The impact of inter-municipal cooperation on local public spending: Empirical evidence using French data

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Abstract:

The purpose of this paper is to assess the effects of inter-municipal fiscal cooperation on municipal public spending, based on the French experience. We estimate a model of municipal spending choice using panel data and spatial econometrics for municipalities over the period 1994-2003. We find first that inter-municipal cooperation has no significant impact on the level of municipal public spending, which suggests that municipal and community spending are independently supplied; and second, that spending interactions between municipalities belonging to the same inter-municipal community disappear, while spatial interactions with other municipalities are significantly positive. Therefore, inter-municipal cooperation seems to reduce competition among local governments.

Keywords: public spending, local governments, inter-municipal cooperation, spatial econometrics, panel data.

JEL codes: C2, H2, H4, H7.

1 Introduction

Since the 1950s, local governments in many European countries (Austria, Sweden, Finland, Germany, Switzerland, France…) have been cooperating and nowadays, the encouragement of cooperation among local authorities in the provision of local public goods remains on the political agendas of many central and local governments (Hulst and van Montfort, 2007). There are several reasons for this widespread and persistent phenomenon (see details in e.g. Blume and Blume, 2007). First, larger spatial units are expected to be more competitive in a globalized world. Second, as governments try to reduce the cost of providing public goods, the achievement of economies of scale in the provision of local public services is a strong incentive to cooperate. Third, fiscal cooperation allows jurisdictions to internalize spending spillovers: the benefits of public expenditure (infrastructure, road building, cultural facilities…) often spread across the boundaries of the supplying jurisdiction and affect the welfare of the citizens in neighboring localities. Fourth, tax competition between municipalities has been observed, especially between urban municipalities, and tax cooperation is often seen as a useful corrective device for municipal levels of tax and spending that otherwise might tend to be too low.

Despite frequent claims that cooperation among local governments is a potential solution to inefficiencies, there are few studies on the impact of such cooperative agreements on local public policies. This paper focuses on this topic and estimates the effect of fiscal cooperation on municipal spending decisions between 1994 and 2005. The French case offers a favorable setting for research on inter-municipal cooperation. In 1971, there was an unsuccessful attempt by central government to force the country's municipalities to merge. Since then, and contrary to Belgium, England and Germany, the French central government has recommended that its over 36,000 municipalities should voluntary cooperate within larger jurisdictions known as communities or 'Etablissements Publics de Coopération Intercommunale' (EPCI). Thus, municipalities that want to finance and manage some public services on a collective basis can create or join a community. These supra-municipal structures co-exist with the municipal structures but have different responsibilities,

depending on member municipalities' choices regarding the competences to transfer to their community.

Since across countries there is a great variety of institutional arrangements for cooperation (Hulst and van Montfort, 2007), we focus on the powerful class of French inter-municipal communities, which have set the levels of one (or more) tax instrument(s) to provide for the joint delivery of public services. Like the municipalities, these inter-municipal communities have high levels of autonomy to set tax rates to finance the supply of public services. Since 1992, this form of local fiscal cooperation has been promoted by central governments with financial incentives to solve the problem of "municipal fragmentation".

We want first to investigate how fiscal cooperation influences the level of municipal public spending. To our knowledge, very few papers analyze the impact of inter-municipal cooperation on municipal decisions although its net effect is *a priori* not known. An initial benchmark could be the related papers by Turnbull and Djoundourian (1993) and Aronsson *et al.* (2000), which focus on the effect of the overlapping structure of local governments on public spending. They estimate the impact of regional spending on the local spending choice and find that public goods provided by the higher and the lower levels of overlapping governments tend to be complements. Adapting their framework, and focusing on the inter-municipal level as the higher local government level, Leprince and Guengant (2002) and Guengant and Leprince (2006), using cross-sections of municipal and inter-municipal spending data, show that inter-municipal spending has a significant and negative impact on municipal spending. Thus, community and municipality public goods tend to be substitutes.

However, none of these papers controls adequately for spatial interactions between neighboring municipalities, although this should be a central part of the municipal spending model since fiscal cooperation, among other goals, is intended to internalize spending spillovers. Charlot *et al.* (2009, 2010) developed a framework that controls for both spillovers and fiscal cooperation effects on municipal choices in a panel data set, but these papers focus on municipal tax choices.

They find that fiscal cooperation is likely to limit tax competition and, as a consequence, increases local business tax rates. However, it is difficult to infer from their results the nature and extent of the fiscal cooperation effect on municipal spending decisions. This remains an empirical question; our first aim, therefore, is to provide empirical evidence based on French data.

The second aim is to determine whether local cooperative agreement on the provision of public goods has an impact on the extent of spending interactions among neighboring municipalities since fiscal cooperation is expected to internalize spending spillovers or to reduce spending competition among local governments. The French case is especially useful to investigate this question because we have two types of municipalities – possibly interacting – coexisting in our sample: those that cooperate within communities, and those that do not.

While many empirical papers have investigated the extent of tax interactions between local governments, studies on the existence and the nature of local governments' interactions in terms of spending are scarcer. Sollé-Ollé (2006) uses a cross-section of 2610 Spanish municipalities in 28 metropolitan areas and finds negative spatial dependency between neighboring municipalities' overall spending decisions. He shows also that this broad result is driven by urban municipalities in the suburbs and that the significance of these spending interactions disappears if the focus is on only non-urban or city centers' spending decisions. Schaltegger *et al.* (2009) study a panel data set of 107 Swiss municipalities in the canton of Lucerne and find that in a small metropolitan area, horizontal overall spending interactions are slightly significant and positive. However, these interactions tend to be highly significant and negative for important categories of spending such as education, health, and environment. Revelli (2003) uses cross-sectional data on the spending decisions of 238 districts and 34 counties. The dataset allows him to study local governments located in non-metropolitan parts of England which have two-tier systems of local government. This is the only paper whose estimated spending model includes both the overlapping structure of local governments and possible horizontal strategic interactions. Empirical evidence shows that public goods provided by overlapping local governments tend to be complements, but that when this effect is controlled for,

the extent of horizontal spending interactions at the lower level of local governments is low, but still positive. Using a panel data set of the spending decisions of more than 50,000 inhabitants French municipalities, Foucault *et al.* (2008) provided strong empirical evidence of positive strategic interactions between the biggest French municipalities in relation to primary and investment spending. However, their empirical model ignores both the possible direct effect of fiscal cooperation on the level of municipal spending, and the indirect effect of cooperation on the extent of horizontal interactions.

Lastly, the study that is close to our second goal is led by Ermini and Santolini (2010) and investigates the impact of inter-jurisdictional agreements in Italy on the extent of spending interactions, focusing on specific categories of expenditures. They find that, for the two spending categories where the partnerships are very active – police and road maintenance – strategic interactions among jurisdictions in voluntary partnerships are lower than among isolated municipalities. This outcome suggests that the benefits of spillovers may be internalized in specific cases.

