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Local Debt and the Development of Municipal Infrastructure. The Case of Małopolska

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Abstract

Theoretical background: The contemporary approach to public debt is multi-faceted. Debt incurred to finance current expenses is assessed differently than debt financing capital expenditure. This distinction is also important from the point of view of local authorities as part of their budgetary policy. Each decision related to incurring a debt has not only financial consequences, but is also made in the political and image context. It is worth noting that the current research on debt insufficiently emphasizes its direct impact on the socio-economic development of a given local government unit, devoting much more attention to the impact of debt on the condition of public finances. In the case of the first stream of research, significant discrepancies should be noted with regard to the selection of optimal indicators for measuring the impact of debt on local development. Therefore, one should agree that local development is conditioned by a whole group of factors dependent and independent of local authorities. The article attempts to verify several indicators of the development of infrastructure partially financed with debt.
Purpose of the article: Against this background, the subject of this study is to identify the policy of incurring debt by local government units in Poland in the longer term, to determine the degree of diversification of this policy, as well as, and perhaps above all, to link this policy with development processes. In order to avoid a superficial approach to such outlined issues, the scope of observation was limited to the communes

of the Małopolska Voivodeship. Such an approach also made it possible to take into account a longer period of observation of the surveyed communes (2010–2020).
Research methods: Out of the total number of 179 communes existing in Małopolska, 11 urban communes (the whole group due to their limited number), 20 rural communes and 20 urban-rural communes were randomly selected for the study. The basic criterion for assessing the policy of municipalities in relation to local debt was the ratio of total debt per capita to total revenue per capita. This indicator allows to determine the level of debt burden on communes' revenue. Next, the total impact of variables characterizing the budgetary policy of the commune was examined, such as: a) own revenue per capita, b) investment expenditure per capita, c) non-recoverable property expenditure per capita (mainly from the European Union), d) debt per capita, on selected indicators of the development of municipal infrastructure of the commune, affecting the quality of life of the commune's inhabitants. Progress in the development of infrastructure improves the conditions for conducting business activity of private enterprises, including the location of new entities, which may result in an increase in the commune's own revenue. The study used a multiple correlation coefficient, the value of which was calculated in each distinguished cluster of communes. The obtained results allowed to assess how the level of indebtedness of communes influenced the socio-economic development of these units.
Main findings: The conducted analysis made it possible to determine the degree of restrictiveness carried out by the authorities of the analyzed municipalities of Małopolska. The level of the multiple correlation coefficient calculated for municipalities between the explanatory variables characterizing the budgetary policy of municipalities (investment expenditure per capita, debt per capita, non-refundable property expenditure per capita and the dependent variable own revenue per capita) proves a fairly strong relationship between the analyzed variables. On the other hand, in rural communes with a low-restrictive budget policy (with a high debt ratio), the total impact of the indicated variables on the level of infrastructure development is generally stronger than in communes with a more disciplined budget policy (with a lower debt level). In the case of urban-rural communes with a low-restrictive budget policy (high debt ratio), the total impact of the analyzed variables on the level of infrastructure development in a commune is generally stronger than in communes with a more disciplined budget policy (with a lower level of debt).

Introduction

Local (self-government) authorities are part of the system of public authorities. Their structure varies depending on the preferred model of state management, which defines the level of decentralization of competences and tasks at individual levels. The division of competences and assigned tasks is important for building a systemic (statutory) structure of financing sources of public authorities from the point of view of their specific type. However, regardless of the preferred model of state management, it is important to note that in any system (model) the amount of financial resources at the disposal of public authorities is always limited. These restrictions mainly apply to central authorities, but they also apply to local authorities. It is worth noting, however, that the possibilities of shaping the amount of financial resources of local authorities are much smaller than that of central authorities. We are not developing this issue. On the other hand, it is important to state that, for various reasons, public revenues, including local government revenues, are generally not sufficient to finance tasks, i.e. incur expenses. In such a situation, central authorities may, guided by the choice of a specific strategy (doctrine), decide to incur public debt, an element of which may be (is) the debt of local government units. It is worth noting that public revenue, and consequently also expenses, find their source in the national income (domestic prod-

uct). In the market economy there are fluctuations (considerable in some years) in the amount of generated national income (business cycle), which affects the revenue of central authorities (state budget), as well as the revenue of local authorities. Due to the fact that the basic public goods provided (financed) by the authorities are rigid or quasi-rigid, incurring debt sometimes becomes a necessity, especially in times of economic crisis, in the event of natural disasters, pandemics, etc. The source and method of financing expenses, as such activities may lead to destabilization (crisis) of public finances. Empiricism in many countries in many periods also confirms such situations. Hence, state authorities or supranational organizations (e.g. the EU) introduce self-restrictions for this type of activity by establishing the so-called fiscal rules. Such rules can also be imposed on local authorities. In view of the above-mentioned revenue limitations, local authorities, striving to meet the expectations of the local community, may decide to incur debt, which should primarily involve financing investment and development tasks. In some countries, for example, in Poland, there is a statutory ban on financing current expenses with loans, except for short-term loans in order to maintain financial liquidity. Thus, seeing the opportunity to use debt to finance development tasks, it is impossible not to notice the possible negative effects of this activity. It is especially about the risk of a debt trap, the need to bear the costs of borrowings. Hence, the aforementioned regulations of the central authorities, which are aimed at protecting local communities against excessively risky actions of these authorities. Notwithstanding this paternalistic approach by the central government to the issue of borrowing, local authorities can make autonomous, but limited decisions, whether to incur or not to incur a debt. Some local authorities even avoid incurring debt, while other local government units abuse this instrument. Both the first, conservative approach to debt and the second too risky approach are not rare.

The above-mentioned issues related to incurring debt prompted a closer examination of the policy of incurring debt by local government units in our country in the longer term, determining the degree of diversification of this policy, as well as, and perhaps most of all, linking this policy with development processes. In order to avoid a superficial approach to such outlined issues, the scope of observation was limited to the communes of the Małopolska Voivodeship. Such an approach also made it possible to take into account a longer period of observation of the surveyed communes (2010–2020).

Literature review

Assessment of the impact of local debt on development

In addition to the budget deficit, the reasons for the emergence of debt lie in the insufficient level of revenue resulting, *inter alia*, from unfinished decentralization, as well as growing collective needs resulting from civilization development and techno-

logical progress. At the same time, local government authorities may be under social, political and economic pressure to provide various public services (Jastrzębska, 2009, pp. 29–30). Consequently, it can be assumed that there are two groups of reasons for the increase in debt: 1) economic (budget imbalance, increased investment activity, overinvestment); 2) other (mismanagement, no analysis, no strategic planning). Jastrzębska and Poniatowicz distinguish the following determinants of local debt: legal-financial, political, economic-social and organizational-managerial (Jastrzębska & Poniatowicz, 2021, pp. 156–167). These aspects are addressed in various studies (Cropf & Wendel, 1998, pp. 211–224; Balaguer-Coll et al., 2016, pp. 513–542). Nevertheless, the recognition that the debt was created for the purpose of carrying out investments contributing to local development is the basis for a positive assessment of local debt. The debt that has been incurred to finance the investment is assessed well. This type of debt contributes to economic development. On the other hand, bad debt is the one that serves to finance current expenditure, and thus consumption (Poniatowicz, 2011, p. 490). Incurring debt to finance current operations needs (current expenditure) may in extreme cases lead to the accumulation of the "debt loop" and solvency problems (Dafflon, 2002, pp. 15–44). Such an approach to debt allows it to be classified as administrative and financial debt, or profitable and unprofitable.

