

COMPETITION AND MUNICIPAL WASTE MANAGEMENT EXPENDITURE: EVIDENCE FROM THE CZECH REPUBLIC, OLOMOUC REGION

Jana Soukopová, Gabriela Vaceková

Abstract: *Today, the increasing importance of waste management and the question of its efficiency is a broadly discussed topic, both on the theoretical and practical level. The present paper provides the results of a comprehensive analysis of the competitiveness of the environment with regard to waste management in the Czech Republic, Olomouc Region, while focusing on its effects on municipal waste management expenditure. The main goal of the paper is to examine and evaluate the impact of the competitiveness of the environment on cost-effectiveness of municipal waste management expenditure by using the Herfindahl-Hirschman Index (HHI) and a competition index of our own design. We compare expenditure per capita for several municipality size groups. Moreover, the data have also been analysed separately for the each of the five districts of the Olomouc Region in order to identify whether there are any significant differences among the districts within the region. The analysed period covers 5 years - from 2010 to 2014 - and the sample consists of all 399 municipalities of the Olomouc Region. The HHI results confirm that the competitive environment has a significant impact on municipal expenditure, but our competition index results show impact of competition as ambiguous.*

Keywords: *Competition, Waste management, Municipality, Efficiency, Costs.*

JEL Classification: *H76, C40.*

Introduction

In recent decades, numerous studies have tried to discover ways of achieving greater efficiency in the provision of public services ([2-5], [7-10], [14-15], [19-21] and [23], among others). Interest in this question increased further with the economic and financial crisis, and the issue has remained topical even after it. In view of this situation, it is necessary to reopen the debate regarding the search for greater efficiency, with particular emphasis on factors that enable the costs of service provision to be reduced [5].

Due to the fact that municipal expenditure on solid waste management from 2012 to 2014 was more than 60 % of current total environmental protection expenditure, and accounts on average for 3 % of total current municipal expenditure in the Czech Republic, it is obvious that waste management expenditure is an integral and indispensable part of municipal budgets. It is therefore a suitable target for measures aimed at saving public resources.

Defining and measuring efficiency, or in other words, the process of using resources and their transformation into outputs and outcomes, seems to be one of the biggest issues in contemporary research. Over the last several decades, great improvements and advances have been made with regard to efficiency evaluation and its methods. However, it still remains a conceptual challenge in relation to public expenditure. This issue is also complicated by the fact that public sector outcomes are off-market, resulting in a current

lack of relevant data and thus making efficiency improvements in this area impossible to quantify.

A lot of research has been conducted regarding factors influencing the cost-effectiveness of public services provision ([2-5], [7-10] [14-15], [19-21] and [23-24], among others). Unfortunately, this is not the case with the Czech Republic. To fill this gap and initiate the performance of systematic efficiency oriented research dealing with public services in the Czech Republic, we chose refuse collection services as a case study.

Most of the above research studies ([2-5], [7-10] [14-15], [19-21] and [23-24], among others) investigated factors affecting municipal refuse collection expenditure. (i.e. economies of scale, mode of production, inter-municipal cooperation, market structure, etc.); see the following table.

Tab. 1: Factors influencing the cost-effectiveness of municipal waste collection

Factor	Research
Output - Quantity of service (amount of waste, number of pick up points, etc.)	[2-7], [10-13], [17], [21-22] [25]
Population density or housing density	[2-3], [9-11], [16]
Frequency	[4], [9-11]
Political influence	[10], [13]
Recycling	[6], [16]
Competition and market structure	[3-6], [9], [17-23], [25]
Conditions of contract	[6], [9-10], [12], [25]
Mode of production (private/public/mix)	[5-6], [9-10], [17], [25], [18-19]
Economies of scale	[10], [17]
Inter-municipal cooperation	[5], [10]

Source: The authors

From Table 1 it is clear that competition is one of the most investigated factors. We have therefore chosen competition as the main factor for our analysis.

