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Do democratic participation and education of councillors foster efficiency of local governments in Poland? An agency theory perspective

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Abstract

This article primarily investigates the influence of voter turnout and education of councillors on the efficiency of public goods delivery by Polish municipalities in 2011 and 2015. Efficiency is measured by the PSE index. The results reveal a positive impact of voter turnout on public sector efficiency. We confirm the existence of an agency relationship, in which higher voter turnout, through more public interest, creates pressure on the effective behaviour of the elected officials. Exceptions to this are shown in the biggest cities. The negative correlation may theoretically point towards electoral activation in the case of poor local authority assessments, and thus opposition to its further activities. According to estimates, the level of the councillors education negatively affects public sector efficiency. We reject the existence of an agency relationship, in which citizens try to select highly qualified councillors, expecting them to provide more public goods. There may be exceptions in the biggest cities.

Keywords: agency theory, public sector efficiency, democratic participation, voter turnout

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1 Introduction

After 1989, Poland, like other post-communist countries in the region, became a democratic country with a market economy. This historic change created a completely new reality for both the society and government. Decentralization of central government power and the building of modern civil society became one of the most important tasks to be done, not only by introducing new regulations, institutions, etc., but also by changing the way people behave in democratic countries. From then on, the people theoretically gained the power to influence their reality. Government became an agent which should act for the benefit of society.

The principal-agent relationship is one of the oldest and most common socio-economic interactions (Ross 1973). It is applicable in a variety of settings, ranging from macrolevel problems (e.g. regulatory policy) to microlevel phenomena occurring between people (e.g. conflicting goals, conflict of self-interest) (Eisenhardt 1989). Information asymmetry occurring between both parties highlights that the agent's actions are not fully observed by the principal. This leaves room for inefficient or undesirable behaviour from the agent, especially in the public sector of a country where public institutions or good practices are not well established. In such an environment, politicians may be tempted to act inefficiently when they are not being monitored.

Voter turnout and the education of councillors can be considered as variables that improve the agency relationship. It is argued that greater voter turnout indicates citizens' awareness of public problems and a greater interest in politics. This may create pressure on the effective behaviour of the government (Borge, Falch, Tovmo 2008; Geys, Heinemann, Kalb 2010). In addition, the career concern model indicates that voters try to choose the most competent politicians who can provide them with more public goods (Alt, Lassen 2006). The aim of this study is to investigate the influence of these variables on the efficiency of public goods delivery by Polish municipalities. It is assumed that these relationships are positive, so higher voter turnout means more public interest in politicians' activities and a better educated agent is able to fulfil his or her duties better. Efficiency is measured by the PSE[1] (Public Sector Efficiency) index which was proposed by Afonso, Schunknecht and Tanzi (2003, 2006). On the basis of statistical data published by the GUS (Statistics Poland) and the PKW (National Electoral Commission), two elections, in 2010 and 2014, are analyzed. An analogous analysis for Polish municipalities is conducted based on the parametric analysis for Norwegian local government units (Borge, Falch, Tovmo 2008). Due to country specific data and the availability of statistical data, the PSP[2] (Public Sector Performance) and PSE indicators are modified and a different model specification is used. Using a linear regression model for cross-sectional data, we can estimate the significance of selected explanatory variables. We extend the existing research related to the relationship between voter turnout and public sector efficiency to Poland. Moreover, we introduce an additional variable: participation of councillors with higher education, which allows us to evaluate the agency relationship described in the career concerns models. Finally, the detailed elections analysis should help better understand of how "young" democracy works in Poland, and how it may influence economic development.

[1] See section 3. Efficiency measure and data for PSE details.
[2] See section 3. Efficiency measure and data for PSP details.

The article is organised as follows. In the next section, the existing literature is reviewed. In the third section, the efficiency measures and data used in the analysis are described. In the fourth section, we apply a country specific linear regression model and discuss the results obtained. A final section concludes.

