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Local government cooperation at work: A control function approach

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n. 202

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Local government cooperation at work: A control function approach

Abstract

We analyze voluntary coalition formation using a unique panel data for 1,056 municipalities in the French region of Brittany between 1995 and 2002. We use a control function approach to develop a binary discrete choice model with spatial interactions. We find that a municipality's decision to cooperate over the provision local public goods depends on the decisions of its neighbours. Comparison with spatial econometrics models (SAR and Durbin) shows that the decision to cooperate is over estimated by these more traditional models. The results are in line with the recent applied spatial economics literature but are derived for a discrete choice model setting.

Classificazione JEL: C3, H2, H4, H7

Keywords: Inter-municipal Cooperation; Panel Data; Control Function.

Contents

I. Introduction

Local government fragmentation raises several issues, such as efficient provision of local public services. A common response to inefficient delivery is the implementation among municipalities of consolidation programs. There are several examples of inter-municipal cooperation in Europe specially among northern European countries. For example, in the case of Finland, the number of municipalities has decreased sharply since the 1940's (Saarimaa and Tukiainen, 2010) and in Denmark the number of municipalities was reduced from 271 to 98 in 2007. In recent decades, inter-municipal cooperation plans have been introduced by many countries around the world such as China (Hinnerich, 2009; Weese, 2009), Canada where the number of municipalities halved between 1996 and 2001 (Poel, 2000), and Israel where amalgamation reform was conducted in 2003 (Reingewertz, 2012). In the theoretical literature, work on political economy includes several papers focusing on the optimal size of a coalition and her characteristics (see e.g. Bolton and Roland, 1997; Alesina and Spolaore, 1997, 2003, 2005, 2006; Brasington, 1999, 2003a, 2003b; Blume and Blume, 2007; Gordon and Knight, 2009; Saarimaa and Tukiainen, 2010; Weese, 2011, Lago-Penas and Martinez-Vazquez, 2013). These studies show that nations are more likely to integrate if levels of income are comparable and voters have similar political preferences. In the context of within states, there are similar issues which are addressed mostly by work on fiscal federalism.[1]

With the exception of Hulst et al. (2009),[2] most of this work focuses mainly on municipality mergers which cause municipalities to disappear following a coalition. In the French setting, the municipalities continue to exist as entities after joining an inter-municipal body in a *functional cooperation*. Following the existing literature, we argue that if a municipality has a choice between remaining independent or joining a community, the political, economic, and socio-demographic environment may influence the cooperation decision in a variety of ways. Also, the cooperation decision is strongly dependent on what neighbors decide since by law, an inter-municipal community must include just contiguous localities. If no neighbors already cooperate, the probability of joining an inter-municipal community will be lower than if close

[1]Since the seminal article by Tiebout (1956), numerous articles show that fragmentation can have positive effects since small governments achieve a better matching between expenditure allocation and local preferences. Therefore, the problem of optimal size in the production of local public goods can be modelled as arbitrage between the welfare gains expected from small localities and the economies of scale expected from the production of public services within a larger jurisdiction (Oates, 1972).

[2]Hulst et al. (2009), in a comparative study involving eight European countries, analyze the shift in institutional arrangements for inter-municipal cooperation agreements that provide such joint local public goods.

neighbors already cooperating. This allows us to use a discrete choice model in which the decision to cooperate is affected by the spatial weighted average decisions of the municipality's neighbors. The main aim of the paper therefore, is to estimate the impact of neighbors' cooperation decisions on municipal decision-making, using a *spatial binary discrete choice model* and controlling for the political and socio-economic environment.

Recent work on spatial interaction models discusses the validity and accuracy of traditional spatial econometrics techniques (Gibbons and Overman, 2012) and provides new evidence on the advantages of instrumental variables (IV) methods. In the case of a linear spatial lag model, Lyytikainen (2012) shows how the use of IV methods associated with careful choice of IV can result in more reliable estimates of the spatial interaction term[3]. In the context of fiscal interaction, the estimation results are lower than the results from a traditional spatial econometric methods, suggesting that the latter overestimate the size of the spatial interaction coefficient. According to Gibbons and Overmans (2012) this result is likely driven by the fact that traditional methods weakly identify the causal effect of the spatial weighted component.[4] Exploiting exogenous variations from policy changes, therefore seem the most appropriate method to derive valid exclusion restrictions in tax competition setting. This paper follows the reasoning in Lyytikainen (2012) but advances the binary discrete choice model case.

In the discrete choice model literature (especially in a panel framework) the counterpart of the IV method is control function. Paapke (2005) and Paapke-Wooldridge (2008) have extensively investigated the case of panel data method for a fractional response dependent variable. We follow their control function strategy to develop a binary choice model with spatial interaction. In particular, we treat the spatial interaction as endogenously determined, and we solve it by imposing exclusion restrictions derived from the French institutional setting. That is, we exploit the exogenous variation determined by a national statutory (upper) tax limit.

The use of control function in this context has many advantages. Firstly, discrete choice models with spatial interaction are computationally intensive (LeSage, 2000; Pinkse and Slade, 1998). Maximum likelihood optimization is complicated because it requires the inversion of large

[3]In a similar study, Baskaran (2014) finds very similar results for North Rhine Westphalia and Lower Saxony

[4]The typical estimation strategy in the case of spatial autoregressive component is maximum likelihood or IV general method of moment (GMM) methods. According to Gibbons and Overman (2012), although specification of the former is difficult, in the latter there is weak identification due to the use of non relevant instruments (i.e., the typical IV strategy implemented using spatial weighted average covariates or spatial weighted average lagged dependent variable as exclusion rectriction).

matrices. When the number of observations grows, convergence can become unfeasible (Klier and McMillen, 2008). Control function is a simple and well-known procedure, which is suited to large panel data, given that it involves only linear regressions and standard probit or Generalized Linear Model (GLM) methods in a binomial family. Also, control function can control for time invariant unobserved heterogeneity via Mundlack-Chamberlain devices (Paapke-Wooldridge, 2008), and thus introduce fixed effects without any differencing transformation, which can be computationally intensive. Klier and McMillen (2008) acknowledged the computational complexity of discrete choice spatial interaction models, and developed the alternative Spatial Logit for Large Sample estimator, which is a GMM procedure that combines logit and two-stage least square estimation. However, as they show in a series of Montecarlo simulations, their procedure tends to overestimate the spatial correlation coefficient. For comparison we use their method in our context and we show that a naive control function a la Wooldridge performs better.[5]

By applying our estimation strategy to a panel of French municipalities, we find that the decision of municipalities to cooperate over the provision of local public goods depends on the decisions of their neighbours. In particular, the probability of cooperating with neighboring municipalities is higher if the latter already provide joint local public goods. However, a common political "color" is not a specific incentive to cooperate. The comparison between control function, maximum likelihood and GMM estimates shows that control function performs better.

This paper is organized as follows. Section 2 discusses the conditions for voluntary cooperation among local governments. Section 3 presents the French institutional context and describes the national rule for tax limitation. The empirical model is discussed in section 4. Section 5 presents the results of our estimation and section 6 concludes.

II. Conditions for voluntary cooperation among local governments

A number of political economy models address the incentives to cooperate.[6] For example, Bolton and Roland (1997) and Alesina and Spolaore (1997, 2005, 2006) study the compromise in economies of scale that encourages cooperation and the problem of heterogeneity of preferences

[5] Although Klier and McMillen (2008) develop the estimator for the Logit regression, McMillen(2010) also provides the estimator for the probit in the R package *McSpatial*.

[6] Issues related to coalition formation and analysis of bargaining are the subject of number of theoretical studies of game theory, which are beyond the scope of the present study (see e.g. Myerson, 1978; Shenoy, 1979; Aumann and Myerson, 1988; Ray and Vohra, 1999; Bloch and al., 2006).

that promotes dissolution, which together determines the optimal size of a given coalition. Nations are shown to be more likely to integrate if they have comparable levels of income and their voters share close political preferences.

