

---

# “Factors Explaining Inter-municipal Cooperation in Service Delivery: A Meta-Regression Analysis”

Germà Bel and Mildred E. Warner

---



Institut de Recerca en Economia Aplicada Regional i Pública  
*Research Institute of Applied Economics*

**Universitat de Barcelona**

Av. Diagonal, 690 • 08034 Barcelona

---

WEBSITE: [www.ub.edu/irea/](http://www.ub.edu/irea/) • CONTACT: [irea@ub.edu](mailto:irea@ub.edu)

---

The Research Institute of Applied Economics (IREA) in Barcelona was founded in 2005, as a research institute in applied economics. Three consolidated research groups make up the institute: AQR, RISK and GiM, and a large number of members are involved in the Institute. IREA focuses on four priority lines of investigation: (i) the quantitative study of regional and urban economic activity and analysis of regional and local economic policies, (ii) study of public economic activity in markets, particularly in the fields of empirical evaluation of privatization, the regulation and competition in the markets of public services using state of industrial economy, (iii) risk analysis in finance and insurance, and (iv) the development of micro and macro econometrics applied for the analysis of economic activity, particularly for quantitative evaluation of public policies.

IREA Working Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. For that reason, IREA Working Papers may not be reproduced or distributed without the written consent of the author. A revised version may be available directly from the author.

Any opinions expressed here are those of the author(s) and not those of IREA. Research published in this series may include views on policy, but the institute itself takes no institutional policy positions.

## *Abstract*

---

Inter-municipal cooperation is an important public service delivery reform, whose drivers move beyond simple concerns with costs and economic efficiency, to policy issues related to governance structure and spatial context. We conduct a meta-regression analysis based on the existing multivariate empirical literature to explore what factors explain divergence in results in the existing empirical studies. We find strong evidence that fiscal constraints, spatial, and organizational factors are significant drivers of cooperation. Our meta regressions do not yield results to explain divergence in results on community wealth, economies of scale or racial homogeneity. More studies on these factors are needed to understand how these factors might affect cooperation. Future theoretical and empirical research should give more attention to spatial and organizational factors to develop a better understanding of factors driving cooperation and how they differ across local government structures and regions.

*JEL classification:* H70, H77, R51

*Keywords:* Intermunicipal Cooperation, Local government, Intergovernmental Relations, Meta-regression analysis

Germà Bel: Department of Economic Policy & GiM-IREA, Universitat de Barcelona (Barcelona, Spain) ([gbel@ub.edu](mailto:gbel@ub.edu)).

Mildred E. Warner: Department of City and Regional Planning, Cornell University (Ithaca, New York) ([mew15@cornell.edu](mailto:mew15@cornell.edu))

## *Acknowledgements*

---

This work was supported by the Spanish Government under the project ECO2012-38004; the Catalan Government under project SGR2014-325, and the ICREA-Academia program of the Catalan Government. US Government support was provided by Hatch grant program administered by the Cornell Agricultural Experiment Station and by Agricultural and Food Research Initiative Competitive Program of the USDA National Institute of Food and Agriculture (NIFA), grant number 2011-68006-30793.

# **Factors Explaining Inter-municipal Cooperation in Service Delivery: A Meta-Regression Analysis**

## **1. Introduction**

In the field of local government service delivery reform, most policy attention has been focused on contracting to the private sector (Boyne 1998; Hodge 2000). But another, equally important reform strategy, especially in the US, inter-municipal cooperation, has begun to garner more research attention as it has grown in importance (Hefetz, Warner and Vigoda-Gadot 2012). Inter-municipal cooperation involves contracts or joint production with other local governments as a means to gain economies of scale, improve service quality, and promote regional service coordination across fragmented local government regions (Agranoff and McGuire 2003). Cooperation tends to be voluntary in the US (Holzer and Fry 2011; Feiock 2007) and more formal and structural (involving more regulation) in Europe (Lago-Peñas and Martínez-Vázquez 2013; Hulst and van Montfort 2007). It is typically found to be a more politically viable alternative than amalgamation (Feiock and Scholz 2010) and for this reason is an important alternative of interest to policymakers of local government reform.

As the literature on cooperation has grown, one distinguishing feature is the broader set of factors that appear to drive or inhibit cooperation as compared to privatization. Theory and empirical evidence on local government contracting to the private sector has primarily focused on service delivery characteristics related to cost savings and transaction costs (Brown and Potoski 2003; Bel and Fageda 2008; Levin and Tadelis 2010; Hefetz and Warner 2012; Wassenaar, Groot and Gradus 2013; Gradus, Dijkgraaf and Wassenaar 2014). But empirical and theoretical evidence on inter-municipal contracting gives more attention to factors related to the local government organization (structure, management, spatial factors) (Bel, Fageda and Warner 2010; Zafra et al 2013,

Hefetz et al 2012, Tavares and Camoes 2007). Comparative studies of the US and Europe have noted that while European studies are more focused on cost savings, US studies are more concerned with government organization factors, in part because the structure of responsibilities and finance in the US creates more diversity in service competencies making cooperation both more needed and more difficult (Bel and Warner 2015).

Although shared services delivery is a widespread phenomenon, no meta-regression analysis of the literature has been conducted. By contrast, systematic evidence is available on other reforms, such as privatization, where meta-regression analyses have been published on the factors explaining privatization (Bel and Fageda 2009), and on the relationship between privatization and costs (Bel, Fageda and Warner 2010). Our current analysis bears some similarity to Bel and Fageda (2009), because we also deal with factors explaining decisions related to government reform; here, cooperation instead of privatization. We do not attempt to deal with the issue of cooperation and costs as too few empirical studies exist in the literature (see Bel and Warner 2015 for a list).

A large enough number of empirical analyses on the motivations for inter-municipal cooperation are now available. Thus, our paper provides an extensive and in-depth analysis of the empirical evidence on the factors explaining inter-municipal cooperation. We conduct a meta-regression analysis based on the existing empirical literature to permit a systematic analysis of the similarities and differences in the results of empirical studies of motivations for inter-municipal cooperation and the implications for public management.

## **2. Theoretical background**

To set up our meta-regression analysis we first outline the major theoretical components of interest. These can be grouped into two major categories: cost and fiscal factors, and organizational and governance characteristics. These two broad categories have been seen as key categories in the theoretical and empirical literature on service delivery reform. Because of this, we believe they may

be especially important for policy on inter-municipal cooperation, and our meta-regression analysis of the available empirical literature can shed light on the relative importance of these factors.

## **Cost and Fiscal Factors**

### ***Cost structure: scale and density***

One of the challenges facing local governments is that size and fragmentation make it difficult to capture the benefits of economies of scale, or the need for coordination across the metropolitan region. While the economy has moved to primarily a city-regional scale (Lobao, Martin and Rodriguez Pose 2014), local government organization reflects the historical development of the region and may result in sub-optimal jurisdiction size. This is especially a concern in Southern Europe and in the US where there is a long tradition of many small municipalities (Lago-Peñas and Martinez-Vazquez 2013; Holzer and Fry 2011). The literature on local government has paid attention to the optimal size for service provision (Olson 1969; Mirrlees 1972; Oates 1972). Volume of service, size of population, and dispersion of population are the three dimensions on which the optimal geographic scale depends (Ladd 1992).

Olson (1969) argued for fiscal equivalence, that government boundaries should match the area enjoying the local public good. When municipal boundaries do not match the service area, some form of municipal cooperation is a natural alternative to achieve both economies of scale and fiscal equivalence. Amalgamation has been offered as one alternative to suboptimal size, but amalgamations are typically not voluntary and result from laws made at a higher jurisdictional level. While Reingewertz (2012) finds reduced expenditures resulted from amalgamation in Israel, most empirical papers on the topic find no evidence of positive impacts from consolidation either on costs/debt or on scale economies (i.e. Hinnerich 2009; Jordahl and Liang 2010; Allers and Geertsema 2014).

By contrast, Ostrom, Tiebout, and Warren (1961, p. 836) envisaged intermunicipal cooperation as an alternative to amalgamation when they suggested that small municipalities could make use of special arrangements to act jointly to provide services when the municipal boundary is suboptimal. Cooperation has proven more popular than amalgamation among local governments (Holzer and Fry 2011). Research across Europe and the US has found cooperation can be especially important in helping small municipalities reach economies of scale (Gradus et al, 2013; Zafra-Gomez et al 2013; Hefetz, Warner and Vigoda-Gadot 2012; Warner 2006; Mohr, Deller and Halstead 2010; Bel and Costas 2006; Bel, Fageda and Mur 2013).

The most common measure in the empirical literature for economies of scale is population, though studies also frequently include attention to community wealth and fiscal stress as drivers of cooperation. Sonenblum, Kirilin and Reis (1977) focus on scale issues and extra-local spillovers in service delivery arrangements. Most studies find cooperation to be negatively related to population as larger cities enjoy internal scale economies (Levin and Tadelis 2010; Hefetz, Warner and Vigoda-Gadot 2012; Bel, Fageda and Mur 2014).

### ***Fiscal factors***

Fiscal factors have been an important driver of local government reform in the last decades, particularly as local government fiscal stress has grown in the 2000s. Whereas privatization was seen as the primary reaction to these restrictions, cooperation is also a tool to create cost savings. In the US cooperation has increased since the Great Recession and is now more common than privatization (Homsy and Warner 2014). Governments generally cooperate when it is in their self-interest, and may tend to exclude governments with higher costs or lower fiscal capabilities from cooperative agreements (Lowery 2000). Because of this, wealthy communities may engage less frequently in cooperation (Warner and Hefetz 2002). However, wealthy communities can also be

desired partners for cooperative agreements, because of their ability to contribute to fund the service (Kown and Feiock 2010).