Competition plays a crucial role in the provision of public services at the local level. As many authors have stated in the recent past (e.g. [3-6] and [24]), there is strong evidence that competition is one of the most significant factors influencing the efficiency and cost ratio of municipal waste service delivery. Furthermore, competition prevents the exploitation of dominance on the market [1], has the potential to generate innovation [14], and represents an important factor promoting the benchmarking of service prices and quality among municipalities [26]. Thus, lack of competition: a) diminishes the pressure to provide services efficiently and b) increases the pressure on public expenditure.

When analysing the solid waste management policy and expenditure of municipalities in the Olomouc Region we examined the impact of competition in the provision of waste management services. Our previous studies [18-20] had addressed a slightly broader topic and tested whether competition had a significant impact on waste handling price levels.

This study deals with a more specific question in order to extend our previous results. We are interested in the “spatial” aspects of competition while using the Herfindahl-Hirschman Index as a measurement method. Our research questions are:

- Does competition have a significant influence on municipal waste management expenditure and cost-effectiveness?
- Are there any differences in statistical significance from the perspective of the research method (the Herfindahl-Hirschman Index and a competition index of our design based on the number of competing companies in municipalities neighboring on a given municipality)?
- Is the Herfindahl-Hirschman Index usable for the evaluation of the cost-effectiveness of municipal waste management expenditure?

The aim of the paper is therefore to analyse the strength of competition as a factor influencing municipal waste management expenditure in the Czech Republic, Olomouc Region, with the use of the HHI, and to discuss the relationship between this factor and cost efficiency.

The paper is structured so as to present the answers to our research question. The first part of the paper provides data about the competitive environment. The second part presents the HHI results. In the final part we discuss these results and formulate conclusions.

1 Competition as a cost efficiency factor

One of the benefits of competition is that it offers efficiency growth and reduces expenditure. Indeed, many research papers (e. g. [4-7], [17] and [25]) provide evidence that a competitive environment in the production of public services, such as waste collection, could result in the efficient provision of such services, and cost savings in the area of service delivery.

A lot of research has been conducted to date regarding competition as a factor influencing the effectiveness of the provision of waste management services (e.g. [3-7], [9-12] [16-17], [21-23] and [25]). The first research papers on competition as an actor influencing the cost of waste management were published by Savas in 1977. His research results show that competition has an impact on the level of public spending.

Savas [17] notes that the larger cities in areas with more than 50,000 inhabitants have lower expenditure on waste management due to the greater number of service providers associated with waste collection in their area, i.e. due to higher competition. The reason for the conclusion of contracts with different providers was the effort to maintain a healthy competitive environment.

Some literature shows that competitive tendering is more important than ownership and other factors. For example Domberger et al. [11] and Dijkgraaf and Gradus [10] discovered that competitive tendering is cheaper than in-house production.

Domberger et al. [11] focused on 305 municipalities in England and Wales from 1983 to 1985 (before competitive tendering was made compulsory). They ascertained that in places where competitive contracting did not occur, public expenditure was higher. According to Gomez-Lobo and Szymanski [13], “*where there are larger numbers of bidders, there are more cost savings*”. Competition encourages public managers to keep expenditure down. Szymanski and Wilkins [23] found similar results in the 1984-1988

period. They found that 20% savings were made in the first year, but these savings disappeared in 2 years, suggesting underbidding by contractors.

Dijkgraaf and Gradus [9-10] discussed possible cost savings from competition and the contracting out of refuse collection in the Netherlands. Reeves and Barrow [16] presented the first analysis of the impact of privatising the provision of refuse collection services on expenditure in Ireland by means of competitive tendering, etc.

2 Methods

The total waste management expenditure of a municipality is determined by its population [a proxy for the amount of waste generated] and variables that affect the requirements of input (density, recycling, competition, mode of production, cooperation, etc.). Population is the most significant variable, and therefore we have transformed the absolute expenditure and population values into relative ones (expenditure per capita; the proportion of the population found in each age category) and therefore did not incur the problem of heteroscedasticity that would otherwise usually occur with data (i.e. when estimating a model with some municipalities that are greatly larger than the others).