Within a state, Oates (1972) points out that the formation of a coalition internalizes inter-jurisdictional spillovers externalities and can be a solution to the problem of free riding. The motivation for coalition formation within a country has also attracted considerable interest from theoretical and empirical economists. Borge and Rattso (2002) confirm that in Norway, political strength, measured by the fragmentation of parties and types of coalition, is important for growth and influences decentralized spending and the formation of agreements. Also for Norway, Sorensen (2006) shows the impact of political transaction costs on voluntary local government mergers. He identifies the role of state grants, revenue disparities and expected changes to party strengths after unification, in merging proocess. Gordon and Knight (2009) and Weese (2011) propose structural econometric methods to analyze spatial mergers. Where a merger is decided voluntarily by the municipal councils, they show that the local political environment plays an important role in the mergers decision. These authors point out also that political fragmentation can be an obstacle to the formation of coalitions and conclude that the political environment can discourage optimal coalition formation. Saarimaa and Tukiainen (2010), using Finnish municipal data, study the case of mergers that were decided independently at the local level, and analyze empirically the coalition formation of local governments. Using a novel reduced form econometric procedure that allows for multi-partner mergers, they find that the decision to cooperate or merge depends on the preferences of voters, and that mergers are much less likely if the distance between median voter in the coalition and the center is large. They argue that in order to reduce political competition and to be re-elected, councillors seems to prefer mergers.

Since we want to address a specific class of cooperation where municipalities continue to exist as entities after joining an inter-municipal body, we address three factors that are key to functional cooperation decision-making: economic, political and socio-demographic determinants.

Although improved cost efficiency is a major incentive for consolidation, it is one of the most difficult key elements for the municipality to assess a priori (Sorensen, 2006). To assess the trade-off between remaining isolated and cooperating, a municipality will compare its revenue with what can be expected after joining the inter-municipal community. Therefore, we expect that if a municipality has higher levels of (exogenous) revenues than her potential partners, it may be opposed to cooperation to avoid revenue sharing with poorer municipalities. Inversely, a relatively poor (in terms of fiscal revenues) municipality will have more incentives to share the resources with richer neighbours.

Citizens of neighbouring municipalities may have more or less close policy preferences. The political costs associated with larger, more heterogenous jurisdictions have been the subject of long debate (Sorensen, 2006). The new local official in the case of merger may pursue a different policy to those pursued by former separates localities, leading to loss of allocation effectiveness (Oates, 1972). In the case of functional cooperation where former jurisdictions do not disappear, the political factor may not be less strategic than in the case of merger case. Although cooperation among local governments to provide joint local public goods is also more likely if voters share close political preferences, each municipality retains autonomy for the provision of specific municipal public goods. A cooperating municipality can transfer some spending to the inter-municipal community but retain many important competences (such as local urban services, buildings, nursery provision, primary schools, and municipal roads maintenance), which respond to specific local preferences.

The socio-demographic characteristics of municipalities are closely related to economic and political determinants. First, the larger the municipality's population, the greater will be its local public needs and the greater will be the spillovers of public goods to neighboring localities. Free riding behavior from citizens who do not live in a city but benefit from its public good delivery provides a dense jurisdiction with a greater incentive to share or transfer to the inter-municipal group some competences and associated supply of services. Second, the prospect of shared social responsabilities (e.g. for elderly people) could also be a strong motive for some municipalities to join an inter-municipal agreement. However, the provision of social services is not ordained by law for inter-municipal communities. Moreover, elderly people are less sensitive to investment by inter-municipal jurisdictions (sport facilities, public transport, road investment). A high proportion of elderly people can influence the probability of cooperation negatively.

Finally, we can conclude that if a municipality has a choice between remaining independent or joining a community, the political, economic, and socio-demographic environment may influence the cooperation decision in a variety of ways. Neighborhood characteristics in terms of economics (e.g. per capita fiscal revenues), politics (political affiliation) and demography are key factors that need to be addressed to understand the cooperation decision. To this context, the French experience is an interesting case.

III. The French institutional context

France is a very fragmented country; since the lowest layer of local government consists of more than 36,700 municipalities and the French local institutional context is characterized by three overlapping tiers of local government. The middle tier consists of 96 counties or *départements*; the top tier consists of the 22 French regions. Municipalities are responsible for local urban services, buildings, provision of nurseries, primary schools, sports facilities, maintenance of municipal roads, and urban public transport. The counties administer social assistance; and maintain county roads and middle schools. Regions are responsible for provision of vocational training, economic development, and building and maintenance of high schools.

Local revenues come mainly from taxation (54%), block grants (23%), and borrowing. The local business tax (*Taxe Professionnelle*)[7] is the major source of local government tax revenues, accounting for approximately 45% of the revenue derived from direct local taxes. The tax base consists mainly of capital goods and is related to the rental values of buildings, and of equipment (assumed to be 16% of the equipment cost). The remaining tax revenues 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"*). All municipalities receive a state grant, related to various criteria including population and tax bases.

Since the beginning of the 1990s, several laws on local cooperation have been passed to solve the problem of municipal fragmentation:

- The law of February 6, 1992 established the basis of inter-municipal cooperation in order to promote economic development.
- The law of July12, 1999 known as the "*Chèvenement law*", is one of the main laws encouraging consolidation of inter-municipal cooperation in France.

[7]This tax, which was related mainly to private capital, was removed in 2010 and replaced by a territorial economic contribution based on property and firm value added.

- A government reform, in 2010, enforced all municipalities to join an inter-municipal structure before January 1 , 2014.

In France, responsibility for creating inter-municipal communities ('*Etablissement public de coopération intercommunale or EPCI*) is left to the municipalities, which (before 2010) could cooperate with the municipality of their choice. However, this cooperation currently is governed by "the principle of territorial contiguity".[8]

Local cooperation is expected to *i)* reduce local public spending through the achievement of substantial economies of scale in the production of some local public goods such as public transport, cultural and sports facilities etc. (mainly investment spending) and *ii)* limit fiscal and spending inequalities among member municipalities. These objectives are achieved through the transfer of some tax and spending powers from the municipalities to the corresponding inter-municipal group.

The inter-municipal community is managed by a board of delegates elected by member municipalities from their local councillors based on an absolute majority. Therefore, unlike municipalities, "départements" or regions, inter-municipal jurisdictions operate under indirect democracy and are a decision-making rather than a strict administrative level. Each municipality must have at least one seat on the council, and no single municipality can hold more than half of the inter-municipal council seats.

Local cooperation has been widely promoted by government based on financial incentives. In 1999, the inter-municipal community was awarded a new state grant[9] (based mainly on community population and inter-municipal tax bases) and new tax revenues. Inter-municipal communities apply tax additional to the four municipal taxes (business, residential, property and land taxes) or set a single business tax (SBT) or *Taxe Professionnelle Unique rate.*[10] If the municipality chooses to impose a SBT, it loses the right to set her own business tax rate but can still set the rate for the three household taxes (residential, property and land taxes).

To impose centralized control over tax rate dispersion, France implemented a municipal tax limitation. In this paper, we focus on the national tax limit set for the local business tax (LBT) or *Taxe Professionnelle* according to which the LBT which is set each year, cannot exceed twice

[8] A municipality must cooperate with any locality with which it has at least one common border.

[9] Note that this state grant attributed to the inter-municipal community coexists with the state grant attributed to the municipality. The latter remains unchanged whether the locality cooperates or not.

[10] During the period of our study, there was a third - marginal - case, which was a mixed case where the community sets a single business tax rate and an additional tax rate on households. The community received tax revenue from households and business while municipality i sets a tax only on households.

the previous year's average business tax rates computed for all French municipal business tax rates (see details in Appendix A). Therefore each year municipalities receive notification of the upper tax limit, which must be respected when setting their annual business tax rate. Since the tax limit is computed at the national level each year in a process that involves around 36,500 municipalities it is impossible for a single municipality to control the tax cap. Below, we explain how we use the exogenous distance to the tax cap or rather, its weighted spatial average - the average spatial weighted difference between the tax rate and the current limit - as an exclusion restriction to provide a better identification of the spatial weighted average cooperation variable.

We employ a panel data set of 1,056 municipalities in the French region - Brittany - over a period of 8 years (1995-2002). The choice of this region is justified by its geographical position: Brittany occupies the northwest peninsula of continental Europe in northwest France. It is bordered by the English Channel to the north, and the Atlantic Ocean to the west and south. Thus, Brittany is affected by its borders with other regions to only a small extent. Note also that there is no specificity in this region concerning inter-municipal communities since the laws on local cooperation are national laws.

