ALL1		ECO1		GEN1		ALL2		ECO2		GEN2		ALL3		ECO3		GEN3	
Lncxppclag	0.961	***	1.010	***	0.966	***	0.918	***	0.968	***	0.924	***	0.935	***	0.955	***	0.940	***
Lndensity	-0.157		0.159		-0.174		-0.285		-0.106		-0.303		-0.215		-0.015		-0.228	
Lndepratio	0.216		0.062		0.167		0.239		0.161		0.199		0.206		0.171		0.171	
Lntgrpclag	0.027		0.028		0.027		0.021		0.025		0.022		0.019		0.018		0.019	
Preel	-0.012		-0.006		-0.012													
Elec	-0.047		-0.183		-0.044													
Postel	-0.042		-0.053		-0.043													
Termcount							0.002		0.009		0.002							
Left	-0.032		-0.035		-0.033		-0.026		-0.030		-0.027		-0.026		-0.024		-0.026	
Frag	-0.465		-0.499		-0.477		-0.454		-0.498		-0.463		-0.434		-0.428		-0.441	
LnNews	-0.050						-0.049						-0.047					
LnNews*elec	-0.003						0.007						0.008					
LnEco_n			0.112						0.093						0.045			
LnEco_n*elec			-0.029						0.006						0.003			
LnGen_n					-0.075						-0.067						-0.061	
LnGen_n*elec					-0.002						0.007						0.008	

*Note: LSDVC estimation initialized with BB estimator, 50 bootstrap repetitions. * p<0.05, ** p<0.01, *** p<.001*

Table 5.3 Capital expenditure LSDVC estimation: augmented model on the period 1984-1995 (180 observations)

Panel a: 1984-1995	ALL1		ECO1		GEN1		ALL2		ECO2		GEN2		ALL3		ECO3		GEN3	
Lnkxppclag	0.737	***	0.721	***	0.744	***	0.752	***	0.719	***	0.76	***	0.784	***	0.757	***	0.791	***
Lndensity	-0.41		-1.07		-0.3		-0.76		-1.24		-0.68		0.359		0.011		0.394	
Lndepratio	1.483		1.999		1.472		1.351		1.78		1.34		1.926		2.374		1.903	
Lntgrpclag	0.019		0.014		0.02		0.012		0.009		0.013		0.008		0.004		0.009	
Preel	0.029		0.03		0.034													
Elec	0.109		-1.8	**	0.149													
Postel	0.161		0.152		0.163													
Termcount							-0.05		-0.06	*	-0.04							
Left	0.104		0.044		0.108		0.109		0.079		0.114		0.121		0.099		0.124	
Frag	0.987	**	0.875	*	0.995	**	0.998	**	0.976	**	1.006	**	1.118	**	1.126	**	1.121	**
Maj	-0.48	***	-0.44	***	-0.48	***	-0.41	***	-0.48	***	-0.41	***	-0.37	**	-0.41	***	-0.37	**
LnNews	0.215						0.297						0.218					
LnNews*elec	-0.13						-0.18	***					-0.13	***				
LnEco_n			0.259						0.321	*					0.268			
LnEco_n*elec			-0.4	***					-0.1	***					-0.07	***		
LnGen_n					0.169						0.25						0.177	
LnGen_n*elec					-0.11						-0.17	***					-0.13	***

Table 5.3 Capital expenditure LSDVC estimation: augmented model on the period 1984-1995 (cont.) (196 obs.)

Panel b: 1996-2008	ALL1		ECO1		GEN1		ALL2		ECO2		GEN2		ALL3		ECO3		GEN3	
Lnkxppclag	0.611	***	0.600	***	0.612	***	0.582	***	0.586	***	0.583	***	0.582	***	0.584	***	0.585	***
Lndensity	-4.297		-5.044		-4.296		-4.317		-5.291		-4.302		-4.118		-5.355		-4.083	
Lndepratio	1.678		1.513		1.765		1.661		1.482		1.787		1.299		1.201		1.461	
Lntgrpclag	-0.095		-0.096		-0.095		-0.102		-0.100		-0.102		-0.137	*	-0.125		-0.137	*
Preel	0.072		0.067		0.074													
Elec	-0.110		-0.559		-0.098													
Postel	-0.206		-0.161		-0.202													
Termcount							0.067		0.051		0.066							
Left	0.051		0.066		0.054		0.055		0.074		0.058		0.097		0.111		0.101	
Frag	-1.481		-1.233		-1.445		-1.420		-1.161		-1.373		-0.985		-0.777		-0.935	
LnNews	0.239						0.217						0.160					
LnNews*elec	-0.097						-0.012						-0.073	**				
LnEco_n			-0.349						-0.479						-0.532			
LnEco_n*elec			-0.134						-0.008						-0.034	*		
LnGen_n					0.297						0.301						0.285	
LnGen_n*elec					-0.090						-0.011						-0.071	**