The above considerations lead to the conclusion that good debt is debt created in order to finance investments bringing various positive effects. The benefits of the investments undertaken can be divided into financial and social. Those relating to the financial sphere result from the possibility of generating revenue in the perspective, e.g. from taxes and local fees. The opposite will be such investments that do not generate revenue, but only contribute to an increase in expenses resulting from the maintenance of the infrastructure (Jurewicz, 2016, p. 233). On the other hand, in the social dimension, it is about the satisfaction of residents with the investments carried out that increase the standard of living (increased level of public services) in a given unit. The satisfaction of the inhabitants may translate, among others, into the results of local elections. This is where the political context of debt emerges. From the point of view of local development, local debt can be divided into constructive and destructive. The first is debt contributing to the development of a given entity, and the second is debt that reduces development opportunities and even leads to insolvency. It should be noted, however, that local authorities can pursue a budgetary policy characterized by a stable level of debt, which in turn means limiting investments in local infrastructure (Bröthaler et al., 2015, pp. 521–546).

The view about the impact of debt on the development of a given local government unit has supporters and opponents. On the one hand, in the literature on the subject, there is a position that can be reduced to the slogan: "everything for development, even debt". Without denying such an approach, one cannot lose sight of the fact that the consequence of excessive debt is excessive burdening of current revenue with debt servicing costs, i.e. limiting the expenditure capacity of the commune, or emerging problems with milling. In such situations, barriers to the development of

a given individual may appear (Gonet, 2018, pp. 135–139). It is also worth noting that excessive indebtedness is often identified with the requirement to have own contribution to obtain EU funds, with which local government units often have a problem (Otczyk & Felis, 2021, p. 177). Looking at debt in a broader perspective, its destabilizing effect on the financial situation of a local government unit can be noticed. It is visible in periods of crises, with any changes affecting the level of revenue resulting from demographic trends and system modifications, lack of restructuring of public tasks, financial risk (Filipiak, 2017, p. 260). Table 1 presents debt as an element/parameter having a positive and negative impact on local development.

Table 1. Importance of debt for local development

Positive	Negative
It creates local development, which leads to an improvement in the standard of living of the inhabitants and an increase in the self-government's competitiveness.	Part of the funds from liabilities is allocated to increasing the competitiveness of the local government, and not to its development.
Increases investment activity.	It reduces investment activity when incurring another debt to repay the existing debt.
It translates into an increase in revenue if the liabilities were allocated to investments that bring profits in the future in the form of revenue, which means that an analysis/evaluation of the profitability of the investment was carried out.	It causes an increase in current expenses, if the investments were not preceded by a reliable assessment of effectiveness and risk.

Source: Author's own study based on (Dolewka, 2018, pp. 171–172; Kozera, 2017, pp. 206–207; Otczyk & Felis, 2021, pp. 174–179).

When assessing local debt and its impact on local development, the issue of debt servicing costs is of particular importance on the one hand, as well as the level of this debt in relation to the revenue made and on the other. In the first case, it is related to the adopted debt management strategy, whereas the level of debt measured in relation to revenue is an indicator (parameter) used to assess the financial management of a local government unit, however, as noted by Piotrowska-Marczak, the level of the indicator is not significant, but the reasons for which this level results (Piotrowska-Marczak, 2013, pp. 21–23). Undeniably, in looking for an answer to the question about the impact of debt on local development, one should also address the following issues: the direction (manner) of spending the funds obtained from external sources and the analysis of the creditworthiness of a given entity.

Security of local government finances – limiting local debt

Local debt is part of the public debt, it arises in the long term as a result of the transformation of the permanent budget deficit (Sołtyk, 2020, p. 138). In the literature on the subject, local debt is most often defined as the sum of various financial liabil-

ities incurred by a given local government unit in connection with the expenditure incurred by this unit in excess of the obtainable revenue (Surówka, 2013, p. 56). Incurring debt by local government units is limited for several reasons. From the point of view of the State Treasury, the regulation of local debt should be treated as a tool preventing the insolvency of a given entity. If this were to happen, the liabilities of this unit are transferred to the debt of the State Treasury (Banaszewska et al., 2020, p. 132). Moreover, debt regulation prevents an increase in expenditure and budget deficit in pre-election periods or through the efforts of various interest groups, and reduces the moral hazard of spending public funds. Therefore, debt limits should be included among the instruments ensuring the safety of the finances of local government units. Moreover, in the situation of loss of this security, understood as the ability to finance public (local) tasks and settling liabilities, problems may arise with maintaining liquidity, entering (returning) an entity to the loan market, absorption of EU funds, implementation of development tasks, etc.

Instruments enhancing the security of local government finances (Owsiak, 2017, pp. 263–270) were included in the Public Finance Act (Ustawa z dnia 27 sierpnia 2009 r., Art. 91, 91a, 92, 93, 212, 227, 224, 228, 240, 242, 243, 244). It is worth emphasizing that they have changed over time, especially those relating to debt limitation. In the years 2010–2013, the following were in force: quantitative (rigid) limits related to debt. The first limit – the rule of debt servicing costs, which could not exceed 15% of the revenues of a local government unit planned for a given financial year. And also the second limit – the debt rule, according to which the debt could not exceed 60% of the total revenue of this entity in a given budgetary year. During the financial year, the total amount of debt of the local government unit at the end of the quarter could not exceed 60% of the revenue planned in a given financial year (Ustawa z dnia 30 czerwca 2005 r., Art. 169, 170). In 2011, the rule of balanced budget in the current part was introduced. An individual debt repayment ratio applies in 2014. It should be noted that these rules were changed successively by the amendment to the Public Finance Act of 2018, and then by the solutions introduced in connection with the COVID-19 pandemic (*The Public Finance Sector Debt Management Strategy in the Years 2021–2024*, 2020, pp. 34–35) .

According to the first rule – balancing the budget in the current part – the planned and performed current expenses cannot be higher than the planned and realized current revenues increased by revenues resulting from: 1) repayment of loans granted in previous years; 2) the surplus of the budget of the local government unit from previous years, less funds from unused funds on the current account of the budget, resulting from the settlement of revenue and expenditure financed with them, related to the specific principles of budget implementation set out in separate acts and resulting from the settlement of funds from the EU budget and non-returnable funds from aid granted by EFTA Member States and subsidies for the implementation of a program, project or task financed with the participation of these funds. For the years 2020–2021, the possibility of not keeping the above rule has been accepted.