Figures 1 and 2 depict the municipalities that entered into an inter-municipal agreement between 1996 and 2002. Inter-municipal cooperation in this period was quite successful due mainly to the allocation of a new community level state grant. However, some municipalities remained independent. Our aim is to explain why some municipalities decided to remain independent while others concluded joint local public goods provision agreements.

IV. Econometric approach

Since by law local governments in France are free to decide to join an inter-municipal group if they share a common border, this allows us to use a discrete choice model. In addition, municipalities continue to exist as entities after joining an inter-municipal body (Di Porto et al., 2013). Therefore, the starting point of our econometric approach is a standard binary

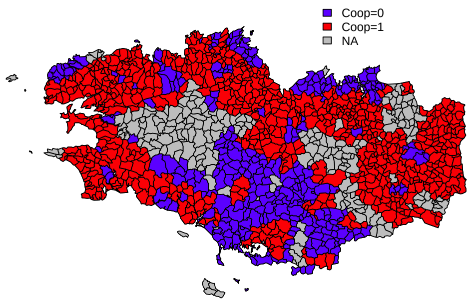

Figure 1: 1996

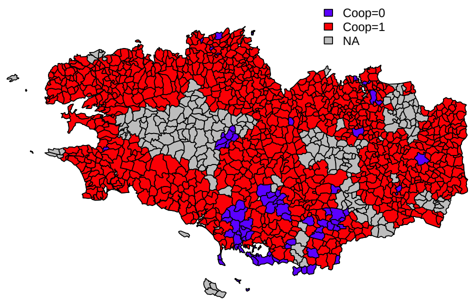

Figure 2: 2002

discrete choice model where the dependent variable $C_{i,t}$ is given by:

$$C_{i,t} = \begin{cases} 1 & \text{if municipality } i \text{ cooperates at time } t \\ 0 & \text{otherwise} \end{cases}$$

The reduced form of our panel data model is:

$$C_{i,t} = \phi(\alpha + \beta X'_{i,t} + u_{i,t}) \tag{1}$$

where i is the index of municipalities, t is an index of the time dimension, $X_{i,t}$ is the matrix of the covariates, β is the vector of coefficient, $u_{i,t}$ is the error term, and ϕ is a normal distribution.

Allowing for the possibility that the error term includes unobserved fixed municipal characteristics, the model can be written as:

$$C_{i,t} = \phi(\alpha + \beta X'_{i,t} + \eta_i + e_{i,t}) \tag{2}$$

where $\eta_i = \bar{x}_i = T^{-1} \sum^T x_{i,t}$ are Mundlack-Chamberlain transformations controlling for the unobserved time-invariant individual effect and e_{it} is an independently and identically distributed error term. Paapke and Wooldridge (2008) show that under conditional normality assumptions, the estimation of fixed effect using covariates time average is straightforward.

To assess the neighborhood effects on the decision to cooperate, we consider a spatial specification for our panel probit model including the spatial lag of the dependent variable as a regressor, $\sum_{j=1}^{N} w_{ij} C_{j,t}$, i.e. the weighted average on its neighbors' values. In this case, neighboring municipalities will be those that are either geographically or geo-politically close (see Appendix 2 for details).[11]

The spatial probit model with fixed effects is therefore given by:

$$C_{i,t} = \phi(\rho \sum_{j=1}^{N} w_{ij} C_{j,t} + \beta X_{i,t}^{'} + \eta_i + e_{i,t}); \tag{3}$$

where N is the number of municipalities, $w_{i,j}$ is an element of the weight matrix W indicating whether observations i and j are neighbors, and $\sum_{j=1}^{N} w_{ij} C_{j,t}$ is the spatial lag of the dependent variable. We choose to estimate a spatial lag model, but also perform a Durbin model specification.[12]

The form of the spatial Durbin model becomes:

$$C_{it} = \phi(\rho \sum_{j=1}^{N} w_{ij} C_{j,t} + \beta X_{i,t}^{'} + \gamma \sum_{j=1}^{N} w_{i,j} X_{jt}^{'} + \eta_i + e_{i,t}) \tag{4}$$

where $\sum_{j=1}^{N} w_{ij} X_{it}^{'}$ is the matrix of spatially lagged explanatory variables with associated parameter vector γ. In particular, the coefficient β measures the influence of municipality' i's characteristics on municipality i's decision to cooperate, while the coefficient γ measures the impact of neighbors' characteristics on i's cooperation decision. In both equations (3) and (4) we include in $X_{i,t}^{'}$ year dummies in order to control for year fixed effects.

We estimate equation (3) and (4) using different techniques and within different specifications. Firstly, we estimate a fixed effect spatial lag (Durbin) model using a linear probability model (LPM). In this case we remove η_i, which are redundant given that we control for municipalities fixed effects using demeaned variables (see Elhorst, 2003).

Secondly, we perform the linearized GMM (L-GMM) procedure in Klier and McMillen (2008). The technique is intriguing since the model in principle performs a non linear estimation

[11] For reasons of space, we show only the results for the spatial distance-based weight matrix with a distance cut-off equal to the 1st quantile of the sample distance distribution (equal to 59 km). The robustness of the findings to weight matrices with alternative cut-offs were also tested. Results are available upon request.

[12] As observed by Gibbons and Overman (2012) Durbin and spatial econometric models SEM are equivalent under a set of nonlinear common factor constraints on the coefficients. Therefore, we aim with this choice to cover all the traditional spatial specification, given that SLX and SEM models are not the main focus of the analysis and cannot be estimated using a control function approach.

and, is first linearised around the convenient starting point $\rho = 0$. In this way it is possible to perform a standard probit model followed by two-step least squares to obtain consistent estimates of the spatial lag coefficient. This procedure uses traditional $\sum_{j=1}^{N} w_{i,j}^2 X_{jt}^{'}$ as exclusions restriction (where $w_{i,j}^2$ are the elements of the W^2 matrix) and can be extended to the panel case including Mundlack-Chamberlain devices. The procedure is also sufficiently flexible to allow for additional external instrument.

Our last specification is probably the simplest in terms of computing time. We apply control function (CF) method considering $\sum_{j=1}^{N} w_{ij} C_{j,t}$ as an endogenously determined variable. In particular, we use a two-step procedure where: i) firstly, we regress the endogenous variable $\sum_{j=1}^{N} w_{ij} C_{j,t}$ on instruments, exogenous covariates and time average covariates, and we obtain the residuals $\hat{\nu}_{i,t}$; ii), we include those residuals in the original regression, that is (for the spatial lag case):

$$C_{i,t} = \phi(\rho \sum_{j=1}^{N} w_{i,j} C_{j,t} + \beta X_{i,t}^{'} + \eta_i + e_{i,t} + \hat{\nu}_{i,t}) \tag{5}$$

This last model can be estimated as a Generalised Linear Model (binomial family) and under fairly standard conditions produces consistent estimate of ρ.[13] Also in this last case we can use traditional $W^2 X_{j,t}$ exclusion restrictions. As previously mentioned, exploiting exogenous variation deriving from policy shocks, fiscal or spatial rules, we get estimates of ρ that are more restrained (smaller) and more credible. This was proved for the case of continuous dependent variable by Lyytikainen (2012). However both the CF and the L-GMM model allow for the inclusion of external instruments of this kind, allowing the interesting possibility of testing this type of relevant instrument in the discrete choice case. We exploit the exogenous variation from a French fiscal rule and we add a new instrument to the exclusion restriction set. Before discussing our results in section 4.1 we explain the identification strategy in more detail and discuss neighbors decisions and other control variables in subsection 4.2.

IV.A. Identification strategy

France has set various ways to control local tax competition, through the imposition of central rules and a tax limitation. The most interesting in our context is the national tax

[13]Given that the second-step regression involves a generated regressor, i.e. the first stage residual, we follow Paapke and Wooldridge (2008) and compute the standard errors for the average partial effect via bootstrap. See Appendix D for details.

limitation imposed on the (LBT) or *Taxe Professionnelle* (see Appendix A for details). This tax is levied by different levels of local governments and constitutes one of the main tax revenue sources for local governments. The average LBT, computed for all French municipalities and, multiplied by 2, constitutes the upper tax limit (TL) for business tax. Given a certain national of TL, not all municipalities have the same freedom to set their specific LBT and for some it is impossible to increase tax rates. By computing the difference between actual LBT and the tax limitation imposed on municipality for each year in our sample, we get an indicator of fiscal freedom, which is a suitable instrument for our purposes.

