View metadata, citation and similar papers at core.ac.uk

brought to you by CORE

provided by Diposit Digital de la Universitat de Barcelona

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

Document de Treball 2018/16 1/33 pág.
Working Paper 2018/16 1/33 pág.

"Does inter-municipal cooperation really reduce delivery costs? An empirical evaluation of the role of scale economies, transaction costs, and governance arrangements"

Bel G & Sebő M

UB IREA

Institut de Recerca en Economia Aplicada | *Research Institute of Applied Economics*

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/ • CONTACT: 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 in public service delivery has attracted the interest of local authorities seeking to reform public service provision in recent years. Cost saving has been among the most important drivers of such cooperation. However, the empirical results from the literature on inter-municipal cooperation and its associated costs offer contradictory outcomes in this regard. The boom in empirical studies addressing this question over the last decade offers insights into the factors that might explain the discrepancy in reported outcomes. With this objective in mind, we conduct a meta-regression analysis that considers all existing multivariate empirical studies of this matter. We formulate several hypotheses regarding scale economies, transaction costs, and governance of cooperation, based on the prior theoretical literature. While we find no clear indications of the role played by transaction costs in the relationship between cooperation and service delivery costs, we find strong evidence that population size and governance are significant in explaining the relationship. Specifically, small populations and delegation to a higher tier of government seem to offer cost advantages to municipalities when opting to cooperate. Furthermore, we build an extension of our model by disentangling service-related transaction costs based on asset specificity and ease of measurability of the service.

JEL classification: H70, H77, R51

Keywords: inter-municipal cooperation, local government, cost saving, transaction costs, meta-regression analysis

Germà Bel: Department of Econometrics, Statistics and Applied Economics & GiM-IREA University of Barcelona. C/ John Keynes 1-11, 08034 Barcelona. Tel: 34.93.4031131 Fax: 34.93.4024573. E-mail: gbel@ub.edu

Marianna Sebő: Department of Econometrics, Statistics and Applied Economics & GiM-IREA University of Barcelona. C/ John Keynes 1-11, 08034 Barcelona. Tel: 34.93.4031131 Fax: 34.93.4024573.

Acknowledgements

We thank the Spanish Ministry of Economy and Competitiveness (project ECO2016-76866-R) and the Catalan Government (2017 SGR 644) for financial support. None of these funding sources was involved in any stages of this research.

1. Introduction

The growing skepticism expressed by local governments towards private-sector participation in public service provision, and the different fiscal and economic constraints these governments face in terms of efficiency and effectiveness, have led many local authorities to devise new forms of public service delivery. In recent decades, one of the alternatives most frequently adopted has been inter-municipal cooperation (IMC), within a context of increasing cooperation between governments, local councils, agencies and political parties (Bouckaert, Peters and Verhoest, 2010). IMC is seen as a tool that can lower costs by exploiting economies of scale, while maintaining greater control over production, something that is not readily achievable in the case of privatization (Levin and Tadelis, 2010; Hefetz and Warner, 2012; Bel, Fageda, and Mur, 2014).

While long-term IMC agreements can be justified on the grounds of enhanced service quality and cross-jurisdictional coordination (Aldag and Warner, 2018), the main rationale for such cooperation is to cut costs. However, the empirical evidence obtained from various countries and services does not systematically confirm the cost-saving potential of IMC agreements. While context may be important in explaining the contradictory results reported in the literature, this is not in itself an adequate explanation (Feiock, 2007).

Here, therefore, the chief motivation underpinning our research is to account for the divergence in the outcomes reported for IMC agreements, and to explore the factors that best explain this variation. In this way, policy makers should have more realistic expectations about cooperation. We take advantage of the booming empirical literature over the last decade, and seek to reconcile seemingly contradictory results by means of meta-regression analysis [see, for other aspects of local service delivery, Bel and Fageda, 2009; Bel, Fageda, and Warner, 2010; Bel and Warner, 2016].

Our paper makes three main contributions to the literature. First, to create the database for our meta-regression analysis, we review all available (to the best of our knowledge) multivariate empirical studies that analyze the cost-saving effects of IMC. This includes both published and unpublished papers. Second, based on a prior analysis of the theoretical background underpinning IMC, we study the causes of this variation in results. To do this, we design a multivariate model to check the theoretical outcomes empirically. Specifically, we focus on the effects of economies of scale, transaction costs, and governance arrangements for IMC. Third, and by way of extension, we further analyze the role of transaction costs based on asset specificity and ease of measurability/contract management difficulty, to better understand the nature and the effects of transaction costs based on their components.

We organize the paper as follows. First, we review the theoretical background and analyze theory-based outcomes or propositions. Based on this review, we then formulate our hypotheses regarding economies of scale, transaction costs and governance arrangements. Second, we review the

multivariate empirical evidence about the effects of IMC on costs.[1] We then explain how the database was built and the choices we made to ensure homogeneity. Next, we formulate a multivariate model and present the results from our estimations, which we discuss generally, and also with special attention to the relationship with our theoretical hypotheses. We also offer an extension of our model that should be useful in tracing the effects of transaction costs, based on the nature of the specific public services under analysis. Finally, we present the results of the robustness tests, and draw the main conclusions and policy implications from our analysis.

2. Theoretical Background

Efficient service provision based on IMC has been discussed essentially in terms of the theory of local public economics, within the framework of institutional collective action, and in relation to the principal-agent problem in collaborative governance. In their review of existing evidence on IMC and costs, Bel and Warner (2016) classified the relevant factors into three groups: scale-related costs; organizational characteristics and service-related transaction costs; and governance arrangements. Here, we adopt this same classification and analyze these factors separately. Before doing so, we should stress that it is not our objective to provide a comprehensive analysis of the theoretical factors underlying IMC; rather, we choose to focus on those that are most relevant to the empirical analysis we conduct herein.

Economies of scale

One of the key motives for adopting IMC is to improve the scale at which a service is delivered, given that municipalities may be of suboptimal size, reflecting the fact that they are usually the outcome of historical/cultural events and do not adhere to any obvious economic/geographic rationale. This means jurisdictional boundaries can be redefined to improve scale and internalize spillover effects. However, certain trade-off relations need to be borne in mind. Mirrlees (1972) explained optimum town size in relation to such conditions as individual preferences regarding consumption, distance from work, area occupied by the individual's residence and population density in the immediate neighborhood. Similarly, Dixit (1973) argued that it is simply unrealistic not to include the benefits of scale economies in economic models, and proposed a model for determining the optimum size and arrangement of a monocentric city. In this model, he also considered the trade-off between economies of scale and diseconomies of congestion, for instance in commuter transport.

[1] We are aware that other empirically based evidence on shared delivery and costs has been published, although it is quite scarce (Holzer and Fry, 2011). For instance, Honadle (1984) and Ruggini (2006) provide anecdotal information about savings in several cases surveyed in the USA. In contrast, various Australian case studies do not show any cost savings (Dollery, Akimov, and Byrnes, 2009). Because meta-regression deals solely with multivariate analysis, we do not provide specific details of these studies, but rather concentrate on what we have identified as our main target for this study.

Taking a different perspective, Ladd (1992) examined the effect of population growth and density on the cost and quality of public services. She found that a higher population density lowers provision costs and described a U-shaped relationship between output and population density. Her study served to confirm that there are certain optimal boundary conditions, and that while economies of scale can be achieved initially, as size increases scale benefits become exhausted. For this reason, scale economies can be potentially advantageous – above all in the case of smaller municipalities – since with increasing capacity average production costs should fall and greater efficiency should be achieved (Hulst and van Montfort, 2011).

One way to modify boundaries for the purpose of service delivery is by means of IMC (Ostrom , Tiebout, and Warren, 1961). As has been emphasized by many scholars (i.e. Bel and Costas, 2006; Warner and Bel, 2008; Hefetz, Warner, and Vigoda-Gadot, 2012; da Cruz and Marques, 2012), IMC provides a market alternative, which allows a service to continue under public delivery while enjoying the advantages of scale economies. However, it should be borne in mind that the optimal scale differs for each local public service. Hence, IMC can provide a better alternative than that of amalgamation (which can be considered as generalized – and usually compulsory – cooperation) to profit from scale economies.

Most empirical papers report a negative effect of population on the frequency of cooperation (Levin and Tadelis, 2010; Hefetz, Warner, and Vigoda-Gadot, 2012; Bel, Fageda, and Mur, 2014), that is, as the size of the municipalities grows, IMC tends to be less cost-advantageous for the participating municipalities. This belief that IMC is especially beneficial for smaller municipalities has been addressed from other perspectives as well. For instance, Warner and Hefetz (2002, 2003) and Mohr, Deller, and Halstead (2010) emphasize that small municipalities are less likely than larger municipalities to use competitive bidding. However, it is worth noting that the relationship between population size and cooperation can be ambiguous when multiservice cooperation is considered (Bel and Warner 2016).

Theoretically, therefore, we expect the scale of cooperation to be a significant variable. In the empirical literature, the usual proxy employed for scale is the municipality's average population or output. As such, our first hypothesis states:

Hypothesis 1: Studies of small municipalities tend to find inter-municipal cooperation more cost-advantageous.

