Determinants of local public education expenditures. Panel analysis for Polish primary and lower-secondary education

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Abstract

The aim of the paper is to analyze factors influencing Polish local governments spending behaviors on education. The special focus is given to degree of decentralization or more generally elasticity which differ various tasks related to education.

We based our analysis on two types of data and studies. We present results of qualitative study- local officials survey made in 30 municipalities, and quantitative study- local budget panel analysis for 2274 municipalities and the period 2006-2011.

We found that local governors do not actively influence salaries of the teachers. The revenues or more generally differences in financial statement of local units do not importantly explain the variation in this task. Municipalities change the level of salaries according to central government regulations and increase them every year. On the other hand they do not decide to change number of teachers, even in case of lowering number of pupils in schools and also deteriorating financial statement due to economic crisis. So in case of more centralized and less flexible task we can observe incremental budget behaviors.

The spending on school maintenance and school supplies are more influenced by revenues of local government and would be modified more dramatically, when they are is changed. The budget policy in case of more decentralized task seems to be more elastic and more differentiated among municipalities. On one hand this is the result of decentralization and could be visible as representation of real local needs. On the other it could impose problems of politicians influence on budget policy. In year of election these expenditures are higher than in another years. Base on qualitative study, we can observe also, that in time of crisis "fixed" spending on salaries pushed expenditures for maintenance and school supplies out, what can result important problem in vertical equity of education.

Introduction

The level of expenditure on education differ between Polish municipalities. It rises question about reasons of this variation. This issue is interesting from a public policy perspective since spending on education has a significant positive redistributive effect and because it increases the human capital of the economy and can lead to direct growth effects (Barro, 1991).

Analysis of the determinants of public expenditure on education is reflected in numerous empirical studies. Thus the high estimated rates of return to schooling is often cited as justification for increased public investment in better quality schools. In developed countries, the evidence from research on the education production function is that the effect of additional expenditure per student is sometimes positive but relatively small (Jenkins et al.,2006) or according to other views non-existent (Hanushek, 2010). There is more convincing evidence that additional expenditure on improved learning materials and school facilities does have a positive effect on student attainment (Pritchett, 1997). Research on this last point, the impact of spending on student performance, however, is not undertaken in this article.

The aim of presented paper is to analyze factors affecting the Polish local governments spending behaviors on education. The special focus is given to degree of decentralization or more generally elasticity which differ various tasks related to education. Teachers' salaries and employment policy is in Poland strongly influenced by central regulation- so is more centralized task. This kind of spending is also limited due to political or social reason. Other than employment operational spending are

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more flexible and less influenced by central regulation in Poland. In this paper we will focus on spending on maintenance and supplies needed for education.
The paper starts by briefly defining the determinants of public spending on education and demand for local public goods. In the next part local government in Poland is shown as a provider of education at primary and lower secondary level. There is presented basic information about local tasks related to education with special focus on differences in local flexibility in various tasks. The revenue and spending statistics for different type of local governments are also given. The last part of this paper, shows results of qualitative and quantitative studies. First the outcomes of quantitative research done in 30 municipalities[3] is presented. The research was conducted in the last quarter of 2011. The sample analyzed in this survey was limited, so it is not possible to make general assumption from these research. Nerveless one can look at them as auxiliary source of information, for the econometric analysis based on whole population of local governments. In the second study using statistical panel data from local budgets for the period 2006-2011, similarities and differences of local spending for education policy in various type of local units- rural, urban and mixed, are presented

1. Determinants of public spending on education

A substantial body of empirical work has investigated the determinants of spending on education. It should be noted that the causes of differences in the school costs can be justified by objective conditions independent from the authorities, municipalities and schools, but also could be result of a defined by local governments policy. Below, we will discuss these groups of factors.

1.1. Number of students and structure of population

Studies examining the impact of the fraction of the population of school-age children suggest strong effect on per-child spending. Costs of education will increase with the increase of school population, which is associated both with the need to employ additional teachers as well as an increased number of premises or aids. Increase or decrease in the number of students will, therefore, caused the change in expenditure on education. However expenditure per student not adjusted proportionately to changes in the population of students. Decrease in the number of students means higher expenditure per student in relation to larger cohorts and vice versa, increase the number of students is associated with decreased spending per pupil. This was confirmed by Poterba (1997) in panel study for the U.S in 1960-1990. Author estimated elasticity of cost per student at -1 taking into account the change in student population size. Therefore total education expenditures are growing with number of students, but not in proportion to the increase in the cohort. This could be explained by a process of adjustments of demand for education to the supply in the short term, which is related to the limited possibilities of reducing the area of school, employment, and costs, which have no rational justification. The another factor, which seems to influence size and type of changes in total educational spending due to increase or decrease in number of students is modification of structure of population. The negative effect of student cohort size on spending per pupil is consistent with a number of European studies of spending on public schools. Case, Hines, and Rosen (1993) found significant negative effects of the school-age proportion of the population on per-child school spending. Borge and Rattsø (1995) discovered slow adjustment to demographic shocks in the composition of spending on primary and lower secondary education in Norway, along with a negative correlation between group size and per person spending. A central issue in interpreting these results arise from differences in the ‘‘demand’’ for educational spending, mediated through the political process. Harris (2001) referring to the median voter model presented that the main cause of decline in spending per pupil were the conflict between old and young. As a result of competition for a larger

[3]Pilot study titled „Financing and management of education by local governments”, carried out by Education Economic Unitat Educational Research Institute in Warsaw, as part of "Quality and effectiveness of education - strengthening ofinstitutional research capabilities" project financed by the European Social Fund within the Priority III framework of theOperational Programme Human Capital.

share of voters in the budget, there is a conflict between age groups in the area of spending on education.

An aging population will increase the political pressure to tilt the composition of social spending in favor of the elderly, which potentially sacrifice on education. According to the Harris exists trade-off between political influence and spending on goods for different age groups. In addition, Borge and Ratsø (1995) showed that the conflict affects only the funds for a younger cohort. Older people reduce spending on child care and education, but young people do not pose a threat to the elderly. That was the case in panel data analyses of general education in Russia (Verbina and Chowdhury, 2004), and for primary and lower secondary education in Denmark (Heinesen, 2004, Borge and Rattsø, 2007) and Switzerland (Grob and Wolter, 2007). These results clearly suggest that it is a disadvantage to be in a large cohort. For example, using data for Swiss cantons during the period 1990-2002, Grob and Wolter (2007) found that when the share of school-aged population decreases by 10 percent, spending per student increases by 4 percent.

