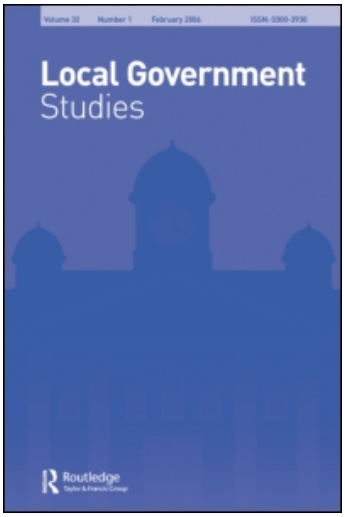

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Local Expenditure Interaction in Italian Municipalities: Do Local Council Partnerships Make a Difference?

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ABSTRACT *This paper investigates interdependence among local councils in Italy in their public spending and distinguishes between possible sources of this interdependence. We find significant positive interaction among neighbouring local councils in regard to both spending at the level of total expenditure and spending on different sub-categories. Attempts to identify the source of this horizontal interaction seem to reject the yardstick competition hypothesis. Addressing the role that local council partnerships may play in internalising fiscal externalities, we suggest that expenditure interaction may be driven by spill-over.*

KEY WORDS: Local council partnerships, local public spending interaction, yardstick competition, spill-overs, spatial econometrics

Theoretical Background

The recent Italian fiscal reform to introduce a decentralised system of revenue-raising and government expenditure decisions should assign more flexibility and freedom to local councils in the realm of public spending allocation and the relative provision of services (Zanardi, 2006). In fact, instead of acting with greater autonomy, there are theoretical reasons to suspect that local councils are responding to the choices of neighbouring jurisdictions in setting the level of their own decision variable, so that one observes spatial interaction among local government expenditure levels. The rationale for this statement draws on different strands in the theoretical

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literature, which have been extensively reviewed by Brueckner (2003) and Revelli (2005, 2006). We briefly describe the main mechanisms and political assumptions that lead to fiscal interaction among local governments.

Using the spill-over model approach, several authors have demonstrated that the benefits or possible detrimental effects of public expenditure (i.e. with regard to spending on security services, infrastructure and road building, environmental services, recreation and cultural facilities, etc.) spread across the administrative boundaries of one jurisdiction and affect the welfare of the residents of neighbouring jurisdictions (Baicker, 2005; Case *et al*., 1993; Freret, 2006; Kelejian & Robinson, 1993; Revelli, 2003; Schaltegger & Zemp, 2003; Solé Ollé, 2006). In these models, the optimal value of the decision of one jurisdiction depends on its own characteristics, of course, but also on policies chosen elsewhere. The interaction among public expenditures will assume positive/negative values as a result of spill-overs depending on the pattern of complementarity or substitutability among local public services (Revelli, 2006). If jurisdictions fail to take account of this spill-over effect when setting the optimal value of a policy instrument, it can be shown that they reach inefficient Nash equilibria and do not maximise social welfare.

Another possible explanation for strategic interaction among jurisdictions rests on the features of the yardstick competition theory.[1] Salmon (1987) proposes a model in which citizens are imperfectly informed voters because they do not have enough information about the costs and suitability of incumbent local fiscal policies for them to be able to make direct evaluation of a local government's behaviour. Therefore, as a means to assess the performance of their own jurisdiction, voters look at other government performances as benchmarks. Thus, the fiscal policies of neighbours become crucial for a politician's chances of being re-elected, and jurisdictions tend to mimic each other, 'trying not to get too far out of line with the policies enacted in nearby jurisdictions' (Revelli, 2006: 110). Several papers have found evidence for the hypothesis of yardstick competition (Allers & Elhorst, 2005; Besley & Case, 1995; Bordignon *et al*., 2003; Redoano, 2003; Solé Ollé, 2003).

Jurisdictions also engage in strategic interaction when they are involved in tax or welfare competition in order to attract investments and resources (Feld & Reulier, 2005; Figlio *et al*., 1999; Heyndels & Vuchelen, 1998; Redoano, 2003; Revelli, 2001). Both approaches are sometimes referred to as the resource-flow model (Brueckner, 2003). Since the provision of a public good is uniform across a given jurisdiction, some people will necessarily be dissatisfied. This usually happens when a central government is in charge of the provision. None the less, Tiebout (1956) argues that even with the decentralised provision of public goods, some inhabitants will be dissatisfied because preferences will not be perfectly homogeneous. However, in this case, each dissatisfied citizen can move to another jurisdiction where a different and preferred combination of tax and quantity

of public goods prevails.[2] This model implies that if agents are 'geographically' mobile,[3] then local governments will compete for citizens through taxation, the provision of public goods and services, or a regulatory system. This argument can be extended easily from citizens to cover any category of mobile tax base or benefit recipients (for example, firms, production factors, etc.), and from competition among local governments to competition among different states or countries. It can be shown that these models adhere to Nash equilibria. Under some circumstances, this competition may end up in a 'race to the bottom', with jurisdictions exerting downward pressure on each other's welfare benefits (Brueckner, 2000).

During the past ten years, a growing body of empirical literature has assessed whether fiscal interactions among jurisdictions influence their policy resolutions (see Brueckner, 2003 and Revelli, 2005, 2006 for a survey). Recently, several papers have focused on local governments (Allers & Elhorst, 2005; Bordignon *et al*., 2003; Brueckner & Saavedra, 2001; Heyndels & Vuchelen, 1998; Solé Ollé, 2006). The decentralisation process now taking place in most European countries has devolved growing functions to this tier of government. It is presumed that local governments can better match local citizens' preferences, and that local policy choices can closely affect citizens' welfare. It therefore becomes important to gain insights into the process of public policy formation at local level, because the lower tier of government must meet the challenge of increasingly localised forms of competition.

To our knowledge, the only paper dealing with the Italian evidence is Bordignon *et al*. (2003). But this focuses on the tax side of local fiscal policies, so that the relevance of previous issues with regard to local public expenditure remains untested in Italy. The aim of this paper is to fill this gap. Since local jurisdictions are, in general, responsible for providing a number of different goods and services, the spending decision is also a decision on how to allocate spending among different local goods and services. Thus, in regard to local public expenditure, we test for interactions not only at the level but also in the composition of expenditures. Finally, we explore the source of spending interaction by exploiting properties of different forms of local council partnerships. Inter-municipality co-operation has been promoted recently in Italy. Although similar local government agreements can be found also in other countries, their importance for fiscal interaction among municipalities has not yet been addressed.

