Imbalance in local revenues from property taxes in Poland versus local infrastructure expenditures

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Abstract. The imbalance in the public finance sphere is equated with the budget deficit, when the inflows to the local budgets do not cover the expenses. In the article, the imbalance is understood in two ways: as the deficit of property tax revenues, in relation to the public expenditures for purposes directly related to the infrastructure that increase the value of a property or change its purpose; and as a spatial imbalance in the amount of revenues in the individual territorial self-government units. The second approach will examine the disproportion of tax and per capita spending broken down into urban, rural and urban-rural communes, as well as the search for the causes of disproportions in the level of tax revenues. The aim of the study is to indicate a permanent budget deficit within the meaning of earmarked expenditure (income from property tax - expenses on real estate infrastructure) in the surveyed units, and a strong differentiation of this deficit in the three groups of local government units examined. The study will use the data from public statistics and methods of multidimensional analysis. The obtained results may be another argument in favor of introducing ad valorem tax in Poland, as well as implementing the concept of activity-based budgets, and prescribing generic inflows to expenditures on related purposes.

1. Introduction

The premise on which the local government model in Poland¹ is based is the leading role of the gmina (an elementary unit in the Polish administrative division) - an active manager of the area whose activities are to be focused on stimulating local social and economic development designed to meet the needs of the local community members [1]. Local development is a multi-faceted, comprehensive process of positive changes, resulting in the improvement of the life quality of citizens and an increase in competitiveness of a given territorial unit, based on internal (endogenous) potential, taking into consideration external (exogenous) determinants. The process takes place in several spheres: the economic one - through quantitative, qualitative and structural development of economic entities, which manifests itself in increased employment, introduction of new technology and in investment; the social

¹ The self-government reform implemented in Poland in 1990-1998 as a part of the decentralization of public authority introduced the basic three-tier territorial division of the country into: gminas (2478 including 302 urban gminas, 621 urban-rural gminas and 1555 rural gminas), poviats (380 including 66 towns with poviat rights) and local government voivodships (16), stipulating in the Polish Constitution that the basic territorial self-government unit is the gmina.
sphere - through improvement of conditions and scope of provision of services in the field of education, health and social care, housing, public safety and order, sport and recreation, culture and arts; the spatial sphere - through rational distribution of population and types of activities (functions) in the space and rational land use management; and finally in the ecological sphere - by protecting valuable resources and ecological values and preventing environmental and cultural pollution - through the concern about preservation of material culture monuments, historical traditions, as well as by preserving, shaping and developing local identities [2-6].

The fundamental factor of development, its foundation and the material base setting the framework for all socio-economic processes, is the space and its quality, as seen by its users, ensuring preservation of spatial order, in which the functioning of the economy and society proceeds in an optimal way [7-11]. This essentially implies the scope of activities and tasks that the legislator has set for the commune as a creator and stimulator of local social and economic development - these include: spatial order, construction and maintenance of technical and social infrastructure facilities, maintenance of public order and safety, as well as of environmental order [12]. The implementation of public tasks in areas that are of key importance for the development of a sustainable territorial unit requires the provision of appropriate instruments and the creation of a legal framework for the effective application of the instruments. The general objective of local development policy in market economy countries is to ensure constant growth in the number and types of jobs in the local community. Local authorities are particularly motivated to carry out such a specific task when there is a close link between the increase in employment and the income of the population and of the local budget. Then the economic objective of local governments is to continuously expand their tax base. The local authorities are vitally interested in the state of their local economies, as this translates into a volume of revenues in the municipal budget [13, 14]. Economic development manifests itself in the increased income of individual residents and local businesses, which consequently leads to the increased gmina's revenue. The system of Polish gminas' revenue is designed in such a way that it reflects the income of households and local businesses, the taxes which go directly to the gmina budget as a statutorily defined share in the state budget revenue from the income tax on natural people who are residents of the given gmina (6.71% share) and on legal people having their seat or branch in the gmina (39.34% share). Taxes that indirectly contribute to the gmina budget are: property tax, local fees on the increase in the value of real estate (zoning fees, betterment levy) and revenues from the management of municipal property (revenues from the sale of real estate, fees from perpetual usufruct of land, rents, lease, usufruct) order [15-19]. An extremely important problem common in Polish communes is the insufficient amount of financial resources in the local budgets for the implementation of gmina's own tasks imposed by law, which all too often result in budget deficits. In the literature, attention is generally drawn to the ineffective size-based system of real estate taxation in force in Poland - the tax base is the area of land, buildings and premises. Such systems dominate in Central and Eastern European countries, in some former Soviet republics, nearly half of African countries, several dozen of Asian and a few Caribbean countries [20-22]. They are confronted with value-based property taxation systems (known as ad valorem or cadastral systems) which, through the tax base related to the property value, enable local authorities to internalize part of the increased value of real estate as an effect of their investment activities in a given area [23-26].