When planning and implementing the budget in 2020, a local government unit could exceed the ratio of balancing current revenue and expenses by the amount of the loss in the revenue of a given unit resulting from the COVID-19 epidemic. Thus, current expenses could be higher than current revenue by the amount of the loss in revenue of a given unit resulting from the COVID-19 epidemic. In addition, for 2020, a change was introduced that made it possible to exceed the relationship regarding the balance of current revenue and expenses by expenses incurred in order to implement tasks related to counteracting COVID-19 (*The Public Finance Sector Debt Management Strategy in the Years 2022–2025*, 2021, pp. 32–33). As a result of the systemic change in 2018, the balanced budget rule in the current part from 2022 adopted the following: the current expenditure made may be higher than the current revenue made plus the budget surplus from previous years only by the amount related to the implementation of current expenditure with the share of funds from the budget, EU funds and non-reimbursable aid granted by EFTA Member States in the event that these funds were not transferred in a given financial year. It should be emphasized that the operating surplus is the basic indicator of the financial security of local governments. The higher the surplus, the lower the risk of losing financial liquidity, the greater the possibility of paying off liabilities. Low surplus means less investment and cutting back on public services (*Nadwyżka operacyjna*, n.d.).

With regard to the second rule – the individual debt repayment ratio – according to the provisions in a given financial year, the value of repayment of liabilities together with the costs of servicing them to the total revenue of the budget may not exceed the arithmetic average of the current revenue ratio calculated for the last three years, increased by revenue from sale of property and reduced by current expenses to total revenue of the budget. During the pandemic, liabilities for loans, borrowings and bond issues that were incurred by a given entity due to the loss of revenue resulting from the COVID-19 epidemic were excluded from the individual debt ratio (only up to the level of losses). The solution is of a long-term nature, i.e. in 2021 and in the following years, the service of liabilities will be beyond the limit for the entire repayment period. The same solution applies to establishing a debt repayment relationship, it will be possible to reduce current expenses by current expenses incurred in 2020 and 2021 in order to perform tasks related to counteracting COVID-19. As a result of system changes, from 2026, the period from which the debt repayment limit is calculated was extended to 7 years and the revenue from the sale of property was eliminated when calculating the individual debt repayment ratio.

In connection with the pandemic, in the years 2020 and 2021, there was a mechanism securing the finances of local government units – the debt of a given unit could not exceed 80% of the revenues made, and during this financial year, the debt at the end of the quarter could not exceed 80% of the planned revenues of this unit. If the entity met the debt repayment limit, not excluding the repayment of liabilities incurred in connection with shortages in revenue, it might not meet the limit of 80% of revenue. In 2020, the legislator also excluded expenditure on debt servicing

from the current expenditure of a local government unit when determining the ratio limiting the amount of debt repayment of a given unit.

When assessing the legal solutions implemented during the pandemic, it should be stated that the security of local government finances has been weakened by allowing the operating deficit (in the current part of the budget) and increasing the possibility of borrowing.

Measures of local development

The concept of local development is multifaceted, it concerns, e.g. economic, social, cultural, technical, spatial, environmental areas (Kosiedowski, 2008, p. 232; Sekuła, 2002, pp. 59–64). Generally speaking, it can be assumed that this is a goal "in itself", pursued by every local government unit. In this approach, development should be treated as a long-term process. In other words, quantitative and qualitative changes take place in the development processes, leading to an increase in the living standards of the inhabitants of the local government community, and consequently, contributing to the economic development of this unit (Markowski, 2008, p. 9). With such a broadly understood development, it is difficult to measure it, as there is no set of universal indicators. In addition, the concept of development today is associated with sustainable development understood as meeting contemporary needs without compromising the ability of future generations to meet their own needs (*Report of the World…*, 1987). Researchers, noticing various aspects of development, decide on the choice of indicators themselves (e.g. Kiczek & Pompa-Roborzyński, 2013, pp. 65–76). Therefore, we can distinguish synthetic indicators, structural indicators and indicators for local communities (Śleszyński, 2017, p. 40). With regard to sustainable development, there is a group of indicators that should be treated as information and diagnostic tools and classified according to groups – environmental, social, institutional, economic (Smarzewska & Bodzak, 2015, pp. 56–59). Without going into detail in the issues of measuring development, it should be emphasized that local development is determined by a whole group of factors dependent and independent on local authorities.

In analyzing the impact of debt on local development, the first step should be to determine the financial condition of a given entity. Investments are certainly one of the factors influencing the level of development. Therefore, the basic indicator of its assessment is the amount/increase of capital expenditure. The impact of debt on development is related to the investments undertaken (sewage system; waterworks; sewage treatment plant; roads; cultural institutions – libraries, theaters, museums, cultural centers, community centers, music institutions, clubs, cinemas; swimming pools; sports halls; sports fields; bicycle paths; revitalization of the old town; parks, including outdoor gyms).

Research methods

When starting the analysis of the policy of communes towards debt in general, it is necessary to make a clear statement at the outset that in these studies it is absolutely necessary to distinguish units with similar characteristics from the total number of observed communes. Comparing small rural communes with large urban communes has a limited cognitive value. Therefore, the studies distinguished the classical division of communes into: a) urban communes, b) rural communes, c) urban-rural communes. In the analyzed period 2010–2020, 182 communes operated in Małopolska, including 3 cities with *powiat* rights (Kraków, Nowy Sącz, Tarnów). Cities with *powiat* rights were excluded from further analyzes due to the incomparably greater economic, financial and population potential, also due to a different system of financial support. These units require separate studies due to their low comparability with small or medium-sized communes.

Out of the total number of communes (179 communes, excluding cities with *powiat* status) in the analyzed period in Małopolska, there were the following numbers of communes:

– urban (11),
– rural (121),
– urban-rural (47).

Due to the still large number of communes and the eleven-year period of observation to more accurately capture the features of the debt policy, their number was limited by drawing lots.

In the groups of rural and urban-rural communes, 20 units were randomly selected. Urban communes were included in the study in full due to their small number (11).

The basic criterion for assessing the policy of municipalities in relation to local debt was the ratio of total debt to total revenue. This indicator allows to determine the level of debt burden on the commune's revenue. Next, the total impact of variables characterizing the municipal budget policy was examined, i.e. own revenue per capita, investment expenditure per capita, non-refundable property expenditure per capita, debt per capita on selected indicators of the effects of municipal investment policy shaping the development of the municipality/quality of life of the residents of the municipality, i.e. sewage system (length of the network in km and users of the installation in % of the total population of a given local government unit); water supply (length of the network in km and users of the installation in % of the total population of a given local government unit). For this purpose, a multiple correlation coefficient was used, the value of which was calculated in each distinguished cluster of communes. The obtained results allowed to assess how the level of indebtedness of communes influenced the socio-economic development of these units.

