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**PARTIAL DECENTRALIZATION AND ITS
INFLUENCE ON LOCAL GOVERNMENTS'
SPENDING POLICY.
AN ANALYSIS OF SPENDING FOR TEACHERS
AND OTHER RESOURCES NEEDED FOR
SCHOOLS.**

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Abstract

The aim of the paper is to analyze how limits in revenue and spending autonomy of sub-sovereign governments influence these governments' decisions. The analysis is focused on Polish towns current spending for schools in years 2002-2013. It presents that revenue autonomy increases towns spending, however the results are different for various categories of expenditure. The expenses were disaggregated for spending for teachers and other schools' recourses. The first category is the most important in schools' budget and in Poland is strongly (but not completely) determined by central regulations. The second category is more decentralized. It is presented that less decentralized spendings are unified among towns and are higher in more revenue' autonomous towns, the spending autonomy doesn't influence them. In case of more decentralized tasks, differences among municipalities are important, expenditure is influenced by spending autonomy, not by revenue autonomy. These results show that less autonomous tasks crowd out others.

Keywords:

partial decentralization, spending and revenue autonomy, local government spending policy

JEL:

H72, H75, H77

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1. INTRODUCTION

In classical models of fiscal federalism, decentralization- when local governments operate as an autonomous units which offer to citizens local public goods financed by local taxes and charges - is presented as the method to improve efficiency of public sector. (Tiebout 1956) (Oates 1972) Unfortunately in real world such completely independent local units do not exist. In practice local governments decisions are influenced by central government's regulations. Their fiscal autonomy is limited both on revenue and expenditure side, and decentralization is only partial. The important question is if and how the limitation of autonomy of local units influence their local spending policy.

The aim of this paper is to analyze how limits in revenue and spending autonomy affect local governments spending decisions. The influence of limits on revenue autonomy on municipal spending has been addressed in large theoretical and empirical literature. There are many studies which analyzed, how the level of general and specific grants affect local policy. (Gramkhar and Oates 1996; Inman 2008; Levaggi and Zanola 2003) There is also large literature, where the authors find relation between local spending policy and share of grants in local budgets. (for example Boetti, Piacenza, and Turati 2012; Borge and Rattso 2002; Eyraud and Lusinyan 2012). However the studies related to spending autonomy are rare and usually this autonomy is defined only through existence of specific grants in local budgets or as discrete variable, when complex decentralization reforms were undertaken in analyzed country. (Ahlin and Mörk 2008; Borge, Brueckner, and Rattso 2012). The reason for the lack of research on the spending autonomy is the difficulty of its quantification, especially in international studies. Measurement of expenditure autonomy is complex and to define it, the examination of regulations which restrict local governments own decisions is needed. (Kim, Lotz, and Blöchliger 2013; Oulasvirta and Turala 2009). The novelty of this study compared to existing works is that I established spending autonomy indicators for Polish municipalities and I present how the level of local unit spending autonomy influence its policy.

In empirical research I study Polish towns' spending policy in case of schools at primary and lower secondary level. I use panel data for Polish urban municipalities (239 towns) for the period 2002-2013. In Poland, as in many other countries, education is the largest part of local budgets. The school sector exists in all municipalities but it is differential among them and that is why it allows empirical examination of economic determinants of this variation. These characteristics of education, caused that in many studies the analysis of spending for schools are used to understand public sector decisions. (for example Barankay and Lockwood 2007; Borge and Brueckner 2014; Falch and Rattsø 1999; Solé-Ollé 2009)

I use in this study standard assumption that the level of spending is expression of demand for education in particular local government. That is why it is influenced by local revenues and economic and social characteristic of local voters. I improve this standard methodology by adding indicators of revenue and spending autonomy of local units. The other novelty of this study is that I divide spending for schools for two categories- spending for teachers' salaries and other non-wage spending¹. Similar decomposition of spending for education were used in other studies to understand cost factors in spending for schools. (Falch and Rattsø 1999; Hanushek and Rivkin 1997) or to analyze input-output relation in education. (Hanushek 1995) In this study I use this disaggregation to separate expenditure with different degree of local autonomy. The tasks related to these spending are defined by Polish law, as own local

¹ Except spending for energy and maintenance, which are determined by condition, size and age of the schools' buildings and also prices of energy- so by different factors, than other categories of operational spending for schools

responsibilities, but teachers' salaries are quite precisely defined by central regulations while other tasks are not. Thanks to this I am able to discuss differences in local spending policy in case of less and more decentralized tasks.

The structure of this paper is following, in section two I review literature related to reasons and effects of partial decentralization. I also present the main problems and suggestions for measurement of local autonomy. In third part of this paper I discuss the limitation of autonomy of Polish municipalities and I propose the measures of municipal spending and revenue autonomy in Poland. The fourth section presents the panel data analysis of effects of limits in local autonomy on Polish towns' spending on schools. Conclusions are in the last part.

2. PARTIAL DECENTRALIZATION

According to the model solutions proposed by the first generation of fiscal federalism (FGFF) theory, the local government's expenditure should be financed with local taxes, which binds the costs and the benefits arising from the delivery of public goods by local governments. Such structure of the local government, causes that welfare-maximizing politicians deliver public goods in response to the preferences of the citizens (and thus improves the allocative efficiency of public spending), while the mechanisms of competition between local governments improves production efficiency. (Oates 1972; Tiebout 1956).

However, in practice, a full decentralization, defined as a complete autonomy of local governments in determining the size and structure of their spending and their revenues, does not exist. It is associated for example with the external effects of different local services, territorial diversity of the local tax base, need for stabilization policy tools to be held in the hands of the central government. (Oates 1999; Swianiewicz 2011)

The existence of above problems requires the State's intervention – and, therefore, limiting the decentralization, inter alia, by:

- limiting local revenue autonomy
 - financing local budgets by general and specific grants
 - limiting the freedom of local governments in shaping local taxes.
- limiting local expenditure autonomy
 - introduction of limits in the quantity and quality of the goods supplied by local governments,
 - creating specific grants, which could be used only for exactly defined local tasks.