In 2017 capital expenditures on real estate in gminas exceeded PLN 25.45 billion, which constituted 13.36% of their total spending. A statistical gmina spent PLN 662.55 per capita, with the largest expenditure per capita being incurred by the capitals of voivodships (PLN 847.78), followed by rural (PLN 679.24), urban-rural (PLN 596.33) and urban (PLN 576.55) gminas. At the same time, gminas' tax revenues from real estate taxes (real estate tax, agricultural tax, forest tax) increased to PLN 20.27 billion, which accounted for 21.03% of their own revenues. A statistical gmina generated per capita tax revenue at PLN 527.68, while, similarly to the per capita property investment expenditure, the highest amount per capita was received by voivodship cities (PLN 666.89), followed by urban gminas with PLN 635.27 and urban-rural gminas with PLN 633.90. Rural gminas significantly lagged behind and received
246.85 PLN of per capita tax revenue. In 2017, the difference between the gminas' tax income from property taxes and property investment expenditure increased to over PLN 5.182 billion, which gives a per capita deficit of PLN 134.87.

This relationship has become a premise of the study, which is aimed at the recognition of spatial differentiation of the above indicated imbalance. At that stage, we adopted urban gminas (voivodship capitals in particular) as a unit in the analysis, because under the Polish tax system, a significant part of revenue from property tax is generated by highly urbanized gminas. The obtained results will be the methodological guide for the examination of other gminas, with particular focus on the division into urban, urban-rural and rural gminas. The study used tools of descriptive statistics and multidimensional analysis. The calculations were made in the Statistica 13.0 package.

2. Methods
The degree of urbanization is evidenced by the intensity of development as well as by the size of local population, while the economic effectiveness of land management is determined by the ratio of total property tax revenue to the hectare of the tax area in question:

\[ E_{ijt} = \frac{\sum_{j=1}^{n} T_{ijt}}{\sum_{j=1}^{n} A_{ijt}} \]

where:
\( E_{ijt} \) – coefficient of economic effectiveness of land management in \( i \)-th gmina in time unit \( t \),
\( T_{ijt} \) – tax revenue from \( j \)-th land use \( (j=1,2,...,n) \) in \( i \)-th gmina in time unit \( t \),
\( A_{ijt} \) – size of \( j \)-th land use in \( i \)-th gmina in time unit \( t \).

In highly urbanized areas, with extremely asymmetrical distribution of type tax revenue from real estate, a simplified formula may be adopted (excluding agricultural tax and forest tax) in the following form:

\[ E_{it} = \frac{T_{it}}{A_{it}} \]

where:
\( E_{it} \) – coefficient of economic effectiveness of land management in \( i \)-th gmina in time unit \( t \),
\( T_{it} \) – property tax revenue in \( i \)-th gmina in time unit \( t \),
\( A_{it} \) – area of land in \( i \)-th gmina in time unit \( t \).

As the article examines urban gminas (voivodship capitals), the study adopts a simplified relation of revenues from the property tax to the total area of the gmina.

In the next step, the starting point for assessing the imbalance in local revenues from property taxes and local property investment expenditure on infrastructure is to find a reference value. It may imply the lowest deficit in the difference between per capita investment property expenditure and per capita property tax revenue or the highest (or average) per capita tax revenue ratio.

\[ V_{rt} = \max_{i} \frac{T_{it}}{K_{it}} \]

where:
\( V_{rt} \) – reference value of the ratio in given time unit \( t \),
\( T_{it} \) – per capita property tax revenue in \( i \)-th gmina in time unit \( t \),
\( K_{it} \) – per capita investment property expenditure in \( i \)-th gmina in time unit \( t \).
Relating to the reference value makes it possible to aggregate voivodship gminas which reached values above or below the reference value (with a variable or constant reference value in time) in the individual years, as well as to analyze the surveyed phenomenon in spatial approach.