This survey shows that several institutional contexts and empirical models have been studied and it is difficult to make clear inferences about: the direct effect of fiscal cooperation on the level of municipal spending; the existence and the nature (positive or negative) of horizontal spending interactions between neighboring municipalities; and the indirect impact of fiscal cooperation on these spending interactions. We try to fill these gaps using a general model of municipal spending choice which also includes the terms of interest.

Our panel data set of French urban municipalities for 1994-2003 and the use of spatial econometric techniques, allows us to estimate a model of municipal spending choices. First, we reject the hypothesis that inter-municipal cooperation affects municipal spending. This suggests that there is neither complementarity nor substitutability between municipal and inter-municipal public goods. Second, we find no spending interactions between municipalities belonging to the same inter-municipal community, but find significantly positive spatial interactions with other

municipalities. As expected, inter-municipal cooperation seems to reduce competition among local governments.

We believe that this paper will contribute to the ongoing debate on the reorganization of sub-national jurisdictions, not just in France but also in all those countries that favor the creation of inter-municipal agreements sometimes based on high central government grants. Our work promotes the idea that cooperation through the creation of a new level of local government (i.e. the inter-municipal community) may reduce competition among cooperating local governments but increases total public spending.

The paper is organized as follows. Section 2 presents the local governments in France. Section 3 discusses the empirical design of the estimations and the data. Section 4 presents the results for the estimations of the impact of cooperation. Section 5 concludes.

2 The French institutional context

French municipalities were subjected to huge change at the beginning of the 1980s. The decentralization process introduced in March 1982 and January 1983 greatly modified the budgetary choices of local authorities which became responsible for implementing public policies on urban infrastructures, economic and social aspects, health, supply of transport for school children, first degree education and supply of school equipment, and culture. Prior to the laws on decentralization, municipalities were in charge of general affairs (elections, administrative and civil registration, first degree education since the Ferry Law in 1881, local road safety and road maintenance). The transfer of additional competencies following decentralization has resulted in municipalities increasing their tax receipts and benefitting from higher grants from central government.

The current French local institutional context is characterized by three tiers of overlapping local governments. The lowest tier consists of some 36,600 municipalities; the middle tier consists of 96 counties (or “départements”); and at the highest level of local government are 22 regions.

Municipalities are responsible for local urban services, building, provision of nurseries and primary schools, and sport facilities, and maintenance of municipal roads and urban public transport. Counties administer social assistance, and maintain the counties' roads and middle schools. Regions are responsible for the provision of vocational training, economic development and building, and high school provision.

Most local revenues come from taxation (54%) and grants (23%). The local business tax (or "Taxe Professionnelle") is the major source of local government tax revenue, accounting for approximately 45% of the revenues derived from direct local taxes.[1] The tax base consists mainly of capital goods and is based on the rental values of buildings and of equipment (assumed to be 16% of the cost of the equipment). The remaining three taxes are collected from households in the form of residential tax ("taxe d'habitation"), property tax ("taxe foncière sur le bâti") and land tax ("taxe foncière sur le non bâti").

In 1992, 1999 and 2004, three laws were passed relating to local cooperation in France.[2] Based on the volunteer principle, neighboring municipalities that want to finance and manage collectively some public services can create, or join, a community or EPCI. In practice, municipalities decide which local public services (from a total of 84 broken down into 14 categories) will be delegated to the community (see Table 1). The EPCI is governed by a board of delegates elected by municipal councils from among their members.[3] Therefore, unlike council members in municipalities, "départements" or regions, EPCI officials are not directly elected by the population.

[1] This tax was abolished in 2010 and replaced by a territorial economic contribution based on property and value added.

[2] There are three main laws on the development of communities in France: the law of 6th February 1992 lays the basis for inter-municipal cooperation and was reinforced and simplified by the law of 12th July 1999 and the law of 13th August 2004 which rationalized the inter-municipal map.

[3] Each municipality must have at least one seat, and no single municipality can hold more than half of the inter-municipal council seats. The number of seats held by a municipality is generally proportional to the municipal population.

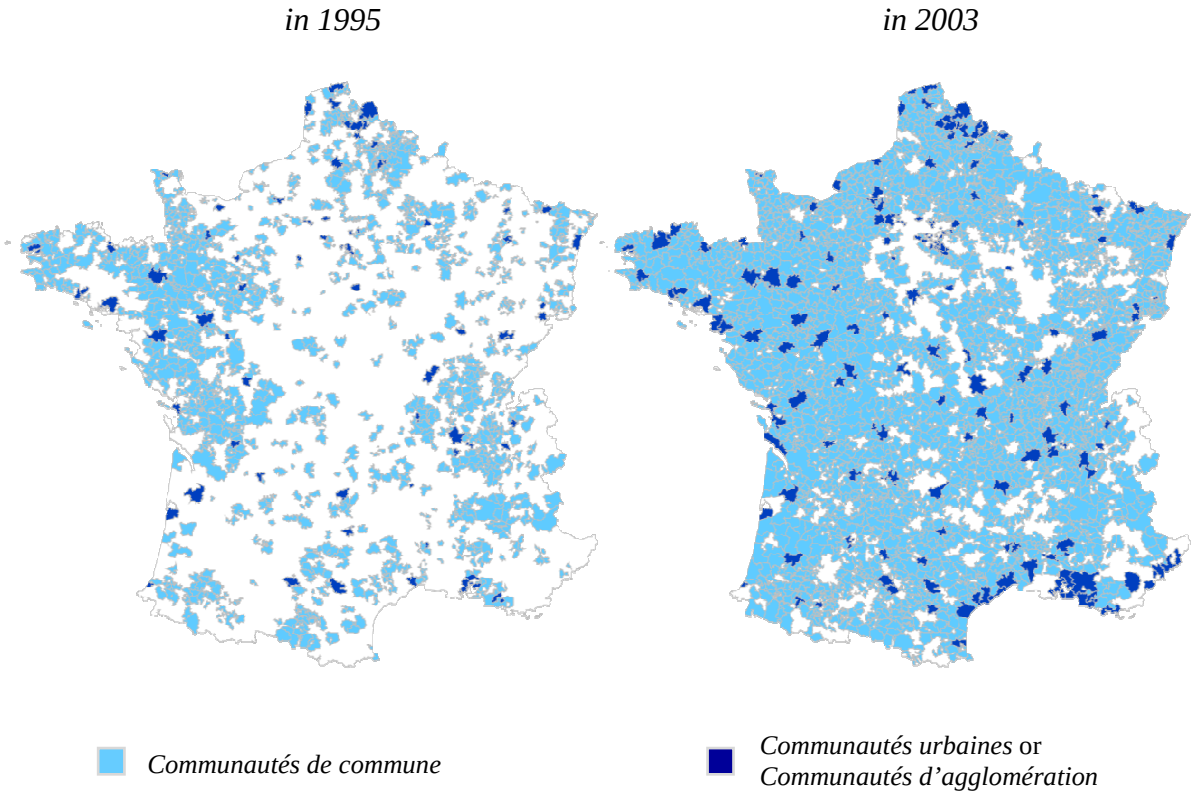
Table 1. *List of the 14 categories of potential and compulsory competences under the jurisdiction of the EPCI*