2.1. The impact of limits of autonomy on local government policy

According to analyses in FGFF theory, limits in autonomy spoil automatic mechanism described in Tiebout' and Oates' models. On other hand, above presented limits are necessary. So there is trade-off between the efficiency of a full local autonomy (or decentralization), and the inefficiencies from it. (Oates 1972, 2005) In opposite to FGFF theories in the second generation (SGFF) theories, politicians do not act to maximize social welfare, but their own interest. That is why studies in SGFF theories focus on determinants of politicians decisions. (Oates 2005; Weingast 2009) Local autonomy gives the electoral accountability of local politicians, while the limits in autonomy spoil the citizens-local governors relations, and also

influence relations between central and local governors. (Devarajan, Khemani, and Shah 2009) In empirical and theoretical studies conducted under both generations of fiscal federalism theory, it is presented that the degree of autonomy has important implications for the structure and efficiency – allocative and cost - of spending at the local level.

The most studies focus on revenue autonomy. The grants, its size, shape, changes were the subject of numerous of scientific papers. As shown by Gramlich (Gramlich 1969), the income elasticity of general grants is higher than that of own local revenues. The general grant will, therefore, affect all the expenses of local governments, leading to their higher level than in the case of revenues being based on local taxes only. This means that "public money sticks to public spending".(Inman 2008) Specific grants are source of financing (or additional financing) of tasks indicated by the donor, but a strong influence of these grants can be observed, also on the other tasks. Empirical analyses show that a crowd out effect occurs, and therefore spending on other local tasks, which are not subject to grants is cut. This may mean that the substitution effect is stronger than the revenue effect. On the other hand, public spending is characterized with low price elasticity. Thus, in practice grants often raise "other" expenses of local governments, not supported with a grant (the income effect prevails). (Dahlberg et al. 2008; Knight and Coate 2002; Otim 1996)

As result when local budgets are more transfer dependent (and especially depend on specific grants) and so called vertical imbalance is high, the local public spending increase, what's more it could cause inefficient growth of local deficit and debt. (for example) (Asatryan, Feld, and Geys 2015; Baskaran 2010; Borge and Rattso 2002; Fiva 2006)

Interesting studies analyze the impact of a change in the specific and general grants level on the local government spending (Gramkhar 2002) Some studies show that a reduction of transfer will result in a decline in the public spending, however much smaller one than in the case of growth. Which means that transfer money is replaced with the funding of local governments (fiscal replacement). On the other hand, papers can be found which indicate that the decrease of expenditure is stronger than in the case of an analogic increase (super-flypaper effect).(Gramkhar and Oates 1996; Levaggi and Zanola 2003; Stine 1994) The reason of different results is related to the characteristics of analyzed goods and the elasticity of local budgets. In case of goods important for society (or politicians) we could expect fiscal replacement, while super flypaper will occur in case of less important tasks. The fiscal replacement is linked also to budget elasticity, only those municipalities which have possibility to use its own revenues or debt to finance non (or less) granted tasks could do it. In case of inelastic budget we could expect super-flypaper effect.(Deller and Maher 2006; Levaggi and Zanola 2003)

The presence of grants in local budgets is primarily an expression of limitation of revenue autonomy. Whereas when the specific grants are replaced by general (or in opposite way) we could understand it as increasing (or decreasing) degree of spending autonomy. Analyzing the effects of reforms is the natural experiment approach which is the theme of some studies. For example Borge et al. presented that after the Norwegian reform, which eliminated earmarking grants from local budgets, diversity in the provision of local goods increased and the local characteristic matter more than in less decentralized regime. (Borge and Brueckner 2014; Borge et al. 2012). Similar are the results of studies on decentralization reforms in Spain (Balaguer-Coll, Prior, and Tortosa-Ausina 2010; Salinas and Solé Ollé 2009; Solé-Ollé 2009) The authors proved that decentralization reforms improved adjustment of services to the local needs (allocative efficiency) and also improved the production efficiency. However authors noticed that *“decentralization has the potential for better matching of regional preferences, but this potential would not be realized in practice if the revenues at the disposal of some regions*

are severely constrained” (Solé-Ollé 2009) This is the problem of real vs legal revenue and spending autonomy which differ local units in particular country. Only those units which have real spending and revenue autonomy could use it according to the needs of the residents.

The problem of diversity of local public spending policy due to degree of autonomy, could be analyzed comparing different local spending. For example Falch and Rattso (Falch and Rattso 1999) found, that school spending are income inelastic- but mostly due to inelastic structure of teachers employment. The other spending related to schools are much more influenced by local government incomes, especially in short term. Such distinction of different categories spending on schools is applied in my empirical study.

As presented the problem of correlation between local government autonomy and local policy is quite well described in literature. But, most of the studies focus on revenue autonomy or grants or general (de)centralization reforms and not on spending autonomy. In this study I fill this gap by using spending autonomy indicators.

2.2. Measurement of level of local autonomy

Autonomy in terms of revenue may be assessed in relation to various sources of revenue, or by its structure. The first approach is to determine whether and how much freedom the local government has in determining its revenue and spending covered by those revenues. The least autonomous type of revenue are specific grants, followed by general grants and shared taxes. The second approach is to develop indicators of autonomy which evaluate the shares of more independent revenues in the local government’s budget. (Ebel and Yilmaz 2002; Kim et al. 2013; Stegarescu 2004)

As opposed to autonomy in terms of revenue, the autonomy in terms of expenditure is difficult to quantify. It requires an analysis of legal provisions affecting different spheres of local autonomy. Taking into account different aspects of local autonomy- policy, budget, output, input and control Bach, S. et al., (Bach, Blöchliger, and Wallau 2009) proposed method to differentiate various goods in term of local spending power. They used these evaluation to compare different local tasks in sample of countries, but without quantifying the level of spending autonomy. In this study I propose indicators of spending autonomy for Polish municipalities using the established by them idea and I calculate indicators similar to those which are used as revenue autonomy indicators.