The last stage of the analysis is the modeling of real estate tax revenue being the effect of property investment expenditure with a time lag by subsequent periods, in order to obtain the best fit function. This will allow to identify the time after which the effect of capital expenditures should be visible in the dynamics of tax revenue growth, assuming a positive correlation of these variables.

The proposed method is the starting point for further in-depth analysis and modifications of the proposed indicators.

3. Date and research results

The analysis covered sixteen urban gminas (voivodship capitals) over the years of 2005-2017. The gminas were described with the following variables:

- $T_j$ – real estate tax revenue: 1 - property tax, 2 - agricultural tax, 3 - forest tax (PLN);
- $L$ – gmina population (residents);
- $A$ – gmina area (ha);
- $K$ – gmina’s property investment expenditure (PLN);

Since in the studied voivodship capitals, the agricultural tax and the forest tax were minimal, the analysis was focused on the property tax. In the majority of analyses, the values studied were converted to per capita or per area values, whereas below (Tables 1 and 2) we present the structure of two significant variables indicating spatial diversity: of revenues from real estate tax and property investment expenditures in the voivodship capitals under study.

### Table 1. Structure of the revenues from real estate tax of voivodship capitals in Poland in 2005-2017 (%)

| City        | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Wrocław    | 8.27 | 8.13 | 8.27 | 7.96 | 8.10 | 8.44 | 8.17 | 8.55 | 8.51 | 8.54 | 8.64 | 8.78 | 8.83 |
| Bydgoszcz  | 4.70 | 4.57 | 4.53 | 4.38 | 4.65 | 4.87 | 4.88 | 4.53 | 4.63 | 4.43 | 4.51 | 4.56 | 4.44 |
| Lublin      | 4.01 | 3.95 | 4.21 | 3.91 | 4.28 | 3.75 | 3.75 | 3.82 | 3.92 | 3.91 | 3.96 | 4.09 | 4.04 |
| Zielona Góra| 1.35 | 1.35 | 1.38 | 1.42 | 1.46 | 1.43 | 1.33 | 1.40 | 1.39 | 1.35 | 1.53 | 1.60 | 1.59 |
| Łódź        | 9.12 | 9.28 | 9.24 | 9.13 | 9.05 | 8.70 | 9.08 | 9.11 | 9.02 | 8.78 | 8.73 | 8.73 | 8.53 |
| Kraków     | 10.81| 10.23| 10.09| 10.37| 9.96 | 9.32 | 9.56 | 9.62 | 9.82 | 10.15| 10.19| 10.32| 10.31|
| Opole       | 1.97 | 1.91 | 1.85 | 1.88 | 1.90 | 1.91 | 1.85 | 1.82 | 1.77 | 1.79 | 1.83 | 1.77 | 2.40 |
| Rzeszów    | 2.26 | 2.23 | 2.18 | 2.23 | 2.27 | 2.28 | 2.36 | 2.30 | 2.33 | 2.34 | 2.37 | 2.39 | 2.30 |
| Białystok  | 2.87 | 2.95 | 3.06 | 3.09 | 3.29 | 3.13 | 3.18 | 3.06 | 3.12 | 3.08 | 3.12 | 3.20 | 3.11 |
| Gdańsk     | 6.97 | 7.13 | 7.12 | 7.41 | 7.26 | 7.76 | 8.10 | 8.50 | 7.89 | 8.48 | 8.11 | 7.99 | 8.43 |
| Katowice   | 5.54 | 5.42 | 5.38 | 5.32 | 5.25 | 5.21 | 4.86 | 4.75 | 4.86 | 4.74 | 4.77 | 4.69 | 4.76 |
| Kielce     | 2.44 | 2.35 | 2.40 | 2.68 | 2.53 | 2.41 | 2.26 | 2.25 | 2.25 | 2.15 | 2.15 | 2.33 | 2.24 |
| Olsztyn    | 1.99 | 1.98 | 1.82 | 1.89 | 1.86 | 2.04 | 1.98 | 2.16 | 2.09 | 2.16 | 2.01 | 2.03 | 2.07 |
| Poznań     | 8.62 | 8.59 | 8.79 | 8.59 | 8.45 | 8.39 | 8.48 | 8.23 | 8.22 | 8.42 | 8.19 | 8.20 |
| Szczecin   | 4.67 | 5.54 | 4.92 | 5.18 | 4.93 | 4.89 | 5.20 | 5.03 | 5.03 | 4.91 | 4.95 | 4.93 | 4.81 |
| Warszawa   | 24.41| 24.39| 24.76| 24.55| 24.79| 25.48| 24.97| 24.87| 25.18| 25.05| 24.66| 24.39| 23.96|
In the analyzed period, nearly half of the total tax revenue in sixteen voivodship capitals was generated by three cities: Warsaw, Kraków and Łódź, while the evident leaders in the structure of property investment expenditures were Warsaw, Łódź and Wrocław (Table 2).