2 Literature review

The agency relationship between voters and government appears because under a social contract there is a delegation to exercise authority (Alvarez, Hall 2006). However, government behaviour cannot be fully observed because of asymmetric information. Voter turnout is considered to reflect an increase in citizens' awareness of public problems, thereby decreasing asymmetry of information and in that way creating pressure on effective behaviour of public servants (Borge, Falch, Tovmo 2008; Geys, Heinemann, Kalb 2010). Nevertheless, research indicates an ambiguous influence of electoral participation on efficiency. Borge, Falch and Tovmo (2008) as certain a positive correlation between voter turnout and efficiency. They estimate that a 10 percentage points increase in voter turnout should increase local government efficiency in Norway by approximately 2.5%. This result is statistically significant for two out of three measures they use. Revelli and Tovmo (2007) investigate the hypothesis of yardstick competition for Norwegian local governments. Their results are statistically insignificant. When analysing the paradox of plenty in Norway, Borge, Parmer and Torvik (2013) obtain results indicating a negative influence, but this relationship is statistically significant or insignificant. Geys, Heinemann and Kalb (2010) demonstrate a positive impact of voter turnout on cost efficiency when analyzing the activity of German local governments. This result is reinforced for units with greater autonomy. Research concerning direct democracy and local government efficiency made by Asatryan and De Witte (2015) for municipalities in the German State of Bavaria supports these findings. Cost efficiency is also analysed by Šťastná and Gregor (2014) for Czech local governments. In both periods of transition and post-transition, they demonstrate a positive influence of voter turnout on local government cost efficiency. Giordano and Tommasino (2011) analyse the impact of interest in politics on the performance measured by the PSP index in 5 sectors: education, health, civil justice, child care and waste collection of the Italian provinces. Political engagement is captured using an index comprised of two proxies: the number of newspapers sold in the province and voter turnout for referenda from 1946 to 1989. The results show a positive dependency of efficiency on citizens' willingness to participate in politics. A negative impact of voter turnout on local Portuguese government performance is demonstrated by Ferreira da Cruz and Marques (2014). They state that this result is unexpected but do not elaborate on the causes.

None of the research mentioned above analyses the influence of the education level of councillors on the efficiency of local governments. The career concern model, which describes agency relationship, indicates that voters try to choose the most competent politicians who can provide them with more public goods. The education level of councillors can be consider as a proxy for competence. Its influence on public sector efficiency is analysed by Karbownik and Kula (2009). They show that it is positive for rural and urban-rural municipalities in Poland, but statistically insignificant for urban municipalities and big cities.

The problem of public sector efficiency is often discussed in literature. A detailed review of research in this area is prepared by Geys, Heinemann and Kalb (2012). Regardless of the method of analysis

(parametric or non-parametric), the indicators: PSP or PSE proposed by Afonso, Schuknecht and Tanzi (2003, 2006) are used to measure the efficiency.

3 Efficiency measure and data

Based on research by Afonso, Schuknecht and Tanzi (2003, 2006), Borge, Falch and Tovmo (2008) and Karbownik and Kula (2009), an output measure is calculated. It is expressed by the public sector performance indicator (PSP). We calculate the PSP according to the following formula:

$$PSP^i = \sum_{s=1}^{S}\left(\alpha_s\left(\sum_{j=1}^{I_s}\beta_{sj}\frac{x_{sj}^i}{\overline{x}_{sj}}\right)\right),\ \sum_{s=1}^{S}\alpha_s = 1,\ \sum_{j=1}^{I_s}\beta_{sj} = 1 \tag{1}$$

where:

x_{sj}^i – indicator (j) in sector (s) in municipality (i),
$\overline{x}_{sj}$ – the mean of an indicator in given sector,
α_s, β_{sj} – sector and indicator weights respectively.

We normalize by the mean value of a given indicator (x_{sj}^i) to facilitate the compilation and interpretation of data.[3] As a result, the average value of indicators is equal to one. Municipalities with index values above one have bigger than average production. Index values below one indicate lower production than average. Indicators and weights used in the PSP calculation are presented in Table 1. Depending on the number of sectors used in PSP indicators, they are labelled from three to five.

The basic PSP indicator includes four municipality service sectors: education, social assistance, environmental protection, and municipal management and administration. Expenditures in these areas cover approximately 70% of total expenditure. Sector weights α_s are calculated on the basis of the service sector share in total expenditure. We calculate PSP4 for 2011 and 2015.