Fiscal constraints, related to debt and expenditure burden or limits on local revenue raising, can be differentiated from fiscal capacity related to community wealth. In recent years local governments have faced increased constraints due to austerity policy, and tax and expenditure limitations passed by higher levels of government (Clifton 2014). Understanding the limits of cooperation as a policy tool requires differentiating fiscal constraints from community capacity to understand their differential effects on cooperation as a tool of policy reform.

### **Institutional and Governance Structure**

Fragmented local government systems face the challenge of providing services efficiently and addressing problems of service spillovers and tax exporting. In the US many scholars argue that when regional governance is voluntary and lacks sanctioning authority or taxation power, the ability to promote cooperation is undermined -especially in services where there is heterogeneity in need and resources across the region (Frug 1999; Lowery 2000; Warner and Hefetz 2002). Key differences between Europe and the US make comparison across studies of cooperation especially important. US local governments are characterized by a higher level of fiscal autonomy and service responsibilities and lower levels of intergovernmental aid, while in continental Europe basic local services (solid waste, water, etc.) are compulsory for all municipalities, so service levels are more homogeneous (Lago Peña and Martinez 2013). These features facilitate cooperation in Europe and may explain why most European studies focus on cost savings. The US studies by contrast, focus more on the institutional challenges to cooperation, which result in part from differences in local government structure in the US (Bel and Warner 2015).

Cooperation requires attention to political institutions and the structure of policy networks, which places an important role on the structure of management and markets among local



governments in the region where cooperation takes place (Hefetz and Warner 2012). Cooperation is easier when there is homogeneity in interests, needs and resources, and institutional homogeneity in budget rules and service requirements (Feiock 2007). Other important factors that may facilitate cooperation are longer tenure and more professional management (Brown and Potoski 2003; Hefetz, Warner and Vigoda-Gadot 2015). Regional governance bodies also facilitate cooperation, as this gives time for reciprocal relationships to build both weak and strong ties across the network (Thurmaier and Wood 2004; Wood 2006; Bel, Fageda and Mur 2013).

Unlike New Public Management reforms that emphasize competition, cooperation is based on collaborative relations that extend across time and space. The possibility of joint production with neighboring municipalities is driven not only by concerns with economic efficiency, but also by factors which include regional coordination and improved effectiveness of service delivery and reduced contracting risk (Joassart-Marcelli and Musso 2005; Hefetz, Warner and Vigoda-Gadot 2012, Hefetz, Warner and Vigoda-Gadot 2015). Theory also addresses geographic considerations related to metropolitan location. Suburbs, as similar sized localities in the metropolitan region, offer the most attractive market for cooperation (Warner and Hefetz 2002; Joassart-Marcelli and Musso 2005; Hefetz et al 2012). Cooperation is also high in rural areas, which lack private market alternatives (Warner and Hefetz 2003; Warner 2006; Mohr et al 2010) and may use cooperation to gain market power (Bel, Fageda and Mur 2013; 2014). Feiock (2007, 2013) has outlined a theory of institutional collective action that builds from Ostrom's (1990) studies of polycentric local government where cooperation is based on trust, reciprocity and collective benefits across the metropolitan region.

### **Governance Costs of the Cooperative Agreements**

Inter-municipal cooperation may be subject to lower governance costs than privatization because cooperating governments share similar objectives (Brown 2008). Cooperation is based on a public market of cooperating governments, not a competitive market of for profit providers (Warner 2011).

Recent theoretical and empirical work emphasizes the importance of the public partner in creating more stable service delivery arrangements (Hefetz, Warner and Vigoda-Gadot 2014). However, Feiock (2007) has emphasized that transaction costs from cooperation involve substantial costs related to information, negotiation, and monitoring. Indeed Marvel and Marvel (2008) have found challenges with monitoring due to lower ability to sanction partners in voluntary inter-municipal cooperative agreements in the US. Sørensen (2007) has found similar problems with dispersed ownership in cooperative agreements in Norway.

Several studies (i.e. Levin and Tadelis 2010; Hefetz and Warner 2012) have shown that when service-related transaction costs are high, inter-municipal contracting is preferred to for profit contracting. Girth et al (2012) point to the opportunity costs of creating a market in for profit contracting, costs that are avoided in inter-municipal contracting. Professional management can help overcome these transaction cost challenges and council manager forms of government have been shown to have higher levels of cooperation (Hefetz et al 2012, 2015; Nelson and Svava 2011). However, differences in wealth, demographic makeup, and geographic location of participating communities may still produce problems creating a willing market of participating municipalities (Lowery 2000; Warner and Hefetz 2002; Warner 2006), and result in coordination problems after the cooperation is in place (Feiock 2007). Heterogeneity undermines local cooperation because it imposes higher transaction costs (Feiock 2007). In the US, racial homogeneity/ heterogeneity have been found to be potential drivers of transaction costs in the governance of the cooperation (Leroux and Carr 2007; Kown and Feiock 2010).

### **3. Empirical studies on inter-municipal cooperation: What do they tell us about drivers and obstacles?**

We have been able to find 49 articles (either published or forthcoming) and working papers including multivariate analysis of factors explaining cooperation, as table 1 shows. We reviewed both published

and unpublished papers from the fields of Economics, Public Policy, Public Administration, Political Science, Urban Studies, and Area Studies. The 10 unpublished papers included in our analysis were presented in international meetings specializing in public policy, and/or available in large working paper collections, such as Econlit, Social Science Research Network, Ageconsearch, Proquest, and Repec-Ideas. Furthermore, we searched for papers from data bases specialized in PhD Dissertations and Grey Reports such as OpenSIGLE, European Science Research Council (ESRC) and E Thesis Online Services (ETHOS) in Europe, and US GAO and The National Technical Information Service (NTIS) in the U.S. Papers selected for our analysis had to have homogenous measures of cooperation –e.g. a regression model with cooperation as the dependent variable.

To our knowledge, our database includes all published and unpublished papers that estimate factors explaining cooperation. In all, we have 38 journal articles, one book chapter, nine working papers and one poster presented at a Conference (where enough information was provided). The database was constructed by the authors. We used as key words for the search “intermunicipal cooperation”, “interlocal contracting”, and “joint contracting”. The search was completed on December 2014. Overall, we took into consideration the Meta-Analysis of Economics Research (MAER-net) reporting guidelines in Stanley et al (2013).

The 49 studies presented in table 1 include a total of 171 estimations where the dependent variable is a measure of the frequency of inter-municipal cooperation. Typically, the measure is (1) a dummy variable with one for cooperative delivery and 0 otherwise in single service studies; and (2) a percentage of the services each jurisdiction provides via cooperative delivery for multiservice studies. Interestingly, most studies (38) focus on the US, either the whole country or one/several states. Eleven papers study countries other than the US. Next we provide a review of the most frequently used variables in these studies.

**(Table 1 here)**

*Fiscal Constraints* have been operationalized by means of different variables, among which the most frequent are debt per capita, own revenues per capita, laws limiting debt, etc. Table 2 shows that 70% of the estimations in our database included variables related to fiscal constraints. Among these, more than half the estimations in our database have shown fiscal constraints to have a significant effect on cooperation.<sup>1</sup> As expected, a large majority of them find a positive effect of fiscal constraints. Results showing the opposite (a negative influence of fiscal constraints on cooperation) are relatively rare, around one third the number showing positive influence. Non-significant results are obtained in little more than half the estimations.

**(Table 2 here)**

*Community Wealth:* The diversity in theoretical expectations regarding community wealth is well reflected in the empirical results obtained. More than half of the available estimations considered community wealth as an explanatory variable for cooperation, usually specified as income per capita. No significant relationship was found in almost two thirds of the estimations. Much less frequent are estimations with significant results for community wealth, and they are almost evenly split between positive effect (20%) and negative effect (15%). Therefore, theoretical expectations on community wealth are divergent, and empirical results so far do not help to solve the question.

*Scale Economies:* Service and place characteristics are the most important drivers of economies of scale. Among these dimensions, size of population is the variable most frequently used in empirical studies analyzing factors explaining cooperation. This is explained by the fact that data on population is more readily available than data on volume of output when a single service is analyzed, and because population is the best indicator of volume of output when the analysis is of multi-service character. Around 70% of the estimations in our sample use number of inhabitants as an explanatory variable for cooperation. Half of these estimations do not find population to be

---

<sup>1</sup> We take significance as evaluated by the authors in each work.

significant. Among the estimations where this variable is significant, the most frequent result is that population has a negative and significant association with cooperation. Therefore, there exists some partial evidence that the frequency of cooperation decreases as population increases, as expected from theoretical views on economies of scale.

*Spatial Factors:* Inter-local cooperation frequently involves geographic proximity of the cooperating municipalities. Cities and suburbs in metropolitan regions represent a market of similar sized municipalities in close proximity. One third of the estimations in the database included variables related to cities and suburbs as drivers of cooperation, and more than half of these found the variable to be significant and positive, as shown in Table 2. Thus, results are largely consistent with theoretical expectations.

*Organizational Factors (Manager):* The council-manager form of city government is understood as more professional and less subject to political interference than the mayor-city model, and thus may serve as a driver for service delivery reform. More than one third of the available estimations analyze the relationship between council-manager form of government and frequency of collaborative agreements, of which half of the estimations find the manager variable to be significantly related to cooperation. Among these estimations where manager is significant, almost 80% find a positive association between manager and cooperation, consistent with theoretical expectations.