We investigate the presence of strategic interactions due to spatial correlation among the 246 Italian local councils of the Marche region when they set the level of current local public expenditure with reference to year 2000. We also test the robustness of our results when different budget categories of public expenditure are concerned, admitting that some expenditures are more prone to mimicking behaviour than others. To allow

for spatial dependence when explaining public expenditure, we take account only of geographical contiguity. However, the main aim of the paper is to disentangle the sources of fiscal interdependence among jurisdictions. Among different possible reasons for spatial interaction, we address the importance of local council partnerships as instruments to internalise spill-overs. To our knowledge, the implications of these institutional arrangements have yet received attention. We think that estimation of the reaction function of local councils joining partnerships can represent a novel perspective from which to investigate fiscal interaction. The issue of inter-municipal co-operation is attracting a great deal of attention in local public economics as an instrument for local government reform, not only in Italy but also at an international level (Dollery & Robotti, 2008). Similar institutional arrangements are spreading in several countries, such as Australia, Canada, France and Spain. Therefore, the empirical approach adopted in this paper may be useful for the analysis of local public expenditure in countries other than Italy.

The paper is organised as follows. Section two introduces the institutional framework and the system of local council partnerships in Italy. Section three describes the spatial econometric procedure and the empirical specification adopted to investigate whether the Italian municipalities under examination engage in fiscal interaction. Section four is devoted to describing the data and the variables. Section five illustrates the results of the estimation of spending interaction. In section six, we discriminate among different potential sources of fiscal interdependence, such as yardstick competition versus fiscal spill-overs, and we explore the role played by local council partnerships in determining fiscal interaction. The paper concludes with a summary of the paper's principal findings.

The Italian Institutional System of Local Council Partnerships

The local institutional structure of Italy consists of three tiers of overlapping governments: region, province and municipality. The 20 regions of Italy represent the upper tier of local government. Italy thus has 103 provinces and more than 8100 municipalities, the latter representing the lowest tier of government. The main competence of municipalities is the administration of functions and the provision of services at a local level. During the 1990s Italy underwent profound transformation in the institutional and financial relationships among levels of government, the aim being the decentralisation and the fiscal autonomy of lower levels of government with respect to the central state (see Ermini & Salvucci, 2008). The final act of this reform was the approval in 2000 of the 'Testo Unico degli Enti Locali'.[4]

Among other relevant provisions, this law has been crucial for inter-jurisdictional partnership development because it introduced new forms of local government co-operation and re-organised existing ones. The rationale

behind inter-communality co-operation is that it alleviates pressure on local public budgets by exploiting scale and scope economies in service provision and promotes service efficiency or quality improvement at local level. The law lists different types of inter-municipal co-operation with diverse official structures and different degrees of institutionalisation and representativeness of local interests. For our purposes here, we focus on two of these agreements: 'Unione di Comuni' (hereafter, UC) and 'Comunità Montana' (hereafter, CM).

The UC is a form of co-operation introduced in 1990 (law 142/1990), but it began to receive specific support in 2000.[5] These entities can manage any service or function assigned to them by the associated councils. For example, they deliver services in the areas of local policing, social assistance services, social welfare, sport and culture, transport, etc. In 2005, there were 269 UCs registered in Italy. The total managed current expenditure is about €149 million, which represents 0.4 per cent of Italian total current expenditure (Ermini & Fiorillo, 2008; Istat, 2005a).

The CM is an Italian institution specifically created by legislation in the 1970s (law 1102/1971) for the maintenance of territory in mountain areas. It is a mandatory partnership: local councils within a CM are identified by laws; they do not have autonomy with regard to the choice of partners; and they are obliged to stay together. In recent years, CMs have expanded their competencies to encompass the provision of various local services (for example, social, cultural and recreational, road and transport services). The portfolio of local services managed can, in fact, be similar to the one operated by UC. In 2005 Italy had 330 CM. The budget features of CM report total current expenditure of about €674 million, that is, about two per cent of Italian total current expenditure (Istat, 2005a, b).

Both UC and CM representatives are appointed from among the associated councils, but the selection criteria may vary widely according to the statutory agreement reached within councils. It is to be stressed that they are not elected by citizens.

The main difference between a UC and a CM is that the former is built on a voluntary agreement among councils, while the CM is a mandatory local council association. This difference may be crucial in regard to the aim of exploiting scale and scope economies, but also of internalising spill-overs. It may influence the relative capacity of council partnerships to achieve an adequate equivalence between administrative boundaries and the area where all costs and benefits apply. Of course, the UC is supposed to be more efficient because any local council can choose the most appropriate partner. Instead, CM partners are selected in order to manage land maintenance issues due to specific geomorphological characteristics of councils, but with no regard to economic considerations concerning potential scale economies or correction for spill-over. We shall operationalise these considerations in the empirical analysis to explore the sources of local council interactions.

Spatial Econometric Approach

Although the theoretical literature often assumes the presence of economic interaction among jurisdictions and analyses its consequences on fiscal policy, verifying the existence and the magnitude of spatial interdependence remains mainly an empirical issue. Most of the papers in the empirical literature have focused on horizontal tax interactions (Besley & Case, 1995; Brueckner & Saavedra, 2001; Case *et al*., 1993; Heyndels & Vuchelen, 1998; Ladd, 1992). All of them have found evidence of a positive interdependence among the tax rates of competing jurisdictions. Following the seminal paper of Case *et al*. (1993), we test for horizontal interactions in the local expenditures setting by focusing on 246 Italian *comuni*, the lowest tier of the Italian local government structure.[6]

Traditionally, empirical models of local public expenditure relate local spending to measures of income and tax shares (including grant-in-aid) and, in addition, to variables reflecting socio-economic and geographical characteristics of the municipality: that is to say, they assume that expenditures are influenced only by observed local features, not by variables characterising other municipalities (Aronsson *et al*., 2000). Adopting a linear specification, this corresponds to estimating the following model:

$$Y = X\beta + \varepsilon \tag{1}$$

where Y denotes a $N \times 1$ vector of the dependent variable consisting of the per capita expenditures of N local jurisdictions, that is, the spatial units of observation, X denotes an $N \times K$ matrix of exogenous 'local' explanatory variables, and ε is an $N \times 1$ vector of independently and identically distributed error terms across observations.