3. SUB-SOVEREIGN GOVERNMENTS IN POLAND AND THEIR AUTONOMY

Sub-sovereign government in Poland consists of three levels- municipalities, counties and regions. In this paper I focus on lowest level (municipalities)). Municipalities – 2489 units- are very diversified group. We can distinguish urban, rural and mixed municipalities. Taking into account this diversity I decided to analyze only urban municipalities– 239 towns².

Important part (about 20%) of municipal spending is related to investments. But in my analysis I will focused only on operational expenditure.³ Local expenditure cover several dozens of public tasks, the most important in local budgets are expenditure related to education (41% of towns spending) and social protection (20%), next categories are- administration (11%), communal services (7%) and transport (5%). Taking together those 5 categories decide on about

² The rules related to spending and revenues related to schools in Poland are different in rural and non-rural areas, that is why for proper econometric analysis it is better to focus on one kind of municipalities.

³As “golden rule” of local budgets suggest, the operational budget may be analyse separately from investment budget. (Musgrave and Musgrave 1989). In 2009 the obligation of balance of operational budget were included in Polish law.

83% of operational spending in urban municipalities. To established indicators of spending autonomy, we need to look more deeply at the rules defining local autonomy in different local tasks. (Oulasvirta and Turala 2009) To established expenditure autonomy indicators I focused on these 5 areas of public expenditure.⁴ I analyzed them according to five aspects of autonomy-policy autonomy, monitoring and evaluation, budget autonomy, input autonomy, output autonomy, (Bach et al. 2009)

I established indicator of expenditure autonomy (ISA), which helps to compare the autonomy of different Polish towns.

$$ISA = (OE - N\&LA) / OE$$

Where

OE- operational expenditure

N&LA- no- and low-autonomous expenditure

As no-autonomous expenditure I decided to define those, where budget autonomy is strictly limited –the spending are financed by specific grants or there are obligatory payments to central budget. As low-autonomous expenditure I defined those own local tasks where both – input and output autonomy is strongly restricted (represented especially by some categories of spending in education and social services). Those spending where the input autonomy is important (communal services, administration, transport) are not included to low-autonomous expenditure.

The table below presents the variation of spending autonomy of Polish towns in years 2003-2013.

Table 1 The variation of spending autonomy (ISA) of Polish towns in years 2002-2013

| | mean | p50 | min | max | cv |
|-----|------|------|------|------|------|
| ISA | 0.50 | 0.49 | 0.24 | 0.81 | 0.15 |

Source: own calculation based on budgetary data

It is worth to notice, that mentioned above legal regulations are the same for every municipality, so *de jure spending autonomy* of towns is the same for all units, but *de-facto spending autonomy* is differential, and depends on real costs of local public services and also size and flexibility of local revenues. Therefore to understand variation in spending autonomy we need to look not only at the expenditure but also at sources and differentiation of local revenues. According to the Polish law there are three main categories of local revenues - own revenues, general grant, specific grants. The most important part of revenues defined by law as own are shares in personal and corporate income taxes. However it needs to be noticed, that those taxes are defined centrally, and any direct local policy related to these taxes is not possible. The other part of own revenues consist of several small categories of revenues- own taxes (property& transport taxes with limited fiscal autonomy related to tax rates and also tax reliefs), charges, revenues from properties, grants received from other municipalities.

I established indicator of revenue autonomy (IRA) which represents share of own local revenues in local budgets (without shared taxes). Taking into account local policy related to local taxes I include in this indicator all potential revenues from local taxes (adding tax reliefs, and costs of smaller tax rates)

⁴The preliminary version of the analysis of spending autonomy for Polish municipalities were presented in (Kopańska 2016)

IRA=OR/R

Where

OR- own local revenues and the loses of revenues due to local fiscal policy

R- all budget revenues⁵

Table 2 The variation of revenue autonomy (IRA) of Polish towns in years 2002-2013

| | mean | p50 | min | max | cv |
|-----|------|------|------|------|------|
| IRA | 0.41 | 0.40 | 0.13 | 0.92 | 0.25 |

Source: own calculation based on budgetary data

The table 2 presents the variation of revenue autonomy of Polish towns in years 2003-2013. The variation of IRA is higher than ISA.

The table 3 (below) presents the correlation between expenditure and revenue autonomy and wealth of towns measured by total revenues per capita. The revenue and expenditure autonomy are positively correlated to each other. The relation of levels of autonomy to wealth of municipality is positive but not strong, especially in case of spending autonomy. It means that even rich municipalities which are burdened by obligatory expenditure have less elastic budget than poorer but with less obligatory spending. This is related to vertical imbalance problem and the question about adequacy of revenues (own and granted) to tasks devoted to local units.

Table 3 Correlation of revenue and expenditure autonomy and local revenues per capita in years 2002-2013

| | ISA | IRA | All revenues per capita |
|-------------------------|------|------|-------------------------|
| ISA | 1.00 | | |
| IRA | 0.59 | 1.00 | |
| All revenues per capita | 0.19 | 0.27 | 1.00 |

Source: own calculation based on budgetary data

4. THE IMPACT OF FISCAL AUTONOMY ON LOCAL GOVERNMENT SPENDING POLICY- QUANTITATIVE STUDY

The problem of local policy in case of different limits in local autonomy will be analyzed using autonomy indicators. Additionally I will study expenditures on goods with different level of local autonomy. I focus on spending related to schools. As presented above tasks related to education are the most important in local budgets. According to Polish law education at primary and lower secondary level is municipalities own task. The similar characteristic of local spending for education could be found in other countries. That is why the analysis of spending for schools is very often used to understand local governments spending policy. (Barankay and Lockwood 2007; Borge and Brueckner 2014; Falch and Rattsø 1999; Solé-Ollé 2009)

Polish municipalities are responsible for school education at 6-years primary level (primary schools) and 3 years lower-secondary level (gymnasiums). Children and youth could choose among public and private schools. There are school zones established for primary and gymnasium education, but those zones are not obligatory. In 2010 about 24% of primary

⁵ Till 2010 there were no clear distinction between operational and investment revenues

schools students and 27% of gymnasium students learn outside their school zones. (Federowicz and Sitek 2011) Private schools are not very popular- in 2013 at primary and lower secondary level there were 5% of towns' pupils in non-municipal schools. It needs to be noticed that in last year's due to demographic changes there is important decrease in number of students in schools. In 2002 there were 737 904 students in towns' schools while in 2013 only 495 075, and average school size in towns decrease from 471 students to 325.