Name of the competences category	Compulsory competences according to the EPCI legal form		
	CU	CA	CC
Energy production and supply			
Environment and living environment	✔		
Funeral services			
Sanitary and social			
Urban policy	✔	✔	
Local plans of action of crime prevention			
Economic development and planning	✔	✔	✔
Social and cultural development and planning			
Space planning	✔	✔	✔
Road network			
Tourist development			
Accommodation and housing conditions	✔	✔	
Infrastructures	✔		
Other			

Nowadays, we can differentiate three categories of EPCI. The communauté urbaine (CU) forces municipalities to transfer at least six competences pertaining to the categories of responsibilities identified in Table 1. The CU model also requires the community to exceed 500,000 inhabitants. The communauté d'agglomération (CA) relies on four mandatory competences and requires the community to exceed 50,000 inhabitants. The communauté de communes (CC) relies two compulsory competences but does not necessitate a minimum population size to be created. Municipalities that are governed by the CU and CA urban models of cooperation lose more responsibilities than those governed by the CC model of cooperation.

Map 1 shows the great expansion of inter-municipal cooperation during our period of study. In 1995, only three municipalities over ten cooperate against eight over ten in 2003. We also notice that the spatial distribution of communities on the French territory has become more uniform. In 1995, some regions appear to cooperate relatively more than the rest of the country (e.g. Bretagne, Pays de la Loire, Nord-Pas-de-Calais), whereas in 2003, local trends are harder to identify.

Map 1. *Spatial distribution of inter-municipal jurisdictions and their legal form.*



3 The empirical design

In this section, we discuss the empirical spending model used to estimate the impact of fiscal cooperation on municipal spending choices and describe the econometric method used. The data are presented in detail.

3.1 The municipal spending model with spatial interactions and fiscal cooperation

We describe our empirical strategy in two sub-sections. In the first (3.1.1), we consider a model of municipal spending based on a basic approach of fiscal cooperation. In the second (3.1.2) we introduce a more detailed approach.

3.1.1 A basic municipal public spending model

As a first step, we present a simple municipal model of public spending with spatial interactions

among local jurisdictions (see Brueckner, 2003; Revelli, 2005). Each municipality *i* chooses the level of a decision variable Z_i and we hypothesize that the municipality's choice is also affected by the level of spending chosen in the other jurisdictions (Z_j). Thus, the municipality's objective function can be written:

$$U(Z_{i,t}, Z_{j,t}, X_{i,t}) \quad (1)$$

where X_i is a vector of the characteristics of municipality *i*.

For municipality *i* to maximize its objective function, it sets $\partial U / \partial Z_i = 0$

The solution to this maximization problem is:

$$Z_{i,t} = R(Z_{j,t}, X_{i,t}) \quad (2)$$

From the reaction function *R*, we obtain that the spending decision of municipality *i* depends on spending choices in other jurisdictions and on municipality *i*'s characteristics. As noted in Brueckner (2003, p.177), the sign of the reaction function's slope can be positive or negative, depending on the properties of preferences. Thus, the specification of such a spending model can be written as:

$$Z_{i,t} = \alpha + \beta WZ_{j,t} + X_{i,t}\eta + \varepsilon_{i,t} \quad (3)$$

where α is a constant term, $\varepsilon_{i,t}$ is a random term, β and η are the unknown parameters to be estimated. The significance of parameter β is expected to reveal whether there are spatial interactions between municipalities when they choose their level of public spending. A negative sign of β would indicate that there are significant spending spillovers meaning that the inhabitants of neighboring municipalities B and C benefit from the local services provided by municipality A. Thus, an increase in spending in A leads to a decrease in spending in B and C. A positive sign of β would lead us to reject the hypothesis of spending spillovers and would indicate that there are spending interactions between neighboring municipalities, due either to tax base mobility (see Wilson, 1999, for a survey of tax competition) or to a yardstick competition mechanism (Salmon,

1987; Besley and Case, 1995). In the first case, municipalities imitate the spending choices of the neighbors in order to keep the tax base within their borders. In the second case, incumbents adopt a mimicking behavior in order to be reelected.

In a second step, starting from this basic framework, we assess the impact of local cooperation on municipalities' spending choices. We first investigate the direct effect of cooperation on the level of municipal spending. We include a dummy variable *Coop* that captures the cooperation status of the municipality. *Coop* is equal to 1 if the municipality *i* is part of an inter-municipal community, and equal to zero otherwise. A municipality's policy reaction function can thus be written as:

$$Z_{i,t} = R_i(Z_{j,t}, Coop_{i,t}, X_{i,t}) \tag{4}$$

where $Z_{i,t}$ is the vector of public expenditure per capita in a municipality *i* at time *t*; $Z_{j,t}$ is the vector of public spending in the set of the neighboring municipalities *j* at time *t*; $Coop_{i,t}$ is the cooperation variable indicating whether or not the locality belongs to a community, and $X_{i,t}$ is the vector of the socio-economic characteristics of municipality *i* at time *t*. The equation to be estimated then becomes:

$$Z_{i,t} = \alpha_i + \beta WZ_{j,t} + \delta Coop_{i,t} + X_{i,t}\eta + \varepsilon_{i,t} \tag{5}$$

where δ is expected to be negative: a municipality belonging to a community loses some spending responsibilities that are endorsed by its community, and thus the municipal spending level is expected to be lower.

In a third step, besides the direct effect of cooperation on municipal spending, we focus on the indirect effect of cooperation on spatial interactions on spending. We extend model (5) to test whether cooperation also influences the extent of spatial spending interactions between neighboring municipalities and we include in the specification an interacted variable ($Coop_{i,t} \times WZ_{j,t}$). The municipal model to be estimated becomes:

$$Z_{i,t} = \alpha_i + \beta WZ_{j,t} + \chi Coop_{i,t} \times WZ_{j,t} + \delta Coop_{i,t} + X_{i,t}\eta + \varepsilon_{i,t} \tag{6}$$

A significant and negative sign of the parameter χ would imply that whatever the sources of spending interactions, a municipality belonging to a community is less responsive to what neighbors do: cooperation reduces municipal responsibilities, leading municipal officials in *i* to be less interested in what other officials, in neighboring municipalities, do. In the case of a spillover model of public spending (β is negative), this estimation result of a negative χ would imply that inter-municipal cooperation has the expected effect and leads to internalization of the spillover benefit among municipalities. In the case of a spending (or yardstick) model of competition between municipalities, cooperation will have the expected effect of reducing competition. Conversely, a positive sign of the parameter χ can be explained by more intense competition between localities over the remaining range of local public services for which they have responsibility.