Organizational characteristics and service-related transaction costs

The importance of transaction costs is stressed by Williamson (1999) in accounting for inefficiencies in public bureaucracy. Moreover, he argues that the choice of service delivery method varies according to service type. Building on Williamson's insights, researchers have analyzed the characteristics and nature

of transaction costs by looking at the nature of a wide range of public services. Brown and Potoski (2003, 2005) revamped the analysis of service-related transaction costs in delivery choices, by focusing on asset specificity and the ease/difficulty of measurement. Levin and Tadelis (2010) adopted a similar approach to that of Brown and Potoski (2003), but also included in their theoretical proposal service characteristics, which they defined as contracting difficulty and resident sensitivity, especially as related to quality. Later, Hefetz and Warner (2012) analyzed service characteristics in terms of asset specificity, contract management difficulty, citizen interest, and market competition. Indeed, the indexes of asset specificity proposed by Brown and Potoski (2005) and Hefetz and Warner (2012), and of the ease/difficulty of measurement (Brown and Potoski, 2005) and contract management (Hefetz and Warner, 2012) are of key relevance to the empirical analysis we conduct herein.

According to transaction cost theory, if delivering a service requires specialized investments, and if performance measurement is difficult, that service will incur high transaction costs (Brown and Potoski 2003, 2005). In such a scenario, privatization is less likely. This insight is based on the idea that agents act in their own self-interest and do not cooperate (Jensen and Meckling, 1976). In partnerships, however, which are likely to be based on trust and mutual commitment between participants, these theoretical outcomes may change (Brown and Potoski, 2005). As such, IMC appears better suited to the latter scenario. Furthermore, cooperation can lead to interactive learning (Hefetz and Warner, 2012).

Alternatively, it can be argued that transaction costs in the case of IMC are likely to be high, since participants will incur information and coordination costs, negotiation and division costs, enforcement and monitoring costs and bargaining costs, as defined by Feiock (2007). We return to these potential costs in the following subsection. However, as Brown (2008) pointed out, cooperation costs do not have to be high. Municipalities tend to place greater trust in other public partners in the case of services exposed to a high risk of opportunism. By way of example, in the case of health and human services, the author concludes that this might occur because governments have similar structures and goals; hence, they are inherently perceived by each other as being more trustworthy. Moreover, although some service-related investments might be high (which usually coincides with high transaction costs), if we consider that inter-municipal cooperation is likely to include cost sharing, the results of cooperation can be positive. However, ease of measurement might not necessarily improve with cooperation, which in a broader sense also refers to the difficulties encountered in contract specification and monitoring (Hefetz and Warner, 2012). Likewise, inter-municipal contracting is more likely to be beneficial for those services for which competition is very low. This can also be explained in terms of transaction costs, since if a market is not competitive enough, it will require a much greater effort on the part of the government to secure and monitor the service at an efficient and effective level (Girth et al., 2012).

Based on the theoretical outcomes of the aforementioned studies our next hypothesis states:

Hypothesis 2: Transaction costs in the context of inter-municipal cooperation have a beneficial effect on cost savings.

Governance arrangements

Engaging in IMC implies that decision-making is externalized, either partially or totally (Argento et al, 2010: 45&50) and, because of this, multiple problems related to collective action are likely to arise (Feiock, 2007; Voorn, van Genugten, and van Thiel, 2017; Silvestre, Marques, and Gomes, 2018). Indeed, the transaction costs related to governance arrangements can be high in the case of cooperation, because participants have to face the costs – of information and coordination, negotiation and division, enforcement and monitoring and bargaining – identified in the previous subsection (Feiock, 2007). Moreover, as Ostrom (1990) pointed out, trust and norms of reciprocity are also of importance in IMC (see, in this regard, Thurmaier and Wood, 2002), and these can develop through networks (Carr, LeRoux and Shrestha, 2009; Shrestha and Feiock. 2011). It would seem that trust and commitment are, effectively, critical for inter-municipal cooperation to work, making IMC a viable form of public service delivery (Silvestre, Marques, and Gomes, 2018).

IMC governance can take the form of informal agreements, formal contracts between the parties, joint-bodies for governance, or the delegation of power and resources to supra-municipal bodies -government or agency- (Bel and Warner, 2015, 2016). A common characteristic of all these IMC arrangements is the option available to a municipality to withdraw from the collaboration as and when it wishes. Cooperation is voluntary (unlike the situation in an amalgamation), so opting-out is a viable reaction to undesired outcomes, or to exploitation by more powerful partners.

IMC is subject to potential risks. Marvel and Marvel (2007) found that monitoring can be a relevant issue, if services are provided internally or by another nonprofit or governmental service provider. In such cases, monitoring is either externalized along with the service or the level of monitoring falls. Significant problems of coordination (Lowery, 2000; Feiock, 2007; Tavares and Feiock, forthcoming) and political transaction costs (Tavares and Camöes, 2007; Rodrigues, Tavares, and Araújo, 2012; Bergholz and Bischoff, forthcoming; Tavares and Feiock, forthcoming) can also arise.

By looking at IMC through the more structural lens provided by principal-agent theory, the main problem to emerge is that of multiple principals relating with one agent. As Gailmard (2009) shows theoretically, the existence of multiple principals raises a collective action problem in relation to monitoring, which can result in the level of oversight being inferior than that required to guarantee the principals' joint interests. For this reason, even if the principals have interests in common, the institutional structure of the overseeing body plays a key role in relation to accountability. The problem of multiple principals is further stressed by da Cruz and Marques (2012) and van Thiel (2016), among others, and has been found to be damaging for ICM outcomes by Sørensen (2007), Garrone, Grilli, and Rousseau (2013) and Blåka (2017).

Given the multiple principal problem, the option of delegating to a supramunicipal government or agency has gained increasing attention. This course of action is frequent in Spain – *comarcas and mancomunidades* (see Warner and Bel, 2008; Bel, Fageda and Mur, 2014), France – *communautés* (see Frère, Leprince, and Paty, 2014) and, more recently, in Italy – *Unione dei Comuni* (see Ferraresi, Migali, and Rizzo, 2018). With governance arrangements of this type, the relation is limited to one principal and one agent. The principal has incentives to consider the interests of all the municipalities involved in the IMC agreement, as each municipality can opt out and leave. Furthermore, these supramunicipal governments typically manage cooperation in different services and, because of this, economies of scale and scope in monitoring and coordination can be exploited (Bel and Costas, 2006; Bovaird, 2014). Hence, the delegation of power and resources to a supramunicipal government or agency can help minimize monitoring and coordination costs, while enabling participants to reap the benefits of cost-related economies of scale. In line with this reasoning, we can formulate our next hypothesis.

Hypothesis 3: Delegation to a supramunicipal government tends to make intermunicipal cooperation more cost-advantageous.

3. IMC and Costs: Empirical Evidence

The multivariate empirical literature on the effects of inter-municipal cooperation on costs is recent, the first papers published on the topic being Bel and Costas (2006) and Sorensen (2007). Thereafter, this literature has grown rapidly, as documented in Bel and Warner (2015). In the last few years it has undergone a veritable boom, with an expansion in the coverage of countries and services considered. While the early studies typically focused on solid waste management, subsequent studies have examined many other services, with studies being conducted (in chronological order) for Spain, Norway, the Netherlands, Italy, France, Czech Republic, Sweden, Germany and the USA. Below, we briefly review this literature.

Spain

The earliest study analyzed solid waste management in the region of Catalonia (Bel and Costas, 2006), and examined the relationship between costs and production mode. While the mode of production (public or private) did not show significant effects on the costs of refuse collection, IMC was found to reduce the costs for small municipalities. The Stevens (1978)-type cost function used in this empirical study has been followed in many subsequent studies, facilitating robust comparisons. Later papers by Bel and Mur (2009) and Bel, Fageda, and Mur (2014) focused their attention on the Spanish region of Aragon and drew on data from a number of different years. In these papers, the authors reported that cooperation reduced costs for smaller municipalities. As both these regions (i.e. Catalonia and Aragon) share the trait of having higher tiers of government to which functions and resources are transferred for

IMC, the authors suggest that delegation can be an advantageous way in which to organize IMC governance.

Zafra-Gómez et al. (2013) analyzed waste management for a state-wide sample, according to the forms of delivery adopted by Spain's small and medium-sized municipalities. The authors considered various forms of IMC (*mancomunidad*, consortium, *mancomunidad* under contract, and supramunicipal management via provincial, county or public companies). They found that IMC reduces costs with respect to single municipal management. Pérez-López, Prior, and Zafra-Gómez (2015) confirmed these findings in a study that expanded the number of services under consideration. Further studies by Pérez-López et al. (2016) and Pérez-López, Prior, and Zafra-Gómez (2018) have analyzed the effect of cooperation on municipal efficiency using different techniques (order-m frontiers, and DEA panel data estimations, respectively), and find that, with IMC, smaller municipalities (up to 20,000 inhabitants) show higher efficiency in waste collection.