The decision to cooperate therefore, is related to both tax revenues and tax freedom. To clarify the relevance of our instrument (i.e. its ability to predict the endogenous variable), let us consider a municipality, which has already reached the exogenous upper bound of the LBT rate. Cooperation might provide her with some policy leeway to increase higher future revenues that otherwise would be constrained by the upper bound imposed and the fact that the tax base can be considered fixed in the short run.

Given the institutional setting, some municipalities have less freedom than others. This creates an exogenous constraint on the cooperation decision making process. It should be noted that this constraint is space and time varying, which should help its identification. Note also that the tax limitation rules is based on a process that involves all 36,500 municipalities in France; therefore, an individual municipality will be marginal in the decision process and the possibility for her to control the national tax limitation through a strategic change in her tax rate will be very unlikely; this ensures instrument validity . Consequently, if $F_{i.t} = LBT_{i,t} - TL_{i,t}$ is our indicator of tax freedom $\sum_{j=1}^{N} w_{i,j} Z_{i,t} = \sum_{j=1}^{N} w_{i,j} F_{j,t}$ will be our additional exclusion restriction for $\sum_{j=1}^{N} w_{i,j} C_{j,t}$. It should be noted that $\sum_{j=1}^{N} w_{i,j} Z_{i,t}$, which is a weighted average tax freedom indicator, is a suitable instrument for the spatial correlation coefficient. Intuitively this means that the spatial endogenous component is predicted in part by a spatial process that is exogenously determined by the national fiscal rule. De facto, some of the cooperating neighbors in each municipality have chosen cooperation for exogenous motivations, that is because their tax rates were close or equal to the tax cap.

IV.B. Neighboring decisions and other control variables

In order to estimate the impact of neighbors cooperation decisions on municipal decision-making, and following the literature on voluntary cooperation decisions the cooperation decision (a discrete choice variable taking the value 1 in the event of voluntary cooperation) is regressed on its spatially lagged value (with spatial weights given by either pure geographical distance or geo-political distance), and on a set of control variables proxying for economic, socio-demographic, and political characteristics.[14]

First, the cooperation decision is strongly dependent on what neighbors decide since by law, an inter-municipal community must include just contiguous localities. If no neighbors cooperate, the probability of joining an inter-municipal community will be lower than if close neighbors already cooperating. We can also expect some mimicking behavior related to cooperation from local officials who might believe it would be stigmatising to remain isolated when most neighboring localities have signed an intergovernmental agreement. Citizens/voters may become aware of new public services provided by a community (e.g. public transport, cultural and sports facilities) and may put pressure on their local government to join the community.[15] Officials might recognize that remaining isolated from an existing close community (which provides a range of good public services to firms and households) could lead to capital flight from the territory. Tax base mobility might explain the propensity of officials to imitate the cooperation decisions of neighbors.[16] It is likely also that municipalities, when deciding whether or not to cooperate, will mimic neighbours' behavior following the trend suggested by Manski (1993). We can expect also that obtaining information on cooperation (expected revenues, expected state grant, etc.) will be easier for an independent municipality located next to a group of cooperating municipalities. Mimicking behaviour related to cooperation is likely to be observed in this context. The literature on local fiscal decision-making provides extensive developments on this kind of spatial spillover and its identification (Brueckner, 2003).

We are aware also that geographical distance is not the only factor in our case. Citizens of neighboring localities do not necessarily have the same policy preferences. As argued before, where a municipality has a choice between remaining isolated or joining a community, politics may have an impact on the cooperation decision in a variety of ways. If a municipality is sur-

[14]Descriptive statistics are reported in Appendix B.

[15]The argument is similar to a yardstick competition models (Salmon, 1987; Besley and Case, 1995) where incumbents imitate the public decisions of their neighbors to stand for reelection.

[16]This is a tax competition argument.

rounded by independent localities, the creation of an inter-municipal community is more likely to happen if the neighboring local officials are of the same political belief. For a municipality that is spatially contiguous to an existing community, a positive decision to join this community will be more likely if the president of the inter-municipal council (elected by local councillors from member municipalities) belongs to the municipality's ruling party. However, in France, functional cooperation is different from a merger: the cooperating municipalities continue to exist as entities after joining an inter-municipal body and the cooperating municipality mayors remain in post after the creation of the inter-municipal jurisdiction. They retain some bargaining power within the community and some strategic competences within their particular municipal territory (such as local urban services, buildings, nurseries, primary schools, sports facilities). Therefore, political factors may be less important in the French context compared to the Northern European countries.

Since more than 80% of french municipalities are very small (less than 2,000 inhabitants), many French mayors do not have a political affiliation and do not want to be associated with a particular political party. Therefore the political color of the municipal government is not directly observable and there is no political data set for these small municipalities. To proxy for political affiliation, we use the results of the first round of the presidential elections since these are more likely to represent real affiliation. This variable comes from the board of elections ("Bureau des Élections et Études politiques, Ministere de l'Interieur"). During our period of study, there were two municipal elections (in 1995 and in 2002) but only one presidential election in 1995. We therefore consider a constant municipal political affiliation over time. In 1995, 546 municipalities could be considered right-wing and 510 localities left-wing.

To capture the political environment of each municipality i, we construct a geo-political matrix as follows. Based on each municipality's leaning (right or left-wing), we assigned a value of 0.5 to the municipalities that voted for a right-wing candidate and -0.5 to the municipalities that voted for a left-wing candidate. We build a political matrix where each element takes the value of 1 if two municipalities are of the same political leaning and 0 otherwise ($P_{ij} = 1$ if both municipalities i and j have the same political colour and $P_{ij} = 0$ otherwise). Third, since we want to take account of the political environment of each municipality, we compute the interaction between the geographic and political matrices to obtain our geo-political matrix (see Appendix C for details).

To assess the trade-off between remaining isolated and cooperating, a municipality will compare its revenue with what can be expected after joining the inter-municipal community (Sorensen, 2006). However, efficiency improvements in the production costs of local public goods may be difficult to evaluate. Therefore, if a locality has a higher level of fiscal revenues (per capita) than its potential partners, it will be less likely to cooperate. We argue that a municipality makes its decision at time t on the basis of the level of its fiscal revenues (i.e. the sum of its tax revenues and the per capita state grant) at time t-1. We expect that a high level of fiscal revenues at time t-1 will reduce the probability of joining the community whereas a financially poor locality will have a greater incentives to forge an agreement with neighboring localities. The obvious financial gains from cooperation (from the extra state grant) and the provision of extra public goods are counterbalanced by each cooperating municipality's loss of some fiscal autonomy through devolution of competences and tax revenues to the community. In entering a cooperative agreement with other localities, a relatively "rich" municipality loses control over a part of its revenues, which are redistributed among the entire community.

We also include the following explanatory variables: population density, and share of elderly people in municipality i. We expect a positive sign of density for the following reason. First, the denser the municipality, the greater will be the local public needs and the public goods spillovers to neighboring localities. In order to reduce free-riding behaviour from citizens who do not live in a city but benefit from her public good provision, the municipality will have an incentive to share or to transfer some competences and the associated supply of services, to the inter-municipal group. We would expect a negative sign for the share of elderly people since this category of the population has comparatively lower needs related to this investment spending, which are financed by the inter-municipal community. However, if the existence of a community is seen as a solution to sharing or transferring the supply of other specific services to this population category, we should observe a positive impact. Since social services are not legally compulsory for intermunicipal communities, the expected sign of this variable is ambiguous.[17]

As usual in this spatial economic context, we cannot rule out the possibility that voluntary cooperation might be strongly dependent on the weighted average of neighbors' characteristics. We perform an alternative Durbin model specification in which the above socio-economic char-

[17] Due to collinearity problems, we had to remove from the estimations population, percentage of unemployed and share of young people in the municipality i.

acteristics of neighbors are spatial lagged covariates. There are two reasons for including these weighted average covariates in an alternative specification of our model. First, this specification can be tested to ensure that a naive control function a la Wooldridge, is a good choice in our context. Second, we want to capture the following economics effects. We expect that being surrounded by richer municipalities (e.g. with higher per capita tax revenues) would reduce the probability of cooperation since rich localities are not likely to transfer their resources to the community. The lagged covariate associated with elderly might exhibit an ambiguous sign for the reasons given above. Finally, a dense neighborhood might be a strong incentive to sign an inter-municipal agreement since local government cooperation allows internalization of spillover effects in the supply of public goods. Tables respectively report the estimations for the Spatial Lag Model in Eq (3) and the Spatial Durbin Model in Eq (4), using the linear probability model (LPM), the L-GMM probit and the CF approach, with the geographical matrix and the geo-political matrix. The L-GMM and CF estimators are performed using W^2X_{jt} as instruments as well as using $(W^2X_{jt}, WZ_{i,t})$.[18]

V. Results

Tables (1) and (2) respectively report the estimations for the Spatial Lag Model in Eq. (3) and the Spatial Durbin Model in Eq. (4), using the linear probability model (LPM), the L-GMM probit and the CF approach, with the geographical matrix and the geo-political matrix. The L-GMM and CF estimators are performed using W^2X_{jt} as instruments as well as using $(W^2X_{jt}, WZ_{i,t})$.

