

## Conference Paper

# The Evidence on the Existence of Economies of Scale in Local Government Units

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### Abstract

The purpose of this paper is to empirically verify if the possible existence of scale economies actually supports the argument that municipal consolidation is needed in Slovenia. The major reform of local self-government in Slovenia was implemented in 1994, when the transformation of existing 58 »communal« municipalities was envisaged. From 1995 onwards, the number of municipalities increased to the current number of 212 municipalities. Consequently, the necessity to implement structural reforms of local self-government in Slovenia has been stressed. The arguments favoring municipal amalgamations stressed that country has become too fragmented and municipal amalgamation would enable the reduction of (administrative) costs, and increase efficiency as well as quality of services provided, indicating that technical aspects of local government operation are targeted. Following, technical efficiency of Slovenian municipalities is estimated with the Data Envelopment Analysis (DEA) method, in order to determine if (and which) municipalities are experiencing increasing returns to scale (i.e., scale economies). The results indicate that there is important scale efficiency component, and predominantly very small municipalities are experiencing economies of scale, but their number is relatively low. Therefore, one of the classical arguments for municipal amalgamation, achieving economies of scale, can only be applied at a limited scale. This does not imply that more extensive amalgamation is not warranted, but it demands that other arguments justifying municipal amalgamation should be presented.

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## 1. Introduction

The major reform of local self-government in Slovenia was implemented in 1994, when the transformation of existing 58 »communal« municipalities was envisaged. From 1995 onwards, the number of municipalities increased to the current number 212, and this transformation was implemented predominantly on the voluntary basis. Namely, the structural reform in 1994 was inspired by the possible improvements in local democracy (see, e.g., [4]). This inspiration was rather natural, as country was just democratizing itself, so democracy issues were more politically viable. However, the result of the process was not just larger fragmentation of local self-government, but the fact that more than one half of municipalities have less than 5,000 residents [14], which is actually legally prescribed minimum size of the municipality. Although

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municipalities can have smaller size, this indicates that exceptions have become the rule. Consequently, several authors have stressed the necessity to implement structural reforms of local self-government in Slovenia (see e.g. [7]). Namely, economic and fiscal crisis has put additional pressures on the efficient management of resources also at the sub-national levels of government, where the issue is related to the appropriate creation and size of local jurisdictions. This can be put in the context of the decentralization theorem [11], which is based on the competing theory and states that excess fragmentation of government leads to inefficiencies in the provision of local public services, such as various duplications, problems in achieving economies of scale etc. The arguments favoring municipal amalgamations stressed that country has become too fragmented and municipal amalgamation would enable the reduction of (administrative) costs, and increase efficiency as well as quality of services provided. In fact, this argumentation clearly identifies that scale economies should also be the reason for municipal amalgamation. This means that technical aspects of local authority operation are targeted, since it is assumed that consolidation of local government units would enable achieving economies of scale and subsequently reduce costs. Therefore, this study would like to portray how important are scale economies, a classical argument favoring municipal amalgamations, for the functioning of Slovenian municipalities.

## 2. Methodology and Data

Theory predicts that scale, size and scope economies determine the nature of production processes carried out in organizations [17], and this also holds for municipalities. This paper focuses specifically on scale economies, which means that only technical efficiency of Slovenian municipalities will be estimated. Technical efficiency is determined by the difference between the observed ratio of combined quantities of output to input and the ratio achieved by best practice. Therefore, the goal is to produce the maximum output or utilizing the minimum inputs compared to what is technically feasible [12]. In order to ensure data stability, 11 so-called urban municipalities (cities), which have special status by the law and they perform specific tasks given to them from central government involving the development of the city [8], are excluded from the analysis, as their costs (expenditures) are not directly comparable to the costs of other municipalities, which means that the analysis is performed for 200 Slovenian municipalities with "ordinary" status. The data for the 2011 fiscal year are utilized; the on-going process of establishing new municipalities from 1995 onwards severely omits the possibility to employ pooled data sets. Besides, in 2012 the mega law (i.e., Fiscal Balance Act) was adopted to tackle the economic and fiscal crisis related problems, and this law also affected municipal expenditures in the form of external shock, so data for 2012 onwards might be biased.

Contemporary empirical literature recognizes several available approaches to generate "best practice frontier" to assess efficiency levels of observed units. One class of methods is represented by the so-called nonparametric-deterministic methods (see [6]). One of those methods is Data Envelopment Analysis (DEA), which has become very popular in the evaluating technical efficiency in the public sector, because it can

easily handle multiple outputs, is non-parametric and does not require input prices [13]. This can be suitable for estimating technical efficiency of service provision. Specifically, the DEA linear programming model that is being solved can be described as:

$$\min_{\theta, \lambda} \theta, \quad (1)$$

$$st - y_i + Y\lambda \geq 0, \quad \theta_i - X\lambda \geq 0, \quad N1'\lambda = 1, \lambda \geq 0, \quad (2)$$

where  $\theta$  is a scalar,  $\lambda$  is a  $N \times 1$  vector of constants and  $N1$  is a  $N \times 1$  vector of ones, the value of  $\theta$  obtained

representing the efficiency score for the  $i$ -th municipality. Actually, the restriction  $N1'\lambda = 1$  that is put additionally into the model imposes convexity to the frontier, corresponding to the variable returns to scale DEA model, a specification that does not presume that all municipalities are operating at the optimal scale, which is suitable for establishing whether particular units under observation experience either increasing, decreasing or constant returns to scale. For the data envelopment analysis a specialist DEAP program version 2.1 is used. This program was developed by [3].