1.2. School Network

The variation in the population density constitutes a significant variation in the public demand on primary education. Consequently, it can be expected that the variation in the density is important determinant of total public spending on education. In less-populated communities, where there are large distances between people, the spending related to transport of pupils are higher. Municipal authorities can affect the level of this expenditure when deciding on the location of schools. Forming a network of school local government may consolidate both schools by reducing fixed expenses for the maintenance of schools and reducing employment in the schools. The possibility of rationalization of expenditure is one of the reasons why the authorities eliminate the smaller schools. With the increase in the number of students in the classroom or school, the average cost of school per pupil fall, which is describe as economies of scale. This occurs when fixed costs, which include administrative costs, will decompose to a large number of students. The another type of economies of scale is related with size of class. From the point of view of efficiency local authorities try to allocate resources to reduce spending per pupil. Lower costs may mean a more numerous class, fewer hours for classes or more hours per teacher. Number of class in a school is associated with the number of full-time job teachers, so the bigger class will be created, the smaller number of teachers the community have to employ. Several studies estimating school expenditure or cost functions have addressed the question of scale economies related to school district size in US or school size in Europe. The general finding in this literature is that there are economies of scale, at least up to some point, but the estimated cost-minimizing size of school districts (if any)varies a lot between studies. [4]The evidence on school cost functions is provided by Shah (1996), although the focus is on costs per pupil at class level rather than at school level. Shah obtains an estimated elasticity of 0.30 on the class size variable, indicating that a 10 per cent increase in class size is associated with a reduction in costs per pupil of 3 per cent. However, comparison of results between studies is difficult, not least because the way in which they control for socioeconomic conditions and school quality (or student outcomes) is very different. In general the presence of economies of scale resulting from the transaction costs depends on whether the organization of work and school management is flexible. If it is possible to freely determine teachers' working time, wages, and outsourcing services to external entities and expand business by renting halls, the economies of scale will be limited. The emergence of constraints in the system of schools is linked to the growing economies of scale (Jakubowski, Kozińska-Bałdyga 2005)

4 In Chakraborty et al. (2000) it is above 25,000 students, while in most studies reviewed by Andrews et al. (2002) it is below 6000 students. For England, Taylor and Bradley (2000) use school-level data on staff hours per student. They find that the cost-minimizing school size is around 1600, which is about the size of the largest schools in England. They also find a strong negative effect on spending per student of school capacity utilization. Falch et al. (2008) finds that teaching hours per student in Norway is sharply decreasing for school size up to about 200 students in a model only utilization variation across schools within the same local government. They conclude that the optimal school size is above 800 students, which is largest school size in the country.

The another important question is if and how number of school affect expenditure. Bigger school could mean that there are more schools in particular area and it could create competition among them. More recent contributions have argued that the level of competition between school affects expenditure on education. Hoxby (2000)carried out on a sample of over 6000observations, find that the greater choice in terms of Tiebout, the greater the competition, the lower public spending on education, which does not lead to a decline in the quality. On the other hand competition may also increase the schools cost to attract students which don't improve quality education. The larger number of schools is associated with the problem of maintaining smaller institutions where the expenditure per student are relatively high. The analysis of Bukowska and Siwinska (2011) indicated that competition in polish lower secondary school increases the public expenditures on education per pupil, yet in the same time it seems to increase their efficiency, measured by the relation of quality of education to the quantity and structure of spending on education.

1.4. School and students characteristic

Schools differ in several ways. For example the general education is cheaper than professional. The type of profession also influence costs- e.g. economic schools are less costly than mechanical. The another source of differences is type and "quality" of students. The costs of pupils with special educational needs and the bad family background are higher than average. These differences will determine costs for school and municipality. In many studies, therefore, take into account the characteristics of the student. Taylor and Bradley (2000) and Falch (2008) confirm that the intensity of work and money spent grows with pupils with special educational needs, as well as from marginalized groups or ethnic minorities. The effect of cost increases due to the need to employ an additional teacher or educator. Some pupils require additional resources in order to provide them with similar access to the curriculum to that enjoyed by the majority of pupils of their age. Environment for lower income individuals are most often associated with higher expenses related to assistance for students, extra academic assistance for meals not charging for certain services. The increase in costs may result from employment necessary pedagogical support as related to behavior problems.

2. Measuring the demand for local goods and services

The economic analysis of determinants of local governments resources allocation is complicated and not obvious task. The classical assumption is the median voter model. The idea of this model is, that we could analyze how the local government spend money in the same manner like in classical microeconomic models of individual spending decisions. The roots of this model are in Duncan Black analyses of majority rule of voting in collective decision process. He found that, in situation of "single-peaked" group preferences, the majority-rule outcome will always be that meets the preferences of median voter of this group. (Black; 1948) Since 1970s the median voter model became the standard in researches related with local government resources allocations, especially in US. The most cited papers where median model were used to analyze demand for local public goods are Borcherding, Deacon (1972) and Bergstorm, Goodman (1973). The basic determinants of median voter (local government) demand for local public goods in this model, are prices – taxes (share of local taxes levied on median voter), and his/her private income. The transfers, which are revenues of local government could be added to this private income, as a median voter's share of these grants. The other determinants are related with socio-economic characteristics of society, which help to understand preferences of median voter. Important are also information about population size- to estimate the impact of congestion. The output of local goods in these studies were estimated as a value of spending for particular public services, which helps to avoidproblems related to measurement of public production.

The critics of usefulness of median voter in analysis of local government allocation decision comes mostly frompolitical economy[5]. The idea, of median voter seems to suit better in direct democracy.