*Racial homogeneity/heterogeneity:* Little more than one third of the available estimations (58) and little more than one quarter of the studies (13) have included specifications of racial homogeneity/heterogeneity. More than half of the estimations find racial homogeneity/heterogeneity significant, and among these a large majority find a positive effect of homogeneity. Note, however, that the majority of estimations showing a positive (negative) association between homogeneity (heterogeneity) and cooperation come from Blaeschke (2014).

Also, two of these papers (Morgan, Hirlinger, and England 1988; Morgan and Hirlinger, 1991, together include eight estimations) specify the variable as a proxy for private interests and political factors (rather than transaction costs related factors). Therefore, there is divergence in what the variable measures.

*Service Level Transaction costs:* In spite of the important theoretical and conceptual work available on transaction costs, the empirical evidence is still quantitatively limited. Only 33 estimations have included variables reflecting transaction costs. However, among these estimations 42% find a positive and significant relationship (more service related-transaction costs are associated with more cooperation) and only seven find a negative relationship. Overall, and consistent with theoretical expectations, cooperation is typically found to be higher when services are more asset specific and other factors related to transaction costs are present.

Finally, we note that ‘political factors’, another type of variable usually considered in the empirical analysis of local government reform, is seldom used in empirical analysis on drivers of cooperation. Only twelve papers –and 30 estimations- consider variables reflecting political factors, and the estimations are divided between those that consider political orientation of elected politicians, and others that consider the type of election (i.e. election at large). The diversity in the way the political variables are specified is very wide. Therefore, we cannot specify expectations about the influence of political factors on cooperation.

#### **4. Empirical strategy: Data and methods**

There are different reasons why analyses that focus on a single topic have a large variation of empirical results. Among these, Stanley and Jarrell (1989) emphasize three types of categories for these reasons: (1) uniqueness of the data sets used in each particular study; (2) biases induced by model misspecification, and (3) distinctive statistical methods. We use meta-regression analysis to analyze the pattern and diversity of findings in the empirical studies. In this way, we are able to

appraise if significant relationships in papers that study drivers and obstacles of inter-municipal cooperation depend heavily on the individual characteristics of each study. Meta-regression analysis has been used frequently in economic and public policy research, after it was introduced in the late 1980s. Recently it has been used to analyze variability of empirical results in the field of public services and local government (i.e. Bel and Fageda 2009; Bel, Fageda and Warner 2010; Carvalho, Marques and Berg, 2012). We are not aware of any meta-regression analysis published to explain the differences between empirical results in studies on drivers and obstacles of inter-municipal cooperation, thus our research contributes to filling this gap.

The most frequently applied empirical strategy in meta-regression analysis is that suggested by Stanley and Jarrell (1989),

$$b_j = \beta + \sum \alpha_k Z_{jk} + e_j \quad j = 1, 2, \dots, L \quad (1)$$

where  $b_j$  is the reported estimate of  $\beta$  of the  $j$ th study,  $\beta$  is the true value of the parameter of interest,  $Z_{jk}$  are the meta-independent variables that measure relevant characteristics of an empirical study, and  $\alpha_k$  are the coefficients associated with those independent variables, and,  $e_j$  stands for the residuals.

The initial empirical strategy for implementing the meta-regression is to use the coefficients or  $t$ -statistic values estimated in each study as a dependent variable in the meta-regression. A first problem we confront is that we have neither  $t$ -statistics nor standard errors for many estimations. Moreover, we cannot compute  $t$ -statistics based on coefficients and standard errors in other cases, because these are given with all zeroes (i.e., 0.000). Therefore, the sample would be significantly reduced if we used  $t$ -statistics. Furthermore, the studies on factors explaining inter-municipal cooperation have used a wide variety of variables to test the relationship between cooperation and economic and organizational factors. Thus the number of homogeneous  $t$ -statistics that we have been able to identify is very limited, which we are aware is a limitation of our research.

Our objective is to analyze whether the relationships we are interested in are significant. To do so, we follow the strategy applied by Bel and Fageda (2009). We construct a set of dependent variables as dummy variables that take a value of one if a study finds a significant relationship between inter-municipal cooperation and the corresponding set of explanatory variables: fiscal and economic, organizational and spatial. Table 3 displays the set of dependent variables, and the set of independent variables (moderator variables) that concern particular characteristics of the studies. Note that we do not include specific regressions for service level transaction costs<sup>2</sup> or politics, because the small number of available estimations does not allow us to conduct a sensible estimation. We specify the dependent variables as follows:

**(Table 3 here)**

*Fiscal constraints:* We find a significant influence of fiscal constraints on inter-municipal cooperation when variable(s) that capture this effect has(ve) a positive influence on cooperation. The variables most commonly used are debt burden, tax burden, own fiscal revenues, and supra-local regulation limiting local taxation and debt.<sup>3</sup>

*Community wealth:* We find a significant influence of community wealth on inter-municipal cooperation when the variable that captures its effect has a negative influence on cooperation. The variable is usually specified as income per capita.

---

<sup>2</sup> In fact, neither the estimation nor the single variables were significant for this factor (results available upon request).

<sup>3</sup>Studies use different measures for fiscal constraints, and this could damage homogeneity, which would constitute a limitation of our analysis. However, the fact that this and other dependent variables include several different measures does not crucially affect the robustness of our study, because we have been careful when analyzing the implication of each measure, and the homogeneity among them.



*Economies of scale:* We find a significant influence of economies of scale on inter-municipal contracting when the variable that captures this effect has a negative influence on cooperation. By far, the variable most commonly used is population size.

*Spatial factors:* We find a significant influence of spatial factors on inter-municipal cooperation when the variable that captures this effect has a positive influence on cooperation. The variable most commonly used is city in a metropolitan area or suburb.

*Organizational factors:* We find a significant influence of manager-type of government on inter-municipal cooperation when the variable that captures this effect has a positive influence on cooperation. The variable most commonly used is council-manager form of local government.

*Racial homogeneity:* We find a significant influence of racial homogeneity on inter-municipal cooperation when the variable that captures this effect has a positive influence on cooperation. The variable most commonly used is percent racial/ethnic majority in population.

The independent variables used are those common in meta-regression analysis, reflecting particular characteristics of the studies: year of data collection, number of observations, geographical area and method of estimation. These variables reflect the type of categories used to explain variations, such as the uniqueness of the data sets, or distinctive statistical methods. Furthermore, area and time differences may reflect institutional contexts or learning over time. As in Bel and Fageda (2009), we include two additional characteristics of the studies: whether the estimations are single-service or multi-service (a few studies consider different services but use single-service estimations), and whether small municipalities (less than 5000 population) are included in the sample or not. Finally, we include two additional variables. One indicates whether the study focuses on cooperation solely, or whether it is considered among other alternatives (e.g. private contracting) for service delivery. The other is a measure of research quality based on the latest available (2014) impact

factor in the Journal Citation Reports of the journal in which the article was published. Journals not considered in JCR and other studies received a 0.

## 5. Results

We first regress the dependent variables against the independent (moderator) variables by means of probit estimation, robust to heteroskedasticity. We estimate the following set of relationships:

$$COOPERATION = F(FC, SE, CW, OF, SF, RH), \quad (2)$$

$$Fiscal\ constraints = F(Year, sample, continent, multi-service, method, method, popsize, onlycoop, impactfactor), \quad (3)$$

$$Community\ Wealth = F(Year, sample, continent, multi-service, method, method, popsize, onlycoop, impactfactor), \quad (4)$$

$$Economies\ of\ Scale = F(Year, sample, continent, multi-service, method, method, popsize, onlycoop, impactfactor), \quad (5)$$

$$Spatial\ Factors = F(Year, sample, continent, multi-service, method, method, popsize, onlycoop, impactfactor), \quad (6)$$

$$Organizational\ Factors = F(Year, sample, continent, multi-service, method, method, popsize, onlycoop, impactfactor) \quad (7)$$

$$Racial\ Homogeneity = F(Year, sample, continent, multi-service, method, method, popsize, onlycoop, impactfactor), \quad (8)$$

Results from the six meta-regressions are provided in Table 4. In all cases the estimations are robust and have clustered estimations from the same study. Recall that each observation is a study analyzing factors explaining inter-municipal contracting. The dependent variables are dummy variables that take a value of one when a study finds a significant relationship between inter-municipal contracting and that variable (except for community wealth and economies of scale which are coded 0= negative relationship). Positive coefficients of the moderator variables indicate that studies with that characteristic tend to provide a positive significant relationship between the corresponding dependent variable and cooperation. A negative sign implies that the associated characteristic of the study is less likely to be associated with positive and significant results. Note the opposite interpretation holds for community wealth and economies of scale.

**(Table 4 here)**

We obtain relatively high R-squares (recall we are conducting probit estimations) for most of our estimations: Fiscal Constraints, Economies of Scale and Racial Homogeneity. The explanatory capacity is smaller but still significant for Spatial Factors and for Organizational Factors, and is very

low for Community Wealth. Overall, the explanatory results of our meta-regression estimations compare favorably with those of studies using similar methodology, such as Bel and Fageda's (2009) analysis of factors explaining local privatization.

The hypothesis that fiscal constraints would trigger more cooperation is well established in the literature. Results show that more recent studies (year) are less likely to find an effect of fiscal constraints. Also, studies done for the US are less likely to find fiscal constraints as a driver of cooperation.

