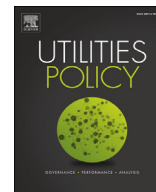


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## Local waste management in the Czech Republic: Limits and merits of public-private partnership and contracting out

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## ABSTRACT

The paper focuses on the efficiency of different forms of local service delivery in the Czech waste collection market, which shows a high degree of concentration. Based on data collected in 2014 from 2065 municipalities, the results of regression analysis indicate that public-private partnerships are more expensive than other delivery forms. Contracting out leads to cost savings, especially for larger municipalities. The results for municipalities with fewer than 500 inhabitants show that a crucial role in municipal cost reduction is played by inter-municipal cooperation.

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### 1. Introduction

The increasing importance of municipal waste management and its efficiency is a broadly discussed topic, both in terms of theory and practical experience (e.g. [Bel and Costas, 2006](#); [Bel and Warner, 2015](#); [Bel et al., 2010](#); [Callan and Thomas, 2001](#); [Dijkgraaf and Gradus, 2007, 2013](#); [Gradus et al., 2014, 2016](#); [Levin and Tadelis, 2010](#); [Ohlsson, 2003](#); [Simões and Marques, 2012a](#); [Simões et al., 2012a](#); [Sørensen, 2007](#); [Zafra-Gómez et al., 2013](#)). Our main intention is to contribute to the ongoing academic debate on this issue.

The field of local public service delivery has experienced profound changes worldwide ([Osborne and Brown, 2005](#)). Although the efficiency of public service delivery might not be a novel research topic, recent growing budget restrictions and decentralization processes have led to inter alia, a kind of worldwide ‘research tsunami’ aimed at efficient public service delivery at all governmental levels.

Whilst the majority of international studies are strictly focused on the importance of the form of production (i.e. public, private, or mixed – PPPs), statistically, clearer, more significant results are provided by the studies focused on competitiveness and forms of

delivery, including external provision (contracting out). In addition, different forms of delivery lead to different results ([Simões and Marques, 2011](#)). Within this context, we wanted to test for links between the forms of service provision and production, and to reveal potential contradictory or synergistic effects.

Obviously, these issues are closely connected to the problems of suboptimal local government size, as well as to the phenomena of economies or diseconomies of scale. Speaking on these issues, it was necessary to take into account the fact that several approaches to evaluate the performance of waste services have been used in recent years. While some authors prefer a nonparametric approach (e.g. [Simões and Marques, 2011, 2012b](#); [Simões et al., 2012b](#)), there is also a group that prefers a parametric approach (e.g. [Bel and Costas, 2006](#); [Bel and Mur, 2009](#); [Bel and Warner, 2015](#); [Bel et al., 2010](#); [Callan and Thomas, 2001](#); [Dijkgraaf and Gradus, 2007, 2013](#); [Gradus et al., 2014, 2016](#); [Sørensen, 2007](#); [Zafra-Gómez et al., 2013](#)). The paper is based on a parametric approach due to the distribution of municipal expenditure data and individual explanatory variables.

We studied the relationship between local waste management costs and selected factors affecting cost efficiency, and paid special attention to: (1) forms of service production (public/private/PPPs), outsourcing, internal production, cooperation, market structure, economies of scale, and multinational corporations, and (2) the size structure of local governments. The following research questions were set:

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**RQ1.** How is the cost efficiency of local waste collection services affected by contracting out?

**RQ2.** How are forms of service production and provision interconnected? Is there a contradictory or a synergistic effect?

**RQ3.** Is the cost efficiency of local waste collection services affected by PPPs? If so, how?

This paper seeks to answer these questions and to establish a possible basis for their solutions.

### 1.1. Literature overview

As stated by Gradus et al. (2014), the debate concerning contracting out, and the privatization of local public services is shifting from an ideological debate to a more systematic discussion of the political and economic factors that determine the form of service delivery (e.g. Bel and Costas, 2006; Bel and Mur, 2009; Bel et al., 2010; Benito et al., 2015; Callan and Thomas, 2001; Dijkgraaf and Gradus, 2007; Gradus et al., 2016; Hefetz and Warner, 2012; Lombrano, 2009; Ohlsson, 2003).

International empirical research has attempted to investigate if, and to what extent, there are differences in performance between the public and private production of local services. Before 2000, Domberger et al. (1986) and Domberger and Jensen (1997) showed that private production of local services led to efficient delivery for a number of government services. However, recent evidence of the cost efficiency of private production is rather ambiguous (Appendix A).

When viewing the mixed production of public services, the initial literature concerning mixed enterprise collaboration was largely normative, rather than positive descriptive, or analytical (e.g. Boardman and Vining, 1991).