[5]But not only, the another problems pointed against median voter model, are related to identification of median voter (Bailey; 1999)

In reality of representative democracy, the politicians decide about public spending and to understand this spending we need to estimate politicians preferences. (Sorenson 1995). The other problem, which destroy efficacy of median voters fiscal illusion- taxes or more generally local government's revenues (also grants, and shared taxes) do not act like prices at private market. Additionally in practice local governments are responsible not for one task but they are multi-task- these impose fiscal illusion and potential rationality as basis for voters decisions. The fly-paper effect is exemplification of these problems. It was found that the public expenditures response for public grants is more significant than for increase of private incomes or local tax revenues. This effect is called „fly-paper effect", because "money stick where it hits" (Inman; 2008). The voters, due to lack of proper information – fiscal illusion, does not have the possibility to control the budget, and the decision about public spending is made by and for self-interested governors. That is why the analysis of local government fiscal decisions should be focused on governors and bureaucrats perspectives and try to understand their preferences(Oulasvirta L. 1997). The basic assumption is that bureaucrats aim is to maximize their income and finally public budget as well, also politicians who try to maximize reelection odds tend to oversize public budget (Niskanen;1975).

The superior exhibition of this characteristic of local councilors is political business cycle or electoral business cycle. Public authorities spend more on items visible for voters (and increase deficit and indebtedness) in pre-election period and generally spend less after election. (Nordhouse 1975; Rogoff 1987, analysis for local level, was presented e.g by Veiga 2007; Pettersson-Lidbom 2003). What is interesting, such behaviors are much more visible in new democratic (Brender, Drazen 2004).

The another theory, which explain the local governments spending decisions which also take into account political dimension is punctuated equilibrium theory of budget policy. This theory presented by Baumgartner andJones adopted idea of punctuated equilibrium in evolution into budget process. They noticed that, like in nature, in budget policy one could observe long periods of stability- when the changes in budgets (spending) are not important (like in incremental policy, proposed by Wildavsky; (Wildavsky; 1964)) but those periods are

interrupted by rare periods of dramatic changes. (Baumgartner, Jones; 1993). The interesting and tested by researchers question is what affect frequency and size of changes. It was noticed, that important are different kind of frictions, which make budgetary process (whole, or for particular tasks and sources of finance)complicated and difficult. For example where there are many diversified participants, and process- due to transaction costs is complex, the changes are difficult and rare. The example of this situation is bureaucratization which create changes difficult. (Robinson S. at al' 2007)

We could also looked at different kind of tasks and spending related to them. Those, were exist strong and well organized group of interest, like school and childcare have stable and in average stronger growth in expenditures compared to others (for example roads and libraries) (Mortensen; 2005; Borge, Rattso; 1995).

Looking at the sub-sovereign government as provider of public goods we need to analyzed, the other kind of frictions too- frictions which are related to degree of decentralization. Even when task is defined as local, very often different kinds of central regulations influence its production. Those limits in autonomy, could be related to political-, budget-, input-,output- autonomy and also to monitoring and evaluation systems. (Bach,Blöchliger, Wallau; 2009). If there are more and more strict limits- then the degree of decentralization is lower and frictions for local policy are harder. To take into account presented above political characteristic of local spending the variables which influence them are:

- socio-economic characteristic of locality (which explain the structure of budget, especially in situation where spending are- even partly- defined by central law),
- the local councilors socio- and party- characteristics,
- number of years to new election,
- local revenues – those which are defined by local politicians (local taxes),
- transfers,

- last year expenditures (as budget theory suggest), but its need to be collated with type of spending
- type of spending, we need to distinguish goods with different levels of frictions- social or legal- among others different degree of decentralization

Besides above, it need to be evaluated characteristic of analyzed good, and those variables which effect its production.

3. Sub-sovereign governments as pre-tertiary education provider in Poland

3.1. Sub-sovereign responsibilities in pre-tertiary education

Sub-sovereign government in Poland consists of three levels. At the lowest – local level, there are 2478municipalities (gmina). There are 307 urban municipalities (gminy miejskie), 582 mixed municipalities (gminymiejsko-wiejskie) and 1589 rural municipalities (gminy wiejskie). The intermediate tier is made up of 314counties (powiat). The largest 66 cities work as powiat and gmina in one. At the upper level there are 16 regions(województwo).

The tasks of sub-sovereign governments which are enumerates in local/regional government Law include the most significant local public services[6]. Those units, and especially municipalities and cities with powiat's rights are important part of Polish public sector. Sub-sovereign expenditures are about 32,5% (data for 2010) of consolidated government expenditures, and municipalities are responsible for about 48% of this spending, cities-30%, counties – 17% and regions- 5%.The largest and most costly local public service- which covers about 30% of sub-sovereign expenditures at municipal and county level[7]- is education or more preciously responsibility for financing and managing schools and non-school institutions associated to pre-tertiary education. Since 1999, there are the 3 main types of pre-tertiary schools in Poland- 6-year primary school; 3-yeargymnasium (lower-secondary level); 2-4 year post-gymnasium schools (upper secondary schools-general or specialized lyceum, technical schools). Compulsory education starts when children are 6 years old[8] from one year of formal education before entering 1st class of primary school, which is provided by primary schools or kindergartens. Obligatory education ends after 12 or 13 years of learning. 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 schools students and 27% of gymnasium students learn outside their school zones. Private schools are not very popular- in 2010 at primary level there were 2,8%children in private schools, 3,9% at private gymnasiums 5,3% in general lyceums and 3,8% in technical schools(IBE; 2011).

Those levels of educations are shared between all tiers of local government according to subsidiarity rule. Kindergardens, primary schools and gymnasiums are gminas tasks. The upper – secondary level of education and also primary schools and kindergartens for handicapped children are poviats' responsibility. We will focus in this study on primary education, and gymnasium, but without special schools. Schools at this level and type are comparable- teach general education, and the costs and spending are not influenced by type of school. The secondary schools (lyceum) and especially technical schools are more diverse and difficult for study. That's why we will analyze below only municipalities. Sub-sovereign governments' educational tasks are related to management of physical assets- school buildings, acceptation and funding 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.

[6]Gminas tasks, are defined by law very broadly- all local tasks, which are not given to other units, and there are alsoenumerated list of 20 obligatory tasks related with social (like education, culture, health care)and communal services (likewater supply, roads and transport), and also local development. Poviats, are the "middle" level, and they are responsible forservices at "above then gminas'" characteristic, the list of tasks given by law is closed- there are 22 services, among them themost important are related with education, transport and social care. The most important task of województwa is region aldevelopment and the most important expenditures are related with transport.

[7]Województwa, play less important role in pre-tertiary education, and spending related with education are about 6% of their budżet.

