NAUKI O FINANSACH FINANCIAL SCIENCES 4(25) • 2015

ISSN 2080-5993
e-ISSN 2449-9811

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SYNTHETIC DEVELOPMENT MEASURE OF LOCAL ADMINISTRATION SIZE IN POLAND

SYNTETYCZNY WSKAŹNIK ROZMIARU ADMINISTRACJI LOKALNEJ W POLSCE

DOI: 10.15611/nof.2015.4.08
JEL Classification: H70, H72

Summary: This paper is dedicated to analysing the size of local administration. On the basis of literature study, ten variables that define size of local administration were chosen, out of these variables two synthetic measures were created. The sizes of local administration at the level of voivodships were calculated for 2013. The research results show a big differentiation among the analysed units in Poland. Data were sourced from the Polish Main Statistical Office (GUS). Taxonomic methods were used in the analysis – synthetic measures were constructed on the basis of the Hellwig method.

Keywords: size of local administration, synthetic measure, taxonomic method.

Streszczenie: Artykuł jest poświęcony analizie rozmiaru administracji na poziomie lokalnym. Na podstawie analizy literatury wytypowano 10 zmiennych, które opisują rozmiar administracji na poziomie lokalnym. Zmienne te posłużyły do stworzenia syntetycznego wskaźnika w oparciu o metody taksonomiczne (metoda Hellwiga). Wyniki dla roku 2013, w układzie wojewódzkim, pokazały duże zróżnicowanie pomiędzy badanymi jednostkami. Dane do badania pozyskano z Głównego Urzędu Statystycznego.

Słowa kluczowe: rozmiar administracji lokalnej, syntetyczny wskaźnik, metoda taksonomiczna.

1. Introduction

The issue of public administration size and its optimisation is an object of constant concern and ceaseless research. However, it is more frequently analysed at the macroeconomic context which deals with the central and district level. Bearing in

mind the above, this paper mainly concentrates on the size of administration at local level in different voivodships in Poland. The aim of the study is to measure the size of local administration in Poland. In the process of designing the research, the following research hypothesis was formulated:

Hypothesis H1: the size of the local administration in Poland is regionally differentiated

In this research the taxonomy method was applied, i.e. the taxonomic development measure (Hellwig's method). The research covers the period of 2013. The authors choose the time as a determinant because of the easy access to comparable employment statistics in local administration since the statistics determine one of the components of the size rate of local administration discussed in this paper.

2. Literature review

Previous studies focus on the verification of the adopted tools which measure the size of local administration. They allow to define the most frequently engaged exponents of the size of public administration which is the level of spending and the number of employees. Such a stand is represented by P.S. Heller and A.A. Tait [1983] among others who in order to measure local administration size use the rate of employment in the local administration. This opinion is likewise shared by G.R. Weiher and J. Lorrence [1991], and G.A. Mackenzie [1991] and also by R. Hemming [1991] who quantifies the administration size by means of total spending. J. Kalseth and J. Rattso [1995], as a tool of measurement take the outlay, define its level and optimise the size of local administration level.

R. Baqir [1999], employs two more tools to describe the size of local administration structure. The first one is total value of spending and income presented together and the second one is the total number of employed staff per inhabitant of the community.

S. Ivanov, et al. [2002], describe local public administration in three ways. Firstly, they extract from total spending the financial means to support the administration, secondly they treat the financial means to support the administration as the total spending of the local administration, and finally they divide the spending on administration on the per capita base levying the administration costs on the local community.

In the research of J.M. Sellers [2003] and also of M.J. Higgins et al. [2006], apart from the above introduced financial measures, the importance of the employment rate is considered. The employment rate in the local government structures is analysed taking into account both the number of the employees in a local unit and the size of public administration employment (governmental and local).

T.A. Garrett and R.M. Rhine [2006], also measure the administration size on an expenditure basis. In their research they focus not only on measuring administration

size (of governmental and local units) but they also consider the expenditure per capita and analyse the factors responsible for its increase (i.e. increase of the expenditures of particular public administration units). Moreover, T.A. Garrett and R.M. Rhine, treat as a measurement of administration size the share of the employment in the structures in relation to the total employment rate of the researched local unit.