First, however, a linear order was made according to the average values of the debt ratio over the period. The values of the standard deviation and the coefficient of variation were also calculated. An interesting relationship was noticed: the lower the

average level of the debt ratio, the greater its volatility over time. To confirm this, the linear correlation coefficient was calculated and its significance was tested in each group of communes – urban, rural, urban-rural (Student's *t*-test for the correlation coefficient). Then, communes were grouped separately in each group (urban, rural, urban-rural) using the *k*-means method, distinguishing 4 commune clusters (see Tables 3, 10, 17). Each cluster contained communes that were as similar as possible in terms of debt levels in individual years. The obtained clusters were described in terms of debt and debt volatility over time.

As noted above, in the first stage, the *k*-means method was used. It is a method of dividing the entire set into disjoint sets, so that within each set the objects are as similar as possible (in terms of the considered features), and the diversity between the created sets is as large as possible. In other words, it is a method belonging to the cluster analysis split methods (Sokołowski & Czaja, 2014, pp. 23–29).

Results

Urban communes

Table 2. Selected urban communes in Małopolska and numerical characteristics of their debt ratio

Commune	Numerical characteristics of the debt ratio		
	average	standard deviation	coefficient of variation
Limanowa	42.991	10.638	24.74%
Zakopane	41.718	8.235	19.74%
Bochnia	34.255	7.712	22.51%
Gorlice	33.370	6.027	18.06%
Nowy Targ	32.291	13.275	41.11%
Bukowno	32.191	9.943	30.89%
Grybów	28.936	8.025	27.73%
Oświęcim	26.982	8.893	32.96%
Mszana Dolna	19.173	6.958	36.29%
Sucha Beskidzka	14.173	7.553	53.29%
Jordanów	12.973	9.652	74.41%

Source: Author's own study.

The most indebted communes in the analyzed period were Limanowa, Zakopane, Bochnia, and the least indebted ones: Jordanów, Sucha Beskidzka and Mszana Dolna (Table 2). The correlation coefficient between the average debt level and the coefficient of variation is 0.259 and is not statistically significant (p-value = 0.425). A commune that owes more debt usually has a more "labile" level of this debt than a commune that is indebted to a lesser extent, but this relationship is not statistically significant.

Table 3. Composition of clusters formed as a result of grouping urban communes using the *k*-means method

Group 1	Group 2	Group 3	Group 4
Grybów	Bochnia	Limanowa	Jordanów
Oświęcim	Bukowno	Zakopane	Mszana Dolna
	Gorlice		Sucha Beskidzka
	Nowy Targ		

Source: Author's own study.

Below there are the numerical characteristics of the debt level (average, standard deviation, coefficient of variation) in each group (see Tables 4–7).

Table 4. Group 1 urban communes – numerical characteristics of the debt ratio

Year	Average	Standard deviation	Coefficient of variation
2010	17.050	6.435	37.74%
2011	18.100	8.344	46.10%
2012	20.650	7.566	36.64%
2013	37.200	15.556	41.82%
2014	34.250	5.445	15.90%
2015	35.100	1.838	5.24%
2016	27.500	0.849	3.09%
2017	26.550	7.707	29.03%
2018	30.700	9.051	29.48%
2019	31.450	5.728	18.21%
2020	29.000	6.647	22.92%

Source: Author's own study.

Cluster 1 has lower debt ratio values than cluster 3 and higher values than cluster 4 (starting from 2012). The volatility of this indicator is generally higher than in cluster 2 and 3 and lower than in cluster 4 (Table 4).

Table 5. Group 2 urban communes – numerical characteristics of the debt ratio

Year	Average	Standard deviation	Coefficient of variation
2010	27.425	10.906	39.77%
2011	40.500	6.411	15.83%
2012	44.175	3.950	8.94%
2013	40.175	0.885	2.20%
2014	41.825	5.232	12.51%
2015	40.825	4.635	11.35%
2016	31.975	2.609	8.16%
2017	27.525	4.346	15.79%
2018	23.100	6.238	27.00%
2019	22.450	5.684	25.32%
2020	23.025	6.790	29.49%

Source: Author's own study.

As Table 5 shows cluster 2 is characterized by higher debt ratio values than cluster 3 and cluster 1 (in 2010–2017). The volatility of this indicator is usually lower than in clusters 1 and 4.

Table 6. Group 3 urban communes – numerical characteristics of the debt ratio

Year	Average	Standard deviation	Coefficient of variation
2010	27.800	0.141	0.51%
2011	29.850	1.202	4.03%
2012	34.000	8.485	24.96%
2013	37.500	4.808	12.82%
2014	45.450	0.919	2.02%
2015	49.000	7.354	15.01%
2016	44.400	5.798	13.06%
2017	49.050	11.950	24.36%
2018	50.350	11.384	22.61%
2019	52.800	3.111	5.89%
2020	45.700	5.940	13.00%

Source: Author's own study.

Cluster 3 is characterized by higher values of the debt ratio than clusters 1 and 4 (see Table 6). The volatility of this ratio is the lowest compared to the other clusters.

Table 7. Group 4 urban communes – numerical characteristics of the debt ratio

Year	Average	Standard deviation	Coefficient of variation
2010	30.533	2.836	9.29%
2011	24.100	3.637	15.09%
2012	20.100	5.667	28.19%
2013	18.333	4.499	24..54%
2014	16.867	7.586	44.97%
2015	11.900	6.409	53.85%
2016	10.600	7.038	66.39%
2017	7.500	4.288	57.18%
2018	6.400	5.645	88.21%
2019	8.133	6.369	78.31%
2020	15.367	6.724	43.76%

Source: Author's own study.

Cluster 4 is characterized by the lowest values of the debt ratio among all groups (see Table 7), and the volatility of this ratio is the highest among all the clusters.

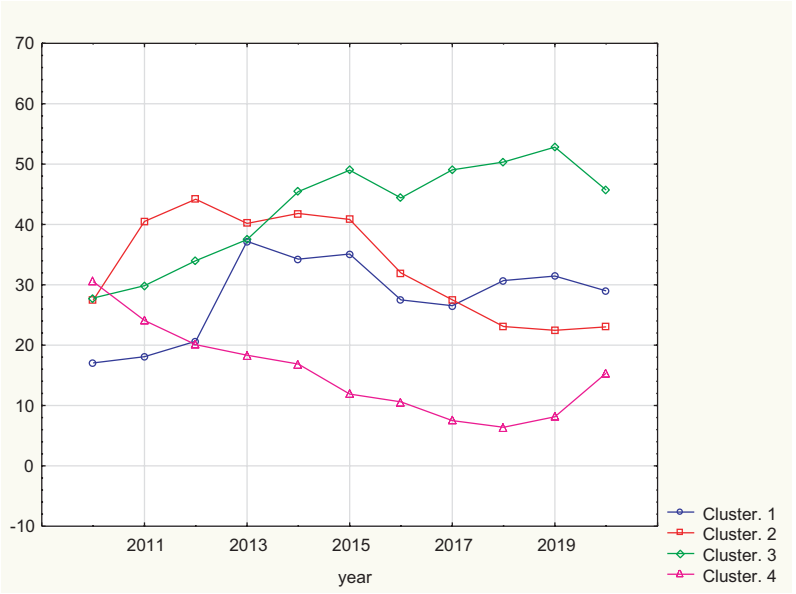

Figure 1. The average values of the debt ratio over time for four clusters of urban communes in Małopolska

Source: Author's own study.

