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Contact to corresponding author: beata.guziejewska@uni.lodz.pl, University of Lodz, Public Finance Department, Rewolucji 1905 r. St., 90-214 Lodz, Poland

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Beata Guziejewska

University of Lodz, Poland

Anna Majdzińska

University of Lodz, Poland

The model of municipal education expenditures in Poland. Policy, budget and demography

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Abstract

Research background: Municipal education expenditures finance the delivery of one of the key public services devolved by central government to lower levels of government. Traditional studies in this field are divided based on whether they consider socio-economic determinants or political factors within the new political economy. The study presented herein was undertaken to explore the role of demographic factors which are frequently ignored in research.

Purpose of the article: This study seeks to identify which variables statistically significantly influence the level of education expenditures in municipalities. The empirical investigation is based on a sample of 2478 Polish municipalities and uses the 2016 Central Statistical Office data to analyse the correlations and regressions between municipal education expenditures and selected economic and socio-demographic factors.

Methods: The parameters of the power and exponential model are estimated using the Generalised Least Squares Method.

Findings & Value added: The results of the statistical analysis have shown a moderate, positive and significant correlation between municipalities' own revenue per capita and local share of education funding per capita. According to the regression analysis results, the model's explanatory variables accounted for 61% of the variance in municipal education

expenditures per capita. The added value of the study is that it highlights the educational challenges related to the demographic situation in Poland that public authorities will soon have to address.

Introduction

Local government spending represents a considerable share of total general government expenditures and largely determines the range and quality of key public services delivered to local communities. The demand for such services is, however, relatively infrequently considered with respect to the role of demographic factors and changes in the demographic structure. Their influence is difficult to quantify because it takes some time to materialize; however, because of the present demographic situation in Poland they will have to be increasingly accounted for, including in studies investigating local finances. The demographic factors will have to be addressed by local officials and strategic decision makers at the national level alike. Furthermore, the allocation function of the state may become more important for lower levels of government, because local governments are responsible for the delivery of most public services used by aging people. In making financial decisions, local governments consider four broad categories of factors — economic, political, legal and socio-demographic. It is the last category of factors that is considered in this article. While special attention is given to demographic factors characterizing individual municipalities, the units' own revenues and transfers from the central government are also analyzed.

The research problem we consider relates to the question addressed in the majority of studies about whether the decentralization of government can make the delivery of public services more effective (see Ahmad & Brosio, 2009). Because research in this field relatively rarely considers the role of the demographic factors and of changing demand for services, this study was undertaken to partly fill the gap and to provide better insight into the spatial dimension of the problem. Which variables influencing the level of municipal education expenditures were statistically significant was investigated giving special attention to municipalities' own revenues, education grants from the central government and demographic factors. Statistical analysis was performed on the values, correlations and regional distribution of the selected variables. The research especially focused on the local shares of education funding, a long-standing topic of educational debates in Poland.

The data analyzed herein were derived from publications of Poland's Central Statistical Office (CSO). Using the Generalised Least Squares

Method four regression models were constructed to investigate changes in municipal education expenditures. The first, general model was estimated for all municipalities and the other three for subgroups created according to their own revenue per capita (the 33rd and 66th percentiles were used).

The quantitative research showed the conditions in which Polish local authorities would carry out their education financing policies, faced with dynamic demographic changes. While the article is based on empirical research, its findings are set in a wider theoretical context of fiscal federalism, local policy and its responses to central grants. The article is organized as follows. The introduction is followed by four sections: a review of the literature, education financing and demographic changes in Poland, data and research methodology, and results. The final section presents the discussion and research conclusions.