Production in the social assistance sector was reflected by the percentage of children 0–17 receiving family help. The same indicator is used by Borge, Falch and Tovmo (2008). This measure in Poland may be outside the direct influence of the local government. It depicts the extent of poverty, which may be region-specific, and independent of local authority efficiency. We change the PSP4 indicator to PSE3 by removing the social assistance sector from it. Expenditure in the remaining areas cover approximately 55% of total expenditure. We calculate PSP3 for 2011 and 2015.

An important municipality task is the maintenance and building of local roads. This is easily visible to voters, so should be considered as a variable. Roads are divided into several categories and because of this different institutions are responsible for them. As a result, municipalities spend their own money to fulfil their task but also get subsidies from central government. Published data show only expenditure on municipal roads without any details. We use investment in municipal roads in total expenditure as a proxy of production in the transport and communication sector. We extend PSP4 to this sector and calculate PSP5 for 2011 and 2015.

[3] The average, minimum and maximum values of indicators in the sample used to calculate PSP are presented in the Appendix.

The PSP indicator shows the output of a given municipality compared to the average. In order to obtain a measure of effectiveness, the PSP indicator is divided by the normalized total revenue received by the municipality. As a result, we can calculate the public sector performance indicator (PSE):

$$PSE^i = \frac{PSP^i}{normalized\,total\,revenue\,in\,the\,municipality_i} \tag{2}$$

We create a PSE indicator for each PSP. Descriptive statistics for PSE4, PSE3, PSE5 are presented in Table 2.

PSE4, PSE3 and PSE5 indicators have similar descriptive statistics and show similar tendencies. There is only one exception for PSE5, for which the maximum value of the indicator increased between 2011 and 2015. The data also shows that average efficiency increased between periods for all measures.

4 Econometric model and results

The parameters of the econometric model are estimated based on two cross-sectional data sets (2011 and 2015), involving 2,297 municipalities. The analysis uses the data of GUS and PKW for the years 2010–2015. Econometric analysis is based on the following model:

$$PSE^i = \beta_1 + \beta_2 X^i + \varepsilon^i \tag{3}$$

where:

PSE^i – vector of efficiency indicators for *i*-municipality,
X^i – vector of explanatory variables,
ε^i – error term.

The explanatory variables are: voter turnout in percentage (VOTER_TOURNOUT); participation of councillors with higher education in municipality councils in percentage (HIGH_EDU_COUN); and total municipality revenue *per capita* in thousand PLN (REVENUE_TOTAL_PC). The last variable describes the economic situation (welfare) of the municipality. Implementing it into the model allows us to show the problem of fiscal capacity. Fiscal capacity is indirectly related to the principal-agent relationship because the environment in which agents operate can influence their behaviour.

In order to distinguish the types of municipalities, we introduced dummy variables for: cities, urban and urban-rural municipalities (CITIES; URBAN; URBAN_RURAL). In addition, a dummy variable is introduced for Kleszczów (KLESZCZOW), Krynica Morska (KRYNICA_M) and Rewal (REWAL), which were the richest municipalities in Poland in 2011 and 2015. They were in the top five in both periods and their revenue *per capita* differs drastically from other municipalities. In order to capture the differences among cities, urban and urban-rural municipalities, we introduce interaction terms between them and two key variables for the analysis: participation of councillors with a higher education in municipality councils (EDU_CITIES; EDU_URBAN; EDU_RURAL) and voter turnout (VOTER_CITIES; VOTER_URBAN; VOTER_RURAL).

Voter turnout and the participation of councillors with higher education in municipality council, are factors influencing the agency relationship. Society as the principal tries to control local government

(agent). We assume that higher voter turnout means more public interest in politicians' activities, which means a higher degree of legitimization of power. This authority seems to follow the social will, which is part of the agency's dependence (the agent acts according to the will of the principal). We used voter turnout data from local elections, which were held in 2010 and 2014.

The high level of participation of councillors with higher education means that people would like to elect more competent officials. According to theory (i.e. career concerns model), this premise seems to be correct. We assume that a better educated agent is able to fulfil his or her duties better than an agent without higher education.

The use of revenue as an explanatory variable shows the fiscal capacity of the municipality. We assume that there is a negative relationship between the amount of revenue and efficiency. As argued by Borge, Falch and Tovmo (2008) this is for two reasons. Firstly, high revenue municipalities usually have high standards in other areas of activity, such as the provision of goods and public services. They do not therefore want to implement special efficiency programmes. Secondly, as they usually have a budget surplus, they are not subject to fiscal pressure.