K.L. Phillips and B. Chen [2007], take as a measurement of local administration size the share of local expenditure in the total public spending (governmental and local) for consumption and also spending on local administration in the spend of the territorial unit. Moreover, they broaden the range of spending measurements by analysing local revenues with reference to public spending allocated for consumption.

Likewise S. Ivanov et al. [2002], also B. Dollery and L. Robotti [2008], as an administration size measurement, take into account the cost of providing public services on a given unit's territory understood as expenses incurred by local administration for public services per capita (i.e. per one inhabitant from a given community). However, unlike the previously presented opinions, B. Dollery and L. Robotti also use size of local administration in spatial terms, expressing the ratio of the number of employees to the surface of the territory occupied by the unit.

M. Labonte [2010], measures the administration at central and local government, expressing it successively with the total value of expenses incurred, the value of spending per capita, and the number of employees in the administration. M. Labonte, in contrast to the previously discussed methodology for measuring the size of government and local administration, expands it by the value of revenues (inflows) they generate to the budget.

J. Boex in his works from 2011 and also from 2012, alongside with such measures as the overall level incurred by the local government spending, calls for measuring the degree of decentralization of local government spending, understood as the value of the funds spent by individual governments on their own tasks (excluding expenses for commissioned tasks of the government administration). At the same time, J. Boex similarly to M. Labonte, highlights the legitimacy of expressing the size of local government administration via the budget inflows, using the revenues. He justifies the postulated measure, among others, as the lack of equivalence between the cost of implementing public tasks transferred to local governments, and the efficiency of performance assigned to their sources of income.

P. Pevcin [2012], expresses the size of government through the per capita total expenditure incurred by the local government units for the implementation of tasks assigned to them.

J.E. Anderson [2012], indicates employment in units of the different levels of territorial division as a measurement tool of the size of local government administration. A similar view is also found in the works of B. Bardes et al. [2014], and J.C. Garand et al. [2014].

The overview presented above does not give the full picture of the changing approaches to measuring the size of public administration at local levels. For example R. Salvino [2007], describes the size of local government using two other variables. The first consists in local government tax revenues recognized in the income statement and the other is the share of own revenues of local governments in personal income. However, although the measures outlined above do not have an enumerative character, they allow to draw up the dominant lines of research undertaken in the paper.

3. Methods and data

In this study the taxonomic development measure (TMR) was applied, a measure created by Z. Hellwig [1968], and further elaborated by Pluta [1986] and Nowak [1990]. This method allows to indicate the underlying hierarchy of the analysed entities (voivodships) according to the size of local administration. The size of local administration is seen as an aggregate resulting from many factors such as: employment in local administration, expenditures or income of local administration. These factors are measured in our study by ten explanatory variables. The explanatory variables for analysis were chosen on the basis of literature study and their accessibility in Polish government statistics (Table 1).

Data were obtained from the Main Statistical Office (GUS), covering the year 2013. The analysis was carried out in the territorial approach on the level NUTS2 (16 voivodships).

We also decided, which is a consequence of the data's availability, to abstract from the use of the total (aggregate) level of expenditure incurred by local authorities (communes and cities with county rights) in connection with their activities and to take up the study of individual generic categories of expenditure of municipalities for which the common denominator was the financing of current structures of local government at municipal level. All the selected variables were transformed into relative values (divided by the number of inhabitants, voivodship's area) in order to minimise the influence of the voivodship's size on the obtained results. This is very important because Polish voivodships vary in terms of size (area, population) (Table 1).

Next, the nature of each variable (i.e. stimulant or destimulant) had to be recognised. It was found that each of the selected variables was a stimulant, i.e. the increasing values of explanatory variables increase the value of synthetic development measure. Therefore the higher level of each of the selected variables, the larger the size of local government administration on municipal level.

The ten explanatory variables were divided into five subsets, based on the criterion of the type of information it provides (Table 2).