By contrast, studies that include smaller places (<5000 population) in the sample are more likely to find a positive effect of fiscal constraints, as small places are more likely to benefit from cooperation. The same is true of multi-service studies, as cooperation in these studies is measured on an organization-wide level, not just in a single service, so the potential for fiscal impact is greater. Furthermore, studies using logistic regression also tend to find a significant positive influence of fiscal constraints. Recall that logistic regression models are more robust than OLS when the dependent variable is bounded between 0 and 1. Finally, studies that focus only on cooperation tend also to find a significant positive influence of fiscal constraints.

The surprising result in the fiscal constraint model is the lower likelihood of finding fiscal constraints as a driver in the US models. Prior meta-regression analysis on local government privatization found US studies were more likely to find fiscal constraints as a driver (Bel and Fageda 2009). What explains the divergent results between privatization and cooperation as regards fiscal constraints? Local government fragmentation in the US is high and the motivations for cooperation extend beyond fiscal constraints to concerns regarding service coordination across the region and service quality improvements (Hefetz, Warner and Vigoda-Gadot 2012). While privatization is driven heavily by cost and fiscal constraints, cooperation is used for a broader range of purposes in the US, namely service quality and service coordination, but these variables are not captured well in the

regression model literature. Our regressions cannot capture other motivators because the number of studies addressing them is too small. Furthermore, in Europe, small places often receive more service for the same price under cooperative agreements. A primary type of cooperation in Europe is joint governance of services, but US studies primarily measure inter-local contracting. The type of contracting in Europe is much more prone to cross subsidies among the partner municipalities.

Turning now to community wealth, the meta-regression studies with larger sample sizes (generally considered to be more robust) are less likely to find significant effects (recall the community wealth variable is reverse coded). The meta-regression also shows that studies where cooperation is considered alone are more likely to find a negative relationship between cooperation and community wealth. Rich communities may feel less pressure to meet economic efficiency goals, or to cooperate with their neighbors. Also, studies published in higher quality journals tend to find this negative relationship between community wealth and cooperation.

Regarding economies of scale, the main operational expectation is that as population increases, cooperation would decrease. Recall that economies of scale exist when population has a negative and significant relationship with cooperation. We expected that studies containing more small places (<5000) would be more likely to find a scale effect. However, that moderator variable is positive, meaning that it is less likely that a relationship with scale is found. Studies conducted for the US and studies focusing only on cooperation are less likely to find effects of economies of scale. This may reflect the wider range of factors driving cooperation in the US studies – beyond economic considerations. Multiservice studies are more likely to find scale effect but this result is only significant at the 10% level.

With respect to spatial effects, we did not find any significant moderator. The equation itself did a poor job of explaining differences in results across studies. This result is interesting. A majority of estimations show that cities in metropolitan areas have higher rates of cooperation, and only a

small minority of studies find cities with lower levels of cooperation (see table 2). Our meta-regression shows these results are not differentiated by any moderator variable. Therefore, theoretical expectations are met by empirical results, 55% of the observations found this result, and differentiation across studies is not explained by the intrinsic characteristics of the estimations. City status in a metropolitan region, where proximity helps create a market for cooperation, is a relevant driver of inter-municipal cooperation.

The meta-regression on organizational factors (manager-type government) dropped the continent moderator variable as all the studies measuring this effect are in the US. Three variables show a positive relationship with manager influence: logistic method, sample including small municipalities and studies focusing only on cooperation. Our theoretical expectation was that professional management would be positively associated with cooperation and indeed this is true – especially in studies including smaller places (<5000 population). As in the case of spatial effects, our meta-regression shows that divergence of results in the literature is not heavily driven by the characteristics of the estimation. Forty two percent of the estimations have a positive association between managers and cooperation (this being a large majority among the results finding a significant association, see Table 2), thus, the theoretical expectation is met by the empirical evidence.

The meta-regression on racial homogeneity also dropped the continent moderator variable. In this case, almost all variables show a significant relationship with racial homogeneity. More recent studies, studies with small municipalities and studies published in high impact outlets tend to find a positive association between racial homogeneity and cooperation, and the opposite happens with almost all other moderators. This equation is the most powerful in explaining the divergence of results. The meta-regression shows that studies that include a wider range of governments are less likely to find racial homogeneity to be a factor. These include the larger sample sized studies, multiservice studies and those which only look at cooperation.

It is common in meta-regressions for papers included to provide more than one observation (see table 1). That can cause a problem of dependence across observations (Ringquist, 2013).<sup>4</sup> To deal with this, we replicated the probit estimations by including a dummy variable to control for the observations obtained from the study by Blaeschke (2014), which is - by far - the work that provides more estimations, up to 22. The results were unchanged. Furthermore, in order to take full account of within-study autocorrelation, we followed the suggestion in Ringquist (2013, p. 218) and used Generalized Estimating Equations (GEE) to estimate a random effects meta-regression model. Table 5 shows the results.

**(Insert table 5 around here)**

Results obtained from our GEE estimations are very similar for fiscal restrictions and for organizational factors; thus, we take the results for these factors as solidly established. The estimations on the other factors yield somewhat different results, which we discuss next.

The estimation for community wealth does not yield any significant variables and, furthermore, shows a very poor overall fit. There is no association between any moderator and community wealth. In this sense, it is worth recalling that two thirds of studies found no effect and those that did were almost evenly split between positive and negative effects (see Table 2). Although community wealth has been described in the literature as an important factor, our meta-regression provides limited insights into why we find such divergent results across studies, and has a large majority of non significant results overall. Indeed, it might well be that community wealth by itself is

---

<sup>4</sup> Other potential sources of dependence across observations are the use of common data sets in different studies, and different studies conducted by similar research teams. While studies for countries other than the US use different sets of data, most studies for the US use data from ICMA. We believe our variable *Continent* (US=1) helps to deal with that. With respect to potential dependence across observations, because the same researchers have done more than one study, in our case a team of researchers conducted six of the papers, and several researchers contributed with three papers. We are aware this can be a limitation of our results.

not a relevant driver of cooperation.

Regarding economies of scale, only two variables are still significant and these only at the 10% level. Studies conducted for the US and studies where only cooperation is considered are less likely to find economies of scale, as before. However, population size is not significant when we take into account dependence across observations. By contrast, the new estimation for spatial factors shows a better fit, and multiservice has a strong negative correlation with cooperation. Finally, in the estimation for racial homogeneity several variables cease to be significant. However, we cannot conclude anything in this case, as this estimation did not converge.

Overall, when we take into account dependence across observations caused by studies providing many observations, several variables cease to be significant in several estimations. Fiscal constraints, spatial factors, and organizational factors appear to be the most robust models across estimations.

## **6. Meta-regression robustness tests**

One concern in meta-regression analysis is studies might be more likely to be published if they find significant relationships between variables. Because of this, publication bias is an important limitation of meta-regression analysis (Stanley, 2005). Publication bias in meta-regression may be examined by means of funnel asymmetry tests -FAT- (Stanley, 2005, 2008). FAT tests are based on the estimation of the reported effect of a study and its standard errors.

The studies included in our meta-regression analyses use different variables to test the relationship between cooperation and each set of factors. Because of this, we can implement our tests for publication bias only for the most common variables for each group of hypotheses, which reduces the samples available for the publication bias test. Furthermore, some studies report the coefficient and statistical significance, but not standard errors or  $t$ -statistics, so we cannot include

these studies in the tests. All this forces us to be cautious when interpreting results of the FAT, because of the low number of observations that can be used.

With respect to publication bias, FAT (1) and FAT (2) show that we find strong evidence of publication bias for fiscal constraints, because in both estimations [using  $1/SE$  and  $\sqrt{\text{sample size}}$ ] the intercept significantly differs from zero. We find weak evidence of publication bias for spatial factors, as the intercept is significant, but only at 10%. If there is publication bias, the direction is positive in both cases, which means that the studies are obtaining overly large effect of fiscal constraints and of city in metropolitan areas. We find even weaker evidence for racial homogeneity, as publication bias found with FAT (1) is contradicted by the results from FAT (2). Table 6 shows results of the funnel asymmetry tests for these three factors.<sup>5</sup> Therefore, we do not believe publication bias is an important problem for racial homogeneity.

**(Table 6 here)**

Publication bias may be filtered by means of estimating a multivariate FAT meta-regression model (Stanley 2005). We deal with this issue following methodological guidelines pointed out in Bel, Fageda and Warner (2010). This will imply re-estimating equations for fiscal constraints (equation 3) and for spatial factors (equation 6), including square root of sample size, and excluding sample size. Our previous results with respect to moderator variables in both equations, for fiscal constraints (3) and for spatial factors (6) are confirmed, because the sign and explanatory significance of each independent variable do not change.<sup>6</sup> Thus the results from our original equations are robust.

---

<sup>5</sup>FAT1 for community wealth, scale and organizational factors show no evidence of publication bias, and are available upon request.

<sup>6</sup>Results for these multivariate FAT meta-regressions are available upon request.



## 7. Discussion and Agenda for Future Research

Inter-municipal cooperation is a growing government reform and one gaining increasing theoretical and empirical attention. Some studies treat cooperation as another alternative service delivery mechanism in the arsenal of new public management style reforms, an alternative to privatization but driven by similar motivators, primarily cost reduction. This is most commonly found in the European studies. However, in the US studies we find attention to a much broader array of motivating factors relating to spatial location and organizational factors. This raises the question of whether cooperation requires a broader theoretical framing than traditional studies of government contracting. We present theoretical expectations that extend beyond cost concerns (fiscal stress, economies of scale) to address governance structure and spatial differences.