Sub-sovereign governments' educational tasks are related to management of physical assets- school buildings, approval and financing of public schools work plans- its mean numbers and type of lessons, number of teachers and other school workers, and salaries for them, type and costs of school maintenance work and quantity and costs of supplies needed for students and teachers. The schools program needs to fulfill national curriculum for particular level and type of school.

In operational school spending we may distinguish different categories. The most important is distinction of spending for teachers and other resources needed for running the school. Those two kinds of spending represents different costs' functions and that is why such disaggregation is used in studies where the problem of cost factors is the most important. (Gerhard Kempkes 2009; Hanushek and Rivkin 1997; Nose 2015). Falch and Rattsø (Falch and Rattsø 1999) present, that not only cost factor, but also political factors related to these spending may be different⁶. Teachers unions are strong at central, but also at local level, and they bargain over wages, working time, and working rules with both national and local governments. That is why the spending for teachers are the most inelastic and steadily increasing part of expenditure for education in many countries. (Falch 2001; Falch and Rattsø 1999). Such disaggregation of public spending for education has been used also in the literature on the link between government expenditure and social outcomes. Hanushek (Hanushek 1995) considers this concept to be "most appealing and useful" to assess the relation between school outcomes and measurable educational inputs. (Dreher, Nunnenkamp, and Thiele 2008; Woessmann 2001) In my analysis the distinction of spending on teachers and other resources is related to different level of spending autonomy related to these two categories. As it will be presented, salaries represent low decentralized tasks while supplies needed for education highly decentralized.

As presented in table 4 below the most important part of local government spending related to educations are spending on salaries and especially teachers' salaries and related items.⁷ It is more than 90% of all operational spending for schools (excluded spending for energy). This is also, the less autonomous part of local spending in education. Work of teachers is regulated by special act. The Teachers Card defines (among others) teachers' base's salary. Such base is the minimum salary which should be paid for teachers with lowest professional degree⁸, but for example the chartered teachers employed in municipality need to receive in average at least 184% of these base. The base salary, were (thanks to Teachers Union and central government agreement) valorized several times in last years and in 2013 was 23,4% higher in real terms than in 2002⁹. Today the chartered teachers' salary is 41% higher than average in economy (but the trainee- 22% less). The trend in teachers professional improvement (on which local authorities have no influence) is also important. In 2002 chartered teachers constituted less than 20% of teachers population, while in 2013- more than 50% . (Kopańska and Sztanderska 2015)

⁶ In mentioned studies there were third element of disaggregation- teachers per pupils ratio, unfortunately in Polish statistic there are no data about number of teachers in municipalities till 2011

⁷ Like social security payments, obligatory social fund, which need to be established in every school.

⁸ There are 4 professional degrees for teachers- stażysta (trainee), kontraktowy (contractual); mianowany (appointed); dyplomowany (chartered).

⁹ And it is similar as average salary increase in Poland.

Taking into account those regulations and depopulation of schools, average spending for the salaries per student were two times higher in 2013 than in 2002. (see table 4)

Table 4 Towns spending for primary and lower secondary schools, zł*per student in years 2002-2013

| | mean | p50 | min | max | cv | Changes of mean value between 2002 and 2013. |
|---|---------|---------|---------|----------|------|--|
| All operational spending for schools ** | 5792.11 | 5678.51 | 2835.39 | 19076.55 | 0.27 | 98% |
| Sallaries*** | 5426.06 | 5301.64 | 2234.78 | 17222.90 | 0.27 | 101% |
| Non-wage spending** | 366.05 | 297.72 | 30.36 | 5530.18 | 0.93 | 56% |

*zł- Polish zloty - price fixed for 2014; ** without spending for energy ***the budgetary qualification does not separate teachers and other school employees' salaries, but the teachers' salaries is the main part of salaries at schools (more than 80%)

Source: own calculation based on budgetary data

The teachers' salaries could be defined as low-autonomous expenditure (and they were excluded from ISA) but we need to notice that according the law, there are possible some local own decisions related to this spending. Direct salary decisions are taken by the managers of the schools, but the school budget is the subject to approval by the local authority. Local governments make also some own wage regulations, which specify, inter alia, the terms and amount of salary amendments (other than centrally defined). Local government can also freely raise wages above the minimum rate. Local government may decide on setting up and closing of schools- and thus indirectly also about the number of teachers.

The second analyzed in our study part of expenditure related to schools are spending for stationary, office supplies and cleaners, teaching aid etc. Those spending create only about 5-6% of all operational spending. So they are less important in budget, but decide about quality and comfort of schools and teaching services. What's more as Woessmann noticed (Woessmann 2001) comparing public spending on schools in several dozens of countries "providing schools with the proper instructional materials and supplies seems to have a positive effect on performance". The positive effect of spending other than salaries on schools output, was presented as important especially in case of developing countries.¹⁰ (Hanushek 1995) What is important for our analysis in contrast to teachers' salaries there are no detailed regulation/standards for such instructional aids and supplies. As visible in table 4 the variation of these spending is much more important than in case of salaries . It may represent the differences of local autonomy in these two categories of spending. As Borge et al noticed, disparities among units increase in case of more decentralized regime (Borge et al. 2012) The spending for non-wages spending increase 58% in analyzed period, but it was much less than teachers' salaries (see table 4).