Scandinavian countries

One of the first papers to examine this question was Sørensen (2007), who studied solid waste collection in Norwegian municipalities. The author compared two theoretical approaches to IMC in the Scandinavian context: on the one hand, corporate governance theory, which holds that indirect and dispersed ownership incur high agency costs; and, on the other, standard political economy, which suggests that introducing distance between politicians and decisions might increase service delivery efficiency. Sørensen's results show that, in Norway, IMC is responsible for efficiency losses that are higher than the benefits obtained from scale economies. Remaining in Norway, Blåka (2017) studied fire and rescue services in a comparison of hypotheses developed under institutional collective action and corporate governance theories, respectively. Her findings indicate that the cost-saving feature of cooperation depends heavily on its organizational form. Costs are lower for IMC under contractual agreements, but cost-saving significantly decreases with the number of partners.

Holmgren and Weinholt (2016) analyzed the cost of fire and rescue services in Swedish municipalities by means of stochastic frontier analysis. Because Swedish fire and rescue services are increasingly formalizing cooperation between municipalities, and also collaborating with other actors, cooperation was introduced with these two variables: i.e. formalized IMC and cooperation with other actors. Both were expected to reduce inefficiency, but the outcomes were mixed: while cooperation with other actors increased efficiency, the effect of cooperation between municipalities was not significant.

The Netherlands

Dijkgraaf and Gradus (2013) analyzed waste collection in Dutch municipalities based on data for the period 1998-2010, using a standard cost function for a long panel dataset. They found cost savings with

IMC. The same authors conducted a follow-up study with very similar characteristics, in which they controlled for provincial and municipal fixed effects, and found a decreasing significance of cost savings with IMC (Dijkgraaf and Gradus, 2014). The same decreasing significance of cost savings was recorded when they controlled for the impact of various unit-based pricing systems on the quantity of waste produced by different streams.

Other papers have been published recently for the Netherlands. Niaounakis and Blank (2017) analyzed efficiency in relation to cooperation between tax departments, and found that municipalities with a threshold population of 60,000 inhabitants had already exhausted their scale economies, and that IMC stopped being advantageous above that threshold. In the case of municipalities engaged in cooperation, they conclude that, whereas costs may increase initially, IMC does reduce costs over time. Allers and de Greef (2018) have confirmed the costs savings to be gained from IMC in the case of tax collection in Dutch municipalities. However, they found no evidence of cost-saving when considering total public spending. Geertsema (2017) has looked at the interest rate levels of municipalities engaged in IMC and of those working in amalgamation as a proxy for efficiency, and finds that IMC organizations pay a higher interest rate. In contrast, the difference is not significant in the case of amalgamations. Finally, Klok et al. (2018) have recently investigated perceived transaction costs, benefits and trust attributable to IMC, and find that smaller municipalities are more positive about the perceived benefits of cooperation and that perceived results depend on the form of cooperation.

Italy

Garrone, Grilli, and Rousseau (2013) studied joint, inter-municipal ventures in Italy, with a sample made up of multi-utility firms (providing water, electricity, gas and waste management services). They found that coordination costs increased significantly for such firms, an expenditure that outweighed the potential cost savings from cooperation. A quite different type of IMC, that undertaken by the *Unione dei Comune* (municipal unions, with clear similarities with Spain's *mancomunidades*), is analyzed by Ferraresi, Migali, and Rizzo (2018). Their empirical analysis focuses on Emilia Romagna and Toscana and employs difference-in-differences and propensity score matching methods. Their results suggest that being a member of a municipal union reduces a municipality's total per capita expenditure, and that this effect is increasing in a period of up to six years after joining the union. Finally, Giacomini, Sancino, and Simonetto (2018) have recently used survey-based data to examine perceptions in small municipalities and found significant expectations that cooperation can contribute to cost reduction, quality enhancement, and institutional legitimacy.

France

French experiences with IMC and its effects on local expenditure were analyzed by Frère, Leprince, and Paty (2014). In this paper, the authors examined the effect of fiscal cooperation over the period 1994-

2003. The authors draw two main conclusions: i) cooperation has no significant effect on public spending levels, and ii) there are no spending interactions within the cooperating organization.

Czech Republic

Soukopová and Klimovský (2016a, 2016b) analyzed solid waste management in the region of South Moravia for 2013 and 2015 respectively, again using a standard cost function, and found that IMC has cost-saving effects. Soukopová et al. (2016) then extended this study of solid waste management to the whole of the Czech Republic and found that IMC increased costs, contrary to the findings of the previous study. This contradiction triggered a series of follow-up studies in the country. Soukopová, Vaceková, and Klimovský (2017), Soukopová and Vaceková (2018), and Soukopová and Sládeček (2018) undertook analyses in which they introduced variations in terms of municipality size, the time period of their databases, and the regions specifically included. Overall, these studies have found that IMC reduces costs, the most significant values being recorded for small municipalities, but they show that these savings disappear with increasing municipal population size.

Germany

Blaeschke and Haug (2018) have recently examined the effects of IMC on the efficiency of the wastewater sector in the region of Hessen. Using a two-stage data envelopment analysis, they find that IMC is related to lower levels of technical efficiency. However, smaller municipalities can benefit from scale economies through cooperation. Using a metafrontier analysis of efficiency, the authors once again show that cooperation gains from scale economies are probably off-set by technical inefficiencies. Furthermore, they conclude that scale effects apply primarily to small municipalities.

United States

The effects of cooperation in the US have been investigated by Bel, Qian, and Warner (2016) by drawing on survey-based data from a large sample of municipalities in New York State in 2013. The analysis examines a wide range of services and finds conflicting results. This indicates that the cost-saving potential of IMC depends on the characteristics of each service. The authors found that cooperation in police, library, road and highway services reduced costs at the 1% level of significance, while it was effective in garbage and landfill management at the 10% level. For the remaining services no significant effects were found.

4. Data

To create a comprehensive database that includes all studies of the effects of IMC on costs and to obtain a representative and unbiased dataset, we conducted a search of the following academic literature database services between April and July 2018: EconLit, Social Science Research Network, AgEcon and Repec-Ideas. So as to include unpublished studies and "gray literature" too, we searched the following websites: OpenSIGLE, National Technical Information Service in the US, US GAO, E-Thesis Online

Services, and European Science Research Council. In both cases we used the following key-words: 'inter-municipal cooperation', 'interlocal cooperation', 'interlocal contracting', 'joint contracting' and 'shared delivery'. Additionally, we also conducted a search using the same key-words on Google Scholar. In all, we identified 28 multivariate empirical studies of the effects of IMC on costs, broadly considered.

After completing a brief literature review (see previous section), we next defined the rules for the inclusion of studies in the metaregression. Our main selection criterion was to ensure the homogeneity of the definition of variables included in our database. After applying this criterion for inclusion, we then extracted the required data from the individual studies. First, the list was confined to those studies in which the costs associated with cooperation were considered as the dependent variable when compared to the management costs of individual municipalities.[2] We then checked whether IMC was defined homogenously in the papers.[3] After confirming the homogeneity of the studies included in the meta-regression analysis, we next sought to ensure the homogeneity of the data for our moderators and our theory-related variables. To do this, we contacted several authors in order to obtain data on the average population of the municipalities included in the estimations.[4] After all these refinements, we ended up with a database comprising 17 published and unpublished studies, with a total of 110 estimations. Throughout this process, we carefully adhered to the Meta-Analysis of Economics Research Reporting Guidelines set out in Stanley et al. (2013).

Table 1 shows the studies included in our database for the meta-regression, with their main characteristics. We have useful information on studies conducted for Spain, Norway, the Netherlands, Czech Republic, France, Italy and the US. As for the specific services, they include a wide range of fields in which municipalities cooperate. Of the 111 estimations, 23 are drawn from either book chapters, conference papers or other unpublished studies. In total, 20% of the estimates come from unpublished work. Moreover, two third of the estimates are drawn from panel data.

Our database includes information on the service(s) considered, the region and/or country for which the study was conducted, the type of collaborative governance arrangement, the year(s) for which the data were obtained, the sample size, the type of estimation, and the overall results for the variable of interest. All these are shown in Table 1. Furthermore, the database includes other statistical information, namely coefficients, t-statistics and standard errors for the variable of interest, the regression method, and the transformation to transaction costs, as we explain below. In addition, we constructed dummy

[2] These included cases where the dependent variable was efficiency indicators (Holmgren and Weinholt, 2016; Pérez-López et al., 2016; Pérez-López, Prior, and Zafra-Gómez, 2018), interest rates (Geertsema, 2017), the management costs incurred by the public utility firm (Garrone, Grilli & Rousseau, 2013), the volume of drinking water sold (Blaeschke and Haug, 2018), as well as perceptions of transaction costs and benefits (Klok et al., 2018), and overall cost perceptions (Giacomini, Sancino, and Simonetto, 2018).

[3] In this step we had to discard two studies that estimated more than one type of cooperation at the same time: Pérez-López, Prior, and Zafra-Gómez (2015) and Zafra-Gómez et al. (2013).

[4] In this way, we obtained supplementary data from Dijkgraaf & Gradus, (2013, 2014) and Ferraresi, Migali, and Rizzo (2018).

variables for delegation, to consider if the study looked at the US or at European countries, and if panel data were used. Table 2 shows the descriptive statistics of our data sample.