[8]Since school's year 2010/2011 this pre-school education is obligatory for 5 years old children

Also private schools receive from local budgets special grants calculated according to number of their students. The schools program need to fulfill national curriculum for particular level and type of school, but usually are much more comprehensive. Taking all together, Poland has one of the most decentralized education systems in Europe and much of the responsibility for the development of the system, lies in the hands of local governments. (Levitas 2012)Simultaneously, local governments are not the only actors which construct local education. As was mentioned, central government established curriculum. The accomplishment of it is analyzed by territorial representatives of the Ministry of Education (Kuratoria), subsequently Kuratoria control work of teachers. Kuratiora also have the right to vote for or against school closing or establishing[9]. It means in practice local governments stay out of the pedagogical process. The other institutional actor, which plays very important role in organization of education is Polish Teachers' Union. As strong lobby teachers influence significantly on regulations related to their job and salaries. The most important act, which define teachers obligations and eligibilities is The Teachers Cart (*Karta Nauczyciela*).It mean that teachers work not under the ordinary work law, but on specially dedicated for them act. The Teachers' Cart defined (among others) teachers' base's salary. Those base is the minimum salary which need to be paid for teachers with lowest professional degree[10], but for example the chartered teachers need to receive at least 184% of these base. The base salary, were (thanks to Teachers Union and government agreement) valorized several times in last 5years and it is today 10,5% higher in real terms then in 2007[11]. It mean that today the chartered teachers minimum salary is 41% higher than average in economy (but the trainee- 22% less).The other important legal obligation is related to teachers who work in rural areas. They receive special amendments to their salaries which is 10% of base salary.

Sub-sovereign governments could pay teachers more than minimum level, and in practice they pay, but their policy related to teachers' salaries is limited, mostly due to financial reasons, and also procedural. First problem are important the changes of teachers professional level. In years 2007-2011 the number of teachers with the highest professional level increased almost 50%. Today about 46% of all teachers in Poland have those highest professional degree, while in 2007 it was only 32%. As was mentioned, the minimum, guaranteed by law salary of this group is relatively high – about 141% of average salary in economy. Second, the educational grant takes into account teachers professional level, but not local policy[12]. Finally in 2008, in Teachers Cart were added new regulations (art. 30aand 30 b) which very strictly define how local governments need to calculate teachers' "average salary". Unfortunately to this calculations were added also additional then minimum salary elements- like pay enhancements or payments for additional working hours. In practice it means that those enhancements are part of obligatory salary, so stopped to play incentive role.

The mentioned above rules and also very important role of teachers and their union are reasons that teachers' salaries and related items[13] are the most important (more than 70%) but also most inflexible part of local governments spending for education and even more- whole local government spending (salaries in education poses about 63% in remunerations in cities and 68% in gminas). As budget theory suggests, in this category of spending we could suspect rather stable increase than dramatic changes. What is more, today spending represents

rather policy settlement which were made years ago[14] then today decisions. To find if and how different local governors demand today for educational services one should looks rather at other

[9]Till 2009 the Kurators' opinion about existence (or not) of public school was obliged for local units, today it is only auxiliary.

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

[11]The average salary in Poland in years 2007-2011 also increased in real terms, but less -9%.

[12]The most important information about this grant will be given in next chapter

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

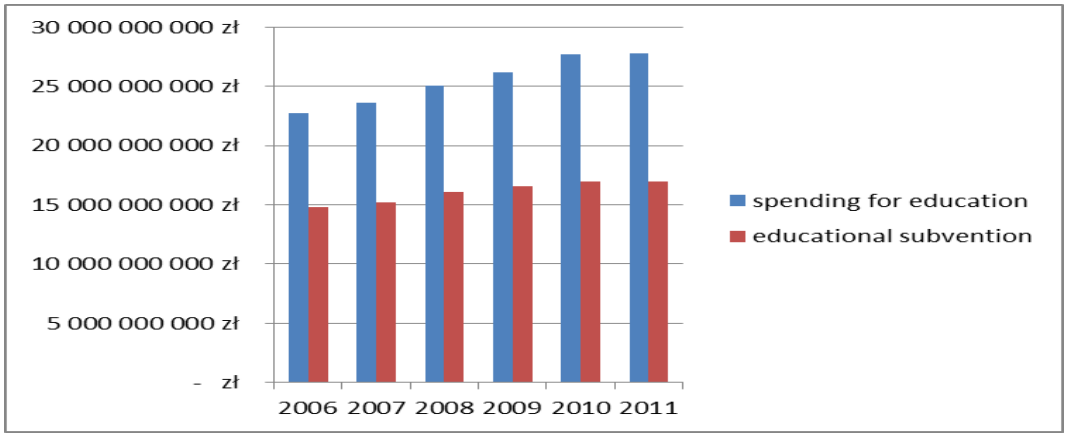
[14]In case of Polish education, mostly in the end of 90'ties, when local government received education as their obligations,and especially in 1999- when on one hand poviats, on other gymnasiums were established.

than salaries operational spending and investments. In these paper we will focus on operational spending related to school maintenance and supplies needed for education[15].
Those spending are less important than salaries in whole spending for schools. In primary schools in 2010 they posed about 11% of whole spending, in gymnasiums it was even less- 9%. But those kind of expenditures and also investment are real local spending. There are only limited regulations related with them. For local governments it is easier to change them then salaries, so we could suspect more dramatic changes in time, but also more important differences among different local governments.

3.2. Local finance and local education

The most important, but not the single source of financing local governments spending for education is general grant- educational subvention, transferred by central budget.

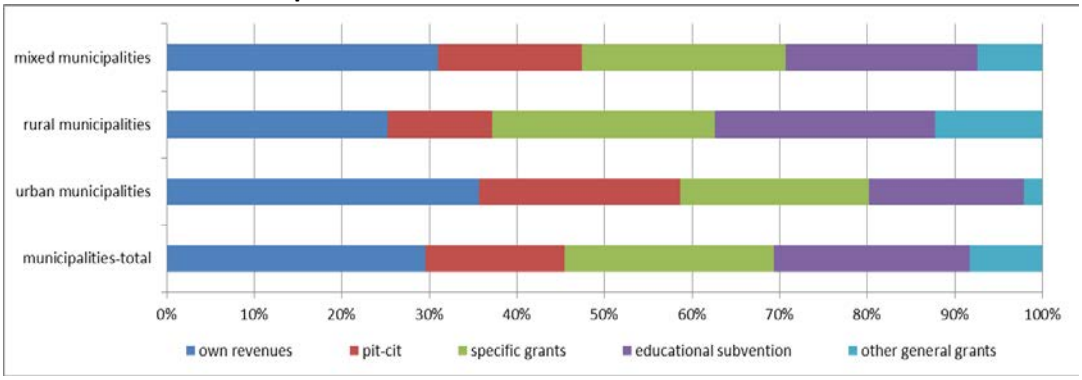
Figure 1 Municipalities expenditures for education and educational subvention in years 2006-2011



Source: Own calculation based on GUS and budgetary data

Those subvention 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 type of teachers. It grows every year, but unfortunately the spending grows even faster, especially in gminas. In 2011 subvention covered about 61% of spending related to schools' education in gminas. It mean local governments finance education also from their own revenues.