Table 1. Definition of variables

No.	Variable	Characteristic	Literature
V1	The number of employees in the local administration / population	The average number of employees in the administration of local government authorities and cities with county rights in cross-section of local provinces by 1,000 of inhabitants	P.S. Heller and A.A. Tait [1983], G.R. Weiher and J. Lorrence [1991], G.A. Mackenzie [1991], R. Baqir [1999]
V2	Expenditure of municipalities for administration / total expenditures	The value of the expenses of local government units at the municipal level spent on the functioning of the municipal office and administration (including personal expenses) in PLN by the total expenditures of analysed units in PLN	S. Ivanov, et al. [2002], K.L. Phillips and B. Chen [2007]
V3	Expenditure of municipalities for administration / population	The value of the expenses of local government units at the municipal level spent on the functioning of the municipal office and administration (including personal expenses) in PLN by 1 inhabitant	S. Ivanov, et al. [2002], T.A. Garrett and R.M. Rhine [2006], B. Dollery and L. Robotti [2008], M. Labonte [2010]
V4	Number of employees in the local administration / employment in public administration in the voivodship	The average number of employees in the administration of local government authorities and cities with county rights in cross-section of local provinces divided by the total number of persons employed in the public administration of the voivodship	J.M. Sellers [2003], M.J. Higgins et al. [2006]
V5	Expenditure of municipalities on external services / population	The value of the expenses (in PLN) of local government units at the municipal level spent to purchase different types of services: Internet, mobile, translation, repairs, etc., per 1 inhabitant	Own elaboration
V6	Expenditure of municipalities for purchases / population	The value of the expenses of local government units at the municipal level spent on a variety of purchases: materials, equipment, software, paper, food, equipment and armaments, energy, etc., in PLN per 1 inhabitant	Own elaboration
V7	The number of persons employed in the local administration / voivodship's area	The average number of employees in the administration of local government authorities and cities with county rights in cross-section of local provinces by the area of the voivodship	B. Dollery and L. Robotti [2008]
V8	Expenditure of municipalities for administration / voivodship's area	The value of the expenses of local government units at the municipal level spent on the functioning of the municipal office and administration (including personal expenses) in PLN by the area of the voivodship	Own elaboration
V9	The income of municipalities / population	The volume of budgetary income of local government units and cities with county rights per 1 inhabitant	K.L. Phillips and B. Chen [2007]
V10	Expenditure of municipalities / population	The value of the expenses of local government units at the municipal level per 1 inhabitant	R. Hemming [1991], J. Kalseth and J. Rattso [1995]

Source: own study.

Table 2. Groups of variables

Type of information	Variables
Group I: On the level of employment in local administration units	(1) The number of persons employed in the local administration / population
	(4) Number of persons employed in the local administration / employment in public administration in the voivodship
	(7) The number of persons employed in the local administration / voivodship's area
Group II: On the level of expenditure on the administration of the municipality	(2) Expenditure of municipalities on administration / total expenditures
	(3) Expenditure of municipalities on administration / population
	(8) Expenditure of municipalities on administration / voivodship's area
Group III: On the level of detailed expenditure	(5) Expenditure of municipalities on external services / population
	(6) Expenditure of municipalities on purchases / population
Group IV: On the level of income in relation to the number of inhabitants (the level of the wealth of local authorities)	(9) The income of municipalities / population
Group V: An indicator of the level of expenditure is in relation to the number of residents (the level of the wealth of local authorities)	(10) The value of the expenses of local government units at the municipal level per 1 inhabitant

Source: own study.

In accordance with the taxonomic methods' procedure, each variable was normalized in a way that the maximum value of each variable was set, and then the value of the variable in each voivodship was divided by the maximum value:

$$V'_{ij} = \frac{V_{ij}}{max\{V_j\}} \tag{1}$$

V_{ij} – j-th explanatory variable for i-th voivodship,
$i = 1, ..., 16$,
$j = 1, ..., 10$,
$V'ij$ – normalized value of Vij.

As a result, the variability interval was set on the range [0, 1] for each variable. None of the variables reached the minimum value equal to 0, which results from its nature. Normalized values are depicted in Table 3.