*Note: LSDVC estimation initialized with BB estimator, 50 bootstrap repetitions. * p<0.05, ** p<0.01, *** p<.001*

All in all, this Section presented the empirical evidence of the weakening of a cycle in the size of expenditure after 1995. At the same time the analyses shows that effect of the diffusion of press information decreased when the considered item of expenditure was not the object of cycles in size anymore.

5. Conclusions

This chapter investigated the impact of the diffusion of newspapers on the expenditure cycles in Italian Regions, separating the effect of economic and generic newspapers, and analyzing the time pattern of cycling. The small sample bias due in the dynamic estimation has been corrected applying the LSDVC estimator (Bruno, 2005), testing the robustness of the coefficients to different specifications of the initial estimator and of the number of bootstrap repetitions to estimate the standard errors.

The empirical results verify the presence of a weak cycle in the size of expenditure (Rogoff, 1990) during the period 1984-2008, by detecting electoral expenditure cycles in capital expenditure of about 19% and weak electoral cycles in total expenditure of about 7.5%. The replication of the analyses on time subsamples of the dataset reveals that these results are motivated by the presence of evident expenditure cycles before 1995; the cycle of expenditure size disappears during the second half of the period, when the electoral and fiscal reforms have been implemented.

The voters' awareness, proxied by the local diffusion of newspapers, has an average positive effect on current expenditure and a negative electoral effect on capital expenditure in the full dataset. This pattern is explained with the role of capital expenditure as the most visible item of spending,

the 'signal' to send to the voters, that is more influential as the legislature turns to its end. The time disaggregated analyses, however, shows that the variation of the diffusion of press is halved with respect to capital expenditure and it is not significant with respect to current expenditure. This result could be explained with a shift towards a pork barrel cycle in which information on the amount and the direction of targeted electoral expenditure is unobservable to voters and cannot be revealed with newspapers.

Finally, an interesting result of the analyses shows that a more specific information does not constrain the cycle more strongly, as generic newspapers are associated to larger coefficients than economic newspapers. This result was unexpected but it is in line with the existing literature stressing the role of newly informed voters (Prat and Stromberg, 2006). The relevant issue is thus spreading information, not increasing the specificity of information.

This paper contributes to the literature in two main directions. First, it illustrates a pattern of cycling from the size to the composition of expenditure. Future research should search for the same pattern in other countries and exploit the available datasets to conduct a proper test of different types of cycles in time.

Secondly, although the link between the diffusion of newspapers and the expenditure decision necessarily passes by popularity concerns, further research should investigate the impact of specific and generic information on the voting decision. The classification of newspaper could also be modified to control for local and national newspapers, or the partisan bias associated to the journals. Finally, as the 'press divide' becomes larger in the very recent years and digital media tend to be considered much more transparent and reliable than other sources of information,

future studies should address the role of these innovative news providers.

6. Appendix

A.1 List of newspapers classified as 'generic'