Table 8 contains the multiple correlation coefficients of Małopolska urban communes calculated for the explanatory variables characterizing the budgetary policy of the commune: own revenue per capita, investment expenditure per capita, non-returnable property expenditure per capita, debt per capita, and selected explanatory variables representing the quality of life of residents / investment effects in communes.[1]

Table 8. Correlation coefficients for the urban communes group

Explanatory Variable	All group
Sewerage (length, km)	0.831
Waterworks (length, km)	0.886
Sewerage (population, %)	0.701
Waterworks (population, %)	0.880

Source: Author's own study.

[1] It was not possible to calculate multiple correlation coefficients in any group of Małopolska urban communes due to the insufficient amount of data, therefore, it was necessary to combine all groups into one (there are only 11 communes in Małopolska).

Rural communes

Table 9. Selected rural communes in Małopolska and numerical characteristics of their debt ratio

Commune	Numerical characteristics of the debt ratio		
	average	standard deviation	coefficient of variation
Czernichów	53.482	8.709	16.28%
Radziemice	39.118	9.913	25.34%
Kłaj	36.145	12.183	33.71%
Żegocina	32.382	6.521	20.14%
Osiek	30.082	8.463	28.13%
Tomice	28.273	9.374	33.16%
Pleśna	27.264	4.396	16.12%
Tymbark	26.755	5.629	21.04%
Gdów	25.918	8.874	34.24%
Czorsztyn	24.718	15.204	61.51%
Brzeźnica	22.791	8.104	35.56%
Wielka Wieś	18.918	9.685	51.20%
Biały Dunajec	18.736	6.006	32.05%
Tokarnia	18.173	9.949	54.75%
Gręboszów	16.955	11.078	65.34%
Łabowa	16.282	9.255	56.84%
Koszyce	15.727	3.824	24.32%
Kamionka Wielka	14.745	2.468	16.74%
Słopnice	11.227	4.690	41.7%
Zembrzyce	5.309	7.600	143.15%

Source: Author's own study.

The most indebted communes in the analyzed period were Czernichów, Radziemice and Kłaj, and the least indebted ones: Kamionka Wielka, Słopnice, Zembrzyce (see Table 9). The correlation coefficient between the average debt level and the coefficient of variation is -0.573 (p-value = 0.0019), which means that municipalities with higher debt generally have lower volatility of the debt ratio in subsequent years. Thus, a commune that is heavily indebted has a more "stable" level of debt than a commune that is less indebted.

Table 10. Composition of clusters formed as a result of grouping rural communes using the *k*-means method

Group 1	Group 2	Group 3	Group 4
Gdów	Łabowa	Słopnice	Czernichów
Pleśna	Kamionka Wielka	Zembrzyce	Radziemice
Tymbark	Tokarnia		
Żegocina	Gręboszów		
Tomice	Wielka Wieś		
Czorsztyn	Koszyce		
Brzeźnica	Biały Dunajec		
Kłaj			
Osiek			

Source: Author's own study.

Below there are the numerical characteristics of the debt level (mean, standard deviation, coefficient of variation) in each group (see Tables 11–14).

Table 11. Group 1 rural communes – numerical characteristics of the debt ratio

Year	Average	Standard deviation	Coefficient of variation
2010	36.467	7.976	21.87%
2011	35.722	6.745	18.88%
2012	39.711	10.971	27.63%
2013	36.033	6.424	17.83%
2014	32.133	7.581	23.59%
2015	26.778	5.011	18.71%
2016	20.200	4.953	24.52%
2017	19.311	6.755	34.98%
2018	22.300	8.476	38.01%
2019	22.656	5.935	26.20%
2020	19.533	4.928	25.23%

Source: Author's own study.

Cluster 1 is characterized by higher debt ratio values than clusters 2 and 3 and lower than cluster 4 (Table 11). The volatility of this ratio is generally lower than in clusters 2 and 3.

Table 12. Group 2 rural communes – numerical characteristics of the debt ratio

Year	Average	Standard deviation	Coefficient of variation
2010	14.886	7.584	50.95%
2011	16.886	9.701	57.45%
2012	23.014	8.404	36.52%
2013	24.314	7.802	32.09%
2014	24.000	7.677	31.99%
2015	21.900	7.563	34.53%
2016	15.586	6.876	44.12%
2017	12.914	5.090	39.41%
2018	11.414	4.649	40.73%
2019	11.271	5.160	45.78%
2020	11.657	4.696	40.29%

Source: Author's own study.

Cluster 2 is characterized by lower values of the debt ratio than clusters 4 and 1 (Table 12). The volatility of this ratio is usually higher than in clusters 1 and 4 and lower than in cluster 3.

Table 13. Group 3 rural communes – numerical characteristics of the debt ratio

Year	Average	Standard deviation	Coefficient of variation
2010	8.950	6.718	75.06%
2011	10.900	14.425	132.34%
2012	6.250	8.839	141.42%

Year	Average	Standard deviation	Coefficient of variation
2013	3.500	4.808	137.38%
2014	2.800	3.253	116.17%
2015	2.550	3.182	124.78%
2016	5.250	7.142	136.03%
2017	3.850	5.445	141.42%
2018	13.800	1.414	10.25%
2019	17.650	2.616	14.82%
2020	15.450	3.748	24.26%

Source: Author's own study.

Cluster 3 is characterized by the lowest values of the debt ratio in 2010–2017 (Table 13). The volatility of this indicator is the highest compared to the other clusters.

Table 14. Group 4 rural communes – numerical characteristics of the debt ratio

Year	Average	Standard deviation	Coefficient of variation
2010	57.100	21.355	37.40%
2011	63.150	5.020	7.95%
2012	48.150	15.627	32.45%
2013	48.250	15.627	32.39%
2014	49.900	7.637	15.30%
2015	46.600	5.798	12.44%
2016	36.550	6.576	17.99%
2017	37.450	4.455	11.90%
2018	40.000	12.587	31.47%
2019	43.450	14.071	32.39%
2020	38.700	13.011	33.62%

Source: Author's own study.