Literature review

Traditional studies in the field of this research are divided according to whether they consider the socio-economic determinants or the political factors within the new political economy. The theory of local expenditure policy draws on the urban policy and allocation policy concepts formulated by Tiebout (1956), Peterson (1981) and King (1984). Although the concepts drew criticism in Europe for their embedment in the US context, they played a major role in the studies and theories that followed. The idea that units of local government could be treated as competing organizations derives from the famous article by Charles Tiebout of Washington University, who concluded that in the same way as competition among privately-owned businesses leads to the more efficient production of private goods, competition among local governments enables the more efficient delivery of public goods. Tiebout's concept sparked a wide-ranging debate among economists, who focused their criticism on its assumptions (see Bewley, 1981, p. 713; Stiglitz, 1983; Zodrow & Mieszkowski, 1986, pp. 356–370). Competitiveness and local policy were discussed by Peterson (1981), who made an attempt to explain the numerous constraints affecting urban policy whose focus should be on structural economic benefits. King (1984) highlighted the importance of economies of scale in managing local public services. In many cases the marginal cost of delivering one more unit of a service tends to be high when its users are few.

The complexity of contemporary urban policy requires that all these aspects, as well as external impacts, the activity of interest groups and lobbying actions, and regionalization and globalization processes, are considered.

According to the main thesis of this article, there will be an increasing need to address changes in demographic structures that bring more challenges not only for local policies.

The political and economic model of shaping local expenditure policy has a special place in the theory of the new political economy. Because of the complexity of the redistribution, subsidiarity, solidarity and asymmetry issues, it is stressed in the literature that in decentralized systems, the policy frequently involves trade-offs (Beramendi, 2012, pp. 2–7). In planning spending budgets, local governments factor in central government grants that have been empirically confirmed to be a major constraint on local authorities' decisions and to produce different results depending on their purpose. Hypotheses formulated within the political economy of grants to explain the effect of central grants on local spending policies are based on the political model of intergovernmental relations and on the model of grant effects (Boyne, 1990, p. 208).

In the self-government model which allows limited autonomy to local authorities the central government's grants are its main instrument for influencing their decisions. In systems that give more financial autonomy to local authorities the importance of grants is limited. Consequently, grants have a different effect on local expenditures and the reasons for this are twofold. Firstly, a change in the grant system has as a stronger effect on local government units where central grants constitute a greater share of their total revenues, because they are obviously more dependent on this source of funding. The awareness of this may cause local politicians and decision makers to put the central government's policy before the needs and preferences of their communities. Studies in the UK of local government finances in the 1970s demonstrated that when central grants cover the bulk of local expenditures, lower-tier authorities tend to make spending decisions based on changes in the grant system (Boyne, 1990, p. 209). The central grants' influence on local expenditures is also explained in terms of the costs that local taxpayers would have to pay if the level of grants were reduced. The theory assumes that local authorities make decisions in the same way as consumers respond to income and price fluctuations. This approach seems to disregard the intricacy of local policies in attributing the impact of central grants mainly to the reactions of an average voter. Its validity was questioned by empirical studies assessing the consequences of government grants in the USA (Gramlich, 1977). The studies concluded that an average voter was not a decision-maker and that local politicians tended to spend extra funds as they wished rather than in ways directly benefitting local taxpayers. Because voters act under a fiscal illusion about the true use of grants, politicians can "mislead" their communities. The

observations led to a modification in the traditional grant theory which replaced the average voter with a more complex model of local policies.

In the literature on local government economy and finances the demand side of public services is rarely investigated with respect to demographic factors, even though it has been observed that especially in developing countries, the decentralization of government helps mitigate poverty and low-income problems. In highly developed countries decentralization has slightly different dimensions related to migrations, population aging or problems specific to metropolitan areas (Ahmad & Brosio (Eds.), 2015, p. 334 and 471). Demographic factors are addressed in analyses investigating variations in the general fiscal condition and financial situation of local governments, but the variety of socio-economic circumstances prevents the identification of universal causal relations between demographic variables and the local governments' fiscal and financial situation (Rusmin *et al.*, 2014, pp. 88–109). In Spain, studies on large local government units showed that their financial stability resulted to a large extent from socio-demographic factors, such as unemployment rate and the proportion of the population under 16 years of age (Rodríguez Bolívar *et al.*, 2016, pp. 29–51), whereas the share of people aged 65+ contributed to the level of net debt.