Finally, to check the robustness of these first empirical models, we estimate two more equations which are similar to equations (5) and (6) but have the *Coop* dummy removed and replaced by $Z_{I,t}$, the level of community's spending.[4] We can estimate the following model:

$$Z_{i,t} = \alpha_i + \beta WZ_{j,t} + \delta Z_{I,t} + X_{i,t}\eta + \varepsilon_{i,t} \quad (7)$$

This allows us to test whether inter-municipal and municipal public goods and services are independent, are substitutes (which would imply a negative impact of $Z_{I,t}$), or are complements (which would imply a positive impact of $Z_{I,t}$). Finally, we include an interaction term ($Z_{I,t} \times WZ_{j,t}$) in the model to test whether inter-municipal spending has an impact on the extent of spatial interactions between municipalities:

$$Z_{i,t} = \alpha_i + \beta WZ_{j,t} + \chi Z_{I,t} \times WZ_{j,t} + \delta Z_{I,t} + X_{i,t}\eta + \varepsilon_{i,t} \quad (8)$$

These empirical models of municipal spending constitute a first step towards the estimation of the impact of fiscal cooperation's on the level of municipal spending and on the nature and extent of the spatial interactions between municipalities. However, these models are basic for two reasons.

[4] See Appendix for a technical note on the method used to construct a proxy for this variable using the available data.

First, the cooperation status of the municipality and the spending level of the community are measured without specifying different types of cooperation. However, of interest here is the variety of communities and their impacts. Thus, we distinguish two types of cooperation. The first type is the one implemented by communities that do not force municipalities to abandon precise and extended ranges of responsibilities. This is the CC model of cooperation, which favors flexibility in the assignment of local public services between municipalities and the community. This type of cooperation is measured by a CC dummy. The second type of cooperation, which is the most integrated, is cooperation among municipalities, which by law, have to assign more responsibilities to their community. This status of cooperation is captured by a CUCA dummy which takes the value 1 if the municipality belongs to a CU or a CA.[5] The models to be estimated then become:

$$Z_{i,t} = \alpha_i + \beta WZ_{j,t} + \delta_1 CUCA_{i,t} + \delta_2 CC_{i,t} + X_{i,t}\eta + \varepsilon_{i,t} \quad (9)$$

$$Z_{i,t} = \alpha_i + \beta WZ_{j,t} + \chi_1 CUCA_{i,t} \times WZ_{j,t} + \chi_2 CC_{i,t} \times WZ_{j,t} + \delta_1 CUCA_{i,t} + \delta_2 CC_{i,t} + X_{i,t}\eta + \varepsilon_{i,t} \quad (10)$$

Second, the nature of the spatial interaction phenomenon we analyze in this first step is standard in the literature. As suggested by Anselin (1988), an a priori set of interactions has to be defined and then tested. While several weighting schemes could be explored to produce different patterns of spatial interaction, a scheme that assigns weights based on geographical proximity would seem the most appropriate for our study. Following the empirical literature, we choose a geographical definition of neighborhood based on the Euclidean distance between jurisdictions.[6] This scheme imposes a smooth distance decay, and weights w_{ij} given by $1/d_{ij}$ where d_{ij} is the Euclidian distance between jurisdictions i and j for $j \neq i$ ($w_{ij} = 1/d_{ij}$ if $d_{ij}<20$ kms, otherwise $w_{ij} = 0$). This weight matrix is standardized so that $\sum_j w_{ij} = 1, \ \forall i$. We use an extended definition of

[5] The "communautés de ville" and the "syndicats d'agglomération nouvelle", two old legal types of communities existing at the beginning of our period of study, are considered respectively as a CA and as CA or CC, depending on the legal type it subsequently assumed.

[6] We checked the robustness of this approach and replicated our estimation strategy using a definition of neighborhood based on contiguity, implying that $w_{ij} = 1$ if two municipalities share a common border, and $w_{ij} = 0$ otherwise.

neighboring municipalities. Since our study is limited to urban areas, there may be important border effects, even in relation to rural municipalities. Therefore, the neighboring spending decisions ($W^{DIST}Z_{i,t}$) are computed for urban municipalities and for all municipalities considered to be neighbors, that is, municipalities located within 20km distance.

However, while this scheme is standard in the literature, it does not take into account the cooperation status of the neighboring municipalities. Thus, we provide a second and more detailed step in the estimation of fiscal cooperation on municipal spending.

3.1.2 The detailed municipal model of public spending

We refine our analysis of the impact of cooperation on municipal spending as follows. We decompose the global spatial interaction term $WZ_{j,t}$ used in equations (5) to (10), into two terms, $W^{SAME}Z_{j,t}$ and $W^{OTHER}Z_{j,t}$. The first term $W^{SAME}Z_{j,t}$ to be included in the empirical model allows us to estimate the impact of neighboring municipal spending only if the neighbors are included in the same inter-municipal community as municipality *i*: thus, these spatial interactions come from intra-community interactions between municipalities belonging to the same community. The second term $W^{OTHER}Z_{j,t}$ allows us to estimate the impact of neighboring municipalities when neighbors do not cooperate or when they do cooperate but in another community.

Using this detailed identification of spatial interactions, we can specify two spatial interactions terms, so that the model to be estimated is as follows:

$$Z_{i,t} = \alpha_i + \mu W^{SAME}Z_{j,t} + \sigma W^{OTHER}Z_{j,t} + X_{i,t}\eta + \varepsilon_{i,t} \quad (11)$$

In order to capture the possible specificity of spatial interactions within the most integrated form of inter-municipal community, we test a model that interacts neighboring spending decisions with the status CUCA of the community:

$$Z_{i,t} = \alpha_i + \mu W^{SAME}Z_{j,t} + \chi CUCA_{i,t}W^{SAME}Z_{j,t} + \sigma W^{OTHER}Z_{j,t} + X_{i,t}\eta + \varepsilon_{i,t} \quad (12)$$

3.2 Econometric issues

Our empirical models of municipal spending suggest we need to control for four econometric issues highlighted in the literature.

First, if localities do react to each others' spending choices, then neighbors' spending decisions are endogenous and correlated with the error term (ε). Ordinary least squares (OLS) yields a biased parameter estimate (Anselin, 1988). Basically, there are two possible approaches that provide consistent estimates of the spatial parameter in our equations of municipal spending. The first is based on an instrumental variables (IV), two-stage least squares (2SLS) method. It consists of finding variables that are correlated with neighbors' fiscal spending choices but uncorrelated with the error term. The IV approach suggests the use of the weighted average of neighbors' exogenous or control variables, (WX), as instruments (Kelejian and Robinson, 1993; Kelejian and Prucha, 1998). The second method is based on maximum likelihood (ML). Under this method, a non-linear reduced form of the estimated equations is computed by inverting the system. A non-linear optimization routine is used to estimate the spatial coefficient. In this paper, we use the IV estimation method because we have chosen a large definition of neighborhood in order to avoid border effects. Since neighbors could belong to rural areas but are not part of our initial sample of urban municipalities, the usual ML routines cannot be used.

Second, if neighbors' localities are subject to correlated shocks, we may find a correlation between jurisdictions' spending choices. The omission of explanatory variables that are spatially dependent may generate spatial dependence in the error term, which is given by the following equation:

$$\varepsilon_{i,t} = W\varepsilon_{i,t} + u_{i,t} \tag{13}$$

If we ignore spatial error dependence, the estimation of our equations could provide false evidence of strategic interaction. However, this is not a problem if we use the IV method, which yields consistent estimates even with spatial error dependence (Kelejian and Prucha, 1998).