For each voivodship the arithmetic mean was calculated:

$$\overline{x_i} = \frac{1}{10}\sum_{j=1}^{10} V'_{ij} \tag{2}$$

Table 3. Normalized values of variables

Voivodship	V_1'	V_2'	V_3'	V_4'	V_5'	V_6'	V_7'	V_8'	V_9'	V_{10}'
Dolnośląskie	0.88	0.85	0.87	0.90	0.72	0.90	0.43	0.43	0.85	0.84
Kujawsko-pomorskie	0.92	0.76	0.74	0.96	0.53	0.85	0.35	0.29	0.80	0.81
Lubelskie	0.89	0.82	0.74	0.87	0.37	0.73	0.25	0.22	0.74	0.74
Lubuskie	0.88	0.92	0.80	0.82	0.39	0.92	0.21	0.20	0.73	0.72
Łódzkie	0.91	1.00	1.00	0.93	0.56	0.99	0.42	0.46	0.81	0.82
Małopolskie	0.74	0.72	0.67	0.89	0.59	0.83	0.54	0.50	0.77	0.76
Mazowieckie	0.91	0.79	0.96	0.50	1.00	1.00	0.45	0.48	1.00	1.00
Opolskie	0.83	0.96	0.80	0.84	0.41	0.84	0.29	0.29	0.68	0.68
Podkarpackie	0.83	0.80	0.70	0.86	0.35	0.77	0.33	0.28	0.72	0.72
Podlaskie	0.90	0.77	0.73	0.83	0.43	0.88	0.18	0.15	0.78	0.79
Pomorskie	0.81	0.70	0.77	0.86	0.70	0.82	0.34	0.32	0.90	0.89
Śląskie	0.81	0.79	0.80	1.00	0.51	0.97	1.00	1.00	0.78	0.83
Świętokrzyskie	0.95	0.91	0.80	0.93	0.39	0.82	0.34	0.29	0.73	0.72
Warmińsko-mazurskie	0.95	0.83	0.77	0.86	0.43	0.82	0.19	0.15	0.77	0.76
Wielkopolskie	0.78	0.80	0.72	0.88	0.51	0.83	0.30	0.28	0.75	0.74
Zachodniopomorskie	1.00	0.88	0.89	0.89	0.64	0.89	0.25	0.22	0.82	0.83

Source: own study.

The arithmetic mean indicates the aggregated measure of the size of local administration. It establishes the synthetic development measure. All the arithmetic means results are organized in ascending order to display the voivodships ranking relevant to the size of local administration (Table 4).

The highest level of the synthetic measure indicates the largest size of the local administration, the lowest one – the smallest size of local government's administration.

4. Results

Based on the values of the constructed synthetic measure, the ranking of the voivodships was created. In this ranking the first position was obtained by the voivodship with the largest value of the synthetic measure and the last (16^{th}) position – by the region with the lowest value of the synthetic measure (Table 4).

We have found that the voivodship characterized by the highest level of local administration is śląskie – with a value of 0.848. The next two positions were occupied by mazowieckie (0.809) and łódzkie (0.7901). All these regions are characterized by a high level of urbanization. The regions characterized by the lowest size of local administration are: podlaskie (0.643), lubelskie (0.638) and podkarpackie (0.637) – the last three positions in the ranking. All these regions are located in the eastern part of Poland and generally are characterized by the lowest level of urbanization and industrialization. These differences in the level of industrialization and urbanization could potentially be a source of the differences in the size of the local administration (Table 4).

Table 4. Ranking on the basis of 10 variables

Voivodship	Value of synthetic measure	Position
Śląskie	0.848	1
Mazowieckie	0.809	2
Łódzkie	0.790	3
Dolnośląskie	0.766	4
Zachodniopomorskie	0.730	5
Pomorskie	0.711	6
Małopolskie	0.702	7
Kujawsko-pomorskie	0.699	8
Świętokrzyskie	0.689	9
Opolskie	0.662	10
Wielkopolskie	0.659	11
Lubuskie	0.658	12
Warmińsko-mazurskie	0.653	13
Podlaskie	0.643	14
Lubelskie	0.638	15
Podkarpackie	0.637	16

Source: own study.