Table 1. Multivariate studies included in the meta-regression analysis

Study	Service	Region/ Country	Governance Arrangement	Year Data Collection	Sample Size	Type of estimation	Effect of IMC on cost
Bel & Costas (2006)	solid waste	Catalonia-Spain	*Comarques* (counties)	2000	186	Cross-Section	Saves costs
Sørensen (2007)	solid waste	Norway	Intermunicipal corporations	2005	211-311	Cross-Section	Increases costs
Bel & Mur (2009)	solid waste	Aragon-Spain	*Comarcas* (counties)	2003	56	Cross-Section	Saves costs
Dijkgraaf & Gradus (2013)	solid waste	Netherlands	IM contract & IM corporation	1998-2010	5886	Panel	Mixed results
Dijkgraaf & Gradus (2014)	solid waste	Netherlands	Intermunicipal Corporation	1998-2010	5878	Panel	Insignificant results
Frère, Leprince, & Paty (2014)	multiservice	France	*Communautés* (communities)	1994–2003	28950	Panel	No significant impact
Bel, Fageda and Mur (2014)	solid waste	Aragon-Spain	*Comarcas* (counties)	2008	85	Cross-Section	Saves costs
Soukopova & Klimovsky (2016a)	solid waste	South Moravia – Czech Rep.	several forms	2013	670	Cross-Section	cooperation saves costs
Soukopova & Klimovsky (2016b)	solid waste	South Moravia – Czech Rep.	several forms	2015	658	Cross-Section	cooperation saves costs
Soukopova et al. (2016)	solid waste	Czech Republic	several forms	2013	365	Cross-Section	Increases costs
Niaounakis & Blank (2017)	tax collection	Netherlands	IMcooperation between tax departments	2005-2012	3116	Panel	cooperation saves costs but not significant result
Soukopová, Vaceková & Klimovsky (2017)	solid waste	Several regions / Czech Rep.	several forms	2014	1962	Cross-Section	cooperation saves costs
Blåka (2017)	fire services	Norway	IM contracts & IM corporations	2013	428	Cross-Section	no significant effect
Soukopová & Vaceková (2018)	solid waste	South Moravia – Czech Rep.	several forms	2012-2014	205	Panel	cooperation saves costs
Soukopova & Sládecek (2018)	solid waste	Olomouc & Zlín/Czech Re.	Several forms	2014-2016	710	Panel	cooperation saves costs
Ferraresi, Migali, & Rizzo (2018)	Multiservice	Emilia Rom. & Toscana/Italy	*Unione dei Comuni* (municipal union)	2001-2011	3686	Panel	cooperation saves costs
Allers & de Greef (2018)	Several services	Netherlands	IM corporation	2005-2013	3331	Panel	savings for tax collection, increase for solid waste
Bel, Qian and Warner (WP, 2016)	Several services	New York St./ US	Several forms	2013	40-848	Cross-Section	Savings for police, library, roads & highways, and solid waste. No effect for other services

Note: 'Multiservice' indicates that the study did not differentiate between services. 'Several services' indicates that different services were considered in the study, and almost all or all the estimations in these studies were made for single services.
Source: Authors

5. **Empirical Strategy**

The Model

Because the aim of this paper is to analyze the divergence in the outcomes of studies examining the effect of IMC on service costs, we opted to employ a meta-regression methodology to explain the variation in results. This methodology has been widely used, for example, in psychotherapy and in studies of expectations and different types of elasticity, etc. (Jarrell and Stanley, 1989) as well as to analyze the effects of privatization on the costs of local public service delivery (Bel, Fageda and Warner, 2010), the effects of private/public ownership on the productivity of local water services (Carvalho, Marques and Berg, 2012), the factors explaining the choice of the privatization of local public services (Bel and Fageda, 2009), and the factors that account for the choice of IMC (Bel and Warner, 2016). The standard econometric model has the following structure:

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

In this way, we can *explain* both the determinants of an event or phenomena and their importance and magnitude. If, however, we want to explain reported *differences* we require a model that can synthesize the various findings. The structure proposed by Jarrell and Stanley (1989) is as follows:

$$b_j = \beta + \sum_{k=1}^{K} \alpha_k Z_{jk} + e_j, \qquad (j = 1,2, \dots L) \tag{2}$$

where b_j, the observed dependent variable, is the reported coefficient of the true effect - β from the jth study out of the set of L studies. The other part of the equation includes the "meta-part", in which α_k represents the meta-regression coefficients, Z_{jk} the meta-independent variables that capture the systematic variations between studies and e_j is the meta-regression disturbance term. Thus, the studies' different results cause differences in Z_{jk} and α_k is the average biases introduced by the misspecification of the studies. From a practical point of view, instead of using the reported coefficients for b_j, it is customary to use the ratio between the reported coefficient and the standard error, i.e. the t-value. This is the case because in studies using different data sets, sample sizes and model specifications, the variances of the coefficients are likely to be different, and so the meta-regression errors will be heteroscedastic. In this paper, we also use the t-values for the estimations (either as reported in the original study or as calculated from the standard errors).[5]

[5] Dijkgraaf and Gradus (2013) and Dijkgraaf and Gradus (2014) did not report any of these values, so we asked the authors to provide us these details from their estimations. We are thankful for their cooperation.

To conduct our estimations, we formulate the following equation:

$$t\text{-}value_i = \alpha_0 + \alpha_1 SampleSize_i + \alpha_2 YearData_i + \alpha_3 US_i + \alpha_4 Multiservice_i + \alpha_5 Panel_i + \alpha_6 Population + \alpha_7 TransactionCosts_i + \alpha_8 Delegation_i + e_i \quad (3)$$

Hence, our model includes eight variables. The first five are the usual moderators related to the environmental or technical characteristics of each study. The last three are variables that reflect theoretical expectations concerning the results: *Population*, *TransactionCosts and Delegation*.

As argued above, one of the most important drivers of IMC is the achievement of optimal boundary levels with the lowest average costs for the provision of a given service. By extending these boundaries, municipalities' scale economies can be a good way to reduce costs. In the studies included in our dataset, the variable representing output is the number of inhabitants. This figure is determined here by data availability and the results are also readily double-checked. Thus, we examine *Hypothesis 1* based on the average population of the municipalities included in the estimations. We expect this variable to be significant and to present a positive sign, reflecting the fact that the cost advantages of IMC tend to be more frequent in studies of small municipalities.

Hypothesis 2 was formulated to reflect the expected decreasing effect on costs (negative relationship) of service-related transaction costs with IMC. We have constructed *TransactionCosts* as a categorical variable, taking stock of the ratings and indicators provided by Brown and Potoski (2005) [B&P Index] and by Hefetz and Warner (2012) [H&F Index]. The variable takes a value of zero if the transaction costs of the specific service in the estimation is low (below average) according to the combined [B&P] and [H&F] indexes. A value of one corresponds to estimations that include many services (we assume this to be an intermediate position regarding transaction costs), and a value of two indicates relatively high transaction costs of a specific service, with respect to average values on the [B&P] and [H&F] indexes. In keeping with *Hypothesis 2*, we assume this variable to be negatively related to costs. Later, we extend our analysis and consider in greater detail the nature of transaction costs.

The dummy representing *Delegation* captures the effect of the transfer of power and resources to a supramunicipal level of government, where decisions are made about the service delivery. This variable is of considerable relevance because it can be used to test *Hypothesis 3* as defined above. We expect this variable to be significant and to present a negative sign. Table 2 summarizes information about our main variables, and Table 3 shows their descriptive statistics.

Table 2: Variables used in the meta-regression analysis

Variables	Description	Expectation
T-Value	T-Value from each estimation	
SampleSize	Number of observations of each estimation.	None
YearData	Year of collection of data for the dependent variables	None
US	Dummy variable with value one for studies on US, and zero otherwise	None
Multiservice	Dummy taking the value of 1 for multi-services and 0 for single-service	None
Panel	Dummy taking value of 1 if panel data is used in the study, 0 otherwise	None
Population	Average population in the municipality as reported	Positive sign
TransactionCosts	Categorical variables taking value of zero (low TC), one (intermediate TC), or 2 (high TC)	Negative sign
Delegation	Dummy variable that takes value 1 if there was delegation to a supra-municipal government, or 0 otherwise	Negative sign

Table 3: Descriptive statistics of the variables used in the meta-regression analysis

Moderator variables	Mean	Standard Deviation	Minimum	Maximum
T-Value	-1.270	2.850	-8.38	18.85
SampleSize	2613.47	5312.20	39	28950
YearData	2008.86	4.19	1999	2015
US	0.12	0.32	0	1
Multiservice	0.23	0.42	0	1
Panel	0.66	0.48	0	1
Population	26354.62	46646.48	221.78	361771.2
TransactionCosts	0.51	0.65	0	2
Delegation	0.29	0.46	0	1

Note: Recall that the variable 'Population' reflects the average population size of the municipalities in the estimation.