The question is how those two kind of expenditure are influenced by revenue and spending autonomy of local units counted by IRA and ISA. I study this for 239 small towns in Poland for years 2002-2013. The simple analysis of correlation (table 5) presents that in case of non-wage spending the correlation is positive and quite strong- stronger for expenditure than

¹⁰ The evidence of the correlation between students' performance and the level of spending is not clear and there is important debate in literature about existence of this correlation. (Burtless 2011)

revenue autonomy indicator. While in case of salaries there is no correlation when we analyze whole period and positive in case of single years. (especially in case of revenue autonomy)

Table 5 Correlation between revenue and spending autonomy and different categories of spending related to education. In Polish towns in years 2002-2013 & 2002 & 2013

| | Sallaries per student | Non-wage spending per student |
|-----------|-----------------------|-------------------------------|
| 2002-2013 | | |
| IRA | 0.05 | 0.19 |
| ISA | 0.06 | 0.31 |
| 2002 | | |
| IRA | 0.39 | 0.28 |
| ISA | 0.17 | 0.36 |
| 2013 | | |
| IRA | 0.38 | 0.34 |
| ISA | 0.08 | 0.39 |

Source: own calculation based on budgetary data

4.1. Panel analysis

To analyze spending policy of towns I use standard assumption that this policy represents median voter demand for analyze local task. (Bergstrom and Goodman 1973; Bergstrom, Rubinfeld, and Shapiro 1982; Borchering and Deacon 1972) Taking into account the characteristic of local system in Poland, where local tax policy is very limited, it can be assumed that the public and private goods are not substitutes and the voter maximized its utility only with respect to public goods and the private budget constraints can be ignored. (Borge and Rattsø 1995)

This allows to derive a simple linear demand function of i-th local government:

$$E_{ki} = f_k(\text{rev}_i; \text{soc}_i, \text{IA}_i)$$

Where

E_{ki} - spending of town i for different categories of education's goods: all operational spending per student (all_spending_ps) (1); salaries per student (salaries_ps) (2); and non-wage spending per student (non_wage_ps) (3)

rev- denotes revenues of i-th local government

soc_i – is the vector of characteristics of the local population that determines the preferences for public education.

IA_i - indicator of autonomy- revenue (IRA) or expenditure (ISA) in town i

The analysis of demand for public education is the subject of large literature (for example Ahlin and Johansson 2001; Ahlin and Mörk 2008; Duncombe, Robbins, and Stonecash 2003; Falch and Rattsø 1999; Poterba 1996) In most studies the local government revenues were found as important factor which determine the level of public spending for decentralized education. The distinction of own revenues and grants is important- as income elasticity of these revenues is different. Taking into account the characteristic of revenues of Polish cities I decided to use in

my model personal income tax (pit_pc). PIT is not local tax, but it constitute important part of local revenues (about 20%). Every town received 39,34% of taxes collected from their citizens. That is why this tax is good approximation not only of local unit financial situation but also of citizens incomes. Local taxes are strongly correlated to autonomy indicators, that is why I did not include them to the model.

Specific grants for schools are very rare and small, but in system of general grants there is educational subvention. This subvention was established to co-finance and level out differences in local government costs related to education. It is calculated according to number of students in every sub-sovereign unit. It takes into account also the type of schools, students special requirements, type of local governments, in addition number and qualification of teachers. Expenditure on maintenance and administration of the schools are calculated in the subsidy at a fixed and equal rate for all schools. But it should be stressed that central government do not guarantee that educational grants fulfill all local spending related to education. There are also no defined standards- what spending could be covered by this grant. In average the educational subvention covered about 55% operational expenditure related to education and 85% of operational expenditure related directly to schools. This subvention is included in our model and it will be divided per student to reflect how it is defined by law. (subv_ps)

Local preferences for public education are related to private income level. Standard assumption is that demand for public spending of high income citizens is higher than middle and low income citizens. Epple and Romano presented that in case of existence of private schools that may be not true. (Epple & Romano, 1996) – but private education is not popular in Poland. The level of income is also related to citizens education. Which was found in many studies as important determinant of people preferences for public schools. Unfortunately in Polish public statistic there are no data for towns about citizens education and their incomes. The approximation of citizens income in our study is information about personal income tax in local budgets. (pit_pc)

The important determinants of people demand for schools is private interest of citizens, and in large literature there is discussion on age structure of society and its demand for education. (Borge and Rattsø 1995; Duncombe et al. 2003; Sørensen and Rattsø 2010) In case of younger society, where there are more children we could suspect higher demand for schools. But if there are more students at schools, per student spending are smaller. With the increase in the number of students in the classroom or school, the average cost of school per pupil fall. In this analysis I take this issue into account, using information about size of average school in town (schoolsize) and number of students in town (students) as an instrument in GMM model. In last years, due to problem of aging society the question if old people support public education started to be very important. There is a large literature on this theme, but the results are mixed. (for example Clark et al. 2009; Duncombe et al. 2003; Sørensen and Rattsø 2010) I decided to look at this issue in my study, and I add variable old_all, which represents the share of people above 70 years in town. The last characteristic of local society which is added in my analysis is the share of women in town's population. (women_all) The others studies presented that women prefer higher spending on education. (for example Ahlin and Johansson 2001; Duncombe et al. 2003) I decided to use panel analysis, where there are data from 239 towns for years 2002-2013.

The table 6 summarised the basic statistics of the explanatory variables which were used in this analysis.