In order to confirm the assumption that competition has a significant influence on municipal waste management expenditure and efficiency we use a combination of methods comprising descriptive statistics, group theory and cluster analysis.

We reduced the sample by removing all municipalities reporting the absence of (or a zero value for) municipal solid waste management expenditure (MSWME). We found that if there is a municipality that provides waste management services internally, it may distort the analysis results. However, there aren't any municipalities which provide waste management services themselves in the Olomouc Region. All of them use private contractors. We then sorted the sample based on MSW expenditure per capita and removed the extreme values from the top and bottom of the list (trimming the top and bottom 0.5% municipalities from the list, resulting in a sample of 386 municipalities). Besides that, no adjustments to the sample were made.

After creating five groups of municipalities according to district we used statistical analysis and the Herfindahl-Hirschman Index to compare data on the mean value (average expenditure), median value and the standard deviation of expenditure per capita with the total data set from the whole Olomouc Region (386 municipalities).

The strength of the competitive environment according to the HHI was also examined within each district separately and compared with our competition index (CI), which is based on the number of competing companies in municipalities neighboring on a given municipality². We used statistical analysis and group theory and compare the average expenditure of 6 groups of municipalities with the same results of our competition index (0-5).

We were then able to compare the results of the two methods.

The OLS regression model was used by the authors of previous research papers [4-7], [9-10] and [12-14], but without obtaining comparable results because of the different

² We base this approach on the premise stated in [16-17] that the influence of competition is greater among municipalities that have neighbours that use a different contract partner, since there are lower marginal costs for a competing company that is considering expansion and taking over the provision of services to a new client (municipality). In the Olomouc Region the minimum value obtained from our CI is 0 and the maximum is 5.

variables used to represent competition. We propose that our approach can show the weaknesses in the above-mentioned studies and prove whether it is possible to use the HHI in the OLS model.

2.1 The Herfindahl-Hirschman Index and our competition index

The Herfindahl-Hirschman Index (HHI) for the assessment of the absolute concentration of industry is currently one of the standard tools that are used to analyse the distribution of market share between firms in a given industry. The index takes into account both the number of firms in the chosen sector as well as their market share. The HHI is calculated by squaring the market share of each firm competing in the market and then summing the resulting numbers.

The HHI formula is written:

$$H = h(q_1, q_2, \dots, q_n) = \sum_{i=1}^N \left(\frac{q_i}{Q}\right)^2 = \sum_{i=1}^N r_i^2 \quad (1)$$

There

H is the Herfindahl-Hirschman Index (HHI)

q_i is the volume of production of the i -th company $i = 1, \dots, n$ (the number of municipalities and their population)

Q is the volume of production in the waste management market

r_i is the market share of firm i in the waste management market, and

N is the number of firms

The HHI takes into account the relative size distribution of the firms in a market. It approaches zero when a market is occupied by a large number of firms of relatively equal size and reaches its maximum of 10,000 points when a market is controlled by a single firm. The HHI increases both as the number of firms in the market decreases and as the disparity in size between those firms increases.

The usual classification of the rate of concentration by value H is as follows [6]:

- An H below 100 indicates a highly competitive environment.
- An H below 1,500 indicates an unconcentrated environment.
- An H between 1,500 to 2,500 indicates moderate concentration.
- An H above 2,500 indicates high concentration.

Our competition index is based on the number of competing companies in municipalities neighboring on a given municipality:

$$CI = \sum_{i=1}^N c_i \rightarrow \max \quad (2)$$

There

CI is a competition index of our design

c_i is a competing company i in municipality neighboring on a given municipality³.

2.2 Data

We used linked open data on municipal waste management expenditure from the ÚFIS automated budget system [22] operated by the Czech Ministry of Finance (MF CR) and from the internet portal of the state treasury, MONITOR [13], and also utilised population data from the Czech Statistical Office. Further information was acquired

³A competing company c_1 is different to a competing company c_2 .

from the SITA, a. s. and RESPONO, a. s. waste management companies. Mayors from municipalities provided further information regarding the contracting process and competitive environment.