It is also considered that demographic factors may increasingly play a role in local financial crises (Mäding, 2017, p. 1) when, for instance, a financial policy focuses on revenues while ignoring necessary expenditures. Changes in the structure of expenditures will be caused not only by the aforementioned aging of societies, but also by factors such as population decreases resulting in lower numbers of service users, migrations, social heterogeneity, and an increasing number of one-person households. Local public policies will have to cope with the challenge of declining demand for some types of services (e.g. provided by the school system) and rising demand for other services (e.g. elderly care, etc.). Demographic factors need to be considered in planning the division of tasks among different units of local government, as well as when plans are made to reform them (Blöchliger & Vammalle, 2012, pp. 85–92).

The revised economic theory holds that the impact of central grants on local expenditures depends on whether local politicians lean towards expenditure increases or tax cuts. The degree of decentralization in the country and its model of local government largely determined by historical processes can also effect local spending policies (Swianiewicz, 2014, pp. 292–311).

Problems in financing education in Poland and demographic changes

Local governments are the key providers of education funding in Poland. The responsibility for managing the public education system has been largely decentralized and delegated to municipalities, counties, and voivodeships that today run kindergartens, primary schools, secondary schools, and the majority of other educational establishments. The most important of the three tiers of government are municipalities, where the bulk of education funding comes from the education part of the general grant, and the remainder (called herein a local share of education funding) is covered from their own revenues, parent contributions, and EU structural funds, etc. In theory, the education part of the general grant is large enough to enable municipalities to pay for their educational needs, but in fact municipalities have long been faced with the necessity of co-funding education from their own revenues.

Local governments' strategic decisions on matters related to the functioning and quality of the education system (such as the network of local schools, the financial plans of individual schools, teachers' pay, etc.) must obey the law in force. In developing financial plans for educational services, municipalities must comply with legal and organizational requirements, which are special in that teaching standards are established by the national education authorities, and education allocations are calculated according to an algorithm utilizing objective needs criteria. While, theoretically, municipalities can formulate long-term educational policies on their own, in practice this freedom is not unlimited because of factors such as teachers' entitlements (i.e. costs) arising under the Teacher's Charter. As a result of both public and private organizations being legitimate providers of educational services (Hillman, 2009, p. 137), the number of private schools in Poland expanded in the 1990s.

The special nature of educational services and the legal, organizational and financial requirements are only some of the exogenous factors that municipalities must consider in designing their strategies for the development and financing of the services. A factor that can also influence their planning is the increasing importance of the demographic situation in the country.

Poland, like most countries in Europe, is faced with demographic aging. The main cause of the rising number and percentage of elderly people is the low and declining fertility rate (below the replacement level) and the increasing average life expectancy. Depending on their direction and intensity, migrations can accelerate or slow down population aging. The percent-

age of children aged 0–14 years, higher in rural areas, has been falling in Poland for more than two decades now. In 2016, this age group constituted 15% of the country's population (14.2% and 16.3% in urban and rural areas, respectively). As the percentage of children decreases, the proportion of older people grows. Today it is larger in urban areas, but before 2006 it was rural areas that were demographically older. It is expected that the 2016 rate of the population aged 65 and over (16.4%; 17.8% and 14.3% in urban and rural areas, respectively) will considerably increase in the next several years, with large cohorts of the 1950s baby boomers reaching the threshold of demographic old age.

Poland's fertility rate has been below the replacement level (2.1 children per woman) since the late 1980s. Its 2016 value of fewer than 1.4 children was recognised as very low. Changes in the Polish fertility rate were a consequence of political reforms that ushered in a new political and economic order and redefined the population's world-views. As a result, the age at marriage went up, and more couples chose informal relationships and voluntary childlessness. These demographic trends have reduced the demand for educational services and caused authorities to shut down schools which met with dissatisfaction from local communities.