Theoretically, economies of scale would be a primary motivator for cooperation, however, we find population is not significant in the majority of studies. Fiscal constraints are more likely to be found significant in studies that include small municipalities, but less likely in more recent studies and in studies from the US. We believe this may be explained by differences in governance structure. Although small, fragmented local government is characteristic of the US and some European countries (France, Spain, Italy), more standard service delivery obligations and cross subsidies due to the wider use of joint production and municipal corporations in the European context (Tavares and Camoes 2007; Gradus et al 2014) may allow cooperation to better address fiscal constraints than in the US.

While fiscal constraints are important drivers, we find some evidence of publication bias in study results. Policy makers typically assume that inter-municipal cooperation will yield cost savings, but the empirical literature on cost savings is limited and cost savings are often not found (Sørensen 2007; Holzer and Fry 2011; Bel and Warner 2015). The growing popularity of inter-municipal cooperation is not explained by fiscal drivers alone.

The majority of studies find higher rates of cooperation among suburbs (cities in metropolitan areas). Cooperation, unlike privatization, is rooted in space. The surrounding local governments create a public market of potential cooperation partners. Multi-service studies are less likely to show a positive effect of metropolitan location on cooperation. These studies may be capturing the potential for economies of scope within the municipality – which may explain lower rates of cooperation. Cooperation occurs both across space and across services and studies of factors driving cooperation need to be structured at the level of the local government, as a multi-product entity, in order to capture this effect. Single service studies may be appropriate for studies of cost, but they may not capture the broader array of factors driving local government cooperation.

Professional management is an important driver of cooperation and our meta-regression shows studies including small municipalities are more likely to find positive impacts of professional management. While much of the literature on transaction costs has focused on service characteristics (Brown and Potoski 2003; Levin and Tadelis 2010), our meta-regression shows the importance of organizational and spatial factors as part of transaction costs. These results confirm Hefetz and Warner's (2012) call for a broader conception of transaction costs, which includes attention to spatial and managerial issues.

Our results suggest important implications for policy makers. Local governments are facing greater fiscal stress since the Great Recession, and inter-municipal cooperation is being promoted as a solution. While fiscal constraints may drive cooperation, it is not clear that cooperation will result in efficiency gains. We do not find clear support for economies of scale in our analysis. We do find that professional management is important to manage the transaction costs of cooperation. If policymakers wish to promote more cooperation, they should provide support for professional management and study the potential economic benefits of cooperation, as these are not always assured. Policy makers also should recognize that cooperation is rooted in space. Spatial proximity

facilitates cooperation in metropolitan areas, but what can policy makers do to promote cooperation among more sparsely settled rural communities? Our spatial analysis also shows the potential trade off between cooperation and economies of scope. Cooperation across services *within* a community may be as important as cooperation across communities.

Our meta-regression analysis of factors explaining cooperation demonstrates that cooperation requires a broader theoretical framing that includes factors beyond the standard efficiency concerns. Studies of alternative service delivery reforms must move beyond individual service level analyses and focus on the policy challenges affecting local government as an organization in its spatial and structural context. Future scholarship needs to give more attention to these organizational and spatial concerns.

## References

- Agranoff, Robert, and Michael McGuire. 2003. *Collaborative Public Management. New Strategies for Local Governments*. Georgetown University Press, Washington DC.
- Allers, Maarten A. and J. Bieuwe Geertsema. 2014. *The effects of local government amalgamation on public spending and service levels: Evidence from 15 years of municipal boundary reform*. Groningen: University of Groningen, SOM research school, (SOM Research Reports; vol. 14019-EEF)
- Bae, Jungah. 2009. Institutional choices for local service contracting and collaboration. *International Review of Public Administration* 14(1): 27-42.
- Bel, Germà and Antón Costas. 2006. Do public sector reforms get rusty?: Local privatization in Spain. *Journal of Policy Reform* 9(1), 1-24.
- Bel, Germà and Xavier Fageda. 2008. Reforming the local public sector: Economics and politics in privatization of water and solid waste. *Journal of Economic Policy Reform* 11(1), 45-65.
- Bel, Germà, and Xavier Fageda. 2009. Factors explaining local privatization: a meta-regression analysis. *Public Choice* 139(1/2): 105-119.
- Bel, Germà, Xavier Fageda, and Melania Mur. 2013. Why do municipalities cooperate to provide local public services? An empirical analysis. *Local Government Studies* 39(2):435-454.
- Bel, Germà, Xavier Fageda, and Melania Mur. 2014. Does Cooperation Reduce Service Delivery Costs? Evidence from Residential Solid Waste Services. *Journal of Public Administration Research and Theory* 24(1): 85-107.
- Bel, Germà, Xavier Fageda, and Mildred Warner. 2010. Is Private Production of Public Services Cheaper than Public Production? A meta-regression analysis of solid waste and water services. *Journal of Policy Analysis and Management* 29(3): 553-577.
- Bel, Germà, and Mildred Warner. 2015. Inter-municipal cooperation and costs: Expectations and evidence. *Public Administration*, 93(1): 52-67.
- Blaeschke, Frédéric. 2014. *What drives small municipalities to cooperate? Evidence from Hessian municipalities*. WP. 14-2014. MAGKS. Joint discussion paper series in economics.
- Boyne, George 1998. Bureaucratic Theory Meets Reality: Public Choice and Service Contracting in US Local Government', *Public Administration Review* 58(6): 474-84.
- Brown, Trevor. 2008. The dynamics of government-to-government contracts. *Public Performance Management Review* 31(3): 364-386

- Brown, Trevor L., and Matthew Potoski. 2003. Transaction costs and institutional explanations for government service production decisions. *Journal of Public Administration Research and Theory* 13(4): 441-468.
- Brown, Trevor L., Matthew Potoski, and David M. Van Slyke. 2008. Changing modes of service delivery: How past choices structure future choices. *Environment & Planning C: Government & Policy* 26(1): 127-43.
- Campbell, Richard W., and Patty Glynn. 1990. Intergovernmental cooperation: an analysis of cities and counties in Georgia. *Public Administration Quarterly* 14(2): 119-141.
- Carr, Jered B., Elisabeth R. Gerber, and Eric W. Lupton. 2007. *Explaining horizontal and vertical cooperation on public services in Michigan: the role of fiscal local capacity*. WP. Wayne State University.
- Carr, Jered B., Kelly Leroux, and Manoj K. Shrestha. 2009. Institutional Ties, Transaction Costs, and External Service Production. *Urban Affairs Review* 44(3): 403-27.
- Carvalho, Pedro, Rui C. Marques, and Sanford Berg, 2012. A meta-regression analysis of benchmarking studies on water utilities market structure. *Utilities Policy* 21, 40-49.
- Clifton, Judith, 2014. Beyond Hollowing Out: Straitjacketing the state? *Political Quarterly* 85(4): 437-444.
- De Mello, Luiz, and Santiago Lago-Peñas. 2013. Local government cooperation for joint provision: The experiences of Brazil and Spain with inter-municipal consortia. In Santiago Lago-Peñas, and Jorge Martinez-Vazquez, eds. *The challenge of local government size. theoretical perspectives, international experience, and policy reform*. Edward Elgar, Cheltenham, pp. 221-241.
- Di Porto, Edoardo, Vincent Merlin, and Sonia Paty. 2011. *Determinants of fiscal cooperation decision-making: The case of French municipalities*. WP, CREM (U. Caen) and EQUUIPE (U. Lille)
- Di Porto, Edoardo, Vincent Merlin, and Sonia Paty. 2013. *Cooperation Among Local Governments to Deliver Public Services : A 'Structural' Bivariate Response Model with Fixed Effects and Endogenous Covariate*. WP1304. GATE Lyon-ST Étienne.
- Feiock, Richard C. 2007. Rational choice and regional governance, *Journal of Urban Affairs* 29(1): 47-63.
- Feiock, Richard C., 2013. The institutional collective action framework. *Policy Studies Journal*, 41(3): 397-425.
- Feiock, Richard C., and John T. Scholz, eds. 2010. *Self-organizing federalism: Collaborative mechanisms to mitigate institutional collective action*. Cambridge University Press, Cambridge.

- Ferris, James M., and Elizabeth Graddy. 1991. Production costs, transaction costs, and local-government contractor choice. *Economic Inquiry* 29(3): 541–554.
- Ferris, James M., and Elizabeth Graddy. 1994. Organizational choices for public service supply. *Journal of Law, Economics & Organization* 10(1): 126–141.
- Frug, Gerald E., 1999 *City Making: Building Communities without Building Walls*, Princeton University Press: Princeton, NJ.
- Garrone, Paula, and Riccardo Marzano. Forthcoming. Why Do Local Governments Resist Contracting Out? *Urban Affairs Review*, forthcoming.
- Girard, Peter, Robert D. Mohr, Steven C. Deller, and John M. Halstead. 2009. Public-private partnerships and cooperative agreements in municipal service delivery. *International Journal of Public Administration* 32(5): 370-392.
- Girth, Amanda, Amir Hefetz, Jocelyn Johnston and Mildred E. Warner 2012. Outsourcing Public Service Delivery: Management Responses in Noncompetitive Markets, *Public Administration Review*, 72(6): 887-900.
- Gradus, R., E. Dijkgraaf and M. Wassenaar. 2014. Understanding Mixed Forms of Refuse Collection, Privatization and Its Reverse in the Netherlands.' *International Public Management Journal* 17(3): 328–343.
- Hefetz, Amir, and Mildred E. Warner. 2012. Contracting or public delivery? The importance of service, market and management characteristics. *Journal of Public Administration Research and Theory* 22(2): 289-317.
- Hefetz, Amir, Mildred E. Warner, and Eran Vigoda-Gadot. 2012. Privatization and inter-municipal contracting: The US local government experience 1992-2007. *Environment and Planning C: Government and Policy* 30(4): 675-692.
- Hefetz, Amir, Mildred E. Warner, and Eran Vigoda-Gadot. 2014. Concurrent sourcing in the public sector: a strategy to manage contracting risk. *International Public Management Journal* 17(3): 365-386.
- Hefetz, Amir, Mildred E. Warner and Eran Vigoda-Gadot. 2015. Professional management and local government service delivery: Strategic decisions across alternative markets. *Public Performance & Management Review*, 38(2): 261-283.
- Hinnerich, B. Tyrefors. 2009. Do merging local governments free ride on their counterparts when facing boundary reform? *Journal of Public Economics*, 93(5/6): 721-728.