Also, public utility regulation is not a new issue (e.g. Bennett and Iossa, 2006; Rosenau, 2000; Hart, 2003). For instance, in the 1960s, Demsetz stressed that although public utility regulation had been criticized because of its ineffectiveness or because of its undesirable indirect effects, the basic intellectual arguments for believing that truly effective regulation is desirable had not been challenged (Demsetz, 1968).

The relationship between the external provision and efficiency has been examined by dozens of authors in recent decades, especially in the US, Canada, and the UK (Callan and Thomas, 2001; Collins and Downes, 1977; Domberger et al., 1986; Kay and Thompson, 1986; etc.). This research trend arrived later in other European countries, including Spain (Bel and Costas, 2006; Bel and Warner, 2008; Bel et al., 2014; Benito et al., 2015), the Netherlands (Dijkgraaf and Gradus, 2007; Gradus et al., 2014, 2016), and Italy (Lombrano, 2009). The results of some international studies (e.g. Domberger et al., 1986; Gradus et al., 2016) indicate that contracting out is cheaper than the internal delivery of public services. However, Hirsch (1965) and Pier et al. (1974) examined local governments in the US and demonstrated that the difference between outsourcing and internal delivery is not significant in terms of expenditure.

More recent economic literature identifies financial constraints and political and legal institutions as determinants of government decisions to contract out (e.g. Bortolotti et al., 2001). EU institutions, national governments, and local public authorities are paying increasing attention to cooperation with the private sector in the form of PPPs (Cabrera et al., 2015; Cruz and Marques, 2012; Leviäkangas et al., 2016; Marques and Berg, 2011; Marra, 2006). PPPs are highly relevant in discussions of the effective and efficient delivery of public services (Papenfuß, 2003).

Questions can be raised about the extent to which these partnerships will promote the public interest and defend collective

interests. International institutions, policy makers, and scholars have become interested in this issue, in particular, the EU (COM 327/2004) suggested implementing different types of PPPs in the delivery of public utilities (Monteduro, 2014). There are four explanations for mixed enterprise collaboration (Gradus et al., 2014; Marra and Carlei, 2014): cost efficiency and budget constraints (Hebdon and Jalette, 2008; Perotti and Van Oijen, 2001; Warner and Hefetz, 2002); stock market liquidity (Faure-Grimaud, 2002; Levine, 1997; Pagano, 1993); ideology and political preferences (Biais and Perotti, 2002; Kikeri et al., 1992); and legal origins (La Porta et al., 1998).

Concerning the results stemming from the literature overview provided, and the research questions set, the paper is structured as follows: the first sub-chapter provides a concise description of the material and the scientific methods used by focusing on data and sources, the structure of the waste collection market in the Czech Republic, and the empirical model. The second part of the paper contains the evaluation and exact description of the achieved results and their statistical significance. The third section is devoted to a discussion, and provides a comparison of the achieved results and previously published papers, our own opinion of the established differences, and our attitude towards the results. Furthermore, we outline the need for further solutions and the importance of developing the research field, society, and practice. The concluding part of this paper provides a concise summary of the most important findings in relation to the paper's focus.

## 2. Materials and methods

### 2.1. Data and sources

The research was carried out on data collected for 2014. The sample consisted of 2065 municipalities located in four regions of the Czech Republic (South Moravian Region, Olomouc Region, Vysočina Region, and Zlín Region).

The analysis utilized linked open data on municipal areas and populations from the Czech Statistical Office (CZSO), and linked open data on the costs of the waste collection service to the Czech municipalities from MONITOR, the specialized information portal of the Ministry of Finance of the Czech Republic. The data relating to the form of delivery, intermunicipal cooperation, economies of scale, PPPs, etc., were obtained via a questionnaire-based survey. The survey was carried out from September 2015 to the end of January 2016.

It was necessary to clean the data to achieve a standard data distribution. This was obtained after the data had been cleaned by 5% due to extreme values (50 lowest values and 53 largest values). The data set contained 1962 municipalities after sample cleaning. In order to perform a statistical data analysis, the municipalities were divided into three population size categories: 1) fewer than 500 inhabitants 2) 501–1000 inhabitants; and 3) more than 1000 inhabitants.

The Czech Republic has one of the highest territorial fragmentations of municipalities in Europe. There are many small municipalities with fewer than 500 inhabitants (more than 48% of all municipalities), and municipalities with 501 to 1000 inhabitants (more than 33% of all municipalities) in the Czech Republic. Municipalities with more than 1000 inhabitants form only 18% of all municipalities (see Table 1). The structure of the research sample corresponded relatively well to the structure of municipalities in the Czech Republic (see Table 1).

### 2.2. The market structure

Each Czech municipality is represented by a local government

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