Table 6 List of variables and descriptive statistics: variation over towns (average for years 2002-2013)

| Name of variable | description | mean | p50 | min | max | cv |
|------------------|---|---------|---------|---------|----------|------|
| subv_ps | Central support for municipal education - educational general grant per student in zł* | 4790.08 | 4490.60 | 2684.57 | 11423.68 | 0.24 |
| pit_pc | Financial statement of town and citizens -Revenues from personal income tax per capita in zł* | 494.50 | 471.25 | 98.92 | 3462.91 | 0.48 |
| schoolsize | Schools' size (number of students in average school in town) | 401.13 | 388.38 | 57.50 | 991.50 | 0.37 |
| Students* | Number of students in town | 2486.59 | 2124.00 | 102 | 9359 | 0.68 |
| women_all | Share of women in town population | 0.52 | 0.55 | 0.49 | 0.52 | 0.02 |
| old_all** | Share of people 70 years old and older in town population | 0.09 | 0.16 | 0.03 | 0.09 | 0.20 |
| ISA | Indicator of spending autonomy | 0.50 | 0.49 | 0.24 | 0.81 | 0.15 |
| IRA | Indicator of revenue autonomy | 0.41 | 0.40 | 0.13 | 0.92 | 0.25 |

* *Instrument variable, used in GMM model*

** *this variable was not significant, it was not included into final models*

Source: Own calculation based on GUS data *zł- Polish zloty - price fixed for 2014

Taking into account the characteristic of budget planning the important explanation of expenditure in year t are spending in previous year. I decided to use two kind of panel data econometric analysis which take this problem into account. First I implement static model with serially correlated error terms (AR1), then dynamic panel estimator- system GMM (generalized method of moments). (Heinesen 2004; Zhu 2013)

All data (except, ISA, IRA and shares) were logarithmized, thanks to this the coefficients could be presented as spending elasticity. I added year effect (2013 was the base for other years).

In case of AR1 analysis, after Hausman test, random effects models were choose.

In case of GMM analysis, as level instruments were used analyzed spending and size of school and to avoid problem of too many instruments the second to third lags were analyzed. As strictly exogenous variables were used population data (old_all, women_all, students), and data which represent town and citizens financial statement (revenues from PIT, educational grant and also autonomy indicators) (Roodman, 2006)

The results of econometric analysis are presented in table 7

Table 7 Estimations results

| | all_spending_ps (1) | | | | salaries_ps (2) | | | | non_wage_ps (3) | | | |
|--------------------|---------------------|------------|-----------|------------|-----------------|------------|-----------|------------|-----------------|------------|-----------|------------|
| | GMM | Static -RE | GMM | Static -RE | GMM | Static -RE | GMM | Static -RE | GMM | Static -RE | GMM | Static -RE |
| L. all_spending_ps | 0.628 | | 0.644 | | | | | | | | | |
| | (26.16)** | | (25.48)** | | | | | | | | | |
| L. salaries_ps | | | | | 0.668 | | 0.669 | | | | | |
| | | | | | (25.85)** | | (23.14)** | | | | | |
| L. non_wage_ps | | | | | | | | | 0.692 | | 0.695 | |
| | | | | | | | | | (29.21)** | | (29.33)** | |
| lnsubosw_ps | 0.214 | 0.39 | 0.202 | 0.393 | 0.177 | 0.38 | 0.181 | 0.384 | 0.167 | 0.515 | 0.152 | 0.5 |
| | (12.04)** | (23.70)** | (11.00)** | (23.88)** | (11.01)** | (23.99)** | (9.96)** | (24.21)** | (3.36)** | (5.94)** | (3.10)** | (5.74)** |
| IRA | | | 0.095 | 0.065 | | | 0.103 | 0.061 | | | 0.074 | 0.05 |
| | | | (6.08)** | (3.70)** | | | (5.98)** | (3.62)** | | | -1.06 | -0.52 |
| ISA | 0.018 | -0.039 | | | -0.002 | -0.116 | | | 0.361 | 0.884 | | |
| | -0.58 | -1.18 | | | -0.08 | (3.67)** | | | (3.19)** | (5.18)** | | |
| lnpit_pc | 0.046 | 0.052 | 0.043 | 0.056 | 0.034 | 0.046 | 0.033 | 0.05 | 0.027 | 0.117 | 0.051 | 0.144 |
| | (6.10)** | (4.84)** | (6.42)** | (5.34)** | (4.61)** | (4.41)** | (5.11)** | (4.76)** | -1.21 | (2.20)* | (2.25)* | (2.70)** |
| lnschoolsize | -0.039 | -0.093 | -0.036 | -0.091 | -0.025 | -0.074 | -0.02 | -0.068 | -0.166 | -0.232 | -0.196 | -0.268 |
| | (3.31)** | (8.69)** | (3.47)** | (8.70)** | (2.26)* | (6.87)** | (2.08)* | (6.50)** | (4.34)** | (4.61)** | (5.36)** | (5.32)** |
| women_all | 0.949 | 1.284 | 0.772 | 1.198 | 0.787 | 1.288 | 0.601 | 1.117 | 2.036 | -0.858 | 2.326 | -0.116 |
| | (3.76)** | (2.62)** | (3.17)** | (2.49)* | (3.19)** | (2.65)** | (2.45)* | (2.33)* | (2.62)** | -0.37 | (2.93)** | -0.05 |
| y.2002 | -0.034 | -0.369 | -0.034 | -0.368 | -0.046 | -0.401 | -0.05 | -0.403 | 0.123 | 0.055 | 0.153 | 0.11 |
| | (2.04)* | (24.99)** | (2.09)* | (25.24)** | (2.69)** | (28.03)** | (2.72)** | (28.43)** | (3.50)** | -0.73 | (4.24)** | -1.46 |
| y.2003 | -0.003 | -0.309 | -0.004 | -0.31 | -0.008 | -0.331 | -0.013 | -0.335 | 0.058 | -0.008 | 0.089 | 0.047 |
| | -0.18 | (23.16)** | -0.3 | (23.55)** | -0.5 | (25.64)** | -0.79 | (26.23)** | -1.77 | -0.12 | (2.68)** | -0.7 |
| y.2004 | -0.036 | -0.277 | -0.038 | -0.276 | -0.047 | -0.299 | -0.05 | -0.299 | 0.068 | 0.02 | 0.076 | 0.03 |
| | (2.94)** | (24.24)** | (3.17)** | (24.26)** | (3.86)** | (27.09)** | (3.88)** | (27.04)** | (2.42)* | -0.34 | (2.61)** | -0.52 |
| y.2005 | -0.015 | -0.235 | -0.017 | -0.234 | -0.028 | -0.26 | -0.03 | -0.258 | 0.171 | 0.108 | 0.172 | 0.104 |
| | -1.38 | (22.93)** | -1.55 | (22.90)** | (2.51)* | (26.27)** | (2.56)* | (26.07)** | (6.43)** | (2.06)* | (6.34)** | (1.98)* |
| y.2006 | -0.002 | -0.195 | -0.003 | -0.194 | -0.015 | -0.221 | -0.016 | -0.219 | 0.184 | 0.171 | 0.182 | 0.164 |
| | -0.25 | (21.95)** | -0.34 | (21.88)** | -1.49 | (25.84)** | -1.54 | (25.59)** | (7.88)** | (3.78)** | (7.62)** | (3.61)** |
| y.2007 | 0.001 | -0.16 | 0.002 | -0.159 | -0.008 | -0.184 | -0.009 | -0.183 | 0.169 | 0.22 | 0.163 | 0.212 |
| | -0.06 | (21.48)** | -0.21 | (21.50)** | -1.04 | (25.82)** | -1.06 | (25.65)** | (7.87)** | (5.81)** | (7.61)** | (5.57)** |
| y.2008 | -0.011 | -0.14 | -0.009 | -0.141 | -0.014 | -0.158 | -0.014 | -0.16 | 0.097 | 0.155 | 0.101 | 0.167 |
| | -1.57 | (22.16)** | -1.29 | (22.34)** | -1.86 | (26.02)** | -1.86 | (26.30)** | (5.23)** | (4.80)** | (5.46)** | (5.17)** |