- Hodge, Graeme. 2000. *Privatization: An International Review of Performance*. Boulder, CO: Westview Press.
- Holzer, Mark and J. Fry. 2011. *Shared Services and Municipal Consolidation: A Critical Analysis*. Alexandria, VA: Public Technology Institute.
- Homsy, George C. and Mildred E. Warner 2014. Intermunicipal Cooperation: The Growing Reform, pp 53-65 in *The Municipal Yearbook 2014*, Washington, DC: International City County Management Association.
- Hulst, R. and A. van Montfort (eds). 2007. *Inter-Municipal Cooperation in Europe*. Dordrecht: Springer.
- Joassart-Marcelli, Pascale and Juliet Musso. 2005. Municipal service provision choices within a metropolitan area. *Urban Affairs Review* 40(4):492-519.
- Jordahl, Henrik and Che-Yuan Liang. 2010. Merged municipalities, higher debt: on free-riding and the common pool problem in politics. *Public Choice* 143(1/2): 157-172.
- Jung, Changhoon and Juchan Kim. 2009. Patterns and the determinants of interlocal cooperation in American cities and counties. *International Review of Public Administration* 14(1):11-25.
- Jung, Changhoon and Seong-Ho Jeong. 2013. Effects of service characteristics on interlocal cooperation in U.S. cities: A pooled regression analysis. *International Journal of Public Administration* 36(5): 367-380
- Krueger, Skip and Michael McGuire. 2005. *A Transaction costs explanation of interlocal Government Collaboration*. Paper presented at the Either National Public Management Research Conference, Los Angeles, CA, Sept 29-Oct 1.
- Krueger, Skip, and Ethan Bernick. 2010. State rules and local governance choices. *Publius: The Journal of Federalism* 40(4): 697-718.
- Krueger, Skip, Robert W. Walker, and Ethan Bernickz. 2011. The intergovernmental context of alternative service delivery choices. *Publius: The Journal of Federalism* 41(4): 686-708.
- Kwon, Sung-Wook and Richard C. Feiock. 2010. Overcoming the barriers to cooperation: Intergovernmental service agreements. *Public Administration Review* 70(6): 876-84.
- Lackey, Steven Brent, David Freshwater, and Anill Rupashinga. 2002. Factors influencing local cooperation in rural areas: Evidence from the Tennessee Valley. *Economic Development Quarterly* 16(2): 138-154.
- Ladd, Helen F. 1992. Population growth, density and the costs of providing public services. *Urban Studies* 29 (2): 273-295.

- Lago-Peñas, Santiago and Jorge Martínez-Vázquez, eds. 2013. *The Challenge of Local Government Size: Theoretical Perspectives, International Experience, and Policy Reform*, Edward Elgar.
- Lamothe, Scott, Meeyoung Lamothe, and Richard C. Feiock. 2008. Examining local government service delivery arrangements over time. *Urban Affairs Review* 44(1): 27-56.
- LeRoux, Kelly, Paul W. Brandenburger, and Sanjay K. Pandey. 2010. Interlocal service cooperation in us cities: a social network explanation. *Public Administration Review* 70(2): 268-278.
- LeRoux, Kelly, and Jered B. Carr. 2007. Explaining local government cooperation on public works: evidence from Michigan. *Public Works Management and Policy* 12(1): 344–58.
- LeRoux, Kelly, and Sanjay Pandey. 2011. City managers, career incentive and municipal services decisions: the effects of managerial progressive ambition on interlocal service delivery. *Public Administration Review* 71(4): 627-636.
- Levin, Jonathan, and Steven Tadelis. 2010. Contracting for government services: Theory and evidence from U.S. cities. *The Journal of Industrial Economics* 58(3): 507-41.
- Lobao, Linda, Ronald Martin, and Antonio Rodríguez-Pose. 2009. Editorial: rescaling the state: new modes of institutional–territorial organization, *Cambridge Journal of Regions, Economy and Society*, 2: 3–12.
- Lowery, David. 2000. A transactions costs model of metropolitan governance: Allocation versus redistribution in urban America. *Journal of Public Administration Research and Theory* 10(1): 49-78.
- Marvel, Mary K., and Howard P. Marvel. 2008. Government-to-Government Contracting: Stewardship, Agency, and Substitution, *International Public Management Journal*, 11: 171-192.
- Mazzalay, Victor. 2011. Subnational regionalisation in Argentina: The effects of subjective interdependence and the relationships between actors on intermunicipal cooperation. *Bulletin of Latin American Research* 30(4): 453–472.
- Mirrless, James A. 1972. The optimum town. *Swedish Journal of Economics* 74(1): 114-135.
- Mohr, Robert, Steven C. Deller, and John M. Halstead 2010. Alternative methods of service delivery in small and rural municipalities. *Public Administration Review* 70(6): 894-905.
- Morgan, David R., and Michael W. Hirlinger 1991. Intergovernmental service contracts: a multivariate explanation. *Urban Affairs Quarterly* 27(1): 128-144.
- Morgan, David R., Michael W. Hirlinger, and Robert E. England. 1988. The decision to contract out city services: a further explanation. *The Western Political Quarterly* 41(2): 363-372.



- Nelson, Kimberly L, and James H Svava. 2011. Form of government still matters: Fostering innovation in US municipal governments. *The American Review of Public Administration* 42 (3):257-281.
- Oates, Wallace, 1972. *Fiscal federalism*. Harcourt Brace Jovanovich, New York.
- Olson, Mancur. 1969. The principle of "fiscal equivalence": the division of responsibilities among different levels of government. *The American Economic Review* 59(2): 479-487.
- Ostrom, Elinor. 2010. Analyzing Collective Action. *Agricultural Economics* 41(S1): 155–166.
- Ostrom, Vincent, Charles M. Tiebout, and Robert Warren 1961. The organization of government in metropolitan areas: A theoretical inquiry. *American Political Science Review* 55(4): 831-842.
- Reinagel, Tyler P., and Justin M. Stritch. 2012. *Competition and professionalism: An exploratory look at municipal participation in facility sharing in Georgia*. Poster presented at 20102 Fall APPAM-Baltimore, MA.
- Reingewertz, Yaniv. 2012. Do Municipal Amalgamations Work? Evidence from Municipalities in Israel. *Journal of Urban Economics* 72(2/3): 240–251.
- Ringquist, Evan J. 2013. *Meta-Analysis for Public Management and Policy*. San Francisco (CA): Jossey-Bass (Wiley & Sons)
- Rodríguez-Oreggia, Eduardo, and Rodolfo Tuirán Gutiérrez. 2006. La cooperación intermunicipal en México. Barreras e incentivos en la probabilidad de cooperar. *Gestión y Política Pública* 15(2): 393-409.
- Shrestha, Manoj K. 2005. *Interlocal fiscal cooperation in the provision of local public services: the case of large us cities*. Paper presented at the American Society of Public Administration, Milwaukee, WI, April.
- Shrestha, Manoj K., and Richard C. Feiock. 2007. *Interlocal Cooperation in the Supply of Local Public Goods: A Transaction Cost and Social Exchange Explanation*. WP. Wayne State University.
- Shrestha, Manoj K., and Richard C. Feiock. 2011. Transaction cost, exchange embeddedness, and interlocal cooperation in local public goods. *Political Research Quarterly* 64(3): 573-587.
- Sonenblum, Sidney, John J. Kirlin, and John C. Reis 1977. *How cities provide services*. Ballinger, Cambridge, MA.
- Sørensen, Rune J. 2007. Does Dispersed Public Ownership Impair Efficiency? The Case of Refuse Collection in Norway, *Public Administration* 85(4): 1045–58.
- Stanley, T. D. 2005. Beyond publication bias. *Journal of Economic Surveys* 19(3): 309–345.