Funnel plots

One of the potential threats to meta-analyses (and other methods based on literature reviews, in general) is that published studies have a greater tendency to report positive effects. This so-called 'publication bias' (Card, Kluve, and Weber 2010) can greatly affect results, so in this subsection we seek to evaluate whether it is present in our estimations. Funnel plots are a way of graphically evaluating potential 'publication bias' and are similar to scatter plots of studies; however, here one axis represents study precision (the inverse of standard error) and the square root of the sample size, and the other represents effect sizes (Card, 2012; Stanley 2008). If there is no 'publication bias', the funnel plot should give us symmetrically varying estimates around the 'true effect'. At the bottom, studies with high standard errors (and, therefore, less precise) will be shown. Here, Figure 1 shows that there are more estimates on the

negative side of the true effect; hence, it is probable that 'publication bias' is present.

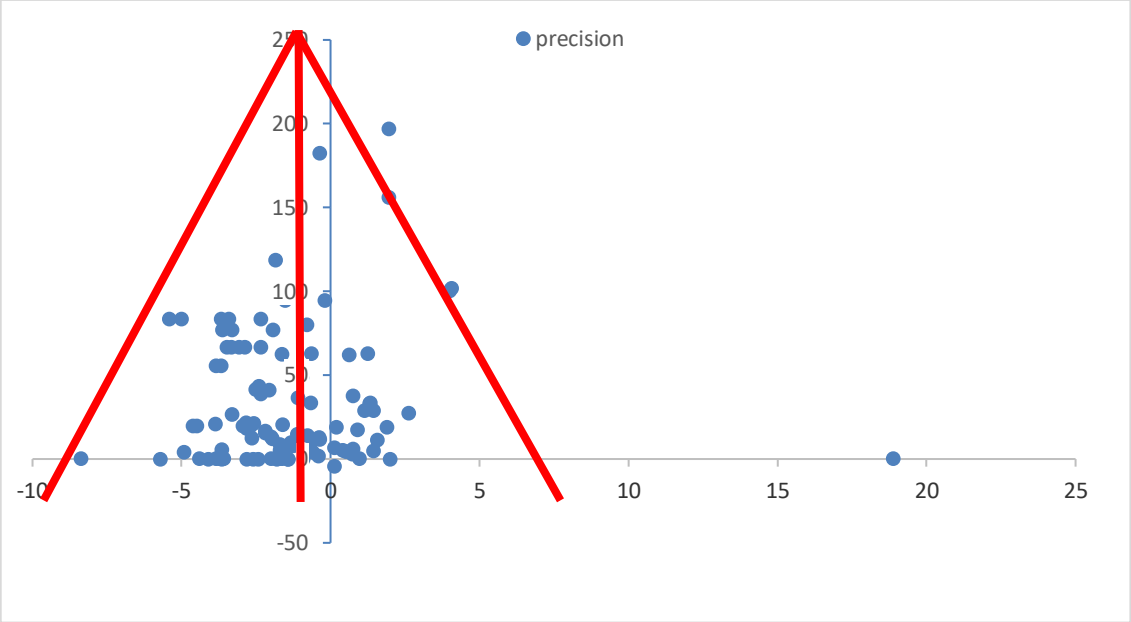
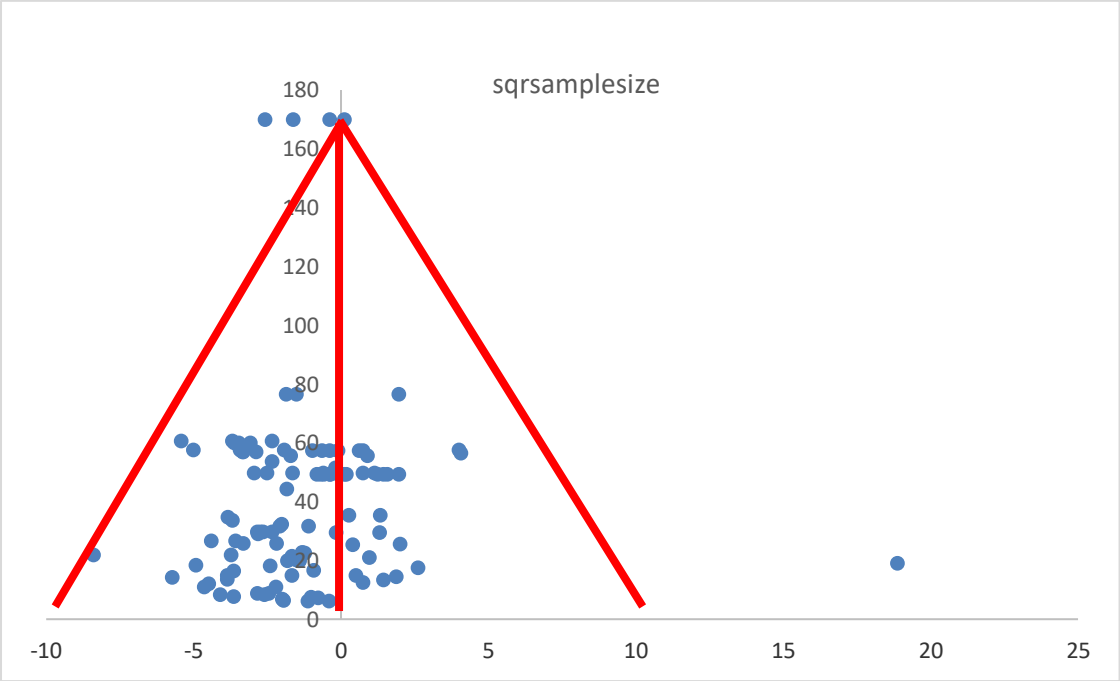


Figure 1: Funnel plots for precision and size

6.



Results

Our results are shown in Table 4. We first estimated the model with ordinary least squares (OLS). After testing for heteroscedasticity (Breusch-Pagan/Cook-Weisberg test: prob > chi^2=0.000), we had to reject the null hypothesis of constant variance. Hence, we corrected the standard errors by conducting the estimation with robust OLS. The variance inflation factor (VIF) was 2.60, and no variable presented a high VIF, all of them being below 5. Hence, multicollinearity is not a relevant problem in our estimation.

Table: 4 Results from metaregression

	OLS	Robust OLS	GEE	GLS
Sample Size	-2.79E-06	-2.79E-06	3.79E-05	1.31E-04
	(0.000)	(0.000)	(5.18E-05)	(1.01E-04)
Year Data	-0.336***	-0.336***	-0.241*	-0.151
	(0.101)	(0.100)	(0.126)	(0.192)
US	-1.325	-1.325	-1.664	-3.679
	(0.992)	(1.186)	(1.503)	(2.888)
Multi-Service	4.139***	4.139***	4.003***	3.308***
	(1.114)	(1.190)	(0.987)	(1.164)
Panel	-3.163***	-3.163**	-3.830**	-6.349***
	(0.745)	(1.331)	(1.670)	(2.531)
Population	6.56E-06	6.56E-06**	6.65E-06**	2.55E-05***
	(5.28E-06)	(2.60E-06)	(2.94E-06)	(8.29E-06)
TransactionCosts	-0.626	-0.626	-0.689	-0.328
	(0.490)	(0.483)	(0.519)	(0.240)
Delegation	-6.853***	-6.853***	-6.054***	-5.952***
	(1.106)	(0.950)	(0.915)	(1.621)
Constant	677.185***	677.185***	487.016*	307.087
	(203.350)	(201.106)	(253.101)	384.752
#Observations	111	111	111	111
Adjusted R-squared	0,261	0,315		
F-statistic	5,87***	11,84***		
Breusch-Pagan/Cook-Weisberg test (p>chi2)	0.000			
VIF	2.60			
Wald(Chi)^2			93.90	98627.99
Prob>Chi^2			0.000***	0.000***

Note: Standard errors in parenthesis. ***Significant at 1% level; **Significant at 5% level; *Significant at 10% level

The results show that two moderators, *SampleSize* and *US*, have no impact on the differences in results in the relationship between IMC and costs. In contrast, *YearData* is statistically significant at the 1% level and presents a negative sign. This means that studies with more recent databases tend to find IMC more advantageous in terms of costs. This might be because, as proposed by Bel and Costas (2006), Hefetz and Warner (2012), and Bel and Warner (2016), municipalities that cooperate improve their efficiency over time, as they learn how to enhance their cooperative practices. *Multiservice* is

significant at the 1% level and its coefficient presents a positive sign, which implies that studies that consider an aggregate set of services, in the delivery of which municipalities cooperate, tend to find IMC less advantageous in terms of costs. Of the other technical variables, *Panel* is significant at the 5% level and presents a negative sign, which indicates that studies based on panel data, as opposed to those that rely on cross-sectional analysis, tend to find inter-municipal cooperation more advantageous. As studies with panel data tend to provide more robust results, we can conclude that analytical robustness analysis is positively related with the cost advantages derived from cooperation.