A map of the areas covered by waste management companies was used to examine the influence of environment competitiveness.

3 Results and discussion

Expenditure per capita was used for the comparison of individual municipalities. The acquired data are from 2010 to 2014 and represent the expenditure of all 399 municipalities in the Olomouc Region.

The Herfindahl-Hirschman Index for the Olomouc Region as a whole is **886.2672**, which indicates the presence of an unconcentrated competitive environment.

The results of the analysis of the competitive environment at the district level in the Olomouc Region using the Herfindahl-Hirschman Index are shown in Tab. 2.

Tab. 2: Results of HHI analysis and average municipal waste management cost in the 2010 – 2014 period

District	<i>H</i>	Number of WMC	Municipal waste management expenditure per capita [CZK/capita]		
			Mean	Median	Stand. dev.
Jeseník	8,874.29	4	754.59	727.18	186.25
Olomouc	2,132.31	10	547.18	515.78	180.75
Prostějov	1,486.74	8	508.43	475.56	183.93
Přerov	1,858.17	10	516.74	493.83	141.82
Šumperk	2,971.45	8	593.64	557.44	255.48

Note: Mean (average), median and standard deviation are descriptive statistics for the samples of MWME per capita for all municipalities in the selected districts.

Source: The authors according to [13], [22]

Results of the analysis show that the mean value, and median value are lowest among municipalities with a stronger competitive environment. This indicates that *the competitiveness of the environment has a significant influence on municipal waste management expenditure in the Olomouc Region.*

From Tab. 2 it is clear that the competitive environment differs between the districts. The worst situation with regard to the researched issue is in Jeseník District, where the HHI is 8,374.29. Such a HHI indicates high concentration with strong waste management companies dominating small firms. In Jeseník District, the public company Technické služby města Jeseník a.s. has the most significant market position, with more than 91% of the market share. In contrast, the other two waste management companies operating in the district have very low market share because they each operate. This is consistent with the results of Bel and Fageda [4], who state that *“lack of effective competition can be especially severe in small and rural municipalities, as they usually have fewer numbers of private contractors available.”*

There is a better situation in Šumperk District, where the HHI is between 2,500 and 3,000. 8 waste management companies operate there. SITA CZ, a. s. has the strongest market position, with more than 39 % of the market share. Other major companies are EKO SERVIS Zábřeh s.r.o. and EKO-UNIMED s.r.o. These larger firms contrast with four smaller waste management companies which only operate in one municipality. The HHI of 2,971.45 indicates that the waste management market is highly concentrated. In comparison with Jeseník District it means that there are more companies with similar and equally distributed market share. There is thus not only one company with a highly dominant position, as there was in the case of Jeseník District. However, there are still three companies with a relatively high market share compared to the others.

There is moderate concentration in Olomouc District and Přerov District. 10 waste management companies operate in Olomouc District, where EKO-UNIMED, s.r.o. is the company with the largest market share. Other companies with a significant market share are REMIT s.r.o. and the public company Technické služby města Olomouce. In Přerov District two waste management companies have a dominant market share (SITA CZ and van Gansewinkel). Each of these two companies operates in 24 of the 95 municipalities belonging to this district. In total, eight other waste management companies operate in Přerov District.

The best situation with regard to the researched issue is in Prostějov District. The HHI is 1,486.74, which indicates an unconcentrated environment. Although the waste management company A.S.A. has the strongest position with a market share of almost 20%, there are another five waste management companies with a not inconsiderable market share.

Based on the HHI analysis and descriptive statistics concerning municipal waste management expenditure it can be stated that the examined competitive environment has a significant influence on the expenditure of the municipalities involved.

It is interesting that this result is in accordance with previous studies that mostly confirmed that competition is a key feature underlying theoretical claims for MWME savings (e.g. [7], [12-13] and [21-23]) because we use a different method. However, this is not in accordance with the results of our previous studies [4], [9], [16], [18-20] which did not validate the influence of the competitiveness of the environment so clearly.