The estimation results show that the spatial dependence parameter (ρ) is always highly significant and positive in all the columns in the Tables (6) and (7). This parameter indicates the influence of neighboring municipalities' cooperation decisions on the cooperation choice of municipalities. We provide evidence that cooperation decision-making is is largely dependent on the decision of neighbours, independently of estimation strategy and of definition of spatial matrix.

First, the territorial contiguity constraint, imposes that to cooperate two municipalities must share a border. Obviously, a municipality is more likely to cooperate if it is surrounded

[18]For reasons of space, Table 5 and 6 report only estimations of the ρ parameter. The estimations for the full models are reported in Appendix E.

Table 1 : Spatial Lag Estimation

Lag Model						
	Geo Matrix with cut-off Q1=59km			**Geo-Political Matrix with cut-off Q1=59km**		
	Instruments: W^2X			*Instruments:* W^2X		
	LPM	L-GMM	CF	LPM	L-GMM	CF
ρ	0.976***	0.874***	0.665***	0.925***	0.947***	0.648***
$\hat{\nu}$			0.865***			0.335***
	Instruments: $(W^2X, WZ_{i,t})$			*Instruments:* $(W^2X, WZ_{i,t})$		
	LPM	L-GMM	CF	LPM	L-GMM	CF
ρ	0.976***	0.934***	0.678***	0.925***	0.947***	0.577***
$\hat{\nu}$			0.922***			0.640***

Table 2 : Spatial Durbin Estimation

Durbin Model						
	Geo Matrix with cut-off Q1=59km			**Geo-Political Matrix with cut-off Q1=59km**		
	Instruments: W^2X			*Instruments:* W^2X		
	LPM	L-GMM	CF	LPM	L-GMM	CF
ρ	0.974***	1.075***	0.752***	0.922***	0.703***	0.569***
$\hat{\nu}$			0.810***			0.418***
	Instruments: $(W^2X, WZ_{i,t})$			*Instruments:* $(W^2X, WZ_{i,t})$		
	LPM	L-GMM	CF	LPM	L-GMM	CF
ρ	0.974***	1.100***	0.738***	0.921***	0.756***	0.474***
$\hat{\nu}$			0.880***			0.773***

by cooperating municipalities. We can expect also that information related to cooperation (expected revenues, expected state grant, etc.) will be more easily obtained by an independent municipality that is located next to a group of cooperating municipalities. This is on line with the literature on yardstick competition (Besley and Case, 1995) and tax competition (Brueckner, 2003). An incumbent may try to avoid stigmatisation and non-reelection by mimicking the cooperation (or isolation) decision of neighbors. The tax competition explanation of this result is that local governments are likely to avoid capital flight from their territories by cooperating in a close community, which provides a new range of public services to firms and households.

For both the lag and the Durbin models, LPM and L-GMM estimates of the spatial coefficient are very high and close to the upper bound 1.[19] In particular, when the purely geographical matrix is used, the LPM estimates are about 0.98 for both the lag and Durbin models, while the L-GMM estimates rang from 0.87 in the lag model when only W^2X is used as an instrument to 1.1 in the Durbin model when both $(W^2X_{jt}, WZ_{i,t})$ are used as instruments. This suggests that neither the linear (LPM) nor the linerised (L-GMM) models are appropriate for modeling discrete choice variables. This is in line with the results in Klier and McMillen (2008) which show that their L-GMM procedure tends to overestimate the spatial coefficient when spatial correlation is very high. The estimates derived from the naive CF are always lower (0.75 in the Durbin model with only W^2X used as an instrument, to 0.68 in the lag model when both $(W^2X_{jt}, WZ_{i,t})$ are used as instruments), suggesting the CF approach is more appropriate for modeling discrete choice variables.

This holds also for the geo-political matrix. In particular, all the estimates of the ρ parameter are lower, with the exception of those derived by the L-GMM estimates of the lag model. Therefore, when geographical and political proximity are considered simultaneously, the influence of neighbours' decisions on the choice to join an inter-municipal community is lower. However, even in this case the CF seems to perform better in estimations of the spatial parameter.

When both $(W^2X_{jt}, WZ_{i,t})$ are used as instruments the CF estimates of the spatial parameters are mostly lower, the exception being the lag model with the pure geographical matrix. This result is in line with those in Lyytikainen (2012), which show, in the case of the linear spatial model, that employing IV methods associated with careful choice of IV can result in

[19] Given that the spatial weigh matrix considered in the estimation is row-standardised, estimates of ρ should lie in the interval (-1,1).

more reliable estimates of the spatial interaction term.

Since the geo-political matrix combines both criteria (distance and political proximity) at the same time, we need to disentangle the effect of political proximity weighted by distance from "pure" geographic closeness on the probability to cooperate. The naive CF approach allows us to address this question by including both matrices in the same specification and considering the two spatially lagged values of the dependent variable (one derived from the geographical matrix and the other from the geo-political matrix) as two different endogenous variables. The model to be estimated therefore is given by:

$$C_{i,t} = \phi(\rho_1 \sum_{j=1}^{N} w_{i,j} C_{j,t} + \rho_2 \sum_{j=1}^{N} w_{i,j}^{geoPol} C_{j,t} + \beta X_{i,t}^{'} + \eta_i + e_{i,t} + \hat{\nu}_{1i,t} + \hat{\nu}_{2i,t}); \quad (6)$$

where $w_{i,j}$ and $w_{i,j}^{geoPol}$ are the spatial weights of the pure geographical matrix and geo-political matrix respectively, ρ_1 and ρ_2 are the associated spatial parameters and $\hat{\nu}_1$ and $\hat{\nu}_2$ are the residuals of the two first-step regressions of $\sum_{j=1}^{N} w_{i,j} C_{j,t}$ and $\sum_{j=1}^{N} w_{i,j}^{geoPol} C_{j,t}$ respectively.

Table 3: CF Estimation with two different spatial matrices

	Lag Model	***Durbin Model***
	Instruments: W^2X	
	CF	CF
ρ_1	0.643***	0.643***
$\hat{\nu}_1$	0.806***	0.779***
ρ_2	-0.063	-0.243
$\hat{\nu}_2$	0.143	0.370
	Instruments: $(W^2X, WZ_{i,t})$	
	CF	CF
ρ_1	0.595***	0.627***
$\hat{\nu}_1$	0.891***	0.876***
ρ_2	0.074	0.107
$\hat{\nu}_2$	0.034	0.001

The estimation results of Eq.(6) are reported in Table(3). Interestingly, we find that the spatial parameter associated with the pure geographical matrix remains significant and positive while the spatial coefficient associated with the geo-political matrix is no longer significant. This suggests that political proximity does not increase the probability of cooperation. In other words, the estimates seem to suggest that the only effect at work is an imitation effect of geographic neighbors decisions but that imitation effect does not apply to political belief.

Unlike Sorensen (2006), Moisio (2012), Saarima and Tukianien (2010), French data do not support the influence of politics in the coalition decisions. We do not find a higher probability of cooperation if municipalities share the same political leaning. In the French institutional context only "geographic" neighborhood seem to matter. As expected, this may be due to the specific type of cooperation implemented in France. Functional cooperation differs from mergers since municipalities continue to exist as entities after joining an inter-municipal body and mayors remain in post after joining an inter-municipal jurisdiction. Local mayors retain some bargaining power within the community and some strategic competences within their municipal territories (i.e. responsability for local urban services, buildings, nurseries, primary schools, sports facilities). In the case of merger, local officials disappear after creation of the community. The political transactions costs identified by Sorensen (2006) for Norway therefore are more powerful in mergers due to the expected changes to party strengths after unification.