In the case of the theoretically based variables, *Population* was expected to be significant with a positive sign. Our results present the expected sign, and the variable is significant at the 5% level. This confirms *Hypothesis 1*, according to which IMC is more advantageous for small municipalities, but as their population grows they are less likely to reap the benefits of scale economies as they may have been able to exploit them more fully without cooperation. However, these municipalities still incur coordination costs when engaging in cooperation. Hypothesis 2 states that these service-related *TransactionCosts* are positively related with the cost advantages of cooperation, and as such we expected a negative sign for this variable. However, we fail to find a significant relationship between service-related transaction costs and the results obtained in the studies, which would suggest a weak relationship between these costs and those of IMC. Finally, we sought to capture the effect of governance arrangements by means of our variable *Delegation*. Consistent with *Hypothesis 3,* we found *Delegation* to be statistically significant at the 1% level and to present a negative sign, which implies that delegating power and resources to a supramunicipal government when cooperating is associated with cost advantages for the cooperating municipalities.

Next, because our sample is formed with observations from 18 studies, each of them containing a different number of estimations, we might be exposed to problems of dependence across observations (Nelson and Kennedy, 2009; Ringquist, 2013). To deal with within-study autocorrelation, we follow Ringquist's (2013: 218) suggestion and employ generalized estimating equations (GEE) to estimate a random effects meta-regression model.[6] In this way, we obtain both consistently estimated coefficients and standard errors. The GEE results, shown in the right-hand column of Table 4, are very similar to those from the robust OLS estimation. The only difference was presented by *YearData*, which was significant at the 1% level and now is only significant at the 10% level. As a check, we estimated a random effects generalized least squares model to determine the robustness of our results. Right-hand column in Table 4 shows the results. All the conclusions reported above continue to apply with the

[6] Nelson and Kennedy (2009) and Ringquist (2013) discuss other potential sources of dependence across observations, including common data sets and common research teams employed in distinct studies. Here, it should be stressed that in our database no data set was used in more than one study. In the case of research teams, note that studies attributable to the same researchers used different data sets, were usually undertaken in different jurisdictions and/or used different estimation techniques. For these reasons, we believe we have no other relevant problems of dependence across observations, apart from the number of estimations conducted in each study.

exception that the significance of *YearData* disappears while that of *Panel* and of *Population* increases (from 5 to 1%).

7. An extension of the analysis of service-related transaction costs

The transaction costs associated with IMC are related to the characteristics of the collaboration activities in which the municipalities engage (Hawkins, 2017). By classifying the service-related transaction costs, we can take into account the nature of the service provided, which should help disentangle the relationship between service-related transaction costs and IMC costs. The two characteristics we can focus on are, on the one hand, asset specificity; and, on the other, ease of measurement. Asset specificity can be defined as the level of specific physical infrastructure or technical knowledge needed, while ease of measurement can be defined as quantifiability in contractual terms (Brown, Potoski, and Van Slyke 2015). Based on these theoretical outcomes, we can formulate the following hypotheses:

Hypothesis 2a: Asset specificity is positively related to the cost advantages of IMC.
Hypothesis 2b: Ease (difficulty) of measurement is negatively (positively) related to the cost advantages of IMC.

To analyze these two hypotheses, we checked the studies that assessed services based on more than one of their dimensions. We took the indicators for asset specificity from Brown and Potoski (2005) and Hefetz and Warner (2012): that is, AS_B&P and AS_H&W, respectively. The ease of measurement indicator is taken from Brown and Potoski (2005): that is, EM_B&P, while the indicator of contract management difficulty (which embeds ease/difficulty of measurement) is taken Hefetz and Warner (2012): that is CMD_H&W. We run GEE estimations by introducing each of these factors sequentially.[7] Table 5 shows the results. When we consider AS_B&P and EM_B&P measures, we find that neither helps account for differences in the IMC cost results. However, when we include in the estimation the AS_H&W and the CMD_H&W measures a somewhat different picture emerges: both asset specificity and contract management difficulty are significant (the first one at the 10% level and the second at the 5% level), and are associated with IMC cost advantages. Note however, that we need to be very cautious in our interpretation of these results. Indeed, they point to the need for further research to disentangle more fully the relationship between service-related transaction costs and service costs under IMC.

[7] We lost three observations when assigning TC measures from Brown and Potoski (2005) and Hefetz and Warner (2012) to services in estimations, because we could not assign precise values to youth recreation, economic development and promotion, and zoning and planning, all three from Bel, Qian, and Warner (2016). For estimations including various services, we used the average values for the measures in Brown and Potoski (2005) and Hefetz and Warner (2012).

Table 5: Asset Specificity and Ease of Measurement

Variables	AS B&P	E(D)M B&P	AS H&W	CMD H&F
Sample Size	2.39E-05 (4.43E-05)	4.10E-05 (5.41E-05)	3.87E-05 (5.22E-05)	5.23E-05 (6.07E-05)
Year Data	-0.267** (0.125)	-0.241* (0.126)	-0.245* (0.127)	-0.225* (0.135)
US_1	-2.359 (1.637)	-2.438 (1.820)	-2.071 (1.630)	-1.936 (1.732)
Multiservice	3.614*** (1.053)	3.313*** (0.618)	3.915*** (0.770)	3.863*** (0.652)
Panel	-3.591** (1.705)	-3.671** (1.664)	-3.715** (1.628)	-3.818** (1.732)
Population	6.84E-06*** (2.40E-06)	6.39E-06** (3.25E-06)	6.1E-06* (3.17E-06)	5.92E-06 (3.70E-06)
Delegation	-6.076*** (0.873)	-5.951*** (0.936)	-6.083*** (0.956)	-6.015*** (1.005)
AS_B&P	-0.661 (1.439)	-	-	-
EM_B&P	-	-0.651 (0.635)	-	-
AS_H&W	-	-	-0.971* (0.505)	-
CMD_H&W	-	-	-	-1.244** (0.602)
Constant	539.814** (247.340)	488.238** (251.718)	496.429** (253.024)	457.099 (268.700)
#observations	108	108	108	108
Wald(Chi)^2	94.42	134.39	119.72	153.63
Prob>Chi^2	0.000***	0.000***	0.000***	0.000***

Note: Standard errors in parenthesis. ***Significant at 1% level; **Significant at 5% level; *Significant at 10% level

8. Robustness Tests

As the funnel plot (Figure 1) shows, our sample might suffer from problems of 'publication bias'. In this section we test for its presence and evaluate its relevance. First, we conducted the funnel asymmetry test (FAT) to check for the presence of 'publication bias' both in terms of study precision (FAT 1) and sample size (FAT 2), as recommended by Stanley (2008) and Stanley and Doucouliagos (2012). In the absence of any bias, the estimations should be randomly spread around the 'true effect'. However, if the effect observed correlates with the standard error then we need to test whether the publication selection has a genuine effect (Stanley 2008). Additionally, Begg and Berlin (1988) argued that 'publication bias' can also be caused by overlooking the variability in sample sizes. If the sample size is small, it is likely that the estimates' variability will be greater. Similarly, if there is no 'publication bias', the graph depicting sample size and effect size should be symmetrical.

Table 6 shows the results from the FAT tests. The key issue is the significance of the intercept and its sign, which in turn reflects the sign of the bias (Stanley 2008). Here, both in FAT (1) and FAT (2), the constant is negative and significant at the 1% level, which means 'publication bias' is a relevant concern in our database. Furthermore, we can analyze the presence of a genuine empirical effect – regardless of the 'publication bias'. The meta-significance test (MTS) is based on the ability of the statistical power to provide evidence of a genuine empirical effect based on the relation between the t-value and the degree of freedom. According to the MTS result shown in Table 6, we can see that this genuine effect is negative; that is, we find a genuine negative effect of IMC on costs. This, in turn, helps to explain the results of FAT(1) and FAT(2).

Table 6: Funnel Asymmetry (FAT) and Meta-Significance (MTS) Tests

	FAT(1)	FAT(2)	MTS
Precision	0.001***		
	(0.000)		
SQR_SampleSize		0.006	
		(0.006)	
log_df			-0.169**
			(0.066)
Constant	-1.386***	-1.491***	0.660***
	(0.300)	(0.452)	(0.180)
#observations	111	111	111
R-squared	0.012	0.004	0.047
F	11.19***	0.79	6.65**

Note: (robust) standard errors in parenthesis; ***Significant at 1 percent level; **Significant at 5 percent level; *Significant at 10 percent level

To assess the potential effect of publication bias on our results, we have estimated two FAT meta-regressions (Stanley, 2005), replacing sample size first with study precision (the inverse of standard error) and then with the square root of sample size. Both FAT meta-regressions, employing the two different estimation techniques, give identical results to those found in our original meta-regressions, above all in the case of the theory-related variables. Table 7 shows the results of the FAT meta-regressions. For the sake of simplicity, we include only the GEE estimation (OLS, Robust OLS and GLS results are available upon request). Thus, we can conclude that 'publication bias' does not undermine our results.