Bel and Fageda [4] have shown that competition may be weak in solid waste collection both in urban and rural areas. In this regard, they have found empirical evidence of differences between the types of firms that operate in different geographical environments. Large firms operate in high-populated municipalities and municipalities that belong to the same metropolitan area. Smaller firms operate at a regional or local level, dominating the market for contracts concerning low-populated municipalities and municipalities in areas isolated from big cities in Catalonia. It is a different situation from that existing in the Olomouc Region, where one of largest firms in the Czech Republic, SITA CZ, operates in 72 municipalities with populations ranging from 129 to 26,806 inhabitants (the median being 446 inhabitants) and smaller firms (EKOLTES Hranice, REMIT, Ltd., etc.) operating in the towns of Hranice, Zábřeh, Šternberk and Uničov (with populations of 11,500 to 18,500 inhabitants).

Dijkgraaf and Gradus [9] note that in the Netherlands in highly concentrated provinces competition is weak, which creates barriers that prevent local governments from effectively obtaining benefits from contracting out. From this we can assume that there are only a few or no such barriers in the Olomouc Region.

However, the above-mentioned studies are not in accordance with one another.

We therefore compared the HHI results with the results obtained from our competitive index. A similar method was used in [4], [12] and [18-19].

The analysis results are shown in Tab. 3 and Tab. 4.

Tab. 3: The nature of the competitive environment in 2014

District	Number of WMC	Number of municipalities						
		CI = 0	CI = 1	CI = 2	CI = 3	CI = 4	CI = 5	Σ
Jeseník	4	13	10	0	0	0	0	23
Olomouc	10	6	38	34	8	2	1	89
Prostějov	8	6	33	34	9	4	0	86
Přerov	10	19	44	25	6	2	0	96
Šumperk	8	16	36	13	3	0	0	68

Source: Authors according to [13], [22]

Based on the analysis results it can be stated that the examined spatial aspect of the competitiveness of the environment does not have any significant influence on expenditure. The lowest values obtained for municipal waste management expenditure are for municipalities with no competing waste management companies operating in neighbouring municipalities. Nevertheless, lower values also appear among municipalities with a high level of environmental competitiveness. Due to this a question arises: Does the competitiveness of the environment really have a significant influence? We have shown the difference between the results of two methods of competition evaluation: the HHI, and a competition index. We have discovered that the HHI is a better tool for measuring the impact of competition and that the diversity of methods for competition impact evaluation could have led to the different and ambiguous results of the above-mentioned research studies.

Tab. 4: Average municipal waste management cost in the 2010 - 2014 period

District	Number of WMC	Average MSWME per capita [CZK/capita]					
		CI = 0	CI = 1	CI = 2	CI = 3	CI = 4	CI = 5
Jeseník	4	1011.62	1103.66	0	0	0	0
Olomouc	10	412.06	551.78	520.57	529.19	573.23	1,007.86
Prostějov	8	531.36	521.65	519.23	411.19	506.78	0
Přerov	10	496.36	525.41	533.97	567.10	511.02	0
Šumperk	8	472.02	654.72	800.67	745.59	0	0

Source: Authors according to [13], [22]

According to the HHI there is a significant influence. If we take the HHI as a proven method of evaluating the competitive environment, we can consider that in the Olomouc Region competition has a significant influence on municipal waste management expenditure.

Conclusion

In the paper we have shown that if we evaluate the impact of competition using the HHI we can say that competition has a significant impact on the cost-effectiveness of municipal waste management expenditure. We have presented relevant empirical evidence of differences between the various districts of the Olomouc Region in the Czech Republic in terms of the effects of competition on municipal waste management expenditure. We have thus contributed to the body of theoretical and practical knowledge concerned with waste management research, as we were able to mathematically prove the conformity of our results with the previous findings. In addition, based on the analysis results, we can draw some conclusions regarding policy implications. The existence of a competitive environment in markets for local services can deliver cost savings, and public managers need to know and use the different tools available to stimulate competition in the market. The case of the Olomouc Region illustrates the opportunities available to other regions and can be shown as an example of “Best Practices”. Publicly owned units can be encouraged to change their contracts and local authorities can be active in looking for new waste management companies among those that operate in another area. Overall, more attention should be devoted to procurement and contracting procedures in order to ensure the maximum number of effective competitors participate. Only in such a case will the fees charged by contract holders be clearly related to the cost of delivering the service.