Building on the spatial econometric approach developed by Anselin (1988), this model can be augmented to account for interdependence among the expenditure decisions of jurisdictions. The assumption that the spatial pattern is due to a spatial auto-regressive process in the dependent variable extends equation (1) to include a spatially lagged dependent variable:

$$Y = \rho WY + X\beta + \varepsilon \tag{2}$$

This specification is identified as a spatial lag model.[7] Here, W represents an $N \times N$ weight matrix that assigns neighbours to every jurisdiction; it is defined *a priori*. The lagged variable WY is a weighted average of all other jurisdictions' spending, so that ρ, called the spatial autoregressive coefficient, identifies the intensity and the sign of the impact of the neighbours' policies on one jurisdiction's spending function. If the coefficient ρ is significant, we conclude that jurisdictions are prone to interactive behaviour and engage in the substantive mimicking of each other when setting their own spending. According to Brueckner (2003), when ρ is

negative, we can assume that spill-overs are behind the observed spatial correlation. If it is positive, further research must be carried out to discriminate among the spill-overs, yardstick competition or fiscal competition explanations, which is the nature of horizontal interactions.

Turning to estimation procedures, lag spatial models invalidate the use of ordinary least squares (OLS) estimators (Anselin, 1988). First, the assumption of strategic interaction among spatial units of observation modelled by a spatial lag model gives rise to the endogeneity of the neighbours' expenditure variable because of the presence of the vector Y on both sides of equation (2). Ignoring the influence of neighbours' spending on one's jurisdiction expenses would lead to inconsistent estimation of the relevant parameter. When normality of the residuals applies, Anselin (1988) solves the simultaneity problem by using maximum likelihood (ML) methods. Otherwise, and more generally, instrumental variables (IV) or two-stage least square (2SLS) estimation techniques represent a valid approach to tackling a spatial lag model. This method typically employs fitted values of $\hat{WY}$, obtained by regressing WY on WX and X as instruments for the actual neighbour spending WY. We obtain estimates of the spending model that are consistent not only with endogeneity bias but also with the presence of spatial error autocorrelation (see Kelejian & Prucha, 1998). This approach, however, requires some caution in the choice of instruments, whose appropriateness must be adequately tested.

The weights matrix W is fundamental when dealing with spatial correlation, because it defines the concept of neighbourhood among jurisdictions and introduces the potential spatial correlation among units of observation. Since it is posited *a priori* by the researcher, it can arbitrarily influence the results obtained. In the analysis reported in this paper, we followed the suggestion put forward by Revelli (2006) of relying on the adoption of a geographical proximity criterion. This makes it possible to describe most of the spatial processes investigated in the domain of applied local public economics. Specifically, we used the contiguity weights matrix. Using this very common procedure facilitates comparison with similar studies. Finally, the contiguity weights matrix fulfils the requirement of parsimony in specification of the spatial structure of the data. A binary matrix, for example, reduces the risk of imposing arbitrary or excessively structured relationships among the units of observation without a specific theoretical reason for doing so (Revelli, 2006). Hence, the spatial weights matrix W has zero diagonal elements and off-diagonal elements w_{ij} with i denoting a jurisdiction and j its neighbour. When we assumed the geographical criterion, the simplest and most commonly used weights matrix we could construct is the contiguity distance matrix. In this case, the generic element w_{ij} of W takes value 1 if jurisdictions i and j share a common border, otherwise $w_{ij}=0$. As is conventional in empirical applications, after the weights are computed, the elements of each row of W are standardised so that they sum to unity.[8]

Data and Variables

For the empirical implementation of our investigation we used data on the 246 local councils of one Italian region, called Marche, for the year 2000. The Marche region is located in the centre of Italy and consists of five provinces and 246 municipalities: 14 per cent of total municipalities lie on the Adriatic coast, while the remaining municipalities extend up to the Umbro–Marche Appennine mountains. The surface area is 9694 km^2, and 33 per cent of it consists of inland mountains and 33 per cent of coastline hills. A key characteristic of this region is the small size of its municipalities. In fact, 57 per cent of municipalities have fewer than 3000 inhabitants. In 2007, the population of the Marche region was about 1.6 million (corresponding to 2.6 per cent of the Italian population), while the population density was 160 inhabitants per km^2, which was smaller than the corresponding figure for Italy as a whole (198).

We focus our analysis on the Marche region for several reasons. First, the local council per-capita fiscal data (tax and fee revenues, current expenditure, current grants, etc.) of this region are very similar to the corresponding data for the median Italian council, so that Marche can be considered a representative region for Italy (Lorenzini & Maltinti, 2006). Secondly, the Marche region is a relevant case for study of Italian local council partnerships: it has been demonstrated that UCs in the Marche perform quite well. With regard to the data employed in this paper, in 2001 there were six UCs in the Marche region, representing 3.4 per cent of the total number of UCs in Italy. They comprised 21 local councils, which was about nine per cent of total councils in the Marche region (Ermini & Salvucci, 2006b). Significantly, the number of services delivered by the average UC of Marche is higher (4.8 services per UC) than the Italian national average (4.0 services per UC). This performance improved in 2005.[9] With reference to CM data, by law the Marche region consists of 13 CMs (that is, four per cent of the total of 330 Italian CMs). Overall, 122 councils belong to CMs, which represent 50 per cent of total councils in Marche (UNCEM,[10] 2008). Finally, the small size of the Marche communes and their lower population density in comparison to Italy are characteristics that may induce local councils to seek to establish inter-municipal partnerships. These aspects are of great importance, because our paper will exploit this institutional arrangement to explore the spatial pattern of local council expenditure.

As regards the dataset, the dependent variable examined was the euro per-capita current public spending level.[11] Data were collected from local councils' balance sheets.[12] Recognizing that some types of spending are more likely to generate mimicking behaviour, and that there is no reason to expect the same direction of spatial autocorrelation for different spending categories,[13] we tested our basic model assuming the following disaggregated categories of spending as dependent variables: education, police, leisure (cultural and sports spending), social services, road maintenance and

transport, local services (housing, town building, parks, environment, rubbish, water delivery and sanitation). These categories cover almost the entire range of spending responsibility of local governments, and they represent more than 60 per cent of total current local expenditure.[14] Again, all variables are expressed in euros per capita. The descriptive statistics of dependent variables are reported in Table 1.