Data and research methodology

This study presents the results of an empirical investigation involving a regression analysis of education expenditures on Polish municipalities and selected economic and socio-demographic factors. The analysis was based on a set of the 2016 CSO data characterizing a sample of 2,478 municipalities and used the following diagnostic variables¹:

Y – municipal education expenditures (PLN per capita),

X₁ – municipalities' own revenue (PLN per capita),

X₂ – the education part of the general grant (PLN per capita),

X₃ – the ratio between the number of teacher posts and the number of classes in schools and kindergartens,

X₄ – the percentage of children aged 3–6 years in kindergarten care

X₅ – the percentage of children and adolescents aged 7–18 years.

¹ Variables that proved statistically insignificant are omitted from this analysis. The original set of potential explanatory variables was reduced by removing low-variability variables and/or co-correlated variables. A relevant example is the local shares of education funding constituting an important element of municipal policy. Although its effect on the level of municipal expenditures is significant, it was skipped because of its strong correlation with the education part of the general grant.

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The 2016 structure of municipal education expenditures (per capita) was the following³:

- 25% of municipalities spent not more than PLN 1112.06 and the remaining 75% at least PLN 1112.06;
- one half of municipalities spent PLN 1231.93 or less and the other half PLN 1231.93 or more;
- 75% of municipalities spent not more than PLN 1373.78 and the other 25% PLN 1373.78 or more.

Education expenditure variations in the center of the distribution⁴ (calculated using the quartile deviation (Q_x) formula) were relatively small; for half of the municipalities situated between the 1st and 3rd quartiles education expenditures deviated from the median value by an average of PLN +/- 130.86. The asymmetry of education expenditures⁵ (in the center of the distribution) was also relatively small, pointing to a high concentration of expenditures around the median.

Municipalities were also relatively different in terms of the local shares of education funding. In 2016, its amounts were relatively large in municipalities concentrated in the Mazowieckie voivodeship (around Warsaw), the Wielkopolskie voivodeship, and in some areas of the Śląskie and Małopolskie voivodeships (Figure 2).

Table 1 presents the municipalities with the highest and lowest levels of local share of education funding. All of them (except for the urban-rural municipality of Kazimierz Dolny) are small rural units. The gap between the top and bottom municipalities is considerable, suggesting that different financial potentials may not be the only factors influencing their financial policy.

Because municipalities have some freedom in designing their development and education funding strategies, many of them choose to support education with amounts exceeding the education part of the general grant, the adequacy of which has long been debatable. However, as it has been

³ Because the levels of municipal education expenditures were markedly different, the descriptive statistics characterising their structure were derived from the measures of position. The low quartile (Q_1), the median quartile (Q_2), and the upper quartile (Q_3) were calculated in MS Excel 2010. Their values (in PLN) were as follows: $Q_1=1112.06$, $Q_2=1231.93$ and $Q_3=1373.78$.

⁴ The quartile deviation was calculated as $Q_x = \frac{Q_3 - Q_1}{2}$

⁵ The asymmetry of distribution was determined by calculating Bowley's coefficient of skewness:

$$A_Q = \frac{Q_3 + Q_1 - 2Q_2}{Q_3 - Q_1}$$

rightly observed, additional funding support for education requires an adequately high level of revenues per capita.

The statistical analysis showed a moderate, positive and significant correlations between municipalities' own revenues per capita and the local shares of education funding per capita ($r_{xy}=0.57$; $p<0.05$; see the scatter diagram in Figure 3). A unit that proved distinctly different from other municipalities, both regarding its own revenues and the local shares of education funding, was the municipality of Kleszczów (PLN 44239.79 and 3692.78 per capita in 2016, respectively). The Pearson's coefficient of $r_{xy}=0.5$ ($p<0.05$) obtained for the sample excluding of Kleszczów meant that own revenues per capita and the local shares of education funding per capita were moderately, positively and statistically significantly correlated also in the other 2,477 municipalities.