Third, serial correlation can arise because municipal spending decisions could be persistent

over time (Veiga and Veiga, 2007; Foucault *et al.*, 2008). To allow for possible serial correlation we include a time-lagged dependent variable (Devereux *et al.*, 2007). This introduces correlation with the municipal fixed effect. To deal with this, we instrument the time-lagged dependent variable (see instruments in the estimation tables).

Finally, our model includes individual fixed effects. We use the within estimation method (each variable is expressed in difference to the individual mean). Whatever the model estimated, the spatial lagged variable, the interacted variables, and the time lagged variable are instrumented.[7]

3.3 Data

Our study focuses on urban municipalities[8] located in the French metropolitan areas (*pôle urbain* according to the INSEE).[9] We selected only those urban municipalities that existed from the beginning to the end of our period of study (1994-2003), which yielded a sample of 2,895 municipalities over 9 years and a total of 26,055 observations. Expenditures data come from the *Direction Générale des Collectivités Locales* (*DGCL, Ministère de l'Intérieur*) and the remaining control variables from French census data. Descriptive statistics are shown in Table 2.

Figure 1 shows the evolution of the cooperative behavior of the whole sample of French urban municipalities that we study in this paper.[10] We observe first that most urban municipalities (about 82%) had decided to join an inter-municipal community at the end of our period of study (2003). Second, in deciding to join a community, they tend increasingly to choose the most integrated form of cooperation (CU or CA), especially after the 1999 law was passed.

[7] Validity of our IV is systematically checked thanks to a Sargan test. In addition, we test the joint endogeneity of the variables using a Fisher test.

[8] This restriction is due to two reasons. First, urban and rural municipalities may present different behavior in terms of public policies. Urban cooperation in communities is often seen as more difficult because of high variation in spending or fiscal capacities across urban municipalities. To cope with heterogeneity, we focus on urban municipalities' public decisions. Second, there are technical difficulties related to computing spatial estimations over the whole country (French local governments include about 36,600 municipalities).

[9] Urban unit with more than 5,000 jobs.

[10] Since our model includes a time lagged variable, observations of the explained variable are limited to the period 1995-2006.

Figure 1. *Evolution of the percentage of studied municipalities belonging to a community, 1995-2003.*

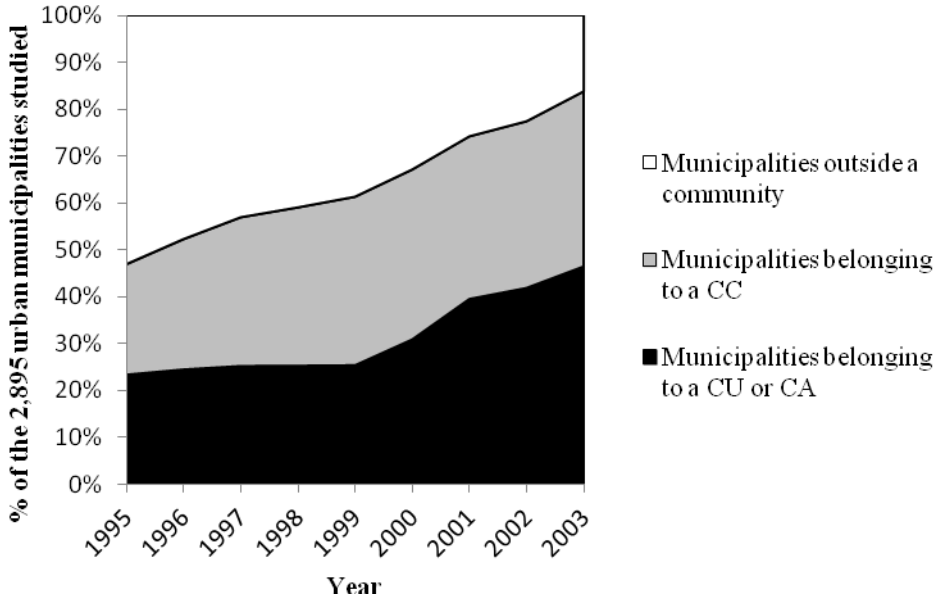


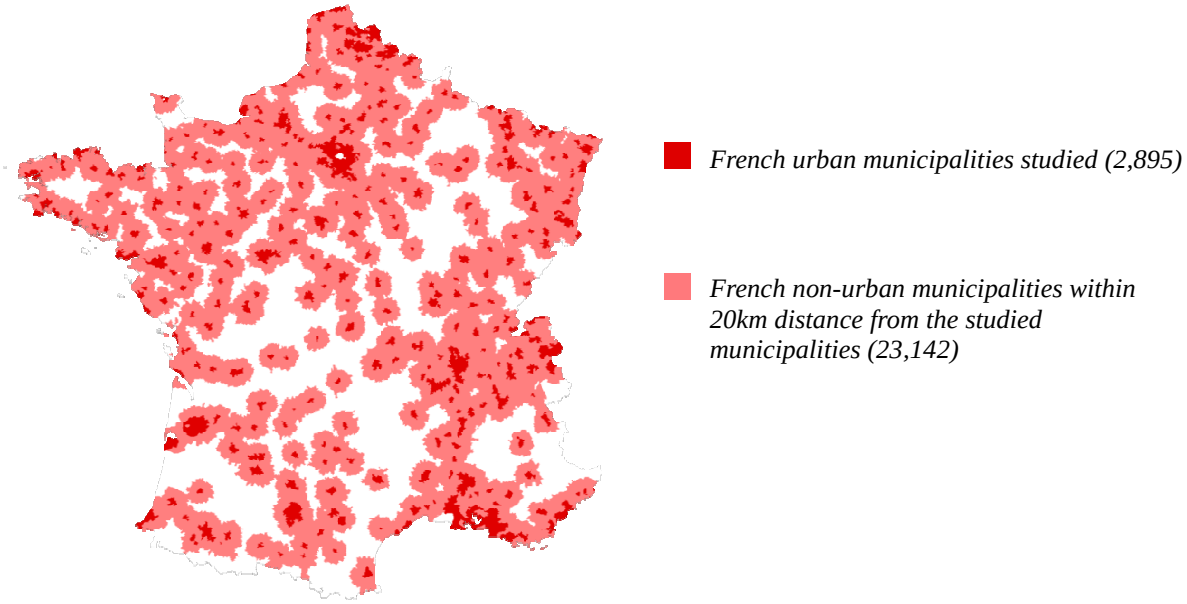
Table 2. *Descriptive statistics, 1995-2003*