Cluster 4 is characterized by the highest values of the debt ratio among all groups (Table 14) and the volatility of this ratio is lower than in clusters 2 and 3.

Table 15 contains multiple correlation coefficients according to the created groups of rural municipalities in Małopolska, calculated for the explanatory variables representing the budget policy of the commune: own revenue per capita, investment expenditure per capita, non-returnable property expenditure per capita, debt per capita and selected explanatory variables representing the quality of life of residents / the effects of investments in communes.[2]

[2] It was not possible to calculate multiple correlation coefficients in the 3rd and 4th groups of Małopolska rural communes due to insufficient data, hence it was necessary to add additional rural communes. Finally, Group 4 was supplemented with 5 communes for which the debt ratio values in the analyzed period exceeded the respective values of the ratios in the remaining groups, and Group 3 was supplemented with 5 communes for which the debt ratios were lower than in the remaining groups.

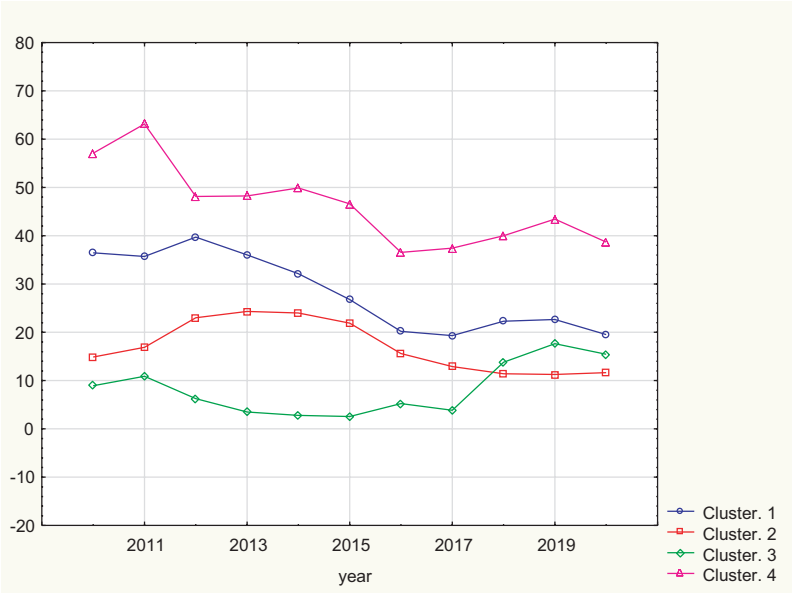

Figure 2. The average values of the debt ratio over time for four clusters of rural communes in Małopolska

Source: Author's own study.

Table 15. Correlation coefficients for the rural communes group

Explanatory variable	Group 1	Group 2	Group 3	Group 4
Sewerage (length, km)	0.948	0.911	0.488	0.955
Waterworks (length, km)	0.608	0.880	0.543	0.971
Sewerage (population, %)	0.933	0.865	0.590	0.958
Waterworks (population, %)	0.832	0.831	0.845	0765

Source: Author's own study.

Urban-rural communes

Table 16. Selected urban-rural communes in Małopolska and numerical characteristics of their debt ratio

Commune	Numerical characteristics of the debt ratio		
	average	standard deviation	coefficient of variation
Piwniczna Zdrój	49.873	13.956	27.98%
Brzesko	47.964	8.358	17.43%
Miechów	43.918	4.549	10.36%
Ryglice	41.200	6.178	14.99%
Libiąż	39.936	6.303	15.78%
Żabno	35.082	10.467	29.84%
Tuchów	32.882	6.764	20.57%
Słomniki	32.809	5.719	17.43%
Radłów	32.236	4.836	15.00%

Commune	Numerical characteristics of the debt ratio		
	average	standard deviation	coefficient of variation
Brzeszcze	30.873	8.660	28.05%
Chrzanów	28.373	13.343	47.03%
Ciężkowice	28.182	7.359	26.11%
Alwernia	24.473	11.531	47.12%
Świątniki Górne	23.918	5.642	23.59%
Andrychów	21.955	5.491	25.01%
Chełmek	21.636	9.343	43.18%
Dąbrowa Tarnowska	17.727	6.883	38.83%
Szczucin	15.927	4.582	28.77%
Wolbrom	14.427	6.235	43.21%
Maków Podhalański	12.864	3.727	28.97%

Source: Author's own study.

The most indebted communes are Piwniczna Zdrój, Brzesko and Miechów, and the least indebted ones are Szczucin, Wolbrom, Maków Podhalański (Table 16). The correlation coefficient between the average level of debt and the coefficient of variation is -0.589 (p-value = 0.0012), which means that municipalities with higher debt generally have lower volatility of the debt ratio in subsequent years. Thus, a municipality that is heavily indebted has a more "stable" level of debt than a municipality that is less indebted.

Table 17. Composition of clusters formed as a result of grouping urban-rural communes using the *k*-means method

Group 1	Group 2	Group 3	Group 4
Słomniki	Alwernia	Andrychów	Piwniczna Zdrój
Libiąż	Chełmek	Maków Podhalański	Miechów
Ciężkowice	Chrzanów	Szczucin	Brzesko
Radłów	Świątniki Górne	Dąbrowa Tarnowska	Ryglice
Brzeszcze		Wolbrom	
Tuchów			
Żabno			

Source: Author's own study.

Table 18. Group 1 urban-rural – numerical characteristics of the debt ratio

Year	Average	Standard deviation	Coefficient of variation
2010	33.771	12.387	36.68%
2011	33.400	7.360	22.03%
2012	34.529	5.933	17.18%
2013	38.500	6.906	17.94%
2014	40.486	7.775	19.20%
2015	36.729	8.783	23.91%
2016	28.600	7.954	27.81%
2017	29.043	7.081	24.38%
2018	29.957	5.006	16.71%

Year	Average	Standard deviation	Coefficient of variation
2019	30.257	6.223	20.57%
2020	29.300	6.572	22.43%

Source: Author's own study.

Cluster 1 has higher debt ratio values than cluster 3 and lower than cluster 4 (Table 18). The volatility of this ratio is generally lower than in clusters 2 and 3 and higher than in cluster 4.

Table 19. Group 2 urban-rural – numerical characteristics of the debt ratio

Year	Average	Standard deviation	Coefficient of variation
2010	31.050	12.959	41.74%
2011	37.050	9.335	25.19%
2012	36.550	6.587	18.02%
2013	31.375	4.148	13.22%
2014	30.375	5.096	16.78%
2015	24.000	7.788	32.45%
2016	18.425	7.330	39.78%
2017	14.250	5.717	40.12%
2018	17.000	4.237	24.92%
2019	13.825	5.894	42.63%
2020	16.700	7.376	44.17%

Source: Author's own study.