At the same time, no significant correlations were found between municipalities' own revenue per capita and the education part of the general grant per capita, or between the latter and the level of the local shares of education funding.

Because the amounts of local education funding varied significantly across municipalities, a quantitative analysis was performed to determine which of the selected variables had the strongest effect on them.

Results

This section presents the regression results obtained for diagnostic variables (X_1 - X_5) using the Generalised Least Squares Method. Four models were constructed to determine the relationship between changes in the local shares of education funding (PLN per capita) and values of the selected explanatory variables. The first, general model described the relationship for all 2478 municipalities. The parameters of the other three models were estimated for subgroups of municipalities formed using the criterion of own revenue per capita⁶. The regression analysis results for the general model are given in Table 2.

The regressions were then used to construct the following model (equations 3 and 4):

⁶ The percentiles were used to this end. Group 1 consisted of municipalities with own revenue per capita \geq PLN 1657.25 (corresponding to the 66th percentile), Group 2 of units with own revenue of between PLN 1178.85 and 1657.25 (between the 33rd and 66th percentiles), and units in Group 3 had own revenues up to PLN 1178.85 (the 33rd percentile).

$$\ln \hat{y}_i = 2.3802 + 0.1085 \ln x_{1i} + 0.5266 \ln x_{2i} + 0.0747 \ln x_{3i} + 0.0023 x_{4i} + 0.0189 x_{5i} \quad (3)$$

where:

\hat{y}_i – the estimated value of the dependent variable (education expenditures per capita).

All variables in the model were statistically significant ($p < 0.05$). According to the value of the adjusted coefficient of determination ($R^2 = 0.61$), the model explained 61% of the variance in local education expenditures per capita in 2016 (the other 39% was caused by factors other than those included in the model)⁷. All parameters on variables X_1 – X_5 had positive signs, meaning that each had a positive effect on the value of dependent variable Y . Generally, the estimated parameters could be interpreted as follows: with each explanatory variable increasing by 1%, education expenditures *per capita* increase on average by the value of parameter B (see tab. 2)⁸.

The conclusion from the above was that in 2016 power variable X_2 (the education part of the general grant per capita) had a stronger effect on the level of education expenditures in all municipalities compared with power variable X_3 . As far as the exponential variables (X_4 and X_5) are concerned, X_5 (the percentage of children and adolescents aged 7–18 years) had a greater influence on the values of the dependent variable. It is notable that even though the demographic variables are significant for education expenditures in municipalities, the amount by which the expenditures grow with every new preschool child or pupil is relatively small.

Using the same procedure as above, the models for the three subgroups of municipalities (equations 1 and 2) were estimated. The regression results for municipalities with the highest levels of own revenues (\geq PLN 1657.25 per capita in 2016) are shown in Table 3. They were used to construct the following model:

⁷ The problem with accounting for the factors is twofold: they either difficult to precisely define or the necessary municipality-level data are scarce. The range of the factors includes, for instance, the political leanings of municipal authorities, the function performed by a given unit within the settlement structure, local expenditure policy, residents' preferences, economies of scale.

⁸ X_4 and X_5 are exponential variables and their parameters are interpreted differently than the parameters of power variables (X_1 – X_3) (see equations 1 and 2). The parameters on X_1 – X_3 are interpreted as percentages (given in table 2). The parameters on variables on X_4 and X_5 should be multiplied by 100 to be interpretable as percentages.

$$\ln\hat{y}_i = 1.4304 + 0.2356\ln x_{1i} + 0.5032\ln x_{2i} + 0.1238\ln x_{3i} + 0.0026x_{4i} + 0.0262x_{5i} \quad (4)$$

All variables in Table 3 are statistically significant ($p < 0.05$). According to the value of the adjusted coefficient of determination ($R^2 = 0.72$), the model explains 72% of the variance in the per capita education expenditures of municipalities that in 2016 had the highest per capita own revenues.