	Min	Max	Mean	Standard deviation
log (municipality's expenditure in hundred € p.c.)	0.28	5.45	2.35	0.48
W^{DIST}*log (municipality's expenditure in hundred € p.c.)	1.45	4.14	2.20	0.27
W^{DIST_SAME}*log (municipality's expenditure in hundred € p.c.)	0.00	3.79	1.43	1.10
W^{DIST_OTHER}*log (municipality's expenditure in hundred € p.c.)	0.00	4.14	2.17	0.29
log (one-period-lagged municipality's expenditure in hundred € p.c.)	-1.57	5.45	2.34	0.48
cooperation dummy	0.00	1.00	0.64	0.48
communauté urbaine/*communauté d'agglomération* dummy	0.00	1.00	0.31	0.46
communauté de communes dummy	0.00	1.00	0.33	0.47
log(community's expenditure in hundred € p.c. + 1)	0.00	3.10	0.52	0.55
log (population density)	2.85	10.11	6.15	1.23
log (proportion of the population below 14 y.o. + 1)	0.09	0.32	0.18	0.03
log (proportion of the population above 60 y.o. + 1)	0.02	0.38	0.17	0.04
log (after-tax yearly mean income)	4.17	6.90	5.16	0.27
log (fiscal potential in hundred € p.c. + 1)	0.00	4.40	1.81	0.49
Number of municipalities				2,895
Number of observations				26,055

Monetary terms are expressed constant euros, base 2005.

Map 2 shows the spatial distribution of the French urban municipalities that we study in this paper. Recall that neighbors' spending decisions ($W^{DIST}*Z_{i,t}$) are computed over our 2,895 urban municipalities and also over all municipalities considered as a neighbor, (i.e. located within 20km) to take account of possible border effects across urban and rural municipalities.

Map 2. *Spatial distribution of the French urban municipalities studied and their neighbors*



In line with the literature, we include four socio-demographic controls and one fiscal capacity variable that may influence local demand for municipal public goods and services:

- population density (*Density*) is expected to take a positive sign since a big city may supply a high level of local public goods to citizens living within their borders and also to the citizens of the neighboring localities;
- proportion of the population aged below 14 (*Pct_Young*) and above 60 years (*Pct_Old*) which is presumed to take account of municipal demographic heterogeneity influencing the demand for local spending. We would expect these control variables to be associated with a positive sign because of the particularly high dependence of these two populations on the services provided by society;
- since we expect demand for local public goods and services to be higher among richer citizens (*i.e.* local public goods are considered to be normal or superior goods, depending on the value of citizens' income-elasticity), after-tax yearly mean income (*Mean_Income*) should have a positive impact on the level of municipal expenditures;

- a municipal fiscal capacity per capita dummy (*Fiscal_Potential*) is included as an explanatory variable to control for the fact that wealthier municipalities can afford higher levels of public spending.

4 Results

This section is organized in two parts. First, we estimate empirical models of municipal spending that rests on the basic cooperation approach (section 4.1). Table 3 presents the estimation results using dummies as explanatory variables to capture the effect of fiscal cooperation; Table 4 presents the estimation results using the level of inter-municipal spending as the main variable of interest. Second, we present the estimations results for a refinement of the basic approach that allows differentiation between interactions among municipalities belonging to the same community, and interactions among the others (section 4.2).

4.1 The impact of cooperation on municipal spending in a basic spatial model

If we focus on Table 3, columns (3.2) and (3.3), we see that *Coop* is not significantly different from zero: local cooperation does not modify the level of municipal public spending. This outcome suggests that the single fact of an urban municipality cooperating in an inter-municipal community does not lead to significantly different spending behavior, compared to isolated municipalities. Table 4, columns (4.1) and (4.2) show that if the dummy *Coop* is replaced by the level of inter-municipal public spending, municipal spending is not significantly modified when inter-municipal spending varies. Municipal and inter-municipal goods and services are neither complements nor substitutes but merely independently supplied. We thus conclude with Result 1.

Result 1. Inter-municipal cooperation *per se* does not have any impact on the level of municipal spending.

There are several possible reasons for this independence between municipal spending and

inter-municipal or community spending. First, the community might provide public goods not previously supplied by rather small municipalities, such as a public swimming pool (see the "Zoo effect" identified by Oates (1988) and some French evidence by Frère *et al.* (2011)). In such cases, the *Coop* dummy may be not significant because the scope of municipal public goods is not influenced by cooperation, and both levels of public spending are independent. Second, in some cases, there may be two phenomena that are compensating for each other (see Leprince and Guengant (2002)). On the one hand, local cooperation among municipalities is a more effect means of provision of the public goods that the local authorities concerned were already providing before the cooperation. In such cases, the *Coop* dummy will be significant and negative because the scope of municipal provision is reduced by cooperation. On the other hand, municipalities may react to the extended scope of inter-municipal provision of public goods by improving the quality of the supplied goods and services or by extending the scope of their public goods provision to satisfy previously unfulfilled demand. In some communities, this municipal behavior might induce a positive impact if the *Coop* dummy. The effects of these opposite signs might be compensating producing a non-significant result overall.

Second, whatever the model specification in Tables 3 and 4, the results show significant and positive spatial interactions between municipalities. Cassette and Paty (2006) first showed in a study comparing urban and rural areas in terms of local tax rates, that urban municipalities do exhibit high spatial interactions patterns. Our paper provides evidence that this tendency is observed if both local tax rates and also local spending are studied. Similar to other studies (see, e.g. Solé-Ollé (2006) or Schaltegger *et al.* (2009)), this outcome confirms that there are strong horizontal spending interactions among neighboring municipalities. We extend Foucault *et al.*'s (2008) finding of strong interactions between the biggest French municipalities, which however does not consider local cooperation, by looking at the interactions induced by proximity – that is, interactions among municipalities located in the same urban area and its periphery. Moreover, when we control for the potential impact of cooperation on municipal spending behavior we show that there are positive

spending interactions. Since the coefficient is positive, we can reject the existence of spending spillovers among neighboring municipalities. The motive for spatial interactions among local governments may be yardstick competition or spending competition over a mobile tax base. Further investigation is needed to disentangle these effects.

Third, in Table 3, column (3.3) and Table 4, column (4.2), we investigate whether the nature and extent of spatial interactions between neighboring municipalities are influenced by membership the municipality in a community. The results in column (3.3) show that the coefficient of $Coop_{i,t}*WZ_{j,t}$ is not significant: local cooperation *per se* may not influence the intensity of horizontal spending interactions, while the results in column (4.2) show that higher community spending has no effect on spatial interactions.

Additionally, we try to distinguish between two models of cooperation. On the one hand, the CUCA urban model of cooperation is more "demanding" in terms of the responsibilities assumed by the community, and is only applicable to communities of more than 50,000 inhabitants (it is thus the most integrated form of cooperation). On the other hand, the CC model of cooperation provides municipalities more flexibility and is a generic model that can be applied in both urban and rural areas. The estimation results in columns (3.4) and (4.3) show that these forms of cooperation do not exhibit different nor significant effects on the level of municipal spending. We also investigate the impact of these cooperation forms on the extent of strategic interactions among municipalities. However, as in the case of the *Coop* dummy, the inclusion of these CUCA and CC dummies shows no significant result (see columns 3.5 and 4.4).