Figure 2 Structure of municipalities' revenues in 2011



Source: Own calculation based on GUS and budgetary data

The most important part of these revenues are in Poland local taxes, and especially property tax and shared central taxes - PIT and CIT, but the structure of local governments revenues is very diversified.

[15] In this category, are spending related with stationary, office supplies and cleaners, teaching aid, services, (all together are about 65% of total spending in this category) and also energy and water for schools (about 35%). Data for 2010, for primary schools and gymnasiums

The most in dependent, due to high share of local and shared taxes in revenues are urban municipalities. Rural gminas, are more dependent on central grants- general and specific (see chart below). Calculated per capita own revenues and shared taxes were in 2011 about 1650ZŁ on urban municipalities, 1350 ZŁ in mixed gminas and 1150 ZŁ in rural. We could say, that different local governments have differently decentralized revenues.
These revenues are influenced by economic situation of the country. Especially PIT and CIT, but also part of own local taxes change according to condition of the national economy. World financial crisis is well visible in local revenues. In 2009 revenues from PIT and CIT were 10% lower in municipalities than in 2008, and own revenues were lower 3%. All local revenues decreased this year by 1%. The situation were a little bit better in 2010, but mostly thanks to specific grants and rising of own revenues. PIT and CIT were still lower than year
earlier. (see table below)

Table 1 Real, year to year (2006-2011O) changes in municipal revenues (in %)

	2007/2006	2008/2007	2009/2008	2010/2009	2011/2010
own revenues	9.42%	11.69%	-2.74%	8.00%	-0.45%
PIT&CIT	22.99%	9.88%	-10.20%	-1.25%	8.42%
specific grants	3.06%	2.92%	-4.14%	13.32%	-5.97%
educational grant	2.75%	5.34%	3.38%	2.10%	0.15%
other general grants	4.70%	11.56%	15.52%	-3.28%	-6.07%
all	8.16%	8.11%	-1.35%	4.85%	-0.54%

source: Own calculation based on GUS and budgetary data

Mentioned above differences and also changes in financial statement of local units could cause variation in local spending policy for education. Especially that according to Polish law, education, as own local government task should be financed locally and central government do not guarantee the grants to fulfill all these spending.

Table 2 Diversification of Municipalities spending for primary schools and gymnasiums- maintenance and salaries per pupil (in ZŁ, 2011)

type of municipality		mean	max	min	sd	number of observations
urban	salaries- per student	6427,87	13532,53	4009,55	995,13	225
	maitenance-per student	771,53	2154,39	286,02	279,03	225
rural	salaries- per student	7929,33	21458,87	5103,13	1216,09	1492
	maitenance-per student	928,14	3350,43	93,23	318,44	1492
mixed	salaries- per student	7253,08	10495,75	3217,17	946,73	557
	maitenance-per student	830,02	2197,66	346,19	253,79	557
Total	salaries- per student	7615,13	21458,87	3217,17	1234,25	2274
	maitenance-per student	888,61	3350,43	93,23	305,23	2274

Source: Own calculation based on budgetary data, without schools for handicap children and youth

There are also not defined minimum level of all local spending related to education. As was mentioned, there are very strict rules related to salaries or generally work conditions of teachers, but there are no given standards for example about number of pupils per teacher or size of class. Those lack of clarity in financial obligation of central and local governments is important reason for differences in local policy related to education (see table below).As visible, the expenditures related to salaries[16] are fairly less diversified than school maintenance and supplies spending. This observation confirm our expectations about role of current local decisions in those two kind of expenditures. Expenditures for maintenance- even less important in structure of educations

[16]Unfortunately due to lack of data in this category are teachers' and also civil servants' salaries. But teachers remuneration is usually more than 95% of this spending.

spending, are more flexible then salaries and better represents problem of local governments' demand for education.

On one hand these differences in local spending for education are exemplification of decentralization of education, on the other mentioned above lack of flexibility in the most important part of spending for education related to teachers' salaries, raises questions about real dimension of this decentralization and is related to horizontal but also vertical equity. Those question is especially important in time of public finance crisis. The other problem, which also need to be mentioned here is demographic changes. In lasts years there are less children at schools. As was presented in the first part of this paper its mean education calculated per pupil is more costly. What's more in situation of inflexible teacher salaries and hiring policy (due to law but also political and social reasons), even when number of teachers decreasing – it is less dramatically then decrease in number of pupils. Finally the ratio pupil per teacher and also pupil per school decreasing every year (see table below).

Table 3 Number of pupils, teachers in schools provided by sub-sovereign government in years 2007-2011

	2007	2008	2009	2010	2011
number of schools	20043	19890	19613	19481	19424
number of teachers	276304	276304	263374	259735	255839
number of pupils	3913336	3721832	3560375	3436824	3328189
pupils per teacher ratio	14.16	13.47	13.52	13.23	13.01
pupils per school ratio	195.25	187.12	181.53	176.42	171.34

Source: Own calculation based on GUS data

4. The empirical studies

To analyze the determinants of local governments spending for salaries in schools and maintenance we used two types of data and studies. First it will be presented the results of qualitative research done in 62 local units (30 municipalities; 17 cities with poviat rights and 15 poviats), but below we will focus on30 units which are responsible for primary schools and gymnasiums, so we will ignore poviats. The research were conducted in the last quarter of 2011. The sample analyzed in this survey was very small, so it is not possible to make general assumption from these research. Nevertheless we can look at them as auxiliary source of information, for the econometric analysis based on whole population of local governments. The second study is the panel data analysis for years 2006 – 2011 and 2274 municipalities.