The regressions in Tables 4 and 5 were obtained for municipalities with moderate own revenues per capita (from PLN 1178.85 to 1657.25) and low own revenues per capita (lower than PLN 1178.85). Because in neither case was variable X_1 (own revenue) statistically significant for education expenditures, it was omitted from the adjusted version of the model, likewise variable X_3 (the ratio of the number of teacher posts to the number classes in schools and kindergartens) which was found statistically insignificant in the case of moderate-income municipalities.

In both low-revenue and moderate-revenue municipalities, education expenditures were mainly determined by the education part of the general grant (its importance for the poorest municipalities was slightly higher). The adjusted coefficient of determination R^2 calculated for both categories of municipalities was 0.57.

According to the regression results in Tables 3–5, the influence of particular variables on education expenditures in the low-, moderate- and high-income municipalities is relatively similar (the differences are small). The education funding policy of a municipality policy depends on a range of factors and its financial capacity. In municipalities with the highest levels of per capita own revenues their increase entails a noticeable rise in education expenditures, but where per capita own revenues are moderate or low the influence of variable X_1 is insignificant. In the poorest municipalities the main source of funding for education is transfers from the central government. The demographic variable ‘children aged 7–18 years’ proved significant (although to a different degree) in all three subgroups of municipalities. A rise in education expenditures following from an increase in the share of adolescents 7–18 years is biggest in the wealthiest municipalities and smallest in the poorest ones, probably because the latter are mostly small locations with only one primary school, where municipal overheads are unrelated to the number of pupils.

Conclusions

A quantitative analysis of the influence of the selected variables on education funding in municipalities showed several general characteristics of their policies in this field. Firstly, a moderate, positive and significant correlation was found between municipalities' per capita own revenues and local shares of education funding per capita. The correlation was slightly weaker when the sample of municipalities was examined without the richest municipality of Kleszczów. Secondly, no correlations were established between municipalities' own revenue per capita and the education part of the general grant, and between the latter and local shares of education funding. The geography of education expenditures corresponds to the geography of local shares of education funding: in both cases they are the highest in Central Poland, Wielkopolska, around the Tri-City and in parts of the Śląskie and Małopolskie voivodeships.

Although the influence of demographic variables on local education expenditures is generally significant, the increase in their per capita amount with every new child entering the education system is relatively small. The reasons are economies of scale and the fact that the main criterion for calculating the education part of the general grant is the number of pupils. Other factors determining the amount of education expenditures include the type of schools, the number of classes, teachers' qualifications, and local shares of education funding, etc.

A regression analysis performed on municipalities grouped according to their wealth levels (own revenue per capita) yielded interesting results. They confirmed that municipalities' own revenues are a significant source of local shares of education funding. In designing their spending policies, municipalities should be aware of all variables considered in the model. All of them were statistically significant for the full sample, and only the analysis of quartiles showed that 'own revenue per capita' was less significant for units with low and moderate levels of own revenues. This means that financial capacity varying considerably among municipalities is a major determinant of their financial policies.

Research into local spending policies and their demographic aspects is relatively new. Popular in the early 1990s (Wise (Ed.), 1994, pp. 13–38), it is gaining importance again. The existing empirical studies on specific demographic factors and issues such as intergenerational conflicts (Poterba, 1997, pp. 48–66, Grob & Wolter, 2005) or national determinants (Sackmann *et al.*, 2015), expressly present the demographic circumstances as a major challenge facing both public policies and public finance. As they are conducted in different contexts and vary in scope (e.g. analyses of high-

ly-developed countries take account of grant distribution, demand for services and their level, etc.) the universality of their findings and the possibility of making generalizations is limited, but they are certainly important for ongoing public policy. The focus of studies examining Central and Eastern European countries is on the decentralization processes and the sources of local government funding (Smith *et al.*, 2010, pp. 77–88). The acknowledgement of the importance of demographic circumstances as a factor influencing local spending policies by this study is consistent with the report by Spanish researchers (Rodríguez Bolívar *et al.*, 2016, pp. 29–51).