Table 3. *Estimation results (1), 1994-2003.*

	3.1	3.2	3.3	3.4	3.5
Methodology & weight matrix					
	IV - Within W^{DIST}	IV - Within W^{DIST}	IV - Within W^{DIST}	IV - Within W^{DIST}	IV - Within W^{DIST}
Parameter estimates (P-values)					
$WZ_{j,t}$	0.6040***	0.6163***	0.6268***	0.6158***	0.6666***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.0002)
$Coop_{i,t} * WZ_{j,t}$	-	-	-0.0140	-	-
	-	-	(0.9272)	-	-
$CUCA_{i,t} * WZ_{j,t}$	-	-	-	-	-0.0484
	-	-	-	-	(0.7890)
$CC_{i,t} * WZ_{j,t}$	-	-	-	-	-0.1659
	-	-	-	-	(0.6357)
$Z_{i,t-1}$	0.4554***	0.4525***	0.4538***	0.4566***	0.4674***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
$Coop_{i,t}$	-	-0.0056	0.0248	-	-
	-	(0.3120)	(0.9406)	-	-
$CUCA_{i,t}$	-	-	-	-0.0064	0.0975
	-	-	-	(0.4176)	(0.8063)
$CC_{i,t}$	-	-	-	-0.0054	0.3524
	-	-	-	(0.3565)	(0.6406)
$Density_{i,t}$	0.0125	0.0137	0.0142	0.0129	0.0278
	(0.8319)	(0.8160)	(0.8101)	(0.8268)	(0.6755)
$Pct\_Young_{i,t}$	0.1119	0.1095	0.1111	0.1086	0.1119
	(0.6664)	(0.6730)	(0.6695)	(0.6761)	(0.6698)
$Pct\_Old_{i,t}$	0.1886	0.1941	0.1920	0.1905	0.1761
	(0.4068)	(0.3922)	(0.4000)	(0.4024)	(0.4459)
$Mean\_Income_{i,t}$	-0.0419*	-0.0414*	-0.0423	-0.0418*	-0.0419
	(0.0922)	(0.0956)	(0.1114)	(0.0938)	(0.1149)
$Fiscal\_Potential_{i,t}$	0.0438*	0.0452*	0.0447*	0.0445*	0.0429*
	(0.0646)	(0.0545)	(0.0632)	(0.0582)	(0.0806)
R-squares					
R-square	0.05791	0.05820	0.05814	0.05831	0.05774
Adjusted R-square	0.05765	0.05791	0.05781	0.05798	0.05734
Tests					
Validity of instruments (Sargan test)	0.3798	0.4610	0.3658	0.3791	0.2239
Exogeneity (Fisher test)	15.02***	15.34***	10.06***	14.82***	7.38***

*Probability in brackets * p < 0.10, ** p < 0.05, *** p < 0.01.*

(3.1) Instruments: spatial lag of density, spatial lag of pct_young, spatial lag of pct_old, spatial lag of mean_income, spatial lag of fiscal_potential, time lag of density, time lag of pct_young, time lag of pct_old, time lag of mean_income, time lag of fiscal_potential.

(3.2), (3.3) Instruments: as (3.1) plus time lag of coop.

(3.4), (3.5) Instruments: as (3.1).

Table 4. *Estimation results (2), 1994-2003.*

	4.1	4.2	4.3	4.4
Methodology & weight matrix				
	IV - Within W^{DIST}	IV - Within W^{DIST}	IV - Within W^{DIST}	IV - Within W^{DIST}
Parameter estimates (P-values)				
$WZ_{j,t}$	0.5811***	0.4970**	0.4846***	0.6808**
	(<.0001)	(0.0416)	(0.0058)	(0.0358)
$Z_{I,t} * WZ_{j,t}$	-	0.0746	-	-
	-	(0.6804)	-	-
$CUCA_{i,t} * Z_{I,t} * WZ_{j,t}$	-	-	-	-0.3517
	-	-	-	(0.4618)
$CC_{i,t} * Z_{I,t} * WZ_{j,t}$	-	-	-	-0.1432
	-	-	-	(0.7601)
$Z_{i,t-1}$	0.4484***	0.4463***	0.4805***	0.5624***
	(<.0001)	(<.0001)	(<.0001)	(0.0004)
$Z_{I,t}$	0.0185	-0.1238	-	-
	(0.7118)	(0.7229)	-	-
$CUCA_{i,t} * Z_{I,t}$	-	-	0.0755	0.8619
	-	-	(0.3659)	(0.4220)
$CC_{i,t} * Z_{I,t}$	-	-	-0.0297	0.0631
	-	-	(0.6947)	(0.9514)
$Density_{i,t}$	0.0131	0.0163	0.0444	0.0819
	(0.8254)	(0.7859)	(0.5284)	(0.3679)
$Pct\_Young_{i,t}$	0.1372	0.1552	0.1719	0.1495
	(0.6053)	(0.5640)	(0.5278)	(0.6065)
$Pct\_Old_{i,t}$	0.1894	0.2002	0.2116	0.2242
	(0.4063)	(0.3829)	(0.3631)	(0.3723)
$Mean\_Income_{i,t}$	-0.0428*	-0.0390	-0.0340	-0.0348
	(0.0852)	(0.1422)	(0.2112)	(0.2274)
$Fiscal\_Potential_{i,t}$	0.0424*	0.0432*	0.0290	-0.0061
	(0.0754)	(0.0708)	(0.3142)	(0.9166)
R-squares				
R-square	0.05821	0.05825	0.05669	0.05091
Adjusted R-square	0.05792	0.05793	0.05636	0.05051
Tests				
Validity of instruments (Sargan test)	0.5522	0.4475	0.554801	0.403987
Exogeneity (Fisher test)	9.51***	7.35***	7.30***	5.14***

*Probability in brackets * p < 0.10, ** p < 0.05, *** p < 0.01.*

(4.1), (4.2), (4.3), (4.4) Instruments: spatial lag of density, spatial lag of pct_young, spatial lag of pct_old, spatial lag of mean_income, spatial lag of fiscal_potential, time lag of density, time lag of pct_young, time lag of pct_old, time lag of fiscal_potential.

Finally, in all the columns in Tables 3 and 4, the time lagged variable ($Z_{i,t-1}$) is always very significant and positive. Therefore, as Foucault *et al.* (2008) show, for a short panel data set of urban municipalities of more than 50,000 inhabitants, French municipal public spending appears to be persistent over time. We can show that this tendency is a general phenomenon common to urban

municipalities of different population size. Among the remaining control variables none had a significant parameter (at the 5% level).

To summarize, these results suggest that including the potential impact of cooperation in our spatial model of municipal spending does not modify the estimation results. However, recall that in this basic model with cooperation, we test the existence of strategic interactions among neighboring local governments but we cannot disentangle the interactions among municipalities in the same inter-municipal community from those with municipalities that do not belong to the same cooperating jurisdiction. In the second step of our empirical investigation, we consider a more refined empirical model.