4.1. The qualitative study

The study consist of individual in-depth interviews (IDI) with decision-makers and representatives of senior staff of departments responsible for education and budget in 5 municipalities. There were also conducted 59 computer aided personal interviews (CAPI) in 25 gminas.[17] The respondents were divided into 3 categories: decision-makers (heads of territorial government units and their deputies, senior staff members responsible for the education department and senior staff members responsible for the budget and finances of territorial government units –treasurers).In all of analyzed local units, spending for education increased in last 4 years, in average this spending increase 20% in real terms, but the maximum was 55%.

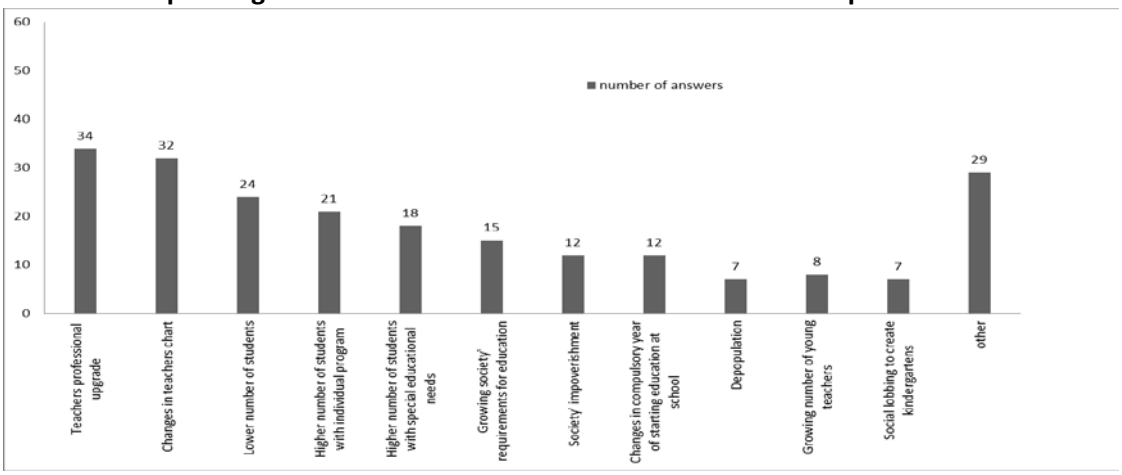
Below (Fig. 3) is visible list of the most important, factors, influencing spending on educations in 25 units. We asked about those factors, which are not dependent on local policy. First three issues mentioned by respondents are related to teachers' salaries. The next are associated to students- decreasing number and also lowering "quality" of them. What is interesting, among important factors mentioned by respondents two are related to preferences of society.

We asked as well about actions taken by local governments in last years which could affect spending on schools- so these factors which are dependent on local policy. We suspected in most units would occurred those operations which decrease spending- if (as was presented) there are important in

[17] IDI and CAPI were done in another localizations

dependent factors increasing it-rational seems to be looking for saving. Surprisingly most governors mentioned changes rising spending- like larger number of not-obligatory lessons for students (30% of units), more important support for talented students (21%) and for students from poor families (12%) and also additional payments for teachers (17%). The only operations, which could cause decreasing of costs, mentioned by analyzed units, were increase of "minimum class quantity", and it was taken only in 4% of analyzed units. The reason of this unexpected answers, could be on one hand related to respondents desire to present their unit in better light -the answer were not compared to real documents- so we do not know if mentioned by respondents activities were really conducted. On the other hand, if those operations were truly done, it could be exemplification of presented in the second part of this paper rather political then economical management of public spending.

Figure 3 Respondents opinion about the most important factors, not dependent on local policy, which influence spending on education and have occurred in their municipalities



Source: Own calculation, based on CAPI (respondents could pointed 3 main factors)

During individual interviews all respondents also mentioned problems of teachers remunerations as most important and inflexible factor influencing spending in education. Besides salaries, local governors noticed, that other guaranteed by law teachers privileges burdened budgets – like obligatory social and trainee fund or special healthful vacation. As one respondent from small gmina said: "*…nobody asked me how much I want to pay teachers, only minister gives table, and I have to pay*" [G1_D2]. The possible cost reduction in this category is related to teachers relieve. All respondents mentioned, that it is difficult operation. Generally in analyzed local units, strategy is to forfeit employment of new teachers but not to dismiss old. Their noticed that firing is costly operation. First from the social point of view. "… *We do not want to do it because it is not humanly possible. And it is dilemma"* [G2_D2]. There are also financial cost, due to obligatory compensation defined at Teacher Chart. The other factor which seems to impact flexibility in employment and remuneration policy is size of sub sovereign unit. Bigger units more often decided to closed schools or merge different entities- and due to this reorganize employment.

Respondents declared more flexibility in spending related to supplies needed for educations and also current repairs. On one hand it means, that in time of crisis this is the first category, were spending decrease. As governor from big city said: "*We look for saving mostly in material assets, we could buy less teaching accessories or do less current repairs, but the teaching process need to be done, so we need to hire teachers*". [MnPP7_D2].On the other hand in better financial situation, spending in this group probably would increase faster, then teachers' salaries.

Quantitative research validate our assumption of differences in local policy due to level of local flexibility- or degree of decentralization- in particular expenditures. Employment, and more generally spending related to teachers, which are the most influenced by central government regulations seems to be more stable, and less dependent on financial situation of local units. The maintenance and school supplies- are those categories of spending, were local governors are almost independent

– so these spending are more decentralized. According to respondents opinion, the expenditures related to this area are more influenced by financial statement of local government and would be modified more dramatically, when this statement is changed. Unfortunately in time of crisis "fixed" spending on salaries pushed expenditures for maintenance and school supplies out, what could cause important problem in vertical equity in education.