Table 7: FAT meta-regressions

	FAT1 GEE	FAT2 GEE
Precision (Inverse SE)	7.38E-04*** (2.10E-04)	-
SQRSampleSize	-	0.008 (0.011)
Year Data	-0.283*** (0.091)	-0.237* (0.126)
US	-1.510 (1.309)	-1.638 (1.476)
Multiservice	4.207*** (1.261)	3.915*** (0.962)
Panel	-3.620** (1.507)	-3.898** (1.719)
Population	6.62E-06** (2.59E-06)	6.27E-06** (3.09E-06)
Transaction costs	-0.629 (0.517)	-0.695 (0.524)
Delegation	-6.301*** (1.017)	-5.960*** (0.832)
Constant	570.695*** (182.698)	477.847* (251.569)
#observations	111	111
Wald(Chi)^2	185.78	97.18
Prob>(Chi)^2	0.000***	0.000***

Note: (robust) standard errors in parenthesis. ***Significant at 1% level; **Significant at 5% level; *Significant at 10% level

9. Discussion and Conclusion

This study has sought to provide an explanation for the diverging empirical results of the effects of inter-municipal cooperation on service delivery costs, and, within this framework, to determine whether theoretical expectations about IMC play a relevant role in explaining these results. We have paid particular attention to hypotheses concerning economies of scale, service-related transaction costs and governance arrangements.

After carefully building a database of all homogenous multivariate studies that have addressed the issue, we employed a meta-regression methodology. We obtained interesting insights into the role played by the environmental and technical variables; thus, studies that rely on more recent databases tend to find greater cost advantages of IMC. The same holds true for studies that focus on single services and those that employ panel data. More importantly, we found that studies conducted in

municipalities with small population sizes tend to find ICM more cost advantageous, which is consistent with the hypothesis we formulate in relation to scale economies. We also found that the studies in which the governance of cooperation is delegated to supramunicipal governments tend to find ICM more cost advantageous. However, we did not find any significant overall relationship between service-related transaction costs and the cost advantages of IMC. When decomposing transaction costs into asset specificity and contract management difficulty we found a slightly significant positive effect of transaction costs on the cost advantages of ICM. These results, though, should be treated as preliminary findings because they are neither systematic across estimations, nor statistically strong. Indeed, more empirical research on transaction costs and IMC is encouraged.

Our research provides interesting results with considerable implications for the effects of IMC on costs. Unfortunately, however, we have not been able to consider here questions of service quality, given that the empirical evidence is extremely scarce. Yet, we believe the main implication that can be drawn by policy makers from our results is that 'one size does not fit all': IMC can be cost advantageous for some services, but not for others. The possibility of exploiting scale economies, particularly in the case of small municipalities, seems to be robustly associated with cost savings. Moreover, just how the governance of the cooperation is arranged matters, highlighting the need to give careful consideration to the coordination and supervision costs involved.

References

Aldag, Austin M. and Mildred Warner. 2018. "Cooperation, Not Cost Savings : Explaining Duration of Shared Service Agreements of Shared Service Agreements." *Local Government Studies* 44(3): 350–70.

Allers, Maarten A., and J.A. Tom de Greef. 2018. "Intermunicipal Cooperation, Public Spending and Service Levels." *Local Government Studies* 44(1): 127–50.

Argento, Daniela, Giuseppe Grossi, Torbjörn Tagesson and Sven-Olof Collin 2010. The 'externalisation' of local public service delivery: experience in Italy and Sweden. *International Journal of Public Policy* 5(1): 41-56.

Begg, Colin B., and Jesse A. Berlin. 1988. "Publication Bias: A Problem in Interpreting Medical Data." *Journal of the Royal Statistical Society. Series A (Statistics in Society)* 151(3): 419–63.

Bel, Germà, and Melania Mur. 2008. "Intermunicipal Cooperation and Privatization of Solid Waste Services among Small Municipalities in Spain." IREA – Working Papers, IR08/16

Bel, Germà, and Antón Costas. 2006. "Do Public Sector Reforms Get Rusty? Local Privatization in Spain." *The Journal of Policy Reform* 9(1): 1–24.

Bel, Germà, and Xavier Fageda. 2008. "Local Privatization , Intermunicipal Cooperation , Transaction Costs and Political Interests : Evidence from Spain." *Research Institute of Applied Economics 2008, Working Papers* 4: 1–23.

Bel, Germà, and Xavier Fageda. 2009. "Factors Explaining Local Privatization: A Meta-Regression Analysis." *Public Choice* 139(1–2): 105–19.

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 E. 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): 553–77.

Bel, Germà, and Melania Mur. 2009. "Intermunicipal Cooperation, Privatization and Waste Management Costs: Evidence from Rural Municipalities." *Waste Management* 29(10): 2772–78.

Bel, Germà, Bingxi Qian, and Mildred E. Warner. 2016. *It depends on what you share: cooperation in the delivery of local public services and costs*. Paper presented in the Amsterdam Workshop on Cooperation and Privatization (Free University-Amsterdam, Netherlands, 5 December 2016)

Bel, Germà, and Mildred E. Warner. 2015. "Inter-Municipal Cooperation and Costs: Expectations and Evidence." *Public Administration* 93(1): 52–67.

Bel, Germà, and Mildred E. Warner. 2016. "Factors Explaining Inter-Municipal Cooperation in Service Delivery: A Meta-Regression Analysis." *Journal of Economic Policy Reform* 19(2): 91–115.

Bergholz, Christian and Ivo Bischoff. forthcoming. Local council members' view on intermunicipal cooperation: does office-related self-interest matter? *Regional Studies*, forthcoming, doi.org/10.1080/00343404.2018.1428293

Blaeschke, Frédéric, and Peter Haug. 2018. "Does Intermunicipal Cooperation Increase Efficiency? A Conditional Metafrontier Approach for the Hessian Wastewater Sector." *Local Government Studies* 44(1): 151–71.

Blåka, Sara. 2017. "Does Cooperation Affect Service Delivery Costs? Evidence from Fire Services in Norway." *Public Administration* 95(4): 1092–1106.

Bouckaert, Geert, B. Guy Peters and Koen Verhoest (2010). *Coordination of Public Sector Organizations. Shifting Patterns of Public Management*. London: Palgrave MacMillan.

Bovaird, Tony. 2014. "Efficiency in Third Sector Partnerships for Delivering Local Government Services: The Role of Economies of Scale, Scope and Learning." *Public Management Review* 16 (8): 1067–1090.

Brown, Trevor L. 2008. "The Dynamics of Government-to-Government Contracts." *Public Performance & Management Review* 31(3): 364–86.

Brown, Trevor L., and Matthew Potoski. 2003. "Managing Contract Performance: A Transaction Costs Approach." *Journal of Policy Analysis and Management* 22(2): 275–97.

Brown, Trevor L., and Matthew Potoski 2005. "Transaction Costs and Contracting: The Practitioner

Perspective." *Public Performance & Management Review* 28(3): 326–51.

Brown, Trevor L, Matthew Potoski, and David M Van Slyke. 2015. "The Impact of Transaction Costs on the Use of Mixed Service Delivery by Local Governments." *Journal of Strategic Contracting and Negotiation* 1(4): 239–67.

Card, David, Jochen Kluve & Andrea Weber, 2010. "Active Labour Market Policy Evaluations: A Meta-Analysis," *Economic Journal, Royal Economic Society*, vol. 120(548)

Card, Noel A. 2012. *Applied Meta-Analysis For Social Science Research*. New York: The Guilford Press.

Carr, Jered B, Kelly LeRoux, and Manoj 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.

Da Cruz, Nuno F., and Rui C. Marques. 2012. "Mixed Companies and Local Governance: No Man Can Serve Two Masters." *Public Administration* 90 (3): 737–758.

Dijkgraaf, Elbert, and Raymond H J M Gradus. 2013. "Cost Advantage Cooperations Larger than Private Waste Collectors."*Applied Economics Letters* 20(7): 702–5.

Dijkgraaf, Elbert, and Raymond Gradus. 2014. "Handbook on Waste Management." In eds. T Kinnaman and K Takeuchi. Cheltenham: Elgar Publishers, 1–39.

Dixit, Avinash. 1973. "The Optimum Factory Town." *The Bell Journal of Economics and Management Science* 4(2): 637.

Dollery, Brian, Alexandr Akimov and Joel Byrnes. 2009. Shared Services in Australian Local Government: Rationale, Alternative Models and Empirical Evidence. *Australian Journal of Public Administration*, 68, 2, 208–19.

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.

Ferraresi, Massimiliano, Giuseppe Migali, and Leonzio Rizzo. 2018. "Does Intermunicipal Cooperation Promote Efficiency Gains? Evidence from Italian Municipal Unions." *Journal of Regional Science* forthcoming.

Frère, Quentin, Matthieu Leprince, and Sonia Paty. 2014. "The Impact of Intermunicipal Cooperation on Local Public Spending." *Urban Studies* 51(8): 1741–60.

Gailmard, Sean. 2009. Multiple Principals and Oversight of Bureaucratic Policy-Making. *Journal of Theoretical Politics* 21(2): 161-186

Garrone, Paola, Luca Grilli, and Xavier Rousseau. 2013. "Management Discretion and Political Interference in Municipal Enterprises. Evidence from Italian Utilities." *Local Government Studies* 39(4):

514–40.

Geertsema, Bieuwe. 2017. *The Economic Effects of Municipal Amalgamation and Intermunicipal Cooperation*. University of Groningen. PhD Dissertation.

Giacomini, Davide, Alessandro Sancino, and Anna Simonetto. 2018. "The introduction of mandatory inter-municipal cooperation in small municipalities: Preliminary lessons from Italy", *International Journal of Public Sector Management*, 31(3): pp.331-346

Girth, Amanda M., Amir Hefetz, Jocelyn M. Johnston, and Mildred E. Warner. 2012. "Outsourcing Public Service Delivery: Management Responses in Noncompetitive Markets." *Public Administration Review* 72(6): 887–900.