- Stanley, T. D. 2008. Meta-regression methods for detecting and estimating empirical effects in the presence of publication selection. *Oxford Bulletin of Economics and Statistics* 70(1): 103–127.
- Stanley, T. D., Doucouliagos, H., Giles, M., Heckemeyer, J. H., Johnston, R. J., Laroche, P., Nelson, J. P., Paldam, M., Poot, J., Pugh, G., Rosenberger, R. S., Rost, K., 2013. Meta-Analysis of Economics Research Reporting Guidelines. *Journal of Economic Surveys* 27, 390-394.
- Stanley, T. D., and Stephen B. Jarrell 1989. Meta-regression analysis: A quantitative method of literature surveys. *Journal of Economic Surveys* 3(2): 54–67.
- Sundell, Anders, Mikael Gilljam, and Victor Lapuente. 2009. *Patterns of Local Public Administration Reform: Perceived Effects and Determinants of Contracting and Intermunicipal Cooperation among Local Governments in Sweden*. Paper presented in APSA 2009 meeting, Toronto.
- Tavares, António F., and Pedro J. Camões. 2007. *Understanding intergovernmental cooperation: An empirical study of collaboration among Portuguese municipalities*. University of Minho (Portugal), WP NEAPP Série IV (6)
- Thurmaier, Kurt, and Curtis Wood. 2004. Interlocal agreements as an alternative to consolidation. In Jered B. Carr, and Richard Feiock, eds. *City-county consolidation and its alternatives. Reshaping the local government landscape*. M.E.Sharpe, New York, pp. 113-130.
- Tiebout, Charles. 1956. A pure theory of local expenditures. *Journal of Political Economy* 64 (5): 416–424.
- Tiller, Kelly J., and Paul M. Jakus. 2005. Applying the Miceli Model to explain cooperation in municipal solid waste management. *Agricultural and Resource Economics Review* 34(2): 217-225.
- Warner, Mildred E. 2006. Inter-municipal cooperation in the U.S.: A Regional Governance Solution? *Urban Public Economics Review* 6: 132-151.
- Warner, Mildred E. 2011. Competition or Cooperation in Urban Service Delivery? *Annals of Public and Cooperative Economics* 82(4): 421-435.
- Warner, Mildred E., and Amir Hefetz. 2002. Applying market solutions to public services: An assessment of efficiency, Equity and Voice. *Urban Affairs Review* 38(1):70-89.
- Wassenaar, Mattheus, Tom Groot, & Raymond Gradus. 2013. Municipalities' contracting out decisions: an empirical study on motives. *Local Government Studies*, 39(3): 414-434
- Wood, Curtis. 2006. Scope and Patterns of Metropolitan Governance in Urban America: Probing the Complexities in the Kansas City Region. *American Review of Public Administration* 36(3): 337-353.

Zafra-Gómez, José L., Diego Prior, Ana M. Plata-Díaz and Antonio M. López-Hernández. 2013. Reducing Costs in Times of Crisis: Delivery Forms in Small and Medium Sized Local Governments' Waste Management Services, *Public Administration*, 91(1): 51–68.

Zullo, Roland. 2009. Does fiscal stress induce privatization? Correlates of private and inter-municipal contracting 1992-2002. *Governance* 22(3): 459-481.

Table 1. Main characteristics-multivariate studies on drivers of intermunicipal cooperation in service delivery

Authors	Number of Estimations	Year Sample	Sample	Country	service	Method	Size
Morgan et al (1988)	1	1982	56	USA	Multi	OLS	>25000
Campbell & Glynn (1990)	2	1984	158	USA – GA	Multi	OLS	Counties
Ferris & Graddy (1991)	2	1982	309	USA	Multi	Logistic	>25000
Morgan & Hirlinger (1991)	7	1983	615	USA	Hybrid**	OLS	>25000
Ferris & Graddy (1994)	1	1982	350	USA	Multi	Logistic	>25000
Lackey et al (2002)	1	1998	88	US-TN	Multi	Ols	All
Warner & Hefetz (2002)	6	1992-97	303-1056	USA	Multi	Logistic	>2500
Brown & Potoski (2003)	4	1997	48538	USA	Multi	Logistic	>2500
Joassart & Musso (2005)	1	1982-90-97	1333	USA – CA	Multi	Logistic	All
Krueger & McGuire (2005)	4	1997	2825	USA	Multi	Logistic	>2000
Shrestha (2005)	4	1990-99	4100	USA	Multi	OLS	>400000
Tiller & Jakus (2005)	3	1993	95	USA – TN	Landfills	Logistic	Counties
Rodríguez & Tuirán (2006)	4	2002	2425	México	Multi	Logistic	All
Warner (2006)	3	1992-97-2002	1031 to 1414	USA	Multi	Logistic	>2500
Wood (2006)	1	2003	46	USA – KS, MO	Multi	OLS	>2500
Carr et al (2007)	10	2005	460	US-MI	Several*	Logistic	All
Leroux & Carr (2007)	10	2005	314 to 316	USA – MI	Several*	Logistic	All
Shrestha & Feiock (2007)	1	2002	1793	USA-GA	Multi	Logistic	>2500
Tavares & Camões (2007)	4	2006	719	Portugal	Multi	Logistic/Poisson	All
Brown et al (2008)	2	1997	18510	USA	Multi	Logistic	>2500
Lamothe et al (2008)	2	2002	9037	USA	Multi	Logistic	>2500
Bae (2009)	2	2002	2011	USA-GA	Multi	Logistic	All
Carr et al (2009)	1	2005	3675	USA – MI	Several*	Logistic	>10000
Girard et al (2009)	1	2004	1422	USA – NH	Multi	Logistic	All
Jung & Kim (2009)	6	2002	238 to 3033	USA	Multi	OLS	> 2500
Sundell et al (2009)	5	2008	289	Sweden	Multi	OLS	All
Zullo (2009)	4	2002	1530-2183	USA	Multi	OLS	Counties
Krueger & Bernick (2010)	2	1997	3664	USA	Multi	Logistic	>2500
Kwon & Feiock (2010)	2	2003	1072	USA	Multi	Logistic	>10000
Leroux et al (2010)	1	2004	919	USA	Multi	Logistic	>50000
Levin & Tadelis (2010)	5	1997-2002	18588 to 19244	USA	Multi	Logistic	>1115
Mohr et al (2010)	1	1995-97-2004	36605	USA-IL,NH,WI	Multi	Logistic	All
Di Porto et al (2011)	5	1995-2003	164592 to 325827	France	Multi	Ols/Logistic	All
Krueger et al (2011)	2	1997	25429	USA	Multi	Logistic	>2500
Leroux & Pandey (2011)	1	2004	117	USA	Multi	OLS	>50000
Mazzalay (2011)	4	2007-08-09	380 to 552	Argentina-CO	Multi	QAP	All
Shrestha & Feiock (2011)	2	2002	1216 to 1305	USA – GA	Multi	Logistic	>2500
Hefetz, et al (2012)	4	1992-97,2002-07	1304 to 1418	USA	Multi	Logistic	>2500
Hefetz & Warner (2012)	4	2007	898 to 4745	USA	Multi	Logistic	>2500
Reinagel & Stricth (2012)	2	2010	471	USA	Multi	Logistic	All

Bel, Fageda & Mur (2013)	1	2008	92	Spain – Aragón	Waste	Logistic	All
De Mello & Lago (2013)	8	2009	393 to 3757	Brazil & Spain	Several*	Logistic	>5000
Di Porto et al (2013)	3	1995-2003	202146	France	Multi	Logistic	All
Jung & Jeong (2013)	2	1990-95-2000	22935	USA	Multi	Logistic	> 20000
Bel, Fageda & Mur (2014)	1	2008	80	Spain – Aragón	Waste	Logistic	All
Blaeschke (2014)	22	2011	112	Germany-Hessen	Multi	Logistic	< 50000
Hefetz et al (2014)	2	2007	1432	USA	Multi	Logistic	>2500
Hefetz et al (2015)	2	2007	570-904	USA	Multi	Logistic	>2500
Garrone & Marzano, forth	3	2001-12	725	Lombardy-Italy	Gas	Logistic	All

Notes: Number of observations obtained from the corresponding study. QAP: Quadratic Assignment Procedure.

.\*These studies consider different services but conduct single service estimations. They are coded as single.

.\*\* This study includes multi service estimations as well as single service estimations. They are coded accordingly.

Source: Authors' elaboration

Table 2. Synthesis of descriptive results for the main explanatory variables in studies of inter-municipal cooperation in service delivery

<b>Fiscal constraints</b>			<b>Community Wealth</b>		
Positive	53	43.8%	Positive	18	20.2%
Negative	16	13.2%	Negative	13	14.6%
Non-significant	52	43.0%	Non-significant	58	65.2%
Total	121	100.0%	Total	89	100.0%
<b>Economies of Scale (population)</b>			<b>Spatial Effects</b>		
Positive	20	16.4%	Positive	33	55.0%
Negative	38	31.1%	Negative	4	6.7%
Non-significant	64	52.5%	Non-significant	23	38.3%
Total	122	100.0%	Total	60	100.0%
<b>Organizational Factors (Manager)</b>			<b>Racial homogeneity</b>		
Positive	26	41.9%	Positive	24	41.4%
Negative	5	8.1%	Negative	7	12.0%
Non-significant	31	50.0%	Non-significant	27	46.6%
Total	62	100.0%	Total	58	100.0%
<b>Service Level Transaction Costs</b>			<b>Politics</b>		
Positive	13	41.9%	Only 12 papers		
Negative	6	19.4%			
Non-significant	12	38.7%			
Total	31	100.0%			

Note: Community wealth is considered to be a driver of cooperation when per capita income has a negative and significant relationship with cooperation. Spatial effects measures geographic proximity as in city/suburb and is a driver of cooperation when it has a positive and significant relationship with cooperation. Economy of scale is considered to be a driver of cooperation when population has a negative and significant relationship with cooperation.

Source: Authors' elaboration.