**Table 2.** Structure of the property investment expenditures in voivodship capitals in 2005-2017 (%)

| City           | 2005  | 2006  | 2007  | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  | 2017  |
|----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Wrocław       | 9.08  | 10.30 | 12.08 | 14.13 | 16.05 | 9.84  | 9.28  | 9.77  | 7.15  | 6.87  | 8.98  | 10.20 | 7.72  |
| Bydgoszcz     | 2.72  | 3.80  | 3.45  | 4.18  | 1.96  | 2.10  | 3.15  | 3.17  | 2.90  | 2.56  | 2.97  | 3.38  | 3.52  |
| Lublin         | 2.86  | 4.17  | 3.19  | 3.85  | 3.45  | 2.47  | 3.43  | 4.23  | 7.46  | 7.37  | 4.27  | 3.77  | 5.02  |
| Zielona Góra   | 2.15  | 1.84  | 1.27  | 0.98  | 1.91  | 1.60  | 0.58  | 0.75  | 0.89  | 1.09  | 0.64  | 1.38  | 2.20  |
| Łódź           | 8.26  | 8.59  | 7.73  | 7.58  | 5.15  | 4.79  | 6.25  | 10.12 | 11.03 | 13.47 | 10.66 | 6.41  |
| Kraków         | 10.54 | 9.19  | 11.90 | 8.66  | 6.92  | 6.09  | 5.41  | 5.52  | 7.89  | 11.03 | 13.47 | 10.66 | 9.25  |
| Opole          | 1.72  | 3.70  | 3.30  | 1.90  | 1.13  | 1.61  | 1.36  | 0.89  | 1.62  | 0.92  | 0.83  | 1.68  | 1.69  |
| Rzeszów        | 2.82  | 2.49  | 2.24  | 1.84  | 2.32  | 2.16  | 2.71  | 3.35  | 3.38  | 4.61  | 2.21  | 3.67  |
| Białystok      | 2.67  | 2.12  | 2.51  | 2.92  | 3.96  | 5.66  | 4.89  | 4.26  | 3.54  | 2.27  | 2.91  | 6.76  |
| Gdańska        | 3.67  | 4.95  | 6.22  | 5.67  | 5.23  | 6.56  | 10.86 | 13.95 | 10.21 | 8.34  | 6.77  | 7.92  | 5.58  |
| Katowice       | 6.77  | 6.28  | 3.36  | 3.68  | 4.03  | 3.93  | 3.22  | 4.60  | 5.88  | 6.67  | 3.48  | 2.70  | 2.32  |
| Kielce         | 3.49  | 2.70  | 1.19  | 1.57  | 2.12  | 2.57  | 3.83  | 2.95  | 2.70  | 2.42  | 3.61  | 2.39  | 2.86  |
| Olsztn         | 1.95  | 1.87  | 1.53  | 1.44  | 2.09  | 2.50  | 1.68  | 2.05  | 2.10  | 6.68  | 1.00  | 2.20  |
| Poznań         | 8.68  | 10.17 | 9.17  | 9.07  | 9.86  | 10.79 | 11.62 | 7.31  | 6.72  | 3.59  | 9.41  | 10.95 | 6.56  |
| Szczecin       | 3.08  | 2.47  | 3.40  | 3.53  | 2.85  | 4.07  | 5.08  | 5.35  | 4.12  | 4.52  | 8.19  | 4.37  | 4.84  |
| Warszawa       | 29.55 | 25.34 | 27.44 | 29.01 | 25.93 | 31.93 | 26.38 | 26.08 | 25.04 | 27.70 | 16.56 | 24.03 | 29.39 |