The inclusion of input, output and other (exogenous) variables in the analysis is predominantly based on the literature dealing with local government efficiency (e.g. [1, 2, 5, 15]; etc.). Therefore, this study utilizes total expenditures of the municipality as input variable, whereas four output variables describing important responsibilities of the Slovenian municipalities with respect to the social, educational and infrastructure services are: (1) the number of pupils in primary schools (nine years program), (2) the total population of municipality (this is the most important variable in the model, since it indicates possible scale effects), (3) the population over 65 years of age, and (4) the number of employed persons in municipality. Although additional variables that describe municipal responsibilities could be included in the model, predominantly related to the provision of cultural and recreational services, the lack of available statistical data on these activities omits doing that. It is worth noting that input-oriented DEA approach is utilized, since it can be assumed that municipal management should have more control over spending rather the amount of services that they need to provide. This approach is quite common in the studies on local government efficiency, where expenditures are taken as input variable [9]. As the size of the sample is quite large (200 units) and the number of input-output variables is rather small (5), traditional limitation of DEA method is avoided. Namely, small sample size combined with large number of inputs and outputs artificially inflates the efficiency scores. Descriptive statistics for the variables employed in the analysis is presented in the table 1 below. Data for all variables relate to the year 2011.

### 3. Results and Discussion

Table 2 represents the results of the multi-stage DEA estimation of technical efficiency for Slovenian municipalities. As the results suggest, the estimated average efficiency

	Minimum	Maximum	Mean	Std. deviation
Total expenditures (in EUR)	568,026	37,584,411	6,810,097	5,916,354
Number of pupils (primary schools, 9 years program)	4	3288	579	555
Population	320	34,195	6,719	5,974
Population above 65 years	69	4,921	1,094	959
Employed persons	118	14,707	2,741	2,480

TABLE 1: Descriptive statistics for input and output variables. Sources: [10, 14], author’s calculations.

	DEA
Average	0.883
Minimum	0.737
Number of TE units (TE=1)	14
Standard deviation	0.066
Average scale efficiency	0.924
Number of municipalities (returns to scale)	DRS (162); IRS (15); CRS (23)

TABLE 2: Summary statistics on the technical efficiency DEA modeling for Slovenian municipalities. Source: own calculations.

of municipalities in Slovenia is 88.3%. The number of 100% technically efficient municipalities is 14 in DEA model, which corresponds to 7 % of total population. If we consider the results, municipalities should on average reduce their expenditures by 12% to achieve technical efficiency. It might be concluded that although technical inefficiencies exist, they are not on average as large as in some similar studies performed for other post-socialist countries, although it is worth noting that such comparisons are actually meaningless as differences in best practice between the samples are unknown (see Steering Committee for the Review of Commonwealth/State Service Provision, 1997). Besides, even the minimal technical efficiency estimated (0.74) is relatively large.

In particular, scale economies are often put forward as an important factor affecting differences in the efficiency among municipalities, since it is reasonable to assume that size influences the ability of municipalities to produce goods and services efficiently. The results indicate that there is an important scale efficiency component. Average scale efficiency level of 0.924 suggests further potential expenditure savings of 7.6% if a municipality could operate at the constant returns to scale technology. Summary statistics in table 2 also reveal that more than 81% of municipalities operate under decreasing returns to scale, and only 7.5% of municipalities operate under increasing returns to scale, which means that they should be consolidated with other small units to achieve the optimal size. This suggests the existence of a production technology with variable returns to scale, as almost 90% of municipalities are scale inefficient. Besides, the average population size of municipalities having increasing returns to scale (1,117 residents) is smaller compared to the average population size of municipalities with constant returns to scale (1,699 residents) and decreasing returns to scale

(7,951 residents). It is evident that predominantly very small municipalities are operating under increasing returns to scale, which indicates that the increase in “production” would obviously raise productivity due to the specialization, so some extent of merging to benefit from scale economies may be one of the alternatives particularly for those municipalities.

## 4. Conclusion

This paper was concerned with determining the level of technical efficiency of Slovenian municipalities.

It is evident that municipalities in Slovenia are operating under the variable returns to scale technology (almost 90% of them), which means that there is still some possibility for improvement to achieve optimal scale. Nevertheless, only 7.5% of municipalities are operating at increasing returns to scale, where some form of consolidation (merging) would lead to greater scale efficiency. Obviously, if municipal consolidation (amalgamation) is to be implemented in order to achieve economies of scale, those municipalities should be targeted. Specifically, scale economies can be put forward as an argument for municipal amalgamation only for 15 municipalities, although they tend to be predominantly very small ones, which is according to the expectations. Therefore, one of the classical arguments for municipal amalgamation, achieving economies of scale, can only be applied at a limited scale. This does not imply that more extensive amalgamation is not warranted, but other arguments justifying municipal amalgamation should be put forward. Further empirical analysis would also be appreciated, particularly in relation to the omitted variables problem, presence of outliers, and potential relationship between size and scale economies (diseconomies) that Slovenian municipalities are currently experiencing.

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