Table 1. Descriptive statistics of variables

Variable	Description	Mean	Std Dev.	Min	Max
Total	Total public expenditure	677.84	361.14	321.50	4343.10
Education	Education expenditure	79.70	33.61	1.60	207.30
Social	Social expenditure	57.25	66.16	0.00	694.20
Police	Police expenditure	31.28	23.53	0.00	206.20
Leisure	Leisure expenditure	32.48	31.74	0.00	373.50
Road	Road and transport expenditure	77.11	44.94	21.70	328.40
Environment	Environment services (water, garbage, etc) expenditure	107.10	68.33	10.60	687.80
ICI tax rate	Local property tax rate	6.03	0.59	5.00	7.00
Density	Population per km^2	147.08	193.29	4.84	1123.37
Pop	Population	5327.92	11182.60	136	100017
Area	Area of unity of observation	39.40	40.12	3.80	269.60
Old	Share of old people (>65 years)	28.75	10.01	14.10	76.70
Young	Share of young people (<15 years)	17.00	5.02	7.70	29.40
GDP	GDP – 1000 euro per capita	20.53	7.85	7.60	65.20
Grants	Grants – euro per capita	325.10	180.59	36.60	1197.90
Coast	Coastal jurisdiction (1 = jurisdiction being on the coast; 0 = otherwise)	0.14	0.35	0	1
Election year	Election year (1 = jurisdiction calling for election; 0 = otherwise)	0.03	0.17	0	1
Right-wing	Right-wing coalition (1 = right-wing coalition ruling; 0 = otherwise)	0.07	0.25	0	1
Large majority	Large majority ruling (1 = share of votes more than 65 per cent; 0 = otherwise)	0.27	0.45	0	1
Unione di Comuni	Unione di Comuni – year 2001 (1 = jurisdiction joining Unione di Comuni in year 2001; 0 = otherwise)	0.09	0.28	0	1
Comunità Montana	Comunità Montana (1 = jurisdiction joining Comunità Montana; 0 = otherwise)	0.50	0.50	0	1

All dependent variables (total, education, social, police, leisure, road and environmental services expenditure) are measured in euro per capita.

The empirical model of local public expenditure comprises various socio-economic characteristics of local jurisdictions. With regard to the above equations, they are collected in the X matrix of the exogenous variables. The only available economic variables are: income and grants from the national level of government, both of them in euros per capita. They measure the availability of resources that can be devoted to public spending. We expected the coefficient of income to be positive if public good was normal and Wagner's law was satisfied. The sign of grants was expected to be positive. The demographic characteristics of the jurisdiction may influence the composition of public spending for services, because they determine the populations' needs and preferences for public goods. We proxied these effects by testing the impact on the dependent variables of the proportion of population which was old (over 64 years of age) and young (under 15). The inclusion of population density yields information on scale economies, and potentially congestion effects, in the provision of public goods. Finally, we use a dummy variable which equals 1 if the jurisdiction is on the coast. This variable introduces a measure of neighbourhood that cannot be included within the weight matrix. It also reflects the extra spending needs of local councils due to potential congestion effects connected with tourist attraction and hospitality. At the same time it controls for the presence of topographical amenities, which, if omitted, could provide false evidence of strategic interaction, given that natural features may be unobservable in the data, so that the amenity level may thus be part of the error term pointing to spatial error correlation (Brueckner, 2003).

Other variables reflecting jurisdictional characteristics (population, squared income per capita, unemployment rate, percentage of foreign people living in the jurisdiction, demographic index, urban contiguity, compliance with caps on local council expenditure,[15] etc.) were dropped from the regression because they did not prove to have significant influence on local expenditure and/or were too correlated with the others.

Results

The estimation results of the total local spending model, adopting the contiguity weights matrix, are reported in Table 2. Column 1 reports the OLS estimates of the non-spatial model. This model accounts for roughly 50 per cent of local spending variation. According to similar results in the applied literature, all variables prove to be statistically significant, with the proportion of young population being the sole exception. These estimates reveal that local spending is higher as income and grants per capita increase, and as the share of the old population decreases. The positive (but modest and overall weakly significant) impact on total spending of population density denotes that potential congestion effects prevail over scale economies. Jurisdictions located on the coast absorb additional amounts of total spending. On checking for spatial autocorrelation, Moran's I

Table 2. Total spending model: OLS and 2SLS estimates

	Non-spatial model	Spatial models	
Regressors	(1) OLS	(2) OLS	(3) IV
ρ	–	0.41*** (4.99)	0.24** (2.25)
Density	0.19* (1.63)	0.16 (1.46)	0.17 (1.57)
Old	−7.89*** (−2.97)	−8.88** (−3.49)	−8.46*** (−3.34)
Young	−5.27 (−1.28)	−9.23* (−2.30)	−7.55* (−1.87)
GDP	20.04*** (7.66)	19.01*** (7.59)	19.45*** (7.81)
Grants	1.66*** (12.06)	1.41*** (10.05)	1.52*** (10.46)
Coast	115.43** (1.97)	97.92* (1.75)	105.34* (1.89)
Cons	−0.57 (−0.01)	−80.45 (−1.16)	−46.61 (−0.67)
Regression diagnostics			
Adjusted R^2	0.52	0.56	
Jarque–Bera test	4788***		
Breusch–Pagan test	865.067***		
Moran's I test	4.75***		
Sargan test			5.705
Observations	246	246	246

t values in parentheses; *significant at 10 per cent; **significant at 5 per cent; ***significant at 1 per cent.