We realize that we have explored only one factor that affects the cost-effectiveness of municipal waste management expenditure and that there are a number of other factors that it is necessary to examine (i.e. economies of scale, mode of production, inter-municipal cooperation, etc.). It is the first research paper devoted to competition as a factor influencing the cost effectiveness of municipal waste collection expenditure using the Herfindahl-Hirschman Index to be produced in the Czech Republic and we plan to publish follow up papers dedicated to this issue using advanced methods such as OLS regression and meta-regression analysis, where we will test the strength of all of the above-mentioned factors.

Acknowledgement

This contribution was supported by Czech Science Foundation project No. GA15-08032S: “Unfair competition and other economic factors influencing the efficiency of the provision of public services.”

References

- [1] BAUM, H.G., CANTNER, J. Liberalisierung der Siedlungsabfallwirtschaft - eine Analyse theoriebasierter sowie praxisbezogener Liberalisierungskonzeptionen. *In BIfA Texte*, 2004, Nr. 27, März 2004.
- [2] BEL, G., COSTAS, A. Do public sector reforms get rusty? Local privatization in Spain. *In Journal of Policy Reform*, 2006, Vol. 9, Iss. 1, pp 1-24. ISSN 1384-1289.
- [3] BEL, G., FAGEDA, X. Between privatization and intermunicipal cooperation: Small municipalities, scale economies and transaction costs. *In Urban Public Economics Review*, 2006, Vol. 2006, Iss. 6, pp. 13-31. ISSN 1697-6223.
- [4] BEL, G., FAGEDA, X. Big guys eat big cakes: Firm size and contracting in urban and rural areas. *In International public management journal*, 2011, Vol. 14, Iss. 1, pp. 4-26. ISSN 1096-7494.

- [5] BEL, G., FAGEDA, X., MUR, M. Why do municipalities cooperate to provide local public services? An empirical analysis. *In Local Government Studies*, 2013, Vol. 39, Iss. 3, pp. 435-454. ISSN 0300-3930.
- [6] BEL, G., FAGEDA, X., WARNER, M. E. Is private production of public services cheaper than public production? A meta regression analysis of solid waste and water services. *In Journal of Policy Analysis and Management*, 2010, Vol. 29, Iss. 3, pp. 553-577. ISSN 0276-8739.
- [7] BROWN, T. L., POTOSKI, M. Transaction costs and contracting: the practitioner perspective. *In Public Performance and Management Review*, 2005, Vol. 28, No. 3 (March, 2005), pp. 326-251. ISSN 1530-9576.
- [8] CALKINS, S. The new merger guidelines and the Herfindahl-Hirschman Index. *In California Law Review*. 1983, Vol. 71, Iss. 2, pp. 402-429. ISSN 0088-1221.
- [9] DIJKGRAAF, E., GRADUS, R. H. Cost savings of contracting out refuse collection. *In Empirica*. 2003, Vol. 30, Iss. 2, pp. 149-161. ISSN 0340-8744.
- [10] DIJKGRAAF, E., GRADUS, R. H. Collusion in the Dutch waste collection market. *In Local Government Studies*, 2007, Vol. 33, Iss. 4, pp. 573-588. ISSN 0300-3930.
- [11] DOMBERGER, S., MEADOWCROFT, S. A., THOMPSON, D. J. Competitive tendering and efficiency: the case of refuse collection. *In Fiscal studies*. 1986, Vol. 7, Iss. 4, pp. 69-87. ISSN 0143-5671.
- [12] DUBIN, J. A., NAVARRO, P. How markets for impure public goods organize: the case of household refuse collection. *In Journal of Law, Economics, and Organization*. 1988, Vol. 4, No. 2, pp. 217-241. ISSN 8756-6222.
- [13] GOMEZ-LOBO, A. and SZYMANSKI, S.: A law of large numbers: bidding and compulsory tendering for refuse collection contracts. *In Review of Industrial Organization*, 2001, Vol. 18, Iss. 1, pp. 105-113. ISSN 0889-938X.
- [14] HEFETZ, A., WARNER, M. E. Privatization and its reverse: explaining the dynamics of the government contracting process. *In Journal of Public Administration Research and Theory*, 2007, Vol. 14, Iss. 2, pp. 171-190. ISSN 1053-1858
- [15] MONITOR, <http://monitor.statnipokladna.cz/en/2014/>
- [16] REEVES E, BARROW M. 2000. The impact of contracting-out on the costs of refuse collection services. The case of Ireland. *Economic and Social Review*. Vol. 31 No. 2 (2000), pp. 129 - 150.
- [17] SAVAS, E. S. An empirical study of competition in municipal service delivery. *In Public Administration Review*, 1977, Vol. 37, Iss. 6, pp. 717-724. ISSN 0033-3352.
- [18] SOUKOPOVÁ, J., MALÝ, I. Vliv konkurence na výši výdajů na nakládání s odpady obcí Jihomoravského kraje. *In WASTE FORUM*, 2012, Vol. 2012, Iss. 4, pp. 173-183. ISSN 1804-0195.
- [19] SOUKOPOVÁ, J., MALÝ, I. Competitive environment in waste management and its impact on municipal expenditures. *In Acta universitatis agriculturae et silviculturae Mendelianae Brunensis*, 2013, Vol. 61, Iss. 4, pp. 1113-1119. ISSN 1211-8516.