Cluster 2 is characterized by higher debt ratio values than cluster 3 and lower than cluster 4 and generally lower than cluster 1 (Table 19). The volatility of this ratio is usually higher than in clusters 1 and 4.

Table 20. Group 3 urban-rural – numerical characteristics of the debt ratio

Year	Average	Standard deviation	Coefficient of variation
2010	17.000	3.088	18.16%
2011	21.100	6.004	28.46%
2012	20.600	7.055	34.25%
2013	16.540	7.022	42.45%
2014	15.800	7.809	49.43%
2015	14.700	5.312	36.13%
2016	14.440	3.272	22.66%
2017	13.500	3.281	24.30%
2018	16.780	6.463	38.51%
2019	15.440	6.585	42.65%
2020	16.480	11.838	71.83%

Source: Author's own study.

Cluster 3 is characterized by the lowest values of the debt ratio (Table 20). The volatility of this indicator is usually higher than in clusters 1 and 4.

Table 21. Group 4 urban-rural – numerical characteristics of the debt ratio

Year	Average	Standard deviation	Coefficient of variation
2010	38.275	8.928	23.33%
2011	42.775	11.815	27.62%
2012	49.725	8.670	17.44%
2013	51.000	3.233	6.34%
2014	58.575	11.196	19.11%
2015	54.025	11.956	22.13%
2016	44.175	7.008	15.86%
2017	42.850	9.775	22.81%
2018	42.025	5.326	12.67%
2019	40.750	3.813	9.36%
2020	38.950	3.336	8.57%

Source: Author's own study.

Cluster 4 is characterized by the highest values of the debt ratio among all groups (see Table 21) and the volatility of this ratio is the lowest among all clusters.

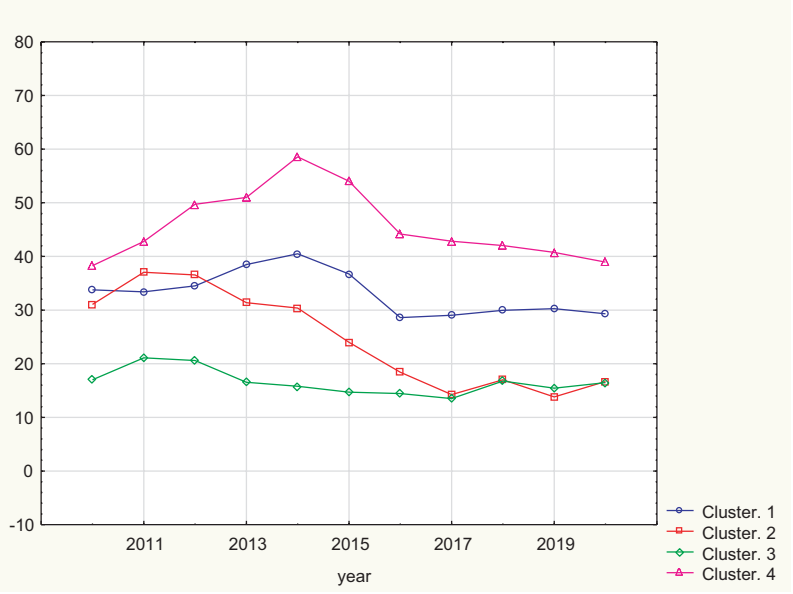

Figure 3. The average values of the debt ratio over time for four clusters of urban-rural communes in Małopolska

Source: Author's own study.

Table 22 contains multiple correlation coefficients according to the created groups of urban-rural communes in Małopolska, calculated for the explanatory variables representing the budgetary policy of the commune: own revenue per capita, investment expenditure per capita, non-returnable property expenditure per capita, debt per

capita and selected explanatory variables representing the quality of life inhabitants / investment effects in communes.[3]

Table 22. Correlation coefficients for the urban-rural communes group

Explanatory variable	Group 1	Group 2	Group 3	Group 4
Sewerage (length, km)	0.674	0.854	0.611	0.931
Waterworks (length, km)	0.783	0.993	0.516	0.983
Sewerage (population, %)	0.880	0.652	0.647	0.958
Waterworks (population, %)	0.734	0.990	0.662	0.993

Source: Author's own study.

Discussions

In Małopolska communes, the total impact of variables: own revenue per capita, investment expenditure per capita, non-recoverable property expenditure per capita, debt per capita on the variables representing the level of development of the municipal infrastructure is quite clear (multiple correlation coefficients are not lower than 0.7). Nevertheless, there is some variation in the strength of the impact on individual dependent variables. The strongest impact of this type is observed in the case of the Waterworks km variable, and the weakest in the case of the Sewage system, population % variable. Due to the necessity to combine all groups of Małopolska municipalities into one group, it is difficult to determine the impact of the debt size of individual municipalities on the strength of the relationship between the variables in question.

In the fourth group of rural communes (with the highest average level of the indicator in 2010–2014 in comparison with other groups), the total impact of variables: own revenue per capita, investment expenditure per capita, non-returnable property expenditure per capita, debt per capita on the variables representing the level of development infrastructure of the commune is stronger compared to other clusters of communes.

The weakest total impact of the explanatory variables on the variables Sewage km, Waterworks km, Sewerage population % describing the level of development of municipal infrastructure is visible in cluster 3 (with lower values of the debt ratio than in Groups 1 and 4 throughout the period and lower values of this indicator in compared to Group 2 in 2010–2017).

In Groups 1 and 2 (with lower debt ratios than in Group 4 and generally higher ratios than in Group 3) total impact of variable own revenue per capita, investment

[3] Calculating the multiple correlation coefficients in the 3rd and 4th groups of Małopolska urban-rural communes was not possible due to insufficient data, hence it was necessary to add additional urban-rural communes. Finally, Group 4 was supplemented with 5 communes for which the debt ratio values in the analyzed period exceeded the respective values of the ratios in the remaining groups, and Group 3 was supplemented with 5 communes for which the debt ratios were lower than in the remaining groups.

expenditure per capita, non-recoverable property expenditure per capita, debt per capita on variable Sewerage km and Waterworks km is usually weaker than in cluster 4, but stronger than in Group 3 (except for the variable Waterworks population %), while in the case of the variables Sewage km, Waterworks km and Waterworks population % the strength of this impact in Group 1 is greater than in Group 2.

In conclusion, in Małopolska rural municipalities with a low-restrictive budget policy (with a high debt ratio), the total impact of variable own revenue per capita, investment expenditure per capita, non-returnable property expenditure per capita, debt per capita on the level of infrastructure development in the commune is generally stronger than in municipalities with a more disciplined budget policy (with a lower level of debt).