statistic, based on OLS residuals, provides useful insights, given that it is assumed to be a measure of spatial dependence.[16] Inspection of the diagnostics in Table 2 shows that Moran's test (Moran's $I = 4.747$, p-value $= 0.000$) indicates some mis-specification of the model of total local spending and suggests that it should be re-estimated allowing for the presence of spatial autocorrelation. Since the Jarque–Bera test (J-B test $= 4788$, p-value $= 0.000$) rejects the assumption of normality of the residuals, the 2SLS estimation procedure would be more appropriate than the ML approach. Given that the instruments are valid, this procedure solves the simultaneity-problem and, in the meantime, yields coefficients that are consistent even in the presence of spatially correlated errors (see Kelejian & Prucha, 1998). The goodness of the instruments was evaluated using the Sargan test. Under the null hypothesis that instruments are valid, these test statistics are distributed as chi-square in the number of over-identifying restrictions. If the hypothesis is rejected, there are doubts about the appropriateness of the instruments. The 2SLS estimated coefficients are reported in column 2 of Table 2. For completeness, we also indicate the OLS estimates of the spatial model. Focusing on the coefficient of the weighted values of neighbours' spending – that is, on the spatial interaction coefficient – we find evidence that contiguous Italian local councils interact when setting a total level of per capita spending, the interaction being positive and significant. The estimated impact on local spending is $\rho = 0.238$, meaning that an increase in every euro spent by jurisdiction i's neighbours causes *ceteris paribus* an increase in jurisdiction i's spending of about €0.24. The remaining variables of the baseline model almost replicate the sign and significance of OLS estimates,

with the exception of population density and the share of young residents. The Sargan test accepts the null hypothesis (Sargan test = 5.705; $p = 0.399$), confirming the validity of our model. When comparing spatial OLS and 2SLS estimates, a substantial difference among coefficients is apparent only in the case of the ρ value of spatial interaction, which is considerably lower in the 2SLS results.

We then checked whether the mimicking behaviour observed in total local council expenditure could be generalised to all spending categories, or whether it reflected the presence of interaction among jurisdictions mainly within specific types of expenses which may be more directly comparable or strategic for the local government. Table 3 sets out local council spending by category. As suggested by Anselin (1988), we report 2SLS estimates only when Moran's test detects spatial autocorrelation that needs to be accounted for. Otherwise, if Moran's I is not significant, we retain OLS estimates.[17] For the sake of brevity, we do not report OLS spatial estimates.

Our results show that mimicking is not a feature common to all spending categories. We observe that jurisdictions react to increases in neighbours' spending by increasing their own spending in half of the six categories of local expenditure analysed: that is, where police, road and environmental services expenditures are concerned. The impact of interaction ranges from $\rho = 0.43$ for police to $\rho = 0.50$ for environmental services spending. The

Table 3. Different spending categories models: OLS and 2SLS estimates

	Education	Social	Police	Leisure	Road	Environment
	OLS	OLS	2SLS	OLS	2SLS	2SLS
ρ	–	–	0.431*	–	0.464***	0.496**
	–	–	(1.94)	–	(4.35)	(2.29)
Density	−0.022*	0.050*	0.011	0.028**	−0.000	0.042
	(−1.67)	(1.65)	(1.17)	(2.11)	(−0.02)	(1.57)
Old	0.121	−0.518	0.194	−0.933	0.205	0.915
	(0.40)	(−0.75)	(0.88)	(−3.04)	(0.63)	(1.47)
Young	1.117**	−0.513	−0.253	0.545	−0.145	−2.221**
	(2.39)	(−0.47)	(−0.76)	(1.14)	(−0.30)	(−2.32)
GDP	1.048***	0.985	0.126	1.182***	0.411	1.154**
	(3.54)	(1.44)	(0.59)	(3.91)	(1.34)	(1.91)
Grants	0.065***	0.081**	0.042***	0.092***	0.112***	0.071**
	(4.21)	(2.26)	(3.28)	(5.77)	(6.05)	(2.06)
Coast	2.909	0.310	9.276*	2.605	4.954	28.587**
	(0.44)	(0.02)	(1.85)	(0.38)	(0.73)	(1.92)
Const	17.283**	26.896	−2.408	−8.535	−6.864	6.887
	(2.17)	(1.46)	(−0.38)	(−1.05)	(−0.8)	(0.32)
R^2	0.304	0.041	–	0.186	–	–
Moran's I test	0.597	1.548	1.689*	1.316	4.589***	5.084***
Sargan test	–	–	4.857	–	8.134	8.363

t values in parentheses; *significant at 10 per cent; **significant at 5 per cent; ***significant at 1 per cent.

presence of some degree of complementarity among jurisdictions' spending rules out the possibility of the strategic substitution among jurisdictions in public services provision that would be observed if jurisdictions' reaction functions were negatively sloped.

For the remaining spending categories, Moran's I never detected the presence of spatial effects. The spending model could be properly estimated by OLS. However, these spending model specifications provided an unsatisfactory explanation of spending determinants because R^2 usually assumed small values. It is likely that this was because there is no reason to assume that all spending categories can be explained by the same set of variables. Moreover, a better fit would require a more detailed and appropriate empirical specification model.[18] On the other hand, it is not really surprising that we do not find mimicking, because Italian local councils, especially if they are small – as is usually the case in our sample – have limited discretion in regard to these spending categories, both because they are assigned limited competence from upper levels of government and because they suffer from limited financial resources.

Considering the influence of factors other than mimicking on local spending, the overall results show that income, grants and coastal location exert a positive impact on local spending; but, except for grants, the relative coefficients are not always significant. At the level of single spending categories, we observe a positive impact of grants, but with reduced relevance effects compared with those evidenced in total spending. Coefficients of the proportion of young people are usually negative, except when education and leisure expenditures are involved. These coefficients, however, sometimes do not differ significantly from zero. The density variable assumes a different sign capturing either potential economies of scale or congestion effects in the provision of public goods. The proportion of old people does not significantly affect local spending allocation.