In the first step, the study focused on determining differences between per capita property investment expenditures in each voivodship capital gmina and in each examined year (Table 3). For each year the following reference values were calculated from the obtained values: max and median. Since in many gminas the values were negative, we decided to adopt maximum values as a reference. It should be noted that throughout the whole period under study, the reference value was represented by Warsaw, except for 2017 (Białystok). The smallest differences were recorded in the years 2005-2006 and 2015-2017. The largest disproportions took place in 2008-2014.

**Table 3.** Distance between the difference in property investment expenditure and per capita property tax revenue and the reference values for the period 2003-2017 (PLN/person)

| City         | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|--------------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Wrocław     | 1.03 | 1.10 | 1.46 | 1.63 | 1.16 | 2.75 | 2.07 | 2.05 | 1.99 | 2.73 | 0.92 | 1.11 | 0.83 |
| Bydgoszcz   | 1.35 | 1.59 | 2.28 | 2.74 | 2.89 | 3.74 | 2.85 | 2.85 | 2.45 | 3.26 | 1.63 | 1.62 | 0.90 |
| Lublin       | 1.30 | 1.52 | 2.29 | 2.74 | 2.68 | 3.60 | 2.71 | 2.65 | 1.87 | 2.57 | 1.42 | 1.55 | 0.57 |
| Zielona Góra | 1.34 | 1.70 | 2.47 | 3.10 | 2.88 | 3.75 | 3.09 | 3.13 | 2.63 | 3.41 | 1.85 | 1.72 | 0.48 |
| Łódź         | 1.04 | 1.21 | 1.86 | 2.36 | 2.03 | 3.30 | 2.61 | 2.46 | 1.62 | 2.13 | 0.31 | 1.01 | 0.93 |
| Kraków       | 0.99 | 1.20 | 1.48 | 2.28 | 2.04 | 3.09 | 2.45 | 2.57 | 2.16 | 2.59 | 1.12 | 1.08 | 0.81 |
| Opole        | 1.47 | 1.66 | 2.36 | 3.08 | 3.06 | 3.88 | 3.14 | 3.24 | 2.67 | 3.59 | 2.02 | 1.86 | 1.00 |
| Rzeszów      | 1.39 | 1.72 | 2.42 | 3.03 | 2.93 | 3.69 | 2.96 | 2.92 | 2.40 | 3.17 | 1.43 | 1.71 | 0.29 |
| Białystok    | 1.27 | 1.64 | 2.31 | 2.83 | 2.58 | 3.19 | 2.46 | 2.54 | 2.20 | 3.04 | 1.62 | 1.56 | 0.00 |
When analyzing the change in time in the ratio of property tax revenues to per capita property investment expenditures with a shift in time (by one year in succession), we found out that the exponential models had the best functionalities (Table 4).

### Table 4. Results of estimating linearized model of exponential effectiveness coefficient $V_t$

| Shift (years) | $R^2$  | Standard error | Coefficient | Value of Coefficient | Standard error | t Stat | p-Value |
|---------------|--------|----------------|-------------|----------------------|----------------|--------|---------|
| 0             | 0.070  | 0.237          | free term   | 0.848                | 0.139          | 6.092  | 0.000   |
|               |        |                | $t$          | 0.016                | 0.018          | 9.097  | 0.384   |
| 1             | 0.319  | 0.156          | free term   | 0.510                | 0.096          | 5.298  | 0.000   |
|               |        |                | $t$          | 0.028                | 0.013          | 2.146  | 0.056   |
| 2             | 0.470  | 0.145          | free term   | 0.421                | 0.094          | 4.476  | 0.002   |
|               |        |                | $t$          | 0.039                | 0.014          | 2.826  | 0.020   |
| 3             | 0.527  | 0.138          | free term   | 0.379                | 0.094          | 4.010  | 0.004   |
|               |        |                | $t$          | 0.045                | 0.015          | 2.988  | 0.017   |
| 4             | 0.520  | 0.136          | free term   | 0.366                | 0.098          | 3.716  | 0.007   |
|               |        |                | $t$          | 0.048                | 0.017          | 2.753  | 0.028   |

In addition, it turned out that the estimated parameters for the variables under analysis indicated the best properties of the model with a three-year delay in tax revenues, in relation to the property investment expenditures. Subsequent delays degraded the quality of the models.