4.2 The impact of cooperation in a spatial municipal model differentiating among neighbors

We use a spatial model of municipal spending with two spatial matrices W^{SAME} and W^{OTHER} (see Equations 11 and 12 and the estimation results in Table 5). Since the parameters for the time lagged dependent variable ($Z_{i,t-1}$) and the covariates (X) are broadly unchanged, we focus here on interpreting the estimated coefficients for both new weight matrices. The parameter for W^{SAME} allows us to identify directly the nature and extent of spatial interactions in spending between municipalities that belong to the same EPCI. The parameter for W^{OTHER} measures the extent of the interactions between isolated municipalities and all their neighbors, and between cooperating municipalities and neighbors outside their inter-municipal community.

The estimation results show that spatial interactions among municipal members in the same community's jurisdiction are not significant while interactions with other municipalities are significantly positive (column 5.1). This result holds even when we interact neighbors' public spending decisions with the type of cooperation using the dummy CUCA (column 5.2). As expected, the results of the estimations suggest that inter-municipal cooperation significantly reduces competition among cooperating local governments.

Result 2. There are no spatial interactions between municipalities belonging to the same inter-municipal community. Inter-municipal cooperation seems to reduce competition among cooperating local governments.

Table 5. *Estimation results using a refined spatial model of municipal spending, 1994-2003.*

	5.1	**5.2**
Methodology & weight matrix		
	IV - Within W^{DIST}	IV - Within W^{DIST}
Parameter estimates (P-values)		
$W^{SAME}\ Z_{j,t}$	0.0024	-0.0005
	(0.4101)	(0.9559)
$CUCA_{i,t} * W^{SAME}\ Z_{j,t}$	-	0.0090
	-	(0.7332)
$W^{OTHER}\ Z_{j,t}$	0.3513***	0.3683***
	(<.0001)	(<.0001)
$Z_{i,t-1}$	0.6299***	0.6121***
	(<.0001)	(<.0001)
$Density_{i,t}$	0.0898	0.0827
	(0.1341)	(0.1899)
$Pct\_Young_{i,t}$	-0.0785	-0.0463
	(0.7756)	(0.8728)
$Pct\_Old_{i,t}$	0.3952	0.3637
	(0.1073)	(0.1626)
$Mean\_Income_{i,t}$	-0.0303	-0.0304
	(0.2614)	(0.2568)
$Fiscal\_Potential_{i,t}$	0.0382	0.0352
	(0.1688)	(0.2249)
R-squares		
R-square	0.04755	0.04821
Adjusted R-square	0.04726	0.04788
Tests		
Validity of instruments (Sargan test)	0.3592	0.2619
Exogeneity (Fisher test)	340.53***	256.84***

*Probability in brackets * p < 0.10, ** p < 0.05, *** p < 0.01.*

(5.1), (5.2) Instruments: spatial lag with the W^{SAME} weight matrix of density, fiscal_potential; spatial lag with the W^{OTHER} weight matrix of pct_young, pct_old, mean_income, fiscal_potential; time lag of density, pct_young, pct_old, fiscal_potential.

The absence of spending interactions between neighbors in the same EPCI may be one of the main consequences of reduction in municipal responsibilities under cooperation: municipalities have less incentive to be apprised of what other member municipalities are doing since certain of their neighbors' responsibilities are now organized by the community. This cooperation effect is

absent in the case of municipalities interacting with neighbors that do not belong to the same community. A pattern of highly significant and positive spending interactions is obtained between isolated municipalities and their neighbors, and between cooperating municipalities and neighbors that do not belong to the same community.

5 Conclusion

Inter-municipal cooperation is a widespread phenomenon occurring in most European countries but its net effect on municipal choices is not *a priori* known since it might combine reduced costs due to economies of scale, internalization of spending spillovers, and reduced tax competition, among other expected effects.

The main aim of this paper was to test the impact of inter-municipal cooperation on municipal spending behavior. We estimated a model of municipal spending choice using panel data for the period 1994-2003. We found that inter-municipal cooperation does not have an impact on the level of municipal spending. This outcome suggests that municipal and community spending are independently supplied. However, we found also that inter-municipal cooperation reduces competition among municipalities in the same community in setting their public spending.

Future work could extend the research described here, in various ways. Further investigation is needed to find the source of the observed positive spending interactions among French municipalities. Spending competition or yardstick competition might explain this outcome. We could also investigate whether the results change if we consider rural areas or different categories of public expenditures.

Appendix

This appendix is a technical note on the method used to proxy for the level of community expenditure Z_{COM} ; it is estimated based on available data since actual data are not freely available. To illustrate the procedure, consider a community that groups *N* municipalities (*i* = 1,…,*N*). For each of these municipalities, we know that its tax revenues derive from the four direct local taxes. We also know the community's fiscal revenues and the general operational state grant g_{COM} (*DGF*). Both components mostly represent community revenue.

Then, for both local government levels, we can distinguish two direct tax categories: household taxes t^h (residential tax, property tax, and land tax) and business tax t^b. This allows us to highlight the differences between the two fiscal forms that a community can adopt: *additional tax system* or *single business tax*. In the former case, both the municipalities and the community set their own tax rates for the four direct taxes. As a result, citizens pay taxes based on a tax rate which is the sum of their own municipal tax rate plus the tax rate set by the community. In the case of a single business tax, only the community sets the business tax rate, and only the municipalities set the three other taxes. The two possible cases are treated in the following way:

$$Z_{COM} = t^h_{COM} + t^b_{COM} + g_{COM} - \sum_{i=1}^{N} \tilde{t}_i$$

where $\tilde{t}_i$ denotes the transfer of tax revenues from the community to the member-municipality *i*.

In the case of the additional tax system, the community is supposed to set taxes that strictly finance the competences it undertakes. Therefore, member-municipalities should not suffer any loss of tax revenue with regard to the public goods and services they supply and we can reasonably assume that they will not choose to decrease their tax rates such that the loss in tax revenues exceeds the cost of the responsibilities transferred to the community. Therefore, the community does not transfer any tax revenues to its member-municipalities and $\sum_{i=1}^{N} \tilde{t}_i = 0$.

In contrast, in the case of single business tax this implies that member-municipalities are not able to decide how much tax revenue they will transfer to the community, which sets the business tax. In this case, we assume that the transfer corresponds to the loss of tax revenues suffered by municipality *i*, that is:

$$\tilde{t}_i = \left(t^h_{i,y\text{-}1} + t^b_{i,y\text{-}1}\right) - \left(t^h_{i,y} + t^b_{i,y}\right)$$

where *y* denotes the year that the municipality *i* joined the community, or the year when the community's fiscal system changed to a single business tax.[11] In both cases, legislation imposes the principle of *budgetary neutrality*. Note that, in some rare cases, the business tax rate may be so low that this change of fiscal system decreases the community's tax revenues: now, the community does not collect any tax revenues from the three household taxes, which loss may be not totally compensated by the additional business tax. In this case, $\tilde{t}_i < 0$ and this time, the transfer is from the member-municipalities in favor of the community.

[11] As a consequence of central government policy favoring a single business tax system, the reverse case (where a community changes its fiscal system in favor of the additional tax system) almost never occurs.

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