By means of Table 4, we now address the issue of spurious expenditure mimicking. Public expenditure and tax effort are correlated via the budget constraint. It may therefore happen that the spatial expenditure interaction observed reflects interdependence among jurisdictions that occurs in the tax setting behaviour (Revelli, 2002b). We tested for tax mimicking by estimating the following spatial empirical model of local tax setting:

$$t = \phi Wt + X\beta + \varepsilon \tag{3}$$

where t is the tax rate. In the empirical specification, we adopted the local property tax rate, named *Imposta Comunale sugli Immobili* (ICI), in year 2000 (see also Bordignon *et al.*, 2003). This was introduced in 1993 in order to restore the local fiscal autonomy removed in the 1970s by a national tax reform. Municipalities imposed ICI tax rates ranging from four per cent to seven 7 per thousand on private home-owners and businesses. The ICI represented the main tax revenue for Italian municipalities until 2008, when

Table 4. Tax interaction model: OLS estimates

	OLS	OLS	OLS
Regressors	(1)	(2)	(3)
Density	0.000 (1.06)		
Area		0.002 (2.09)	0.002* (2.01)
Pop		0.000 (0.30)	0.000 (0.56)
Old	−0.007 (−1.13)	−0.009 (−1.47)	
Young	−0.006 (−0.60)	−0.001 (−0.11)	
GDP	0.002 (0.33)	0.001 (0.20)	−0.003 (−0.59)
Grants	−0.000 (−0.90)	−0.000 (−0.83)	−0.006** (−2.72)
Coast	0.133 (0.98)	0.201* (1.64)	0.186 (1.52)
Cons	6.318*** (38.96)	6.202*** (37.49)	6.153*** (46.37)
Regression diagnostics			
R^2	0.08	0.10	0.10
Jarque–Bera test	3.431	3.973	3.952
Breusch–Pagan test	0.22	0.54	0.43
Moran's I test	0.786	0.314	1.332
Observations	246	246	246

t values in parentheses; *significant at 10 per cent; **significant at 5 per cent; ***significant at 1 per cent.

it was abolished. The results of the estimation results on tax mimicking are reported in Table 4. Only the OLS tax model was estimated because Moran's I test does not detect spatial mis-specification.[19]

The empirical specification of the tax model that we adopted is quite standard in applied fiscal studies (Bordignon *et al.*, 2003). However, we find that no variable in column 1 of Table 4 can significantly account for the tax-setting behaviour of the Italian municipalities examined. We also tested the influence of other variables to allow for different empirical specifications of the equation (population, squared population, territorial area of jurisdiction, unemployment rate, etc.). Some variables prove to be statistically significant in explaining the local tax rate, as shown in columns 2 and 3 of Table 4. However, neither do we find evidence of spatial interaction processes in these cases.

Overall, these estimates demonstrate that the spatial dependence process in public spending levels does not originate from the revenue side of the budget. Hence, one possible source of spatial interaction may be public expenditure spill-over (Revelli, 2002b, 2006).

The Source of Fiscal Interaction

Using the contiguity matrix, we find support for spatial interaction in total spending, as well in the police, road and environmental services expenditures of local councils. This evidence of interdependence among local councils' spending decisions is consistent with various theories, such as the yardstick, fiscal competition and expenditure spill-over ones. This is because the reduced form of the reaction function of these theories, allowing for spatial

dependence, is exactly the same (Brueckner, 2003; Revelli, 2005). In what follows, we try to identify the source of the interaction detected; or at least to rule out the less likely possible explanations.

The Yardstick Competition Hypothesis

Empirical investigation of the yardstick competition hypothesis makes inferences about assumed links between the interaction among jurisdictions and the political process. The few studies on yardstick competition in spending-level decisions (Freret, 2006; Freret & Elhorst, 2006) have obtained mixed results regarding its influence. Instead, when tax-setting behaviour has been considered, it has been found that yardstick comparison operates mainly when politicians can re-run for election (Bordignon *et al.*, 2003; Case 1993), when mayors are not backed by large majorities (Allers & Elhorst, 2005; Bordignon *et al.*, 2003; Sollé Ollé, 2003), or when a right-wing coalition is in government (Sollé Ollé, 2003). Politicians tend to implement fiscal policies similar to those of neighbouring jurisdictions in order to signal a good performance to their voters and gain re-election. Mimicking is less pronounced if politicians cannot run for re-election (Bordignon *et al.*, 2003). Since they are supported by a large citizens' consensus, large majorities are less interested in conducting political competition than small majorities interested in being re-elected; it follows that large majorities copy-cat less (Allers & Elhorst, 2005; Bordignon *et al.*, 2003; Sollé-Ollé, 2003). As regards the nexus between political ideology and fiscal interaction, it can be shown that as governments move to the right, they will be punished more by voters for tax increases (Sollé-Ollé, 2003). Similarly, they will be punished if they opt for spending increases because it is contrary to their ideology. In both cases one observes greater reaction to neighbours' fiscal policies.

We tested whether previous predictions held within those spending categories that exhibited significant spatial lag coefficients (see Tables 2 and 3) so that we could interpret spatial interaction among local councils as a consequence of yardstick competition. To this end, following Bordignon *et al.* (2003) and Allers and Elhorst (2005), we adopted an estimation method that considered two different strategic interaction regimes defined by an appropriate dummy D as follows:

$$Y = \rho_{D=0} ZWY + \rho_{D=1}(I - Z)WY + \alpha_{D=0} + \alpha_{D=1} + X\beta + \varepsilon \qquad (4)$$

The dummy D reflects the political characteristics of jurisdictions. It is equal to 1 when the attribute is matched by the jurisdiction and 0 otherwise. Matrix Z is an $N \times N$ diagonal matrix whose diagonal elements equal the dummy variable D, while matrix $(I–Z)$ is its complementary. The spatial interaction coefficients $\rho_{D=0}$ and $\rho_{D=1}$, and the associated intercepts $\alpha_{D=0}$ and $\alpha_{D=1}$, describe the two different reaction regimes.

For the empirical specification, we considered three separate characteristics of jurisdictions that might drive different reaction regimes: (i) the jurisdiction called elections in the year 2000; (ii) the ruling government is backed by a large majority, that is, it obtained more than 65 per cent of votes; (iii) a right-wing coalition rules. The descriptive statistics of these variables are summarised in Table 1. We may conclude that the spending interaction detected is a consequence of yardstick behaviour if we observe a statistically significant difference in the reaction of the two regimes, and the reaction is stronger (i.e. the spatial correlation coefficient is higher) among jurisdictions involved in elections,[20] and it is weaker when mayors are backed by a large majority and a right-wing coalition does not rule.