4.2. The quantitative study

Data used in this analysis come from local governments' budgetary information collected by Ministry of Finance and Polish Statistical Office (GUS). Those data include information about municipalities' revenues and expenditures and also socio-demographic data for years2006-2011.Altogether there were analysed for 2274 units for these 6 years. We have decided to use panel data analysis. The expenditures in our model are function of different variables- financial, social, political and related to characteristic of production:

$Ekit=fk(rev_{it}; soc_{it}; pol_{it}; sch_{it})$

where:

i =1…2274- municipality

t =2006; 2007; 2008; 2009; 2010; 2011 - year

Eki- spending for two different kind of education goods- salaries (1) and maintenance +supplies (2) (k=1,2)

rev_{it}- group of variables which define local government (i) financial statement and level of its revenue decentralization in year t

soc_{it}- group of variables which characterise local society in municipality i in year t

pol_{it}- group of variables which characterize local politics in municipality i in year t

sch_{it}- group of variables which characterize local education and its costs in locality i in year t

Table 4List of variables

name of variable	**meaning of variable**
eki- spending for two different kind of education goods- salaries and maintenance +supplies	
mainps	spending for maintenance+ supplies needed for education per student (in zł*)
salaryps	spending for maintenance+supplies needed for education per student (in zł)
poli- group of variables which characterize local politicians in municipality i	
womcouncil	share of women in municipality's council (%)
youngcouncil	share of very young (below24)councilors (%)
soci- group of variables which characterize local society in municipality i	
socialhelppc	local government spending for grants and other social help per capita (in zł)
schi- group of variables which characterize local education and its costs in locality i	
school - size	average size of school (number of pupils per school- average in municipality)
revi- group of variables which define local government (i) financial statement and level revenue decentralization	
edusubpc[18]	educational subvention per capita (zł)
ownrevpc	own local revenues per capita (zł)
pitcitpc	revenues from pit and cit per capita (zł)

* all values in zł are in real term- base year is 2011

We decided to define school system only via school-size. We found it is correlated to size of classes, number of pupils and well present school network in municipalities. Private schools, as we noticed earlier, are not very popular in Poland. Only in 23% of municipalities there are non-municipal schools, and in average only 1,6% of pupils attend to its.

The information about private income at municipal level are not present in Polish statistics. Local government PIT (personal income tax) revenues could be taken as broad approximation of private income. The problem is, that farmers do not pay PIT, and especially in rural and mixed municipalities

[18] In many Polish studies educational subvention is calculated per student. But in our opinion such calculation mean that we look at this subvention as at specific grant. As was mentioned according to law this is general grant, which could be spend on other than education task- so it need to be calculated as other local revenues- per capita

small amount of PIT is not equivalent of low level of private incomes. That is why we decided to use revenues from PIT and CIT as municipal income.
Social help spending, which represent spending of municipality for the poorest, seems to be the best approximation of local citizens financial statement, but we found it not significant in our model. Also variables which characterise governors were not significant. So finally in our model werevariables, which basic statistics are in table 5 below. It may be seen that there is considerable variation for most variables.

Table 5 Descriptive statistics: variation over municipalities (average for years 2006-2011)

type of municipality		salaryps	mainps	subvpc	pitcitpc	ownrevpc	school size
		in ZŁ*					Average number of students
urban	mean	5728,44	764,91	517,82	610,89	1062,10	360,64
	median	5648,86	711,62	485,63	578,42	893,22	352,67
	stand dev	1015,28	286,92	148,10	202,96	891,96	125,60
rural	mean	6935,43	873,39	753,61	300,92	725,83	127,54
	median	6778,70	820,45	750,67	243,34	568,72	118,50
	stand dev	1234,95	319,33	135,77	225,02	1120,35	45,80
mixed	mean	6382,01	796,99	653,81	396,89	841,21	189,27
	median	6288,12	756,74	638,70	347,05	718,23	178,75
	stand dev	1064,31	262,32	145,58	225,05	880,88	64,56
all	mean	6680,45	843,94	705,84	355,10	787,37	165,73
	median	6537,10	790,77	714,98	289,00	640,25	138,00
	stand dev	1238,57	305,97	158,46	241,92	1050,16	93,85

Source: Own calculation based on GUS data *zł- polish zloty - price fixed for 2011

We decided to use logarithm of variable (so we have log-log models). We have found important autocorrelation in time. As we have mentioned earlier such autocorrelation is obvious due to budgetary process. Autocorrelation can be corrected by implementing static model with serially correlated error terms (AR1) or lagged dependent viable (LDV). LDV, in case of short time series produced the "Nickell bias" (Zhu; 2012).
We used panel data model with fixed effect[19] In our sample we have almost all local units which operate in Poland, and quite short time perspective- we could assume that time-invariant characteristics of every local unit are perfectly collinear with the unit dummies.
We have found time effect important, so we add year's dummies (2011 was the base for other years; year 2006 were omitted)
Finally our model is:

$$LnEk_{it}=\alpha_i+\beta_1 lnsubv\_pc_{it}+\beta 2 lnownrev\_pc_{it}+\beta 3 pitcit\_pc_{it}+\beta 4 lnschool\_size_{it}+\beta 5 year\_2007+\beta 6 year\_2008 + \beta 7 year\_2009+ \beta 8 year\_2009+ \beta 9 year\_2010+\varepsilon_{it}$$

– α_i (i=1….n) is the unknown intercept for each municipality
- β1-β7 are the coefficients for our variables,

And

$$\varepsilon_{it=}\rho\ \varepsilon_{it-1+}\xi_{it}$$

whereξ_{it} is i.i.d. (Lillard, Willis 1978; Lillard, Weiss 1979).

[19]To decide about fixed effect, we used Hausman test

In the estimation in the first column of Table 6 the signs of the estimated parameters are as expected, and they are significant. In the case of salaries in all types of municipalities the education subsidy per capita turned out to be significant but its value only slightly increased the amount of salaries. 1% increase of grant decide about 0,06-0,09% increase of spending for salaries. Own revenues, PIT and CIT were significant only in case of all and rural municipalities. The effect was positive but very small, 8-9 times smaller than for subsidy- so close to zero.

Size of the school, as expected, has negative effects on expenditures for salaries in all cases. But the value of this effect is small.

The most important variable, which explain variance in spending for salaries are years. Compared to year 2011 in all previous years wages were lower. As mentioned above the base of teachers' remuneration is shaped by regulations and in analyzed period grew every year.

Thus summarizing, we can see that the income situation and the school size have an expected impact on teachers' salaries, but this effect is very week. It seems that law regulations more than local finance influence level of expenditures for salaries. Local own policy here is indeed very limited.