In the fourth group of urban-rural communes (with the highest average level of the indicator in 2010–2014 in comparison with other groups), the total impact of variables: own revenue per capita, investment expenditure per capita, non-returnable property expenditure per capita, debt per capita on variables representing the level of development of the commune's infrastructure is stronger than in other clusters of communes. The weakest total impact of the explanatory variables on each of the explanatory variables describing the level of development of municipal infrastructure is visible in cluster 3 (with the lowest values of the debt ratio among all groups). In Group 2 (with lower debt ratios than in Groups 4 and 1 and generally higher ratios than in Group 3) total impact of variable own revenue per capita, investment expenditure per capita, non-recoverable property expenditure per capita, debt per capita on variable presenting the level of development of the commune's infrastructure is usually weaker than in Cluster 4, but stronger than in Group 3 and with one exception (Sewerage, population %), stronger than in Group 1. In Group 1 (with lower debt ratio values than in Group 4 and generally higher indicators than in Group 3 and 4) the total impact of variable own revenue per capita, investment expenditure per capita, non-returnable property expenditure per capita, debt per capita on the variables representing the level of development of the commune's infrastructure is usually stronger than in cluster 3 and at the same time generally weaker than in Groups 4 and 2.

To sum up, in Małopolska urban-rural municipalities with a low-restrictive budget policy (high debt ratio), the total impact of variable own revenue per capita, investment expenditure per capita, non-returnable property expenditure per capita, debt per capita on the level of infrastructure development in the commune is in general stronger than in communes with a more disciplined budget policy (with a lower level of debt).

The conducted research confirms that the type of budgetary policy in relation to the debt incurred (restrictive or expansive) translates into the level of infrastructure development in the commune. However, these dependencies are not permanent. High debt does not always affect the level of development. This may result from various reasons, e.g. depending on the type of commune, degree of affluence (level of own revenue), lack of investments in the studied areas (water supply, sewage system).

The research period assumed in the work covers 2020, i.e. the first year of the COVID-19 pandemic. This situation affected the financial condition of communes in Poland (Malinowska-Misiąg, 2022, pp. 48–63; Kostyk-Siekierska, 2021, pp. 29–45), which could have had an impact on the results obtained in the study. In the case of communes, revenues were realized in the amount of over PLN 149 million, which accounted for 100.2% of the plan; expenditures PLN 144 million, which accounted for 91.4% of the plan. Capital expenditure of communes was lower by 7.2% (10.6% in real terms). On the other hand, expenditure on investment tasks was lower by 7.7% compared to 2019. The amount of expenditure on investments implemented by communes as part of projects co-financed from foreign funds also decreased by 16.9% (KRRIO, 2021, p. 198). Most communes closed the budget with a surplus – 79.7% of communes (p. 202), and the amount of debt increased by 5.6% compared to 2019 (p. 205). Despite the fact that the budgetary policy was carefully implemented in the conditions of the pandemic and there was no direct threat to financial liquidity, this summary list does not exclude an individual approach in assessing the financial situation of municipalities in Poland. It should be added that the high level of revenue results from the transfer of funds from the Government Local Investment Fund classified as own revenues and the receipt of targeted subsidies for the implementation of benefits under the "500+" program (since 2016).

In the area presented in the article, research and empirical analyzes were conducted. The literature presents the results of other researchers, but it is difficult to compare them with the results obtained in this work for two reasons. Firstly, the analyzes covered a different research period or types of communes, and the research assumptions were different. Secondly, some studies concerned Małopolska, but they adopted different criteria and research methods (Woźniak & Zemanek, 2006, pp. 193–205; Ziemiańczyk, 2010, pp. 31–40; Paluch, 2013, pp. 527–539). Ziemiańczyk's research, which concerned rural and urban-rural communes in Małopolska, draw attention. To assess the socio-economic level of these communes, the author chose 10 indicators (5 in the field of economic development and 5 in social). The results of the study confirmed the common opinion about the division of the voivodeship into the western part characterized by a higher economic development and the eastern part with a lower level of this development, as evidenced by the variability index of the received assessments of economic development at the level of 35.7%. In the case of human development, despite the low variability index of 16%, the results confirmed its greater territorial differentiation. On the other hand, the synthetic indicator combining the features of economic and social development was the best in towns and urban-rural communes, which form specific local and regional centres. The obtained research results are in line with the problem of spatial polarization perceived in the literature on the subject, e.g. spatial polarization of own revenue (Kossowski & Motek, 2021, pp. 1–23), as well as the aspect emphasized in the article that local development is determined by a whole group of dependent factors and independent of local authorities. Research on communal investments also addresses the aspect of

revenue potential (Zawora, 2018, pp. 224–235) and the impact of EU funds on the investment activity of communes (Sierak, 2018, pp. 195–208).

A certain perspective on the development of communes in Poland is also provided by the sustainable development ranking, which is created on the basis of criteria (indicators) from three areas of development: economic, social and environmental protection (*Najlepsze gminy w Polsce…*, 2022). In the 2022 edition of the ranking, the ten best communes of each type (urban, rural and urban-rural) included (respectively 2, 1 and 1) communes from the Małopolskie Voivodeship.

Conclusions

The increase in indebtedness of municipalities is to the greatest extent related to covering investment expenditure. This state of affairs can be considered favorable, as these expenses form the basis of socio-economic development. The fact that debt is also incurred to finance statutory day-to-day tasks proves a structural maladjustment of the financial supply system for local authorities. This may result from the emerging development disproportions in the periods of accelerated economic growth, characteristic of countries undergoing economic transformation. In view of the tensions in public finances at the government level (imbalance in the state budget, increase in public debt), the systemic under-financing of local governments forces them to incur debt. It cannot be ruled out the systemic solutions, the symptom of which are imbalances in the budgets of local authorities, resulting from the implemented doctrine of centralization of authorities and public finances. The change of this state depends on political factors (will). The research has highlighted the relationship between the type of debt policy pursued by local authorities and the development of infrastructure. They fit into the direction of research on local debt focused on the analysis of the relationship between the incurred debt and tangible (useful) results, such as, for example, the length of local roads, the percentage of residents using the water supply system and sewage treatment plants, residents' access to cultural goods, the impact of investments on improvement environment, etc. Such an analysis is fully rational, as it directly links incurring debt with socially and economically useful goods and services.

In other words, the article is an attempt to examine how the budgetary policy in relation to debt affects the investment activity of the commune, and, thus, local development. Budgetary policy was expressed through basic financial figures such as: own revenue per capita, investment expenditure per capita and debt per capita. The effects of investment activity were selected indicators shaping the quality of life of the inhabitants (length of water supply and sewage systems, percentage of people using these networks in the total number of inhabitants of a given commune). Utility indicators prove the development of the commune and, at the same time, the level of implementation of the commune's tasks. An innovative approach to the analyzed

dependencies consists in strongly emphasizing the relationship between the debt incurred and the development of communes. This issue is all the more topical because in the 21st century local governments face new civilizational challenges, and there are units where there are problems with water supply and sewage systems. This problem concerns especially small communes. Therefore, the issues raised in the study are not exhaustive, which means that further research is required in various cross-sections, also taking into account the processes of aging population, migration and suburbanization.

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