The coefficient of fiscal revenues per capita (at time t-1) is negative although not significant, in all the specifications. As expected, a high level of fiscal revenues at time t-1 reduces the probability of joining a community whereas a financial poor locality may have stronger incentives to set an agreement with neighboring localities. The obvious financial gains from cooperation (through the extra state grant) and the provision of extra public goods are counterbalanced by each cooperating municipality losing some fiscal autonomy through devolution of competences and tax revenues to the community. The lagged covariate that gives the impact of the neighbours' fiscal revenues on the decision to cooperate shows, that the municipal fiscal revenues (at time t-1) of the neighboring municipalities may be relevant to the cooperation decision. When the lagged covariate is significant, its coefficient is negative suggesting that, being surrounded by rich municipalities does not encourage cooperation among local governments. Both results are in line with Sorensen (2006), which shows that for Norway high-revenue municipalities prefer not to merge with poorer neighbors.

In relation to the remaining economic and socio-demographic determinants of cooperation, once we control for the cooperation decisions of neighborhood using the control function approach, we find that most economic and socio-demographic characteristics of the municipalities exhibit the expected sign (positive for density and negative for elderly people) but lose their significance.

VI. Concluding remarks

This paper explored empirically the determinants of cooperation decision-making by French municipalities, an interesting setting that involves municipalities decide to join an upper tier of government for the joint provision of some public goods. This decision does not remove power from the local governments and local mayors who retain responsibility for certain services. We tested the possibility that standard spatial econometric techniques might overestimate the extent of mimicking behaviors in the non linear case.

To disentangle the political, economic and socio-demographic determinants, we use a unique panel data of 1,056 municipalities within a French region (Brittany). We employed a naive control function approach to develop a binary discrete choice model with spatial interaction. We exploited the statutory national tax limit as an exclusion restriction to estimate the decision to cooperate in response to neighbors' decisions; we use this instrument to increase the relevance of our set of instruments in order to avoid weak instrument issues. The estimation results provide evidence that the choice to join an inter-municipal community is largely dependent on the decision of geographic neighbors, independent of the estimation strategy. We find also that French data do not support the influence of politics in the coalition decisions. Comparison among different specifications and especially standard spatial econometrics models (SAR and Durbin) shows that the coefficient of the spatially weighted average decision to cooperate is over estimated by these more traditional models, which is in line with the recent applied spatial economics literature (e.g. Lyytikainen, 2012) but are derived for the first time in a discrete choice model setting. Further reseach should be done to enhance our understanding of the determinants of fiscal cooperation, such as the bargaining power that a municipality may have within the intermunicipal community.

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VII. Appendix

A - Local business tax

When considering the main local tax rate (local business tax rate LBT or taxe professionnelle), we face three possible cases :

1) When the municipality does not belong to any intermunicipal group, the municipality sets the LBT rate, the intermunicipal tax rate is zero.

2) When the municipality belongs to an intermunicipal group with additional taxation, the municipality set a LBT tax rate and the intermunicipal group sets an additional tax rates (ATR) on the same tax base.

3) When the municipality belongs to an intermunicipal group with single business tax or *taxe professionnelle unique*, the municipal business tax rate is zero. The intermunicipal group sets the local business tax rate, which applies to all municipalities within the group.

Tax limitations are computed by state services every year and are communicated to all local governments at the end of year t-1 before they set their tax rates for year t. These rules depend on the tax regimes of each municipality in both years (year t-1 and year t).

Business tax rate in year t can not exceed 2 times the average business tax rates set by all French municipalities in year t-1.

These average tax rates are calculated as the ratio (R) between:

- the whole tax revenues of the localities and the intercommunal groups for the LBT
- and the sum of the tax bases of LBT.

This rule depends on the fiscal regimes in year t and year t-1(See Table 3').

Table 3': Fiscal regime

	Fiscal regime of municipality i in year t		
Fiscal regime of municipality i in year t-1	Additional tax	Single business tax	Isolated
Additional tax	R-ATR	R+ATR	R
Single business tax	R	R	R
Isolated	R	R	R

B - Descriptive Statistics

Table 4 : Descriptive Statistics

	Density_t1	Elderly_t1	Revenues_pc_t1	Wdensity_t1	WElderly_t1	WRevenues_pc_t1
min	8.77	0.06	0.06	87.19	0.18	0.18
max	35281.29	0.53	7.01	4784.50	0.30	0.40
median	306.56	0.25	0.21	762.36	0.25	0.25
mean	753.59	0.25	0.25	752.25	0.25	0.25
std.dev	1928.14	0.08	0.21	491.14	0.03	0.03

Table 5 : Correlation Matrix

	Density_t1	Elderly_t1	Revenues_pc_t1	Wdensity_t1	WElderly_t1	WRevenues_pc_t1
Density_t1	1	0.03	0.21	0.34	-0.05	0.09
Elderly_t1	0.03	1	0.02	-0.08	0.55	0.03
Revenues_pc_t1	0.21	0.02	1	0.05	0.03	0.24
Wdensity_t1	0.34	-0.08	0.05	1	-0.06	-0.05
WElderly_t1	-0.05	0.55	0.03	-0.06	1	0.28
WRevenues_pc_t1	0.09	0.03	0.24	-0.05	0.28	1

C - Spatial Weight Matrices

The spatial weights matrix W used in the analysis is a row-standardised matrix based on the inverse of the great circle distance between the centroids of two municipalities i and j (denoted by d_{ij}), taking as the maximum distance to have not zero weight the first quantile of the distance distribution (denoted by d_{Q1}), equal to 59 kilometres in our sample of Brittany's municipalities. In particular, for any couple of municipalities i and j, the value of the element $w_{i,j}$ of W is given by:

$$w_{i,j} = w^*_{i,j} / \sum_j w^*_{i,j}$$

$$w^*_{i,j} = \begin{cases} 0 & \text{if } i = j \\ d_{ij}^{-1} & \text{if } d_{ij} \leq d_{Q1} \\ 0 & \text{if } d_{ij} > d_{Q1}. \end{cases} \tag{7}$$

The geo-political matrix is instead built as follows:

1. For each municipality i we construct a political colour variable PC_i as:

$$PC_i = \begin{cases} 0.5 & \text{if municipality } i \text{ voted for a right-wing candidate} \\ -0.5 & \text{if municipality } i \text{ voted for a left-wing candidate.} \end{cases}$$

2. Then we built a political matrix P_{ij} such that:

$$P_{ij} = \begin{cases} 1 & \text{if } PC_i = PC_j \\ 0 & \text{otherwise.} \end{cases}$$

3. Finally, we interact the political matrix P with the distance-based matrix with cut-off W. In particular, for any couple of municipalities i and j, the value of the element $w_{i,j}^{geoPol}$ of the geo-political matrix is given by:

$$w_{i,j}^{geoPol} = w_{i,j}^{geoPol*} / \sum_j w_{i,j}^{geoPol*}$$

$$w_{i,j}^{geoPol*} = \begin{cases} d_{ij}^{-1} & \text{if } i \neq j,\ PC_i = PC_j \text{ and } d_{ij} \leq d_{Q1} \\ 0 & \text{otherwise.} \end{cases} \tag{8}$$

D - Bootstrap procedure

Because of the two-step regression in the CF approach, the standard errors in the second stage must be adjusted for the first-sage estimation. Following Paapke and Wooldridge (2008) we use the following bootstrap procedure.

Given the observed sample of observations $Z = \left(C_{i,t}, X'_{i,t}, \sum_{j=1}^N w_{i,j}C_{i,j}, \sum_{j=1}^N w_{i,j}X'_{i,j}\right)$ for $i = 1, ..., N$ and $t = 1, ..., T$, the bootstrap procedure consists of five steps.

1. Generate B independent bootstrap samples $Z^1, ..., Z^B$ in two steps:

   (a) draw with replacement N integers from the cross-sectional units (i.e. the municipalities) $i = 1, ..., N$;

   (b) construct the bootstrap sample taking for each bootstrapped municipality all its observations in time and its spatially lagged variables, that is *keeping both temporal and spatial structures intact.*

2. Estimate the model for each $Z^1, ..., Z^B$ and take the estimated parameters of the second stage regression.

3. Compute for each bootstrap sample, $b = 1, ..., B$, and for each explanatory variable, $k = 1, ..., K$, the average partial effect APE_k^b.