Table 6Estimation results for expenditure for salaries

	lnsalaryps-all	lnsalaryps-urban	lnsalaryps-rural	lnsalaryps-mixed
lnsubv_pc	0.08	0.06	0.09	0.07
	(6.47)***	(1.55)	(6.15)***	(2.54)**
lnpitcit_pc	0.01	0.00	0.01	-0.01
	(1.84)*	(0.03)	(1.74)*	(0.44)
lnownrev_pc	0.01	0.00	0.01	0.01
	(3.39)***	(0.31)	(2.82)***	(1.43)
lnschool_size	-0.08	-0.18	-0.08	-0.05
	(9.61)***	(4.96)***	(8.71)***	(3.04)***
year_2007	-0.14	-0.13	-0.14	-0.15
	(98.79)***	(23.20)***	(82.55)***	(48.02)***
year_2008	-0.15	-0.14	-0.16	-0.15
	(97.59)***	(23.29)***	(82.27)***	(46.18)***
year_2009	-0.11	-0.09	-0.11	-0.11
	(72.61)***	(20.63)***	(59.66)***	(35.92)***
year_2010	-0.04	-0.04	-0.05	-0.04
	(32.48)***	(8.69)***	(27.62)***	(15.38)***
Constant	8.66	9.39	8.63	8.68
	(141.59)***	(43.05)***	(118.01)***	(62.46)***
Rho-ar	0,39	0,34	0,38	0,36
N	11,370	1,125	7,460	2,785
Number of groups	2274	225	1492	557
Number of periods	5	5	5	5

Base for years- year 2011

* p<0.1; ** p<0.05; *** p<0.01

As visible in Table 7 in case of expenditures for maintenance revenues are more important factor of variance than in case of salaries. In particular educational transfer is significant. 1% increase of this grant impose local spending for maintenance by 0,6-0,8%. Own local revenues and revenues from PIT&CTIT are also important, but 7-8 times less. It could be the exemplification of fly paper effect- when public spending are more influenced by grant than own local revenues.

The effect of each year in case of spending for maintenance is significant. But we can see that the impact is different than in case of salaries. While in 2007 and 2008, expenses were lower compared to 2011, already in the years 2009 and 2010 were at similar level or even slightly higher. This is strange, especially when we take into account financial crisis, which occurred in local budgets in 2009 and in 2010. The only explanation seems to be that in 2010 there were election to local government in Poland. And local governors decide to use public money as pre-election gimmick. We can conclude, that local own policy in the case of school maintenance expenditure is visible.

Table 7 Estimation results for expenditure for maintenance

	lnmaitenanceps-all	lnmaitenanceps-urban	lnmaitenanceps-rural	lnmaitenanceps-mixed
lnsubv_pc	0.73	0.56	0.79	0.63
	(13.65)***	(3.41)***	(12.04)***	(5.75)***
lnpitcit_pc	0.11	0.16	0.09	0.13
	(4.52)***	(1.61)	(2.79)***	(2.36)**
lnownrev_pc	0.06	0.10	0.05	0.07
	(5.45)***	(2.70)***	(3.73)***	(2.98)***
lnschool_size	-0.18	-0.40	-0.21	-0.07
	(5.27)***	(2.66)***	(5.05)***	(0.96)
year_2007	-0.08	-0.01	-0.09	-0.08
	(11.90)***	(0.34)	(10.64)***	(6.31)***
year_2008	-0.03	0.02	-0.04	-0.03
	(4.84)***	(0.62)	(4.85)***	(2.08)**
year_2009	-0.00	0.06	-0.02	0.01
	(0.55)	(3.26)***	(2.59)***	(0.94)
year_2010	0.02	0.07	0.01	0.03
	(3.54)***	(4.28)***	(0.87)	(2.76)***
Constant	1.84	3.68	1.74	1.73
	(6.07)***	(3.77)***	(4.61)***	(2.86)***
Rho-ar	0,26	0,28	0,25	0,29
N	11,370	1,125	7,460	2,785
Number of groups	2274	225	1492	557
Number of periods	5	5	5	5

Base for years- year 2011

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

6. Conclusion

Education is the example of service which in many countries is in the local responsibility, but the autonomy of decision in these sphere is limited. This is also the case in Poland, as education is own local task and is financed locally. There is central grant calculated due to educational costs, but this is general grant- so can be spend as if it was the own (non-earmarked) local revenue. We could say the revenue autonomy (or revenue decentralization) of education is limited only by localities general budget restraints.

There are no central standards for local spending for education. So level of spending according to law is related to own local policy. On the other hand these expenditures are limited by different central regulations. In our paper we compared local policy related to tasks where those limitation are different. We could say there are different levels of spending decentralization related to these tasks.

Employment and basic level of teachers' salaries is example of rather centralized but still own local task of local governments in Poland. There are given by law minimum levels of teachers' salaries and special rules of their employment. Conversely local units are responsible for this employment and decide about teachers' salaries above this minimum level. School maintenance and supplies needed for education is the case of decentralized task, where there are no strict central regulations.

We need to remember that elasticity of spending of mentioned above tasks is influenced also by other than central regulation limits. Due to political or social reasons expenditures related to employment are always less elastic than to maintenance.

The aim of presented paper was to analyze factors affecting Polish local governments spending behaviors on education. The special focus was given to degree of decentralization or more generally elasticity which differ various tasks related to education.

We found local governors spending policy related to teachers and their salaries is very limited. The revenues or more generally differences in financial statement of local units do not importantly explain the variation in this task. Despite the fact that under the law teachers' employment and remuneration is the own municipal responsibility, local governors do not use this right. The level of teachers' salaries is adjusted to central government regulations. On the other hand municipalities do

not decide to change number of teachers, even in case of lowering number of pupils in schools and also deteriorating financial statement due to economic crisis. This seems to be exemplification of social or political limitations of this kind expenditure. Finally in case of more centralized and less elastic task we can observe incremental budget behaviors.

The spending on maintenance and current supplies are more influenced by financial condition of local government and would be modified more dramatically, when the financial situation is changed. The budget policy in case of more decentralized task seems to be more elastic and more differentiated among municipalities. On one hand this is the result of decentralization and could be visible as representation of real local needs. On the other this can lead to differentiation of this spending according to budget cycle. Base on qualitative study, we can observe also, that in time of crisis "fixed" spending on salaries pushed expenditures for maintenance and school supplies out. This could result important problem in vertical equity of education.

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