The scope of future research into municipal education expenditures should be extended to include more factors that may influence local governments' financial strategies. Among those, the role of political factors with respect to local expenditure policies seems interesting, as well as the opportunities in using the falling demand for educational services to improve education quality.

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Annex

Table 1. Municipalities with the highest and lowest levels of local share of education funding per capita in 2016

Municipality	Local share of education funding (PLN)	Municipality	Local share of education funding (PLN)
Boniewo	0.00	Stare Babice	1815.61
Przodkowo	0.00	Kobierzyce	1824.65
Nowa Karczma	0.00	Lesznowola	2154.21
Komarów-Osada	40.87	Kazimierz Dolny	2336.38
Zaręby Kościelne	57.78	Kleszczów	3692.78

Source: developed by the authors based on CSO data.

Table 2. The regression results for local shares of education funding in 2016 (N=2478)

Variable		<i>B</i>	<i>Stand. error</i>	<i>p-value</i>
Constant		2.3802	0.0858	<0.0001
Municipalities' own revenue (PLN per capita)	X ₁	0.1085	0.0061	<0.0001
The education part of the general grant (PLN per capita)	X ₂	0.5266	0.0115	<0.0001
The ratio of the number of teacher posts to the number of classes in schools and kindergartens	X ₃	0.0747	0.0237	0.0017
The percentage of children aged 3-6 years in kindergarten care	X ₄	0.0023	0.0002	<0.0001
The percentage of children and adolescents aged 7-18 years	X ₅	0.0189	0.0017	<0.0001

Source: calculated by the authors using the GRETL software based on CSO data.

Table 3. The regression results for education expenditures in municipalities with the highest own revenue per capita in 2016 (N=843)

Variable		<i>b</i>	<i>Std. error</i>	<i>p-value</i>
Constant		1.4304	0.1450	<0.0001
Municipalities' own revenue (PLN, per capita)	X ₁	0.2356	0.0165	<0.0001
The education part of the general grant (PLN, per capita)	X ₂	0.5032	0.0155	<0.0001
The ratio of the number of teacher posts to the number of classes in schools and kindergartens	X ₃	0.1238	0.0494	0.0124
The percentage of children aged 3-6 years in kindergarten care	X ₄	0.0026	0.0003	<0.0001
The percentage of children and adolescents aged 7-18 years	X ₅	0.0262	0.0031	<0.0001

Source: calculated by the authors using the GRETL software based on CSO data.

Table 4. The regression results for education expenditures in municipalities with moderate own revenue in 2016 (N=817)

Constant		<i>B</i>	<i>Std. error</i>	<i>p-value</i>
Constant		3.5017	0.1205	<0.0001
The education part of the general grant (PLN per capita)	X ₂	0.4764	0.0196	<0.0001
The percentage of children aged 3-6 years in kindergarten care	X ₄	0.0024	0.0002	<0.0001
The percentage of children and adolescents aged 7-18 years	X ₅	0.0189	0.0025	<0.0001

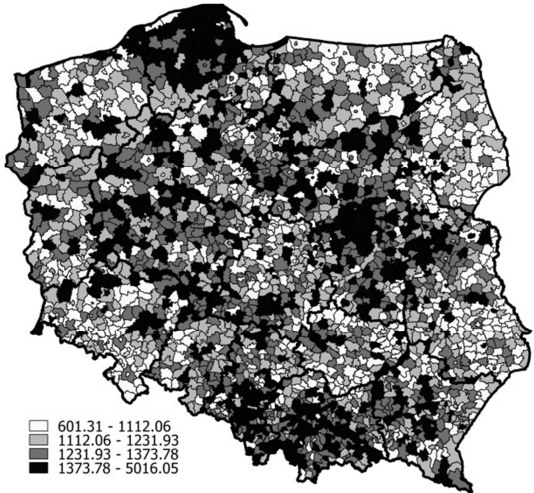
Source: calculated by the authors using the GRETL software based on CSO data.