4. Compute the the two-side p-value:

$$P_k^B = 2 \times \min\left(\sum_{b=1}^{B}\{APE_k^b \leq 0\}, \sum_{b=1}^{B}\{APE_k^b > 0\}\right)/B. \tag{9}$$

In our estimates we set $B = 300$.

E - Regression Results

Table 6 : Geo Matrix with cut-off Q1=59km.

	LPM		L-GMM Instruments: W^2X		L-GMM Instruments: $(W^2X, WZ_{i,t})$	
	Lag model	Durbin model	Lag model	Durbin model	Lag model	Durbin model
Intercept			0.176	1.944***	0.102	1.819***
			(0.252)	(0.371)	(0.252)	(0.372)
ρ	0.976***	0.974***	0.874***	1.074***	0.934	1.099***
	(-0.008)	(0.008)	(0.219)	(0.096)	(0.219)	(0.096)
Density_t1	4.967e-06**	0.000*	0.000	0.000	0.000	0.000
	(2.784e-06)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Elderly_t1	0.217	0.101	5.773***	-3,308	5.675**	-3.39
	(0.278)	(0.295)	(2.036)	(2.206)	(2.041)	(2.209)
Revenues_pc_t1	0.041	0.064	-0.354	-0.205	-0.344	-0.208
	(0.046)	(0.047)	(0.350)	(0.320)	0.3478	(0.322)
mDensity_t1			0.000*	0.000	0.000*	0.000
			(0.000)	(0.000)	(0.000)	(0.000)
mElderly_t1			-7.736***	1.967	-7.603***	2.045
			(2.041)	(2.207)	(2.046)	(2.211)
mRevenues_pc_t1			-0.029	-0.106	-0.04	-0.102
			(0.360)	(0.326)	(0.359)	(0.327)
Wdensity_t1		0.000**		0.000***		4.4e-4***
		(0.000)		(0.000)		(1.3e-4)
WElderly_t1		3.806***		108.874***		108.146
		(1.382)		(10.024)		(10.778)
WRevenues_pc_t1		-0.622**		-13.769***		-13.473***
		(0.266)		(1.819)		(1.821)
mWdensity_t1				-1.90E-04		-1.90E-04
				(1.6e-04)		(1.6e-4)
mWElderly_t1				-108.421***		-107.475***
				(10.106)		-10,115
mWRevenues_pc_t1				5.039**		4.920**
				(2.053)		(2.393)
year.f2			0.301***	0.227***	0.300	0.223***
			(0.054)	(0.067)	(0.054)	(0.060)
year.f3			0.348***	0.138*	0.348	0.135*
			(0.054)	(0.074)	(0.054)	(0.074)
year.f4			0.393***	0.064	0.393	0.060
			(0.055)	(0.093)	(0.055)	(0.093)
year.f5			0.507***	0.364***	0.509	0,365***
			(0.057)	(0.117)	(0.057)	(0.117)
year.f6			0.703***	0.516***	0.705	0.513***
			(0.057)	(0.117)	(0.057)	(0.117)
year.f7			0.801***	0.608***	0.801	0.599***
			(0.059)	(0.123)	(0.059)	(0.123)
N. of municipalities	7392					

Notes: (i) In LPM and L-GMM coefficients are reported.
(ii) Standard errors in parenthesis.
(iii) Significance levels: ***1%, ** 5% , *10%.
(iv) Dependent variable: $C_{i,t}$
(v) All covariates are lagged by one period to avoid endogeneity problems.
(vi) mDensity_t1, mElderly_t1, mRevenues_pc_t1, mWdensity_t1, mWElderly_t1 and mWRevenues_pc_t1 are the Mundlack variables.

Table 7 : Geo Matrix with cut-off Q1=59km.

	CF Instruments: W^2X		CF Instruments: $(W^2X, WZ_{i,t})$	
	Lag model	Durbin model	Lag model	Durbin model
Intercept	-0.245***	-0.388	-0.256***	-0.34
	(0.069)	(0.278)	(0.061)	(0.253)
ρ	0.664***	0.751***	0.677***	0.738***
	(0.078)	(0.135)	(0.070)	(0.131)
$\hat{\nu}$	0.865***	0.809***	0.922***	0.879***
	(0.114)	(0.135)	(0.105)	(0.179)
Density_t1	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Elderly_t1	-0.849	-0.317	-0.929	-0.325
	(0.641)	(0.644)	(0.609)	(0.590)
Revenues_pc_t1	-0.067	-0.044	-0.07	-0.045
	(0.060)	(0.700)	(0.0721)	(0.067)
mDensity_t1	0.1e-04*	0.1e-04	0.1e-04**	0.1e-04**
	(0.000)	(0.1e-04)	(0.1e-04)	(0.1e-04)
mElderly_t1	0.487	0.051	0.585	0.071
	(0.637)	(0.647)	(0.601)	(0.586)
mRevenues_pc_t1 p.c	0.008	-0.016	0.008	-0.015
	(0.075)	(0.096)	(0.086)	(0.098)
WDensity_t1		0.000		0.1e-04
		(0.2e-04)		(0.2e-04)
WElderly_t1		-5.293		-5.653
		(4.614)		(4.764)
WRevenues_pc_t1		-0.711		-0.671
		(0.752)		(0.760)
mWDensity_t1		0.1e-04		0.2e-04
		(0.7e-04)		(0.7e-04)
mWElderly_t1		5.087		5.392
		(4.740)		(4.793)
mWRevenues_pc_t1		0.938		0.780
		(1.035)		(0.980)
year.f2	-0.014	-0.01	-0.017*	-0.011
	(0.011)	(0.013)	(0.009)	(0.012)
year.f3	-0.022*	-0.006	-0,026***	-0.006
	(0.12)	(0.015)	(0.011)	(0.015)
year.f4	-0.211	0.007	-0.023*	0.009
	(0.014)	(0.018)	(0.012)	(0.019)
year.f5	-1.70E-04	0.038	-0.004	0.041*
	(0.017)	(0.025)	(0.016)	(0.025)
year.f6	0.010	0.059*	0.005	0.062**
	(0.022)	(0.030)	(0.214)	(0.032)
year.f7	0.045*	0.108**	0.041	0.114***
	(0.027)	(0.036)	(0.026)	(0.040)
N. of municipalities	7392			

Notes: (i) In CF average partial effect are reported.
(ii) Bootstrap standard errors in parenthesis.
(iii) Significance levels: ***1%, ** 5% , *10%.
(iv) Dependent variable: $C_{i,t}$
(v) All covariates are lagged by one period to avoid endogeneity problems.
(vi) mDensity_t1, mElderly_t1, mRevenues_pc_t1, mWdensity_t1, mWElderly_t1 and mWRevenues_pc_t1 are the Mundlack variables.

Table 8 : Geo-Political Matrix with cut-off Q1=59km.

	LPM		L-GMM Instruments: W^2X		L-GMM Instruments: $(W^2X, WZ_{i,t})$	
	Lag model	Durbin model	Lag model	Durbin model	Lag model	Durbin model
Intercept			0.113	2.851***	0.095	2.608***
			(0.238)	(0.301)	(0.238)	(2.608)
ρ	0.925***	0.921***	0.947***	0.703***	0.947***	0.756***
	(0.014)	(0.015)	(0.206)	(0.104)	(0.207)	(0.104)
Density_t1	5.42e-06**	5.07e-06**	0.3e-04	0.3e-04	0.3e-04	0.3e-04
	(0.213e-05)	(2.18e-06)	(0.2e-04)	(0.2e-04)	(0.2e-04)	(0.2e-04)
Elderly_t1	0.308	0.180	5.007	-2.428	5.155**	-2.518
	(0.279)	(0.294)	(2.024)	(2.143)	(2.035)	(2.152)
Revenues_pc_t1	0.028	0.039	-0.373	-0.363	-0.343	-0.371
	(0.046)	(0.047)	(0.354)	(0.337)	(0.350)	(0.341)
mDensity_t1			0.3e-04	0.3e-04	0.3e-04*	0.4e-4
			(0.2e-04)	(0.2e-04)	(0.2e-04)	(0.2e-04)
mElderly_t1			-6.999	1.034	-7.105***	1.113
			(2.02979)	(2.145)	(2.040)	(2.153)
mRevenues_pc_t1			-0.013***	0.001	-0.039	0.012
			(0.363)	(0.342)	(0.360)	(0.344)
WDensity_t1		1.89e-05		1.6e-04***		0.17e-03***
		(1.53e-05)		(0.5e-04)		(0.05e-03)
WElderly_t1		2.576**		99.604***		99.439***
		(1.216)		(5.668)		(5.6888)
WRevenues_pc_t1		-0.329		-5.178***		-4.994***
		(0.232)		(0.548)		(0.550) *
mWDensity_t1				-2.20E-04		-2.30E-04
				(0.9e-04)		(0.9e-04)
mWElderly_t1				-102.588***		-101.878***
				5.74233		(5.760)
mWDensity_t1						
year.f2			0.304***		0.302***	
			(0.054)		(0.054)	
year.f3			0.354***		0.353***	
			(0.054)		(0.054)	
year.f4			0.4***		0.397***	
			(0.055)		(0.055)	
year.f5			0.520***		0.513***	
			(0.056)		(0.057)	
year.f6			0.719***		0.715***	
			(0.057)		(0.057)	
year.f7			0.828***		0.812***	
			(0.059)		(0.059)	
N. of municipalities	7392					