- [20] SOUKOPOVÁ, J., MALÝ, I., FICEK, V. Má konkurenční prostředí vliv na výdaje obcí na nakládání s KO v ČR? *In Waste forum*, 2013, Vol. 2013, Iss. 4, pp. 231-239. ISSN 1804-0195.
- [21] STEVENS, B. J. Scale, market structure, and the cost of refuse collection. *In Review of Economics and Statistics*. 1977, Vol. 60, Iss. 3, pp. 438-448. ISSN 0034-6535.
- [22] SZYMANSKI, S. The impact of compulsory competitive tendering on refuse collection services. *In Fiscal Studies*. 1996, Vol. 17, Iss. 3, pp. 1-19. ISSN 0143-5671.
- [23] SZYMANSKI, S., WILKINS, S. 1993. Cheap rubbish? Competitive tendering and contracting out in refuse collection—1981–88. *In Fiscal Studies*. Vol. 14, Iss. 3, pp. 109-130. ISSN 0143-5671.
- [24] UFIS - Monitoring of municipal finances, <http://www.info.mfcr.cz/ufis/>
- [25] WARNER, M. E., BEL, G. Competition or monopoly? Comparing privatization of local public services in the US and Spain. *In Public Administration*, 2008, Vol. 86, Iss. 3, pp. 723-735. ISSN 1467-9299.
- [26] WILSON, D.C., RODIC, L., SCHEINBERG, A., VELIS, C.A., ALABASTER, G. Comparative analysis of solid waste management in 20 cities. *In Waste Management and Research*, 2012, Vol. 30, Iss. 3, pp. 237 - 254. ISSN 0734-242X.

Contact Address

Mgr. Ing. Jana Soukopová, Ph.D.

Masaryk University, Faculty of Economics and Administration,
Department of Public Economics
Lipová 41a, 602 00, Brno, Czech Republic
Email: soukopova@econ.muni.cz
Phone number: +420 549 493 034

Ing. Gabriela Vaceková, Ph.D.

Masaryk University, Faculty of Economics and Administration,
Department of Public Economics
Lipová 41, 602 00 Brno, Czech Republic
Email: gabriela.vacekova@econ.muni.cz
Phone number: +420 549 49 8318

Received: 01. 09. 2015

Reviewed: 13. 10. 2015, 03. 11. 2015

Approved for publication: 17. 12. 2015