Table 5. The regression results for education expenditures in municipalities with the lowest own revenue in 2016 (N=818)

Constant		<i>b</i>	<i>St. error</i>	<i>p-value</i>
Constant		3.0261	0.1575	<0.0001
The education part of the general grant (PLN per capita)	X ₂	0.5559	0.0270	<0.0001
The ratio of the number of teacher posts to the number of classes in schools and kindergartens	X ₃	0.1041	0.0378	0.006
The percentage of children aged 3-6 years in kindergarten care	X ₄	0.0018	0.0003	<0.0001
The percentage of children and adolescents aged 7-18 years	X ₅	0.0142	0.0030	<0.0001

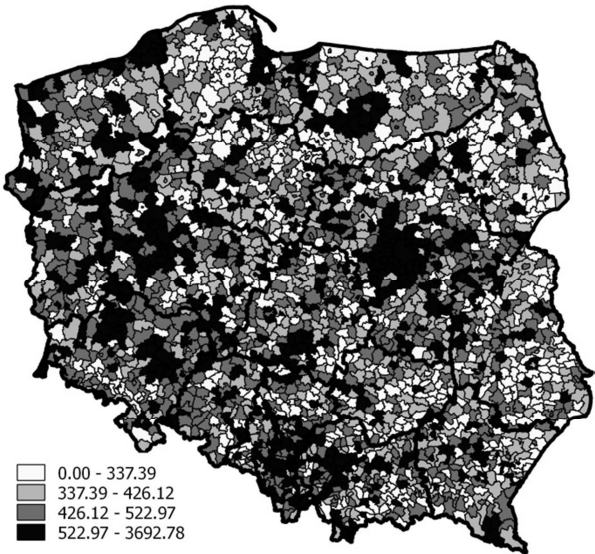
Source: calculated by the authors using the GRETL software based on CSO data.

Figure 1. Municipal education expenditures per capita in 2016 (by quartiles)



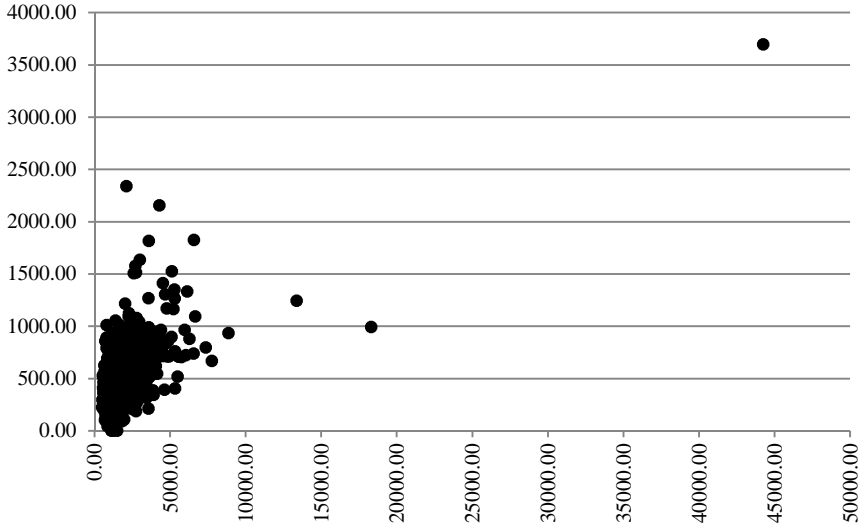
Source: created by the authors based on CSO data.

Figure 2. Local share of education funding per capita in 2016 (by quartiles)



Source: created by the authors based on CSO data.

Figure 3. A scatter diagram for municipalities' own revenue and local share of education funding (PLN per capita)



Source: developed by the authors based on CSO data.