Table 3. Variables used in the meta-regression analysis

Dependent variable	Description	Observations
Fiscal constraints	Dummy variable that takes value one if a study finds a significant (positive) relationship between variables for fiscal constraints and cooperation	121
Community wealth	Dummy variable that takes value zero if a study finds a significant (negative) relationship between variables for wealth and cooperation, and a value of one otherwise	89
Scale economies	Dummy variable that takes value zero if a study finds a significant (negative) relationship between variables for population and cooperation, and a value of one otherwise	122
Spatial Factors	Dummy variable that takes value one if a study finds a significant (positive) relationship between city in metropolitan area or suburb and cooperation	60
Organizational Factors	Dummy variable that takes value one if a study finds a significant (positive) relationship between manager-type government and cooperation	62
Racial Homogeneity	Dummy variable that takes value one if a study finds a significant (positive) relationship between racial homogeneity and cooperation	58
Independent (Moderator) variables	Description	Observations
<i>Year</i>	Year of collection of data for dependent variables	171
<i>Sample</i>	Number of municipalities included in the considered sample	171
<i>Continent</i>	Dummy variable that takes value one when studies refer to US, and value zero when they refer to other countries	171
<i>Service</i>	Dummy variable that takes value one when multiple services are considered, and value zero when just one sector is considered	171
<i>Method</i>	Dummy variable that takes value one when a discrete choice method is used, and value zero when Ordinary Least Squares is used	171
<i>PopSize</i>	Dummy variable that takes value one when the considered sample includes municipalities with a population lower than 5,000 inhabitants	171
<i>Onlycoop</i>	Dummy variable that takes value one when the study focuses on cooperation solely	171
<i>ImpactFactor</i>	Impact Factor in JCR-2014 of the journal in which the article was published (if any). Papers in journals not included in JCR and also unpublished papers receive a 0.	171

Note: Difference between number of observations of dependent and independent variables is due to the fact that the variables we take as dependent are not always present in all studies and estimations.

**Table 4** Meta-regression robust estimates. Probit

Moderator variables	Dependent variable		
	Fiscal constraints	Community Wealth	Economies of Scale
<i>Year</i>	-0.12 (0.04)***	+0.02 (0.04)	+0.07 (0.03)**
<i>Sample</i>	+1.7E-06 (1.9E-06)	+6.0E-05(2.5E-05)**	+1.1E-06 (2.1E-06)
<i>Continent (US=1)</i>	-1.68 (0.41)***	-0.22 (0.65)	+1.04 (0.53)**
<i>Service (multi=1)</i>	+1.08 (0.33)***	+0.40 (0.38)	-0.90 (0.53)*
<i>Method (logistic =1)</i>	+0.87 (0.34)**	-0.36 (0.63)	-0.32(0.32)
<i>PopSize (small inc. =1)</i>	+1.82 (0.64)***	-0.89 (0.83)	+0.96 (0.49)**
<i>Onlycoop (coop= 1)</i>	+1.54 (0.43)***	-0.79 (0.43)*	+1.29 (0.39)***
<i>ImpactFactor</i>	+0.03 (0.25)	-0.90 (0.37)**	+0.05 (0.21)
<i>Intercept</i>	+244.60 (70.35)***	-42.36 (69.96)	-131.84 (62.82)**
Pseudo R <sup>2</sup>	0.352	0.116	0.201
χ <sup>2</sup> (joint sig.)	66.96***	17.45**	22.39***
Log pseudolikelihood	-53.54	-29.43	-60.47
N	121	89	122

  

	Spatial (city+suburb)	Factors	Organizational Factors (Manager)	Racial Homogeneity
<i>Year</i>	+0.02 (0.03)		-0.05 (0.03)	+0.19 (0.05)***
<i>Sample</i>	-2.1E-05(1.8E-05)		-8.21-0.6 (1.5E-05)	-7.6E-0.4 (1.1E-0.4)***
<i>Continent (US=1)</i>	-0.92 (0.69)		&	&
<i>Service (multi=1)</i>	-1.20 (0.86)		-0.27 (0.90)	-1.18 (0.59)* *
<i>Method (logistic =1)</i>	-0.74 (0.47)		+0.83 (0.45)*	-1.91 (0.37)***
<i>PopSize (small inc. =1)</i>	+0.37 (0.53)		+1.45 (0.47)***	+2.93 (0.97)***
<i>Onlycoop (coop= 1)</i>	-0.85 (0.57)		+1.10 (0.49)**	-3.52 (0.83)***
<i>ImpactFactor</i>	+0.11 (0.38)		+0.21 (0.27)	+2.74 (0.32)***
<i>Intercept</i>	-46.52 (57.97)		+98.68 (61.93)	-373.17 (100.00)***
Pseudo R <sup>2</sup>	0.115		0.134	0.447
χ <sup>2</sup> (joint sig.)	11.05		14.88**	91.50***
Log pseudolikelihood	-36.55		-36.77	-9.17
N	60		62	38

Note 1: Standard errors in parentheses (robust). Note 3: Significance at the 1% (\*\*\*), 5% (\*\*), 10% (\*)

Note 2: &: Omitted because of collinearity.

Note 3: In the case of Racial Homogeneity the estimation dropped 20 observations because of collinearity (so, N=38).



**Table 5** Meta-regression robust estimates. Generalized Estimating Equations (GEE)

Moderator variables	Dependent variable		
	Fiscal constraints	Community Wealth	Economies of Scale
<i>Year</i>	-0.03 (0.10)***	+0.00 (0.01)	+0.00 (0.01)
<i>Sample</i>	+7.5E-08 (4.0E-07)	+5.5E-06(3.8E-06)	+1.2E-07 (6.9E-07)
<i>Continent (US=1)</i>	-0.48 (0.11)***	-0.04 (0.10)	+0.32 (0.19) *
<i>Service (multi=1)</i>	+0.32 (0.06)***	+0.04 (0.06)	-0.06 (0.177)
<i>Method (logistic =1)</i>	+0.20 (0.11)*	-0.02 (0.11)	-0.03(0.05)
<i>PopSize (small inc. =1)</i>	+0.43 (0.16)***	-0.11 (0.16)	+0.14 (0.13)
<i>Onlycoop (coop= 1)</i>	+0.44 (0.14)***	-0.12 (0.09)	+0.29 (0.16)*
<i>ImpactFactor</i>	+0.02 (0.06)	-0.13 (0.08)	-0.03 (0.09)
<i>Intercept</i>	+59.66 (20.54)***	-3.86 (16.41)	-2.41 (13.34)
Wald(chi)2	391.40	8.57	15.70
Prob > chi2	0.00***	0.38	0.05**
N	121	89	122

  

	Spatial (city+suburb)	Factors Organizational Factors (Manager)	Racial Homogeneity
<i>Year</i>	+0.01 (0.01)	-0.01 (0.01)	+0.04 (0.01)***
<i>Sample</i>	-6.1E-06(6.5E-06)	-8.33-0.7 (5.6E-06)	-2.1E-0.5 (1.1E-0.5)**
<i>Continent (US=1)</i>	-0.27 (0.34)	&	-0.47 (0.16)***
<i>Service (multi=1)</i>	-0.39 (0.08)***	+0.26 (0.16)	-0.01 (0.09)
<i>Method (logistic =1)</i>	-0.13 (0.15)	+0.16 (0.19)	-0.24 (0.15)
<i>PopSize (small inc. =1)</i>	+0.11 (0.15)	+0.39 (0.12)***	-0.32 (0.21)
<i>Onlycoop (coop= 1)</i>	-0.26 (0.22)	+0.29 (0.17) *	-0.19 (0.11)*
<i>ImpactFactor</i>	+0.00 (0.14)	+0.01 (0.09)	+0.03 (0.09)
<i>Intercept</i>	-12.15 (17.68)	+21.55 (21.51)	-77.55 (27.53)***
Wald(chi)2	124.36	70.13	195034.00
Prob > chi2	0.00***	0.00***	0.00***
N	60	62	58

Note 1: Standard errors in parentheses (robust). Significance at the 1% (\*\*\*), 5% (\*\*), 10% (\*)

Note 2: &: Omitted because of collinearity.

Note 3: In the case of Racial Homogeneity, the estimation did not converge.

**Table 6** Meta-regression tests (robust and clustered)

FISCAL CONSTRAINTS		
	FAT (1)	FAT (2)
Explanatory variables	Dep. Variable t-Statistic	Dep. Variable t-Statistic
Intercept	1.705 (0.377)***	2.136 (0.553)***
1/SE	0.0009 (0.0017)	-
Sqrt (sample size)	-	-0.0061 (0.0037)
N	32	32
R <sup>2</sup>	0.0018	0.0614
SPATIAL FACTORS		
	FAT (1)	FAT (2)
Explanatory variables	Dep. Variable t-Statistic	Dep. Variable t-Statistic
Intercept	3.173 (1.505)*	4.509 (2.244)*
1/SE	0.0218 (0.0154)	-
Sqrt (sample size)	-	-0.0135 (0.0149)
N	38	38
R <sup>2</sup>	0.0407	0.0124
RACIAL HOMOGENEITY		
	FAT (1)	FAT (2)
Explanatory variables	Dep. Variable t-Statistic	Dep. Variable t-Statistic
<i>Intercept</i>	-0.921 (0.276)***	0.381 (0.453)
<i>1/SE</i>	0.0035 (0.0012)**	-
<i>Sqrt (sample size)</i>	-	-0.0375 (0.0214)
N	25	25
R <sup>2</sup>	0.2964	0.2512

Note 1: Standard errors in parentheses (robust to heteroskedasticity and adjusted by correlation between observations in the same study)

Note 2: Significance at the 1% (\*\*\*), 5% (\*\*), 10% (\*)



Institut de Recerca en Economia Aplicada Regional i Pública  
*Research Institute of Applied Economics*

**Universitat de Barcelona**

Av. Diagonal, 690 • 08034 Barcelona

**WEBSITE:** [www.ub.edu/irea/](http://www.ub.edu/irea/) • **CONTACT:** [irea@ub.edu](mailto:irea@ub.edu)