We use the OLS[4] method to estimate four models. The results are presented in Table 3.

Results show that in six models not all explanatory variables are significant and they are not in line with theoretical assumptions. The values of the variables' parameters are in many cases close to zero, so their impact is rather negligible. Due to this, we mainly focus on the impact direction and on its basis try to explain possible tendencies. Below, every variable is described in line with statistical significance and theoretical relationship assumptions.

The negative effect of total revenue *per capita* is consistent with the hypothesis that high fiscal capacity decreases efficiency. Results are significant for all models.

The education level of the councillors negatively affects efficiency in all models, but the impact is very small. This does not allow us to confirm the existence of an agency relationship, in which citizens try to select highly qualified officials who can provide more public goods. Exceptions are cities where we can observe a positive impact for all models. For urban and rural municipalities the education level of the councillors negatively affects efficiency in five out of twelve models. This does not correspond to the results obtained by Karbownik and Kula (2009), where for rural and urban-rural municipalities they obtained a positive relationship. Their results for cities were inconclusive. Even though our results show that voters in rural and urban areas may not pay much attention to the education of officials, no cause-effect relationship should be posited. We propose that other factors, such as place of residence (inhabitancy) of the candidate or involvement in local activity, may be more important to voters. The opposite situation may appear in the biggest cities and can be explained by informational problems. In the biggest cities people do not know candidates directly, so they have to judge them on the basis of general information, e.g. from their CV. In such circumstances education may play an important role while choosing candidates.

The positive effect of voter turnout in all six models is consistent with the hypothesis that higher voter turnout means more public interest in politicians' activities, which can in turn put pressure on the effective behaviour of the elected officials. However, this hypothesis can be rejected when interaction terms are considered. In cities, we notice a negative relationship between voter turnout and efficiency. In urban and rural municipalities it is positive, but for the latter statistically insignificant. This statistical insignificance of voter turnout indicates that efficiency may not be affected by democratic

[4] Ordinary least-squares.

participation in rural municipalities. The values of the variables' parameters are very small (between 0.02 and 0.09) in all models, so their impact is rather negligible.

The results are conflicting and should be explained considering the country specifics. Electoral participation in the parliamentary elections in Poland significantly differs from the former post-communist countries which are new members of the EU and from other existing developed democracies. While average participation in other countries fluctuates between 60–70%, in Poland it is less than 50%. Poland is an outlier in the region in this area. In the case of local elections, voter turnout is similar, approximately 50%. However, a certain pattern is observed: the smaller the local government unit, the higher the proportion of residences who participate in the election. In addition, "electoral participation in Poland is unstable – many citizens between elections go from absenteeism to voting or vice versa" (Cześnik 2009, p. 30). Voter turnout instability may be explained as follows. In light of the survey by Kurniewicz and Trutkowski (2015a, 2015b), low voter turnout favours current leaders. They note that: "Clearly there is a negative relationship between the chance of re-election and the electoral participation" (Kurniewicz, Trutkowski 2015a, p. 11). In their opinion, voters are more likely to go to the polls to express their opposition than to appreciate the way in which the municipality is managed. In other words, if a municipality is managed well, people are not interested in politics. They often become interested in the case of inefficiencies. However, it does not seem appropriate to argue that low voter turnout results in higher efficiency. Based on this analysis, no cause-effect relationship should be established. It is possible that there is another variable (i.e. scandal, corruption, breaking the law), which although not included in the study may affect efficiency and voter turnout. Similar conclusions are formulated by Bartnicki (2014), who uses a multinominal logistic regression model to analyse the re-election problem in Polish municipalities. He states that an increase in voter turnout lowers the probability of re-election, but its impact is weaker than the political competition measured by the number of candidates. Therefore, the political factor is more important. Support for this conjecture is presented by Fałkowski and Bukowska (2016), who analysed how the monopolisation of power in rural municipalities influences their effectiveness in three areas: unemployment, the financial position of the municipality and investments. They state that there is no correlation between monopolisation of power and effectiveness. Nevertheless, they observe a negative relationship between remaining in office and voter turnout and conclude that monopolisation of power has a bigger impact on local politics than municipality effectiveness.