Table 7 Estimations results cont.

| | all_spending_ps (1) | | | | salaries_ps (2) | | | | non_wage_ps (3) | | | |
|-----------------------|---------------------|------------|----------|------------|-----------------|------------|----------|------------|-----------------|------------|----------|------------|
| | GMM | Static -RE | GMM | Static -RE | GMM | Static -RE | GMM | Static -RE | GMM | Static -RE | GMM | Static -RE |
| y.2009 | 0.011 | -0.091 | 0.014 | -0.092 | 0.009 | -0.105 | 0.009 | -0.108 | 0.092 | 0.165 | 0.102 | 0.191 |
| | (2.16)* | (15.84)** | (2.72)** | (16.04)** | -1.67 | (19.07)** | -1.61 | (19.63)** | (5.86)** | (5.51)** | (6.44)** | (6.44)** |
| y.2010 | 0.029 | -0.041 | 0.03 | -0.041 | 0.023 | -0.054 | 0.024 | -0.055 | 0.095 | 0.175 | 0.108 | 0.2 |
| | (7.07)** | (7.91)** | (7.46)** | (7.92)** | (5.75)** | (10.84)** | (5.64)** | (11.26)** | (6.21)** | (6.42)** | (7.21)** | (7.41)** |
| y.2011 | 0.006 | -0.023 | 0.008 | -0.022 | 0.006 | -0.029 | 0.007 | -0.028 | -0.015 | 0.079 | -0.013 | 0.082 |
| | (1.99)* | (5.29)** | (2.68)** | (4.95)** | (2.28)* | (7.14)** | (2.52)* | (6.80)** | -0.97 | (3.38)** | -0.81 | (3.49)** |
| y.2012 | 0.014 | -0.009 | 0.016 | -0.008 | 0.011 | -0.014 | 0.012 | -0.012 | 0.034 | 0.063 | 0.031 | 0.059 |
| | (5.64)** | (2.93)** | (6.30)** | (2.48)* | (4.83)** | (4.41)** | (5.39)** | (3.79)** | -1.79 | (3.48)** | -1.61 | (3.23)** |
| const | 0.875 | 5.045 | 0.905 | 4.98 | 0.914 | 5.038 | 0.907 | 4.959 | -0.146 | 1.9 | -0.01 | 2.086 |
| | (3.42)** | (15.91)** | (3.35)** | (15.91)** | (3.66)** | (16.18)** | (3.40)** | (16.05)** | -0.2 | -1.21 | -0.01 | -1.31 |
| N_groups | 2,832 | 2,841 | 2,832 | 2,841 | 2,832 | 2,841 | 2,832 | 2,841 | 2,832 | 2,841 | 2,832 | 2,841 |
| N_municipalities | 239 | 239 | 239 | 239 | 239 | 239 | 239 | 239 | 239 | 239 | 239 | 239 |
| AR(2) | 0.35 | | 0.35 | | 0.39 | | 0.43 | | 0.07 | | 0.07 | |
| Hansen test | 0.11 | | 0.17 | | 0.2 | | 0.14 | | 0.1 | | 0.09 | |
| number of instruments | 76 | | 76 | | 76 | | 76 | | 76 | | 76 | |
| R-sq: | | | | | | | | | | | | |
| within | | 0.95 | | 0.95 | | 0.95 | | 0.95 | | 0.34 | | 0.33 |
| between | | 0.37 | | 0.41 | | 0.29 | | 0.33 | | 0.21 | | 0.18 |
| overall | | 0.81 | | 0.82 | | 0.8 | | 0.81 | | 0.25 | | 0.23 |
| rhoar | | 0.66 | | 0.65 | | 0.66 | | 0.66 | | 0.54 | | 0.54 |

* $p < 0.05$; ** $p < 0.01$; z statistic in brackets

Source: Own calculation, for all analyses STATA SE/14 were used.