The estimates for the selected spending models assuming different regimes are reported in Table 5. Distinguishing between councils running for election or otherwise, we always obtain results that contrast with yardstick competition, in that mimicking is more pronounced among councils not involved in elections.[21] Moreover, the difference between spatial interaction coefficients is not statistically significant. Turning to the vote margins gained by ruling coalitions and strategic interaction, we see that the yardstick hypothesis is not rejected only in the case of local expenses: in this case, a large majority does not engage in strategic interaction, and the difference between the reactions of the two government types is significant. For the remaining spending categories, either the value of the spatial coefficients or the statistical insignificance of their difference does not give support to yardstick competition. Similar conclusions hold for the impact of government ideology on expenditure mimicking among municipalities. Taking these results together, we can conclude that yardstick competition is

Table 5. Yardstick competition model estimates for different spending categories: 2SLS estimates

Regressors	Total	Police	Road	Environment
Election year	0.025	0.256	0.047	−0.213
	(0.06)	(0.34)	(0.09)	(−0.19)
No Election year	0.257**	0.440**	0.468***	0.517*
	(2.44)	(1.97)	(4.41)	(2.40)
χ^2 of equality between ρs	0.32	0.06	0.72	0.44
Large majority	0.421***	0.517**	0.363***	0.082
	(3.13)	(2.16)	(2.64)	(0.27)
No large majority	0.156	0.484*	0.514***	0.635***
	(1.23)	(1.76)	(4.32)	(2.85)
χ^2 of equality between ρs	2.71*	0.01	1.12	2.85*
Right-wing	0.616**	0.005	0.479	0.304
	(1.98)	(0.01)	(1.60)	(0.43)
No right-wing	0.230**	0.485**	0.463***	0.526**
	(2.12)	(2.02)	(4.23)	(2.38)
χ^2 of equality between ρs	1.45	0.06	0.00	0.09

t values in parentheses; *significant at 10 per cent; **significant at 5 per cent; ***significant at 1 per cent. All estimates include population density, share of old and young, GDP and grants per capita, coast and constants.

not the most suitable explanation for the observed interaction among jurisdictions.

The Spill-over Hypothesis and the Role of Local Council Partnership

The existence of spill-over in the provision of different local public services has been documented in the empirical literature (Case *et al*., 1993; Revelli, 2003; Solé Ollé, 2006). It has been argued that these externalities could be internalised, thus enhancing the efficiency of a jurisdiction's fiscal policy by reshaping territorial organisation (Feld & Reulier, 2005). This can be achieved, for example, by different kinds of inter-jurisdiction agreements for the administration of those spending categories that have beneficial or detrimental spill-overs. They enable the economic policies of co-operating jurisdictions to be co-ordinated in order to take the spill-over effects of fiscal policy into account (Baicker, 2005; Schaltegger & Zemp, 2003). Following this reasoning, we tried empirically to address the possibility of fiscal spill-over behind the detected spending interdependence among jurisdictions by evaluating the role of local council partnerships as instruments to correct for externalities. To this end, we conducted empirical analysis on the two Italian local council partnerships already introduced in section 2, that is, UC and CM. If it is the presence of externalities that drives spatial interaction among councils, we expected strategic interaction to be weaker within councils affiliated to a partnership. Local councils assign to this institution the administration of those functions and services that generate spill-overs, while they retain and directly manage those functions that do not affect others and are not affected by the policies of others. Hence, they need no longer react to neighbouring fiscal policies.[22] By contrast, councils not affiliated to partnerships are more influenced by other jurisdictions' expenses, so that they are more prone to engage in strategic interaction in order to correct them. Moreover, we argue that voluntary partnerships, such as our UC, are more efficient in internalizing spill-overs than mandatory ones, such as CMs. As discussed in section two, we expected that fiscal interaction among councils associated in voluntary partnerships (that is, UCs) is less intensive than fiscal interaction among mandatorily associated councils (in CMs).

To address these issues empirically, we used two dummies that took value 1 if the jurisdiction joined, respectively, CM or UC in the year 2001 and zero otherwise.[23] The descriptive statistics of these variables are summarised in Table 1. We adopted the estimation procedure suggested by Bordignon *et al*. (2003) and Allers and Elhorst (2005) and illustrated in equation (5).

$$Y = \rho_{C=0} QWY + \rho_{C=1}(I - Q)WY + \delta_{C=0} + \delta_{C=1} + X\beta + \varepsilon \qquad (5)$$

The dummy C assumes value 1 when municipalities are associated in local a partnership (i.e. UC or CM) and 0 otherwise. Matrix Q is an

$N \times N$ diagonal matrix whose diagonal elements equal the dummy variable C, while matrix $(I–Q)$ is its complementary. The parameters $\rho_{C=0}$ and $\rho_{C=1}$ measure the intensity of expenditure interaction of municipalities belonging or not belonging to UCs (CMs). The associated parameters $\delta_{C=0}$ and $\delta_{C=1}$ measure the intercept of the previous reaction functions.

Table 6 reports our estimates considering the two different reaction regimes: councils belonging or otherwise to *comunitá montana* and belonging or otherwise to *unione di comune*. As usual, we examine only those spending categories that showed spatial lag interdependence. Considering the impact on strategic interaction of being in a *comunità montana*, we generally do not find evidence for our expectations of smaller ρs for local councils in CMs; moreover, the difference among ρs is not significant. However, we found it instructive that our results support the idea that spill-overs are behind strategic interaction only in the area of environmental services expenses. Since CM partners are not chosen freely,[24] they may experience difficulties in internalising spill-overs in functions different from those for which they were created. Turning to local councils belonging or otherwise to *unione di comune*, we see that the interaction among jurisdictions belonging to UCs is never significant, while it is significant for those not in UCs, a result consistent with our expectations. The difference among ρs is, however, not significant. To sum up, at this stage there is no clear-cut evidence in favour of the spill-over explanation of fiscal interdependence among jurisdictions. Nevertheless, we think that the role of partnerships, and especially of voluntary agreements, should be examined more thoroughly in the future. First, it is interesting that strategic interaction among jurisdictions belonging to UCs takes values smaller than those resulting for local councils outside UCs in the case of police and road expenses, which are precisely

Table 6. Estimates of the impact of inter-jurisdictions agreements on different spending categories: 2SLS estimates

Regressors	Total	Police	Road	Environment
Comunità Montana	0.384***	0.490**	0.470***	0.730***
	(3.66)	(2.09)	(4.37)	(3.66)
No Comunità Montana	0.313*	0.384*	0.216	0.810**
	(1.79)	(1.20)	(1.06)	(2.51)
χ^2 of equality between ρs	0.15	0.10	1.96	0.05
Unioni di Comuni	−0.559	0.429	0.381	0.806
	(−0.96)	(0.63)	(0.68)	(1.65)
No Unioni di Comuni	0.299**	0.437*	0.485***	0.546***
	(2.90)	(1.97)	(4.59)	(2.63)
χ^2 of equality between ρs	2.20	0.00	0.04	0.25

t values in parentheses; *significant at 10 per cent; **significant at 5 per cent; ***significant at 1 per cent. All estimates include population density, share of old and young, GDP and grants per capita, coast and constants.

the two spending categories where UC is extremely active. These results may indicate that there are beneficial spill-overs which are partly internalised by local council partnerships. Secondly, we have estimated spending equations in the year 2000, when the *unione di comune* was not very widespread, a situation that changes dramatically when more recent years are considered (see Ermini & Salvucci, 2006a, b), so that the importance and efficiency of voluntary agreements may have improved.