Notes: (i) In LPM and L-GMM coefficients are reported.
(ii) Standard errors in parenthesis.
(iii) Significance levels: ***1%, ** 5% , *10%.
(iv) Dependent variable: $C_{i,t}$
(v) All covariates are lagged by one period to avoid endogeneity problems.
(vi) mDensity_t1, mElderly_t1, mRevenues_pc_t1, mWdensity_t1, mWElderly_t1 and mWRevenues_pc_t1 are the Mundlack variables.

Table 9 : Geo-Political Matrix with cut-off Q1=59km.

	CF Instruments: W^2X		CF Instruments: $(W^2X, WZ_{i,t})$	
	Lag model	Durbin model	Lag model	Durbin model
Intercept	-0.245***	-0.106	-0.188***	0.082
	(0.082)	(0.305)	(0.067)	(0.213)
ρ	0.647***	0.568***	0.577***	0.473***
	(0.098)	(0.205)	(0.083)	(0.120)
$\hat{\nu}$	0.335***	0.418**	0.639***	0.773***
	(0.112)	(0.203)	(0.116)	(0.150)
Density_t1	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Elderly_t1	-0.653	-0.32	-0.72	-0.425
	(0.615)	(0.609)	(0.647)	(0.660)
Revenues_pc_t1	-0.114**	-0.07	-0.116***	-0.072
	(0.079)	(0.068)	(0.068)	(0.065)
mDensity_t1	0.1e-04	0.1e-04	0.1e-04*	0.1e-04
	(0.1e-04)	(0.1e-04)	(0.1e-04)	(0.1e-04)
mElderly_t1	0.304	0.008	0.372	0.139
	(0.620)	(0.624)	(0.650)	(0.650)
mRevenues_pc_t1	0.051	0.009	0.046	0.008
	(0.088)	(0.087)	(0.070)	(0.093)
WDensity_t1		0.1e-04		0.1e-04
		(0.1e-04)		(0.1e-04)
WElderly_t1		0.101		0.976
		(4.772)		(3.756)
WRevenues_pc_t1		-1.394		-1.319**
		(0.570)		(0.585)
mWDensity_t1		-0.00001		0.000
		(0.4e-04)		(0.5e-04)
mWElderly_t1		-0.356		-1.441
		(5.077)		(3.917)
mWRevenues_pc_t1		1.141		0.801
		(0.686)		(0.683)
year.f2	-0.00231	0.015	(-1.47e-03)	0.015
	0.01216	(0.017)	(0.010)	(0.012)
year.f3	-0.00472	0.022	-3.65E-03	0.022
	0.01394	(0.018)	(0.012)	(0.013)
year.f4	-0.00202	0.036*	1.10e-03	0.036**
	0.01594	(0.019)	(0.013)	(0.017)
year.f5	0.01620	0.070**	0.022	0.068***
	0.02069	(0.025)	(0.016)	(0.024)
year.f6	0.02658	0.096**	0.036*	0.096***
	0.02643	(0.031)	(0.022)	(0.029)
year.f7	0.05346	0.138***	0.067***	0.141***
	0.03028	(0.036)	(0.027)	(0.035)
N. of municipalities	7392			

Notes: (i) In CF average partial effect are reported.
(ii) Bootstrap standard errors in parenthesis.
(iii) Significance levels: ***1%, ** 5% , *10%.
(iv) Dependent variable: $C_{i,t}$
(v) All covariates are lagged by one period to avoid endogeneity problems.
(vi) mDensity_t1, mElderly_t1, mRevenues_pc_t1, mWdensity_t1, mWElderly_t1 and mWRevenues_pc_t1 are the Mundlack variables.

Table 10 : Estimates with two different spatial matrices.

	CF Instruments: W^2X		CF Instruments: $(W^2X, WZ_{i,t})$	
	Lag model	Durbin model	Lag model	Durbin model
Intercept	-0,181**	0.198	-0.25***	-0.331
	(0.092)	(0.647)	(0.073)	(0.282)
ρ_1	0.642***	0.642***	0.594***	0.627***
	(0.193)	(0.185)	(0.160)	(0.195)
ρ_2	-0.063	-0.242	0.074	0.106
	(0.236)	(0.373)	(0.165)	(0.187)
$\hat{\nu_1}$	0.806***	0.779***	0.891***	0.876***
	(0.146)	(0.180)	(0.167)	(0.221)
$\hat{\nu_2}$	0.143	0.369	0.034	0.9e-03
	(0.176)	(0.374)	(0.160)	(0.208)
Density_t1	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Elderly_t1	-0.763	-0.439	-0.925	-0.321
	(0.657)	(0.672)	(0.637)	(0.638)
Revenues_pc_t1	-0.072	-0,031	-0.073	-0.047
	(0.071)	(0.074)	(0.070)	(0.070)
mDensity_t1	0.1e-04**	0.1e-04*	0.1e-04**	0.000*
	(0.1e-04)	(0.1e-04)	(0.1e-04)	(0.000)
mElderly_t1	0.387	0.140	0.582	0.072
	(0.659)	(0.684)	(0.645)	(0.625)
mRevenues_pc_t1	0.011	-0,024	0.011	-0.013
	(0.086)	(0.095)	(0.083)	(0.100)
W^{geo}Density_t1		0.2e-04		0.000
		(0.3e-04)		(0.000)
W^{geo}Elderly_t1		3.567		-5.567
		(9.693)		(4.953)
W^{geo}Revenues_pc_t1		-1.413		-0.682
		(1.044)		(0.756)
mW^{geo}Density_t1		0.3e-04		0.000
		(0.7e-04)		(0.1e-03)
mW^{geo}Elderly_t1		-4.027		5.289
		(9.984)		(5.083)
mW^{geo}Revenues_pc_t1		0.597		0.775
		(1.110)		(1.014)
year.f2	-0.005	0.013	-0,017	-0,011
	(0.013)	(0.026)	(0.010)	(0.012)
year.f3	-0.012	0.012	-0.02525*	-0.006
	(0.015)	(0.023)	(0.012)	(0.015)
year.f4	-0.009	0.020	-0.022	0.0100
	(0.017)	(0.022)	(0.013)	(0.0190)
year.f5	0.014	0.059**	-0,003	0.0419
	(0.022)	(0.032)	(0.017)	(0.0246)
year.f6	0.030	0.085**	0,007	0.0629*
	(0.029)	(0.040)	(0.022)	(0.0314)
year.f7	0.068*	0.134***	0.044	0.1145***
	(0.068)	(0.045)	(0.026)	(0.0387)
N. of municipalities	7392			

Notes: (i) In CF average partial effect are reported.
(ii) Bootstrap standard errors in parenthesis.
(iii) Significance levels: ***1%, ** 5% , *10%.
(iv) Dependent variable: $C_{i,t}$
(v) All covariates are lagged by one period to avoid endogeneity problems.
(vi) mDensity_t1, mElderly_t1, mRevenues_pc_t1, mWdensity_t1, mWElderly_t1 and mWRevenues_pc_t1 are the Mundlack variables.