The above conclusions may explain the lack of or negative relationship between voter turnout and efficiency. The efficiency of municipalities does not depend on voter turnout, or voters are more likely to go to the polls to express their opposition. In that way they can remove politicians from office. This could be a case for cities, where we observe a negative impact of interaction terms (VOTER_CITIES). Why do cities differ? We checked election results in more detail for 65 big cities included in the sample. In 2010 only ten of the current mayors (about 15%) were not elected for the next term in office. For 2014 this number increased to seventeen (about 26%). In both cases, the majority of mayors remained in office, so they must have governed the city well. The voter turnout in the cities was: 42.1% in 2010 and 41.6% in 2014 (for the whole sample respectively: 52.3% and 52.8%). According to the results values of the interaction's term, parameters for VOTER_CITIES are slightly higher in 2015 than 2011. This may show relatively stronger opposition, which is in line with the number of mayors who were not elected (15% comparing to 26%). Moreover, the decrease in voter turnout in the biggest cities from 2010 to 2014 combined with the increase in average value of efficiency indicators (see Table 2) must

be reflected in negative relationship between this interaction term and efficiency. This supports the conjecture that low voter turnout favours incumbent leaders. In 2010 and 2014 the number of mayors who represented any political party was twenty-eight. The remaining thirty-seven, the majority of the mayors, were independent. In 2010 forty-eight and in 2014 forty-four mayors began at least their 3rd term in office. The majority of mayors were independent and they stayed in office for a long time. The relative power stability can be the result of good governance but may also be supported by some political action. Many people have an aversion to political parties, especially at the municipal level. What is good for central government political discourse may be discarded by local institutions. Politicians adopt their behaviour to this situation. According to Gendźwiłł (2010) independent mayors prefer to be seen as good managers or good public servants rather than politicians. They build "the brand" on the basis of their names, which allows for the removal of party political identification and the creation of the image of an independent local official. At the same time, some mayors also make an informal alliance with a chosen political party in order to strengthen their power and the probability of re-election. This mixture allows for a significant advantage on the local political scene (Flis 2011). This tendency is especially observed in bigger cities (Drzonek 2014). Probably, parties are prone to use this strategy, especially in the biggest cities, to secure a huge number of votes in parliamentary elections. Nevertheless, local politicians cannot afford a moral hazard behaviour. There is competition between them and parties who would like to take power. It is also possible to remove politicians from office in a local referendum if he or she governs a municipality badly. All of these circumstances seem to foster good governance in the biggest cities, which calms voters and is reflected in low voter turnout. As a result, the negative relationship between low voter turnout and increasing efficiency seems natural for cities.

It appears that cities are less efficient than urban-rural municipalities. In three out of six models the results are statistically significant. In five models we notice a statistically significant advantage of the rural municipalities over the urban-rural ones. Due to this data, the biggest municipalities may operate more effectively than small ones. Urban municipalities are the least effective.

Kleszczów, Krynica Morska and Rewal, which are the richest municipalities in Poland, differ positively in terms of efficiency from the other municipalities for PSE4(2015) and PSE5(2015) models. Kleszczów is very rich thanks to a leading brown coal mine and energy company. Krynica Morska and Rewal are two small rural municipalities located at the seaside. They are rich thanks to a small number of inhabitants and big tourist traffic.

5 Conclusions

According to estimates, voter turnout has a positive impact on public sector efficiency measured by PSE indices. These results are consistent with the hypothesis that higher voter turnout means more public interest in politicians' activities, which can create pressure on the effective behaviour of the elected officials. Such a principal-agent relationship is supported by the data. The increased voter turnout in the last local and European elections when the governing party remained in power seems to confirm this. Voters may go to the polls to express their appreciation. There might be also an exception. According to the results, these are the biggest cities, for which interaction terms show a negative impact. For rural municipalities the results are inconclusive.