Concluding Remarks

We have examined whether spending decisions by jurisdictions in Italy exhibit some degree of interdependence. Taken together, our results show that there is significant interaction between spending by neighbouring local councils in the Italian region analysed, both at the level of total expenditure and in regard to different sub-categories. The spatial interaction coefficient also assumes positive values, meaning that a jurisdiction reacts to contiguous jurisdictions' increases in public expenditures by increasing its own public expenditure.

Identifying the source of this interaction is not an easy undertaking, either because theoretical models do not offer clear and unambiguous predictions or because there are some limitations in the data. However, we suggest that the presence of spill-overs may be a likely reason for the spatial interaction among jurisdictions, given that we also fail to find any strong influence of opportunistic behaviour appealing to political, ideological and electoral motivations, i.e. yardstick competition. Moreover, we believe that analysing the role of local council partnerships in determining horizontal interaction among jurisdictions warrants closer interest. It might provide useful insights for effective territorial reshaping to internalise potential spill-overs. Since several countries have pursued inter-municipal co-operation as an instrument for local government reform, the empirical approach adopted in this paper can be replicated in institutional settings different from the Italian one in order to increase understanding of the consequences of local council partnerships on fiscal policies at lower levels of government.

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Notes

1 Brueckner (2003) assumes this literature to be a special category of spill-over models in that it deals with information spill-overs.
2 This is the well-known 'voting with their feet' mechanism of revelation of preferences at a local level (Tiebout, 1956).
3 The assumption of zero or low mobility costs is crucial in this theoretical approach. On the relevance of mobility costs, see also Salmon (2006).
4 This law (also referred to as d.lgs. 267/2000) is the fundamental law for local councils which collects all regulations concerning local councils into a single text.
5 For example, the law provided for state financial support and removed the necessity of compulsory amalgamation after ten years.
6 In recent years the topic of vertical fiscal competition has received attention in empirical analysis (Andersson *et al*., 2004; Aronsson *et al*., 2000; Esteller-Morè & Solé Ollé, 2001). We do not tackle this issue in this paper. If not explicitly controlled for, vertical fiscal competition may generate spatially correlated errors. Use of the maximum likelihood method to estimate a lag spatial model may produce serious mis-specification of the ρ coefficient (Revelli, 2003). By contrast, the instrumental variables approach that we adopt here produces consistent spatial lag model estimates even in the presence of spatially correlated errors (Kelejian & Prucha, 1998).
7 A second approach with which to introduce spatial interaction, known as the spatial error model, assumes that the error terms are correlated across space (Anselin, 1988). We do not model this source of auto-correlation because the estimation procedure we adopt produces consistent results even in the presence of spatially correlated errors (Kelejian & Prucha, 1998).
8 As pointed out by Revelli (2006: 113): "the fact that the spatial weights sum to one for each local jurisdiction means that the total effect of all neighbours is the same, regardless of the number of neighbours. This implies that, the fewer the neighbours, the stronger their individual influence on the central unit will be".
9 Ermini and Fiorillo (2008) report that in 2005 the average UC in the Marche delivered a higher number of services (10.5 services per UC) to the population than did the average Italian UC (7.7 services per UC), while it exhibited similar characteristics in terms of inhabitants (1200 inhabitants) and numbers of associated councils (5.5 councils).
10 UNCEM is the Unione Nazionale Comuni-Comunità Enti Montani (that is, the official national association for CM). Data are available at http://www.uncem.it.
11 This is operational expenditure, it does not include investment expenses.
12 This corresponds to the *Certificato del Conto di Bilancio*, whose features are also available at www.finanzalocale.interno.it.
13 This happens either because some spending categories are more comparable among jurisdictions than others or because there is diverse complementarity among different kinds of expenses. That is, the presence of spill-over or yardstick and fiscal competition is more plausible with regard to specific categories of spending.
14 The remaining 40% of total current expenditure is absorbed by administration, justice, tourism, economic affairs, and productive services.
15 See also Brugnano and Rapallini (2007) for discussion of the Stability Pact in Italy.
16 Moran's test is usually assumed to be a test for spatial autocorrelation. However, it shows power against alternatives other than spatial autocorrelation, such as heteroscedasticity and non-normality.
17 However, in such cases we checked the robustness of Moran's *I*, verifying that 2SLS yielded a spatial lag estimated coefficient that was not statistically different from zero. In all cases, it did not fail.
18 The empirical specification adopted is quite standard in applied local expenditure analysis. Therefore, we prefer to rely on this explanatory model in order to make our results more comparable with those of similar studies.

19 Note also that other tests perform well with regard to normality and heteroscedasticity.
20 The election climate should exacerbate strategic comparison with other jurisdictions' performances.
21 These results, however, may be a consequence of the inappropriateness of data, given that only few jurisdictions called elections in 2000.
22 Sollé Ollé (2006) observes that, if spill-overs are detected and externality-correcting instruments are present but not fully effective, then the estimated impact of the spill-overs should be considered a lower bound of their real value.
23 We chose this year instead of 2000 because the number of local councils within the *unione di comune* was bigger in 2001, making our conclusions more robust. This did not introduce any bias in our results since it has been demonstrated that all councils joining a *unione di comune* in the Marche region were already co-operating in the years before the constitution of the *Unione* itself (Ermini & Salvucci, 2006b). However, we checked that conclusions did not differ using one or the other dummy. The estimation results are available from the authors upon request.
24 Therefore, they may not represent an optimal administrative area in terms of equivalence of benefits and costs.

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