In subsequent gminas, differing results indicate spatial imbalance of the phenomenon in time. In the diagrams below, cities classified into three subgroups, with a convergent course of the $V$ coefficient (revenues from real estate tax to per capita property investment expenditures) in 2005-2017 (Figure 1).
Figure 1. Dynamics of effectiveness coefficient V in 2005-2017 by three groups of voivodships

The first group includes three voivodeship capitals, including two from the west of Poland, with a low population density. The distinguishing feature of this group of cities is the highest value of the efficiency coefficient V, which after 2010 ranged between 4 and 7. The third group consists of the largest cities of the country, including Warsaw, the Polish capital, whose V coefficient was below 1.5 throughout the whole period under study (except for Gdańsk in the initial years of study, i.e. 2005-2006). What was characteristic for the second group was stability over 2010-2015 (0.5-2.0) and a sudden leap in 2014.

The analysis of individual variables reveals that there is a strong correlation between variables characterizing the population density (persons/area), and the examined tax variables. In the table below, for selected three years separated by five-year intervals, Pearson's correlation was determined for the basic variables under study and for data series for cities (Table 5).

Table 5. Correlation of area-related variables in 2005, 2010, 2015

| Variable                                      | 2005 | 2010 | 2015 |
|-----------------------------------------------|------|------|------|
| Population density (persons/ha) | $X_1$| 1.00 | 1.00 | 1.00 |
| real estate taxes (thousands PLN/ha)          | $X_2$| 0.82 | 0.83 | 0.90 |
| Property investment expenditure (thousands PLN/ha) | $X_3$| 0.68 | 0.72 | 0.34 |
| Coefficient V                                 | $X_4$| -0.12| -0.61| -0.65|

The revealed relationships were very strong, except for the dependence of the coefficient V and the variable characterizing the population density in 2005. In the following years the relationship was
already significant and negative, which indicated that the increase in population resulted in a decrease in the value of the coefficient $V$, i.e. the relation of income from real estate taxes and local property investment expenditures on infrastructure in the examined voivodship capitals and in the examined years.

Therefore, in the same three years, the voivodships were grouped due to the two variables mentioned in the table above (X1, X4) by means of the Ward method with Euclidean distance. A cut-off at the level of the fourth nod reveals that in the following years, with only minor shifts, the voivodship capitals fell into the same four groups (Figure 2).

![Figure 2. Clustering cities by their population density and V coefficient in 2005, 2010, 2015](image)

Clustering obtained in selected years (five-year periods) has not confirmed the mutual similarity of large voivodship capitals, which may have been caused by local investments in specific years and significant differentiation in terms of population density.

4. Conclusions
The nature of the activity conducted by local governments (meeting public needs) and its financing from public funds makes from the activity of a local government an object of vital social interest and a subject to constant control in terms of legality, economy and reliability. An activity which is particularly important for the development policy pursued by local authorities are its investment projects (investments in technical and social infrastructure), that are key instruments for controlling, initiating and creating local development. The effectiveness of activities undertaken in this area is determined by a number of endo- and exogenous factors. An important problem, commonly classified in Poland as barriers to effective implementation of development policy, is the ineffective,
size-based system of property taxation. This results in the lack of correlation between investment expenses incurred by gminas on the development of a given area and the amount of their income from property tax. The analyses of voivodship capitals carried out, as a part of the study, showed geographical diversity in terms of imbalance between investment expenditures and the amount of income from real estate tax levied in particular cities. The proposed method is a starting point for further in-depth analyses and modifications to the suggested indicators. The obtained results constitute a methodological guide to the research into other gminas, in particular, regarding the division into urban, urban-rural and rural gminas.

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