1.	Adige	24.	Gazzettino	47.	Tribuna di Treviso
2.	Arena	25.	Lavoro	48.	Leggo
3.	Avvenire	26.	Mattino	49.	Libero
4.	Corriere Mercantile	27.	Messaggero	50.	Libertà
5.	Corriere di Rieti	28.	Messaggero Veneto	51.	Manifesto
6.	Corriere della Sera	29.	Piccolo	52.	Mattino di Padova
7.	Corriere dell'Umbria	30.	Quotidiano	53.	Nuova Venezia
8.	Corriere di Viterbo	31.	Resto del Carlino	54.	Nuovo Quotidiano di Puglia
9.	Dolomiten	32.	Tempo	55.	Occhio
10.	Eco di Bergamo	33.	Tirreno	56.	Padania
11.	Epolis	34.	Indipendente	57.	Provincia pavese
12.	Gazzetta del Mezzogiorno	35.	Gazzetta di Parma	58.	Paese sera
13.	Gazzetta del Sud	36.	Gazzetta di Reggio	59.	Quotidiano della Calabria
14.	Gazzetta di Mantova	37.	Altoadige	60.	Quotidiano di Sicilia
15.	Giornale	38.	Nazione	61.	Repubblica
16.	Giornale di Brescia	39.	Notte	62.	Sannio
17.	Giornale di Vicenza	40.	Nuova Basilicata	63.	Secolo d'Italia
18.	Giornale Italia	41.	Nuova Ferrara	64.	Secolo XIX
19.	Giornale dell'Umbria	42.	Nuova gazzetta di Modena	65.	Stampa
20.	Giorno	43.	Nuova Sardegna	66.	Taranto news sera
21.	Centro	44.	Provincia di Como-Lecco	67.	Unione sarda
22.	Corriere Adriatico	45.	Provincia di Cremona	68.	Unità
23.	Giornale di Sicilia	46.	Sicilia		

A.2 Data sources of the dataset

Total exp, Current exp, Capital exp, Grants	Italian Institute of Statistics (ISTAT), Finanza locale: entrate e spese dei bilanci consuntivi (Comuni, Province e Regioni), paper yearbooks from 1980 to 2004, online publications from 2005 to 2009. Link: *http://www.istat.it/*
Density, Depratio	Italian Institute of Statistics (ISTAT), Sistema di Indicatori Territoriali Link: *http://sitis.istat.it/sitis/html/*
Preel, Elec, Postel, Left, Frag	Italian Ministry of Interiors, *Archivio storico delle elezioni* Link: *http://elezionistorico.interno.it/*
News, Eco_n, Gen_n	Sobbrio (2011) and ADS (Accertamenti Diffusione Stampa)

A.3 Descriptive statistics of the dataset

Variable	*Mean*	*Std. Dev.*	*Min*	*Max*
Total exp	1.473	0.816	0.050	4.364
Current exp	1.176	0.639	0.027	3.429
Capital exp	0.297	0.311	0.017	2.274
Density	200.280	105.052	59.130	427.680
Depratio	49.636	4.115	39.190	61.470
Grants	0.525	0.476	0	2.946
Preel	0.200	0.400	0	1
Elec	0.200	0.400	0	1
Postel	0.202	0.402	0	1
Left	0.458	0.499	0	1
Maj	0.567	0.496	0	1
Frag	0.691	0.134	0.128	0.880
News	0.074	0.039	0.016	0.247
Eco_n	0.005	0.002	0	0.012
Gen_n	0.069	0.037	0.015	0.240
Termcount	2.918	1.433	1	5

A.4. Total expenditure LSDVC estimation: augmented model without interacted term

	1984-2008						1984-1995						1996-2008					
	ALL1		ECO1		GEN1		ALL1		ECO1		GEN1		ALL1		ECO1		GEN1	
Lntxppclag	0.651	***	0.626	***	0.656	***	0.493	***	0.526	***	0.499	***	0.985	***	1.013	***	0.989	***
Lndensity	-0.115		-0.053		-0.130		-2.129		-2.224		-2.099		-0.832		-0.756		-0.852	
Lndepratio	2.113	***	2.075	***	2.070	***	0.238		0.727		0.192		0.241		0.091		0.217	
Lntgrpclag	0.025	***	0.024	***	0.026	***	0.041	***	0.040	***	0.042	***	0.010		0.010		0.010	
Preel	0.025		0.027		0.026		0.057		0.072	*	0.059		-0.013		-0.011		-0.013	
Elecy	0.067	*	0.077	*	0.067	*	0.216	***	0.242	***	0.218	***	-0.002		-0.001		-0.003	
Postel	-0.029		-0.022		-0.028		0.124	**	0.141	**	0.125	**	-0.098	*	-0.103	*	-0.098	*
Left	0.019		0.007		0.021		-0.190	*	-0.200	*	-0.184	*	-0.019		-0.022		-0.019	
Frag	0.527	***	0.443	**	0.523	***	0.393		0.395		0.389		-0.637		-0.680		-0.635	
Maj	-0.140	**	-0.174	**	-0.138	*	-0.271	***	-0.320	***	-0.270	***						
Lnallpc	0.249	*					0.317	**					0.076					
Lnsolepc			0.183	*					0.156						0.043			
Lnaltripc					0.212						0.288	**					0.056	