At the same time significant differences can be observed between the value of the synthetic measure between voivodships with the biggest (0.848) and the smallest size of administration (0.637) – the local administration in śląskie is bigger by 33% than in the podlaskie voivodship. These values show the size of administration disregarding the number of inhabitants and the territory of the voivodship due to the fact that the variables were analysed in relative values (in reference to the number of inhabitants and territory).

During the next stage of the research, we decided to create a second ranking, but removing from the set of selected variables two of the most general variables – income per capita and expenditure per capita (Table 5). The removal of these two variables did not change the results significantly. The ranking highlighted again śląskie (0.859) as the region with the biggest size of local administration. The next two positions were taken by łódzkie (0.784) and mazowieckie (0.761). The last three places were allocated to the same regions as in the first ranking but in a different order: podkarpackie (0.616), lubelskie (0.612) and podlaskie (0.608). It is also important that we observed a greater spread between the highest and the lowest value in the second ranking.

The ranking constructed on the basis of eight explanatory variables showed even bigger discrepancies in the size of administration between the voivodships – podlaskie's administration is 41% smaller that the administration of śląskie.

Table 5. Ranking on the basis of 8 variables

Voivodship	Value of synthetic measure	Position
Śląskie	0.8589	1
Łódzkie	0.7838	2
Mazowieckie	0.7611	3
Dolnośląskie	0.7468	4
Zachodniopomorskie	0.7065	5
Małopolskie	0.6865	6
Świętokrzyskie	0.6801	7
Kujawsko-pomorskie	0.6736	8
Pomorskie	0.6647	9
Opolskie	0.6564	10
Lubuskie	0.6418	11
Wielkopolskie	0.6378	12
Warmińsko-mazurskie	0.6247	13
Podkarpackie	0.6162	14
Lubelskie	0.6116	15
Podlaskie	0.6079	16

Source: own study.

5. Conclusions

The study enabled a number of findings related to both the method of measuring the size of local government at municipal level and the factors determining the size of the municipal administration in a provincial context.

This research is an attempt to create a synthetic measure of the size of local administration. To date, studies have concentrated on the analysis of many independent variables that characterized the size of local administration. Therefore this research can contribute, to a certain extent, to the studies of the quantification methodology of this phenomenon.

Applying the constructed measure to the Polish local data from 2013, we observed that the smallest size of local government at the municipal level exists in three regions: podkarpackie, lubelskie and podlaskie and the biggest – śląskie, łódzkie and mazowieckie. The ranking positions of all the provincesare based on the value of the synthetic measure created on the basis of 10 (8) variables. Due to the fact that on the basis of two measures similar results were obtained, it seem reasonable that the better of these two will be the one that is constructed on the smaller number of variables. While those variables that were rejected had a very general character it seems that their presence in the synthetic measure does not bring any added value.

Due to the unequal representation of the various categories of characteristics in the total number of tested variables, the effect of unintentional weighing was obtained. The ranking of the size of local government administration was established on the basis of the value of the synthetic indicator for the particular voivodship.

Analysis of the values of synthetic measure showed significant differentiation in the size of local administration in Poland. This indicates new directions of further studies where factors that have an impact on the development of the administration at local level could be analysed. It seems that a simple explanation of the level of urbanization is not sufficient when taking into account such big discrepancies. The level of urbanization or industrialization could explain the high position in the ranking of voivodships such as śląskie, mazowieckie or dolnośląskie. At the same time we could expect that wielkopol at the top of the ranking, which has quite similar characteristics as dolnośląskie or mazowieckie, but the measure of size of administration is much smaller (0.6378).

Further studies will be dedicated to the analysis of regional characteristics that would allow to explain the value of the synthetic measure of the size of administration. The next step would include the analysis and testing of the synthetic measure of the size of administration on an international sample. Due to the fact that the chosen variables are widely quoted in international public statistics, it is possible to apply the constructed measure to the local administration size analysis in European Union countries.

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