The results from different models are similar. The size and direction of relation in case of all operational spending and spending for salaries are congruous. This is not surprising, taking into account the importance of salaries in total expenditure. Interesting are differences between the determinants of wage and non-wage spending.

In case of GMM model it is visible, that every analyzed category of spending is mostly related to its amount from previous year.

The increase of educational subvention increase all operational expenditure and also both – wage and non-wage spending. In case of GMM model 1% increase of general grant causes 0,2% of increase all spending, 0,18% of salaries and 0,15% of non-wage spending. So revenue elasticity of subvention is quite weak. But when we analyzed AR models, and we do not take into account spending from previous year, the educational subvention is much more important explanatory of changing of spending. 1% increase of subvention leads to 0,4% increase of all spending and spending for salaries and 0,5% of spending for school's equipment.

The towns and citizens revenues represented by revenues from PIT positively influence all categories of spending. (only in case of GMM model for non-wage spending and spending autonomy indicator those revenues were not statistically important explanation of local spending). The towns where there are richer citizens and the towns which receive more revenues from income taxes, spend more on pupils in schools. But the income elasticity is weak, in case of all operational revenues and spending for salaries 1% increase in PIT results 0,03%-0,06% increase of spending per students. In case of non-wage spending those elasticity is higher (but still weak)- in AR model 1% increase of PIT leads to 0,12-0,14% increase of spending for schools' materials, and in GMM model by 0,5%

The economies of scale were significant in all models. All spending decrease when school is bigger. 1% more pupils in school caused that all operational spending are 0,04%-0,09% smaller and spending for salaries 0,02%-0,07% smaller. The scale effect is stronger in case of non-wage spending- 1% increase of school size caused 0,2% -0,3% decrease of non-wage spending per student.

Demographic composition of towns' society is important determinant of spending per school. Towns where there are more women spend more on all categories of school resources. (only in case of non-wage salaries and static models, this variable was not significant)

The most interesting for our study are results of influence of spending and revenue autonomy on analyzed expenditure. The revenue autonomy influence all operational spending and spending for salaries. Those towns which are better endowment in own revenues are ready to pay more for teachers, but the size of this relation is not strong. 1% point more own revenues in local budget, leads to 0,06% -0,1% higher spending for teachers and all operational spending. What interesting - the revenue autonomy does not influence non-wage spending.

The spending autonomy indicator does not determine all operational spending. In case of spending for salaries in GMM model this indicator was not significant but in case of static model the ISA was significant and the coefficient was negative.

The spending autonomy is important explanatory of non-wage expenditure. The towns, which have more flexible budget decide to pay more for materials and supplies needed for schools. The size of the relation is relatively strong. The increase of ISA by 1 percentage point leads to increase in per pupil non-wage spending by 0,4-0,9%. This result represents equity problem – those municipalities which budget is less dependent on local decisions spend lesser on supply needed for education. So the inflexible, and centrally regulated spending affect the pupils and teachers access to materials needed for schools operation. Analyzing year effect we can see,

that salaries increased almost every year and were higher in 2013 comparing to previous years, while in case of non-wage spending there is opposite effect. As was mentioned the increase of teachers' salaries per student was result of central regulations and also the depopulation of schools. It was presented that spending per pupil for teacher salaries are twice higher in 2013 than in 2002. While the non-wage expenditure increased in that period only by 60%. So the teachers' salaries influence other school spending and crowd out those which are not obligatory.

5. CONCLUSIONS

The aim of presented paper was to study problem of partial decentralization and its influence on local governments spending decisions. Unlike the large literature which focuses on revenue autonomy, in this paper I analyzed also the spending autonomy. I established revenue and spending autonomy indicators for Polish municipalities and I used them as an explanatory variables of local spending decisions. I focus on spending for schools, but desegregating them into expenditure for salaries and other spending. The first category in Poland, as in many other countries is quite strongly defined by central regulations. It represents low decentralized spending. The second category- non-wages spending represents the small part of school spending, but important for comfort and quality of education. Some studies present that those non-wage spending are important determinant of educational effects, especially in developing countries. (Hanushek 1995; Woessmann 2001) This category of spending is in Poland autonomous and there are no special regulations which define the quality and quantity of these spending in schools. So non-wage spending represents highly decentralized expenditure.

As in other studies I found that more decentralized spending are various among towns, while less decentralized are more homogenous. Usually in literature this effect is presented as exemplification of allocative efficiency- when decentralized spending are more close to citizens preferences. But such positive conclusion is spoiled by the another results of my study, when the autonomy indicators are analyzed.

My study present that towns better endowment in own revenues spend more for salaries, but it does not influence the non-wage spending. The opposite is effect of spending autonomy. This autonomy does not influence spending for teachers, but it is important and quite strong determinant of non-wage spending. Towns, which need to spend more on tasks defined by central regulations cut the spending for stationary, office supplies and cleaners, teaching aid etc. As was presented in literature wage and non-wage spending for schools seems to be substitution goods (Falch and Rattsø 1999), but as my analysis presents in case of limits in spending autonomy more decentralized tasks are crowd-out by regulated obligations (non-wage by wage spending). It is similar result, as presented in literature for specific grants, which sometimes crowd-out other than granted tasks. This is also similar to super-fly paper effect, when decrease of central specific grants caused important decrease of public spending, especially those which are less supported by local citizens or politicians. But in my study I focus on spending elasticity of local units, which is spoiled not only by grants but also by central regulations related to local spending. It represents the problem of equity between local units and adequacy of local revenues to decentralized expenditures. Only towns which have elastic budgets could really decide about directions and size of decentralized spending.

The analysis of spending autonomy presents, that for proper understanding of local budget policy we need to take into account the interdependence of different tasks and remember that central regulation of one task influence all local spending. Knowledge about how and to what extent fiscal autonomy impact the structure of expenditure is therefore crucial for designing public policies.

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