*Note: LSDVC estimation initialized with BB estimator, 50 bootstrap repetitions. * p<0.05, ** p<0.01, *** p<.001*

A.5. Current expenditure LSDVC estimation: augmented model without interacted term

	1984-2008						1984-1995						1996-2008					
	ALL1		ECO1		GEN1		ALL1		ECO1		GEN1		ALL1		ECO1		GEN1	
Lncxppclag	0.528	***	0.517	***	0.532	***	0.266	***	0.324	***	0.266	***	0.972	***	1.007	***	0.978	***
Lndensity	0.384		0.426		0.367		-2.92		-2.946		-2.913		-0.156		0.112		-0.169	
Lndepratio	2.205	***	2.119	***	2.163	***	-0.902		-0.426		-1		0.13		0.064		0.078	
Lntgrpclag	0.035	***	0.033	***	0.036	***	0.051	***	0.052	***	0.051	***	0.027		0.028		0.027	
Preel	0.038		0.04		0.04		0.07	*	0.094	**	0.071	*	-0.011		-0.006		-0.012	
Elecy	0.039		0.047		0.039		0.144	**	0.185	***	0.145	**	-0.037		-0.031		-0.038	
Postel	0.017		-0.01		-0.016		0.109	*	0.136	**	0.109	*	-0.042		-0.052		-0.043	
Left	0.013		-0.024		-0.01		-0.282	**	-0.284	**	-0.275	**	-0.032		-0.035		-0.033	
Frag	0.501	**	0.41	*	0.496	**	0.194		0.19		0.183		-0.471		-0.51		-0.482	
Maj	0.084		-0.12	*	-0.082		-0.125		-0.188	**	-0.12							
Lnallpc	0.261	*					0.414	***					-0.056					
Lnsolepc			0.187	*					0.12						0.1			
Lnaltripc					0.219	*					0.398	***					-0.079	

*Note: LSDVC estimation initialized with BB estimator, 50 bootstrap repetitions. * p<0.05, ** p<0.01, *** p<.001*

A.6. Capital expenditure LSDVC estimation: augmented model without interacted term

	1984-2008						1984-1995						1996-2008					
	ALL1		ECO1		GEN1		ALL1		ECO1		GEN1		ALL1		ECO1		GEN1	
Lnkxppclag	0.700	***	0.664	***	0.703	***	0.733	***	0.696	***	0.741	***	0.610	***	0.604	***	0.611	***
Lndensity	-1.289		-1.327		-1.286		-0.080		-1.043		-0.002		-4.444		-5.283		-4.436	
Lndepratio	2.654	***	2.724	***	2.614	***	1.375		1.878		1.373		1.579		1.436		1.672	
Lntgrpclag	0.006		0.004		0.007		0.019		0.014		0.019		-0.097		-0.096		-0.097	
Preel	0.034		0.035		0.035		0.028		0.025		0.033		0.072		0.068		0.074	
Elecy	0.184	**	0.196	***	0.184	**	0.438	***	0.443	***	0.443	***	0.154		0.143		0.155	
Postel	-0.054		-0.043		-0.053		0.161		0.176	*	0.163		-0.205		-0.155		-0.201	
Left	0.097		0.085		0.100		0.100		0.065		0.104		0.053		0.066		0.056	
Frag	0.726	*	0.619	*	0.726	*	0.986	**	0.942	*	0.991	**	-1.497		-1.280		-1.457	
Maj	-0.166		-0.221	*	-0.162		-0.475	***	-0.529	***	-0.477	***						
Lnallpc	0.291						0.225						0.202					
Lnsolepc			0.255						0.317	*					-0.405			
Lnaltripc					0.261						0.173						0.263	

*Note: LSDVC estimation initialized with BB estimator, 50 bootstrap repetitions. * p<0.05, ** p<0.01, *** p<.001*

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