Hawkins, Christopher V. 2017. "Political Incentives and Transaction Costs of Collaboration among US Cities for Economic Development." *Local Government Studies* 43(5): 752–75.

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 Intermunicipal Contracting: The US Local Government Experience 1992–2007." *Environment and Planning C: Government and Policy* 30(4): 675–92.

Holmgren, Johan, and Åsa Weinholt. 2016. "The Influence of Organisational Changes on Cost Efficiency in Fire and Rescue Services." *International Journal of Emergency Management* 12(4): 343.

Holzer, Marc and John C. Fry. 2011. *Shared Services and Municipal Consolidation: A Critical Analysis*. Alexandria, VA: Public Technology Institute.

Honadle, Beth W. 1984. 'Alternative Service Delivery Strategies and Improvement of Local Government Productivity', Public Productivity Review, 8, 4, 301–13.

Hulst, Rudie J., and André J. G. M. van Montfort. 2011. "Institutional Features of Inter-Municipal Cooperation: Cooperative Arrangements and Their National Contexts." *Public Policy and Administration* 27(2): 121–44.

Jarrell, Stephen B., and T. D. Stanley. 1989. "Meta-Regression Analysis: A Quantitative Method of Literature Surveys." *Journal of Economic Surveys* 3(2): 161–70.

Jensen, Michael C., & William. F. Meckling. 1976. Theory of the firm: Managerial behavior, agency costs, and ownership structure. *Journal of Financial Economics*, 3: 305–360

Klok, Pieter Jan, Bas Denters, Marcel Boogers, and Maurits Sanders. 2018. "Intermunicipal Cooperation in the Netherlands: The Costs and the Effectiveness of Polycentric Regional Governance." *Public Administration Review* 0: 1–10.

Ladd, Helen F. 1992. "Population Growth, Density and the Costs of Providing Public Services." *Urban Studies* 29(2): 273–95.

Levin, Jonathan, and Steven Tadelis. 2010. "Contracting For Government Services: Theory and Evidence From U.S. Cities." *The Journal of Industrial Economics* LVIII (3): 507–41.

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. 2007. "Outsourcing Oversight: A Comparison of Monitoring for In-House and Contracted Services." *Public Administration Review* 67(3): 521–30.

Mirrlees, James A. 1972. "The Optimum Town." *The Swedish Journal of Economics* 74(1): 114.

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.

Nelson, Jon, and Peter E. Kennedy. 2009. The use (and abuse) of meta-analysis in environmental and natural resource economics: an assessment. *Environmental and Resource Economics* 42(3), 345–377.

Niaounakis, Thomas, and Jos Blank. 2017. "Inter-Municipal Cooperation, Economies of Scale and Cost Efficiency: An Application of Stochastic Frontier Analysis to Dutch Municipal Tax Departments." *Local Government Studies* 43(4): 533–54.

Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press.

Ostrom, V., C.M. Tiebout and R. Warren. 1961. 'The Organization of Government in Metropolitan Areas: A Theoretical Inquiry', *American Political Science Review*, 55, 4, 831–42.

Pérez-López, Gemma, Diego Prior, and José Luis Zafra-Gómez. 2015. "Rethinking New Public Management Delivery Forms and Efficiency: Long-Term Effects in Spanish Local Government." *Journal of Public Administration Research and Theory* 25(4): 1157–83.

Pérez-López, Gemma, Diego Prior, and José L. Zafra-Gómez. 2018. "Temporal Scale Efficiency in DEA Panel Data Estimations. An Application to the Solid Waste Disposal Service in Spain." *Omega* 76: 18–27.

Pérez-López, Gemma, Diego Prior, José Luis Zafra-Gómez, and Ana María Plata-Díaz. 2016. "Cost Efficiency in Municipal Solid Waste Service Delivery. Alternative Management Forms in Relation to Local Population Size." *European Journal of Operational Research* 255(2): 583–92.

Ringquist, Evan J. 2013. *Meta-Analysis for Public Management and Policy*. San Francisco, CA: Jossey-Bass, Wiley & Sons.

Rodrigues, Miguel, Antonio F. Tavares, and J. Filipe Araújo. 2012. "Municipal Service Delivery: The Role of Transaction Costs in the Choice between Alternative Governance Mechanisms." *Local Government Studies* 38(5): 615–38.

Ruggini, John. 2006. Making Local Government More Workable Through Shared Services, *Government Finance Review*, February: 31–35.

Shrestha, Manoj K., and Richard C. Feiock. 2011. "Transaction Cost, Exchange Embeddedness, and

Interlocal Cooperation in Local Public Goods Supply." *Political Research Quarterly* 64(3): 573–87.

Silvestre, Hugo Consciência, Rui Cunha Marques, and Ricardo Corrêa Gomes. 2018. "Joined-up Government of Utilities: A Meta-Review on a Public–public Partnership and Inter-Municipal Cooperation in the Water and Wastewater Industries." *Public Management Review* 20(4): 607–31.

Sørensen, Rune J. 2007. "Does Dispersed Public Ownership Impair Efficiency? The Case of Refuse Collection in Norway." *Public Administration* 85(4): 1045–58.

Soukopová, Jana, and Daniel Klimovský. 2016a. "Intermunicipal Cooperation and Local Cost Efficiency: The Case of Waste Management Services in the Czech Republic." In *MUNI/A/1018/2016*

Soukopová, Jana, and Daniel Klimovský. 2016b. "Local Governments and Local Waste Management in the Czech Republic: Producers or Providers?" *NISPAcee Journal of Public Administration and Policy* 9(2): 217–37.

Soukopova, Jana., Frantisek Ochrana, Daniel. Klimovský, and Beata Mikusova Mericková. 2016. "Factors Influencing the Efficiency and Effectiveness of Municipal Waste Management Expenditure." *Lex Localis* 14(3): 359–78.

Soukopová, Jana, and Tomáš Sládeček. 2018. "Intermunicipal Cooperation in Municipal Waste Management and Its Effects on Cost-Effectiveness." *Waste Forum* (1).

Soukopová, Jana, and Gabriela Vaceková. 2018. "Internal Factors of Intermunicipal Cooperation: What Matters Most and Why?" *Local Government Studies* 44(1): 105–26.

Soukopová, Jana, Gabriela Vaceková, and Daniel Klimovský. 2017. "Local Waste Management in the Czech Republic: Limits and Merits of Public-Private Partnership and Contracting out." *Utilities Policy* 48: 201–9.

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): 103–27.

Stanley, T.D., Doucouliagos, H., 2012. *Meta-regression Analysis in Business and Economics*. Routledge Advance in Research Methods, Routledge, Oxon.

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(2): 390– 94.

Stanley, T.D., Jarrell, S.B., 1989. Meta-regression analysis: a quantitative method of literature surveys. *Journal of Economic Surveys*, 3(1), 54–67.

Stevens, Barbara J. 1978. Market Structure, and the Cost of Refuse Collection. *The Review of Economics and Statistics* 60 (3): pp. 438-448

Tavares, António F., and Pedro J. Camöes. 2007. "Local Service Delivery Choices in Portugal: A

Political Transaction Costs Framework." *Local Government Studies* 33(4): 535–53.

Tavares, Antonio F., and Richard C Feiock. Forthcoming. "Applying an Institutional Collective Action Framework to Investigate Intermunicipal Cooperation in Europe." *Perspectives on Public Management and Governance*: forthcoming. doi.org/10.1093/ppmgov/gvx014

Thurmaier, Kurt, and Curtis Wood. 2002. "Interlocal Agreements as Overlapping Social Networks: Picket-Fence Regionalism in Metropolitan Kansas City." *Public Administration Review* 62(5): 585–98.

Van Thiel, Sandra. 2016. "A principal-agent perspective" in Steven van de Walle and Sandra Groeneveld, eds., *Theory and practice of public sector reform,* 44-60. Abingdon: Routledge

Voorn, Bart, Marieke L. van Genugten & Sandra van Thiel. 2017. The efficiency and effectiveness of municipally owned corporations: a systematic review. *Local Government Studies*, 43(5); 820-841.

Warner, Mildred E. and Germà Bel. 2008. "Competition or Monopoly? Comparing US and Spanish Privatization," *Public Administration*, 86(3): 723-736.

Warner, Mildred E. and Amir Hefetz. 2002. "The Uneven Distribution of Market Solutions for Public Goods," *Journal of Urban Affairs*, 24(4): 445-459.

Warner, Mildred E. and Amir Hefetz. 2003. "Rural-Urban Differences in Privatization: Limits to the Competitive State," *Environment and Planning C: Government and Policy*, 21(5): 703-718. 13.

Williamson, Oliver E. 1999. "Public and Private Bureaucracies: A Transaction Cost Economics Perspective." *The Journal of Law, Economics, & Organization* 15(1): 12–39.

Zafra-Gómez, Jose Luis, Diego Prior, Ana Maria 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.

UB IREA
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/ • **CONTACT:** irea@ub.edu