The negative correlation between voter turnout and efficiency may theoretically point towards higher electoral activity in the case of poor local authority assessments, and thus opposition to its further governance. However, it does not seem appropriate to argue that low voter turnout results in higher efficiency. Based on this analysis, no cause-effect relationship should be posited. It is possible that there is another variable (i.e. scandal, corruption, breaking the law), which although not included in the study may affect efficiency and voter turnout. The negative impact of interaction terms for the biggest cities may also be result of a specific environment created by a mixture of formal political independence of mayors but informal connections to political parties and legal regulations which do not allow for moral hazard behaviour. If nothing wrong is happening, voters do not go to the polls, which is reflected in low voter turnout. Its negative relationship seems natural in connection with the growing efficiency in the cities.

According to estimates, the level of the councillors' education negatively affects public sector efficiency measured by all PSE indices. This does not allow us to confirm the existence of an agency relationship, in which citizens try to elect highly qualified officials expecting them to provide more public goods. Voters may not care about the education of officials. Other factors, such as residency of the candidate or involvement in local activities, may be more important to them. However, there might be exceptions in cities. It is possible that if people do not know candidates directly, they may try to judge them on the basis of general information, e.g. education level. This seems to be the simplest proxy of candidate competence.

The results do not allow to explicitly confirm the existence of the agency relationships being investigated. Both the turnout and education of councillors may have different effects depending on the type of municipality, so they may or may not foster efficiency of local governments. It seems that economic and political factors as well as the constantly developing civil society of young Polish democracy may be responsible for this.

In three out of six cases, cities are characterized by lower efficiency measured by the PSE indices than urban-rural municipalities. According to estimates, rural municipalities are the most efficient and cities may operate more effectively than urban municipalities.

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Appendix

Table 1
Indicators and weights in the PSP4, PSP3 and PSP5 measures

Municipality service sector (sector weight α_s)	**Indicator (indicator weight β_s)**
Education	
PSP4 2015 (0.506); PSP4 2011 (0.510)	Pupil–teacher ratio in primary education (0.333(3))
PSP3 2015 (0.646); PSP3 2011 (0.660)	Pupil–teacher ratio in secondary education (0.333(3))
PSP5 2015 (0.458); PSP5 2011 (0.447)	Share of children 3–6 years in kindergartens per 1000 children (0.333(3))
Social assistance	
PSP4 2015 (0.217); PSP4 2011 (0.227) PSP5 2015 (0.197); PSP5 2011 (0.199)	Share of children 0–17 receiving family help (1)
Environmental protection and municipal economy	
PSP4 2015 (0.136); PSP4 2011 (0.139)	Percentage of municipality inhabitants using waterworks (0.33(3))
PSP3 2015 (0.173); PSP3 2011 (0.180)	Percentage of municipality inhabitants using sewers (0.33(3))
PSP5 2015 (0.123); PSP5 2011 (0.122)	Percentage of municipality inhabitants using sewage treatment plant (0.33(3))
Administration	
PSP4 2015 (0.140); PSP4 2011 (0.123) PSP3 2015 (0.179); PSP3 2011 (0.159)	Investment share in total expenditure (0.5)
PSP5 2015 (0.126); PSP5 2011 (0.107)	Value of EU funds *per capita* acquired by the commune (0.5)
Transport and communication	
PSP5 2015 (0.094); PSP5 2011 (0.123)	Investment in municipal roads in total expenditure (1)

Table 2
Descriptive statistics for the PSE4, PSE3 and PSE5 indicators

Index (year)	Standard deviation	Min.	Max.	Mean
PSE4 (2015)	1.7594	0.0049	14.43	2.726
PSE4 (2011)	1.5873	0.0054	14.82	2.565
PSE3 (2015)	1.6778	0.0060	14.46	2.651
PSE3 (2011)	1.5246	0.0068	17.76	2.493
PSE5 (2015)	1.7253	0.0045	14.16	2.708
PSE5 (2011)	1.5720	0.0049	13.84	2.551

