Fly-paper and super fly-paper effect. Education at primary and lower secondary level in Poland- case study.

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Fly-paper and super fly-paper or fiscal replacement effect for years has been seen as anomaly of models presenting local government spending. However in recent years they are recognized as obvious factor of this policy. From the point of view of central government it is worth to understand those effects and take them into account in transfers policy. It is important to understand their power and in case of changing grants- their sign of asymmetry.
There are many theoretical explanations of these phenomenon's. In our study we suggest that the most important is politics. In case of education expenditure and grants in Polish municipalities, we have found super-fly paper effect in urban local units and fiscal replacement in small - rural areas. In rural municipalities governors are closer to the society, and it is more difficult for them to change socially important tasks. So even less elastic budgets in these areas do not limit expenditure vital for the citizens. In opposite in urban areas, where politicians are more anonymous, it is easier for them to adopt expenditure to political needs, not taking much care of the local opinions.

Introduction

Local governments in Poland are responsible for important part of public tasks, education is one of them. In late 90ties Polish municipalities received education as their own responsibility. To finance this task, for every municipality educational grant is calculated. According to the law it is general grant- local units could spend it for education but also for another tasks.
In case of no define standards of educational spending this decentralization impose question about local government policy towards education. The aim of this paper is to find if and how changes in educational grant change Polish municipalities spending for education. We will study if this response is symmetric- the same in case of increase and decrease of grants, or asymmetric. Especially in time of demographic changes (lowering number of pupils) and public finance crisis this question seems to be important.
In first part of this paper the review of economic literature related to so-called fly-paper and super-flypaper effect is given. It is shown if, how and why changes in grants could change local spending policy. The second part of this study is about local government in Poland and its obligations related to education. The last part presents econometric panel data analysis of budgetary data for Polish municipalities for years 2006-2011.

1. Fly paper effect and super-flypaper effect - review of literature

Central government transfers, as a local government revenues are important, permanent (and even growing) part of local budgets. On one hand it seems to be in opposite to fiscal independency of local units, but on the other this is result of deeper decentralization of public tasks. Among others the problem is, that own local revenues are insufficient and not proper to finance those tasks from which benefits are not only local. Growing decentralization of public spending impose also problem of horizontal inequalities between local units.
There are different forms of transfers. From the point of view of local spending policy, the most important is to distinguish earmarked[1] and non-earmarked[2] grants. The former are given under the condition that it can only be used for a specific purpose. The later can be spent as if they were the own (non-earmarked) local revenues. According to the first generation of fiscal decentralization theory, the basic difference how these grants influence local governments spending policy is related to power of income and substitution effect affecting the median voter decision.
In case of general grants there is only income effect, because these grants do not change the relative price of local government's services. The grantor could expect, that grant increased not only aided service but also other public (or even private) consumption. If the basic reason of granting is to improve consumption of particular

[1] Or specific grants, categorical grants
[2] Or general grants, revenue shared

service – then specific grant is better. This kind of grant co-finances granted service with own local government revenues. It means that for the local government (median voter) this service is cheaper than without aid. In this case we have income and substitution effect, and grantor could expect more important increase of consumption of granted service than for the same amount of grant assigned as a lump-sum (Bailey S. 1999; p. 190). But still the consumption of other than granted services is influenced by the grant. This analysis based on median voter model, suggest that grants to local government have the same effect for public and private spending like increase of private-voter revenues (Oates E.; 1972; p. 113). However the empirical research do not support this conclusion.

In late 60ties Gramlish'a (Gramlish E. 1969) and Henderson'a (Henderson J. 1968) found that general grants influence local spending harder than private revenues. While 1 dollar increase of private revenues imposes local government spending by 0,02-0,08 dollar, 1 dollar increase of general grant imposes those spending by 0,3 dollar or even more then 1 dollar. This observation have started the a number of studies, which are summarized by statement that "public money sticks to public spending," hence the effect is called the fly-paper effect[3]. R. Inman counted that in last 40 years there were more than 3.500 papers analyzing this phenomenon. (Inman R. 2008) Most of these studies confirmed the observation that fly-paper exist.

The further researches looked also at changes in local spending in case of increase and decrease of grants (both general and specific). Some of these studies found, that there is asymmetry in local government response to different changes. Part of researches presented that decreasing of transfers caused decrease in local spending, but smaller than rise in analogues increase of grants (the first was study of Gramlich; 1987). It was called "fiscal replacement" form of asymmetry. But other studies found opposite asymmetry- fall in spending in response to decline in transfer is stronger than analogous increase in respond to rising grants. This effect was called super flypaper effect. (this term was used by Stine 1994). There were also researches were no asymmetry was demonstrated. (for example Gramkhar, Oates, 1996)

Simultaneously with further empirical studies, theoretical justification of flypaper and asymmetry effects of grants were looked for. These investigation could be grouped into first and second generation of fiscal theory. According to analyses prepared under the assumptions of first generation of fiscal theory and median model ideas fly paper is the result of adjustment costs. Tax changes are costly, and it is not rational to change them in response to changes in transfers. (Dahlby B; 2011) The time is needed for such adjustment. For example one year after the introduction of new transfers for school districts in USA fly paper effect was very strong and almost entirely grant was used to increase spending on schools. But within three years the effect disappeared because local taxes were reduced. (Gordon N.; 2004) However, in other studies, even after the long period fly paper effect has been shown (Dahlberg M., et al. 2008).

Above argument is strengthened, if consideration is given to the problems of median model assumption. In reality it need to be taken different – not median levels of voters incomes into account. It mean that complexity and costs of tax policy are even higher. (King D. 1984, str. 114) The level of inequalities varies across municipalities. On one hand its mean that tax but also spending policy is more complicated and costly. On the other hand it create suspicions about validity of econometric models using median voter assumptions which analyze fly paper effect and asymmetry reaction. (Aronsson T.; Wikstrom M; 1996)

Median voter were criticized from the point of view of public choice theory. (still in first generation of fiscal federalism theory). Due to fiscal illusion voters do not understand transfers as their private revenues. Transfers are stick to public sector, and do not impose their private budget. Its mean that in case of non-earmarked and earmarked grants substitution effect exist. And that is why fly paper is observed. (Courant P., Gramlish E., Rubinfield D; 1979; Turnbull G 1998) We could say that private and public budget, due to fiscal illusion are separated. And public revenues could be spend only for public goods, and do not compete with private spending (Hines J. Thaler R 1995)

Fly-paper and asymmetry reaction for grants are logical consequence of presented by public choice theory behaviors of bureaucracy and politicians. Local officials operate as monopolist- they decide about level of public spending. The only limitation of their activity is level of public revenues. So public revenues- transfers, need to be spend for public tasks. It is not in local officials interest to resign from such extra income and cut local taxes. They try to maximize public budget (Bailey, s; 1999, str. 240; Strumpf K. 1998) On the other hand when public transfers are reduced local officials try to cover this revenues by other revenues and finally we have got

[3] The author of this term is Arthur Okun

asymmetry reaction called fiscal replacement. Analogously public politicians try to maximize public spending to increase their chance of re-election. Transfers (both specific and general) are free money from their point of view. Such revenues are well to finance election gimmick, what explain fly-paper effect. (Grakham S; 