Table 3
Estimation results

Variable/efficiency	PSE4		PSE3		PSE5	
	2015	**2011**	**2015**	**2011**	**2015**	**2011**
CONST	0.484 (0.96)	0.863* (1.95)	0.625 (1.25)	1.094** (2.41)	0.521 (1.04)	0.848* (1.94)
VOTER_ TURNOUT	0.056*** (6.33)	0.044*** (5.12)	0.047*** (5.50)	0.036*** (4.09)	0.054*** (6.13)	0.042*** (5.12)
HIGH_EDU_COUN	-0.021*** (-8.78)	-0.020*** (-8.75)	-0.019*** (-7.88)	-0.018*** (7.86)	-0.021*** (-8.59)	-0.019*** (-8.50)
REVENUE_ TOTAL_PC	-0.000*** (-3.60)	-0.000*** (-3.43)	-0.000*** (-2.35)	-0.000*** (-2.97)	-0.000*** (-3.45)	-0.000*** (-3.24)
CITIES	-0.266 (-0.48)	-0.868** (-1.76)	-0.505 (-0.97)	-1.104** (-2.24)	-0.310 (-0.57)	-0.857* (-1.77)
URBAN	-2.867*** (-2.58)	-3.006** (-2.28)	-3.241*** (-3.02)	-3.609*** (-2.72)	-2.422** (-2.12)	-3.188** (-2.33)
RURAL	1.188** (2.05)	0.854* (1.67)	1.146** (1.99)	0.643 (1.23)	1.234** (2.15)	0.961* (1.91)
KLESZCZOW	4.160** (1.99)	1.964 (1.13)	1.820 (0.86)	1.015 (0.66)	3.674* (1.82)	1.986 (1.09)
KRYNICA_M	3.059*** (6.38)	0.943 (1.02)	3.700*** (7.92)	0.539 (0.65)	3.071*** (6.30)	1.507 (1.54)
REWAL	0.809* (1.70)	0.301 (0.67)	0.410 (0.85)	0.202 (0.51)	0.815* (1.77)	0.345 (0.73)
VOTER_CITIES	-0.038*** (-3.64)	-0.023*** (-2.29)	-0.031*** (-3.12)	-0.017* (-1.67)	-0.037*** (-3.64)	-0.022** (-2.24)
VOTER_URBAN	0.077*** (3.82)	0.074*** (3.16)	0.086*** (4.38)	0.088*** (3.64)	0.070 (3.57)	0.076*** (3.12)
VOTER_RURAL	0.002 (0.22)	0.002 (0.29)	-0.000 (-0.03)	0.003 (0.32)	0.001 (0.16)	0.002 (0.26)
EDU_CITIES	0.021*** (7.01)	0.019*** (7.15)	0.018*** (5.97)	0.016*** (6.30)	0.021*** (6.95)	0.018*** (6.88)
EDU_URBAN	-0.011* (-1.75)	-0.007 (-1.23)	-0.011** (-2.11)	-0.007 (-1.34)	-0.012* (-1.79)	-0.005 (-0.99)
EDU_RURAL	-0.010*** (-2.66)	-0.003 (-1.03)	-0.005 (-1.48)	0.001 (0.33)	-0.010*** (-2.86)	-0.005 (-1.56)
Observations	N = 2,297	N = 2,297	N = 2,297	N = 2,297	N = 2,297	N = 2,297
R^2	0.423	0.401	0.379	0.348	0.424	0.403

Significance level: * -10%, ** -5%, *** -1%, () – Student t-value.

Table 4
Descriptive statistics for indicators used to calculate PSP

Indicator	2011			2015		
	min	max	average	min	max	average
Pupil–teacher ratio in primary education	0.000	0.222	0.085	0.051	0.388	0.084
Pupil–teacher ratio in secondary education	0	0.146	0.083	0.049	0.180	0.088
Share of children 3–6 years in kindergartens per 1,000 children	74.5	1,376.6	582.7	145.6	1,942.9	743.6
Share of children 0–17 receiving family help	6.2	83.9	45	4.3	78.4	35
Percentage of municipality inhabitants using waterworks	0	99.9	80.5	0	100	87.9
Percentage of municipality inhabitants using sewers	0	99.8	41.5	0	100	51.0
Percentage of municipality inhabitants using sewage treatment plant	0	100	46.0	0	100	53.5
Investment share in total expenditure	0.11	72.04	21.82	0.14	60.11	15.46
Value of EU funds *per capita* acquired by the commune in thousand	7	117,001	3,077	99	118,889	4,597
Investment in municipal roads in total expenditure	0	42.86	6.93	0	40.27	5.86

Notes:
According to the data, there were differences between municipalities in 2011 and 2015. The data also shows the improvement of municipal infrastructure between 2011 and 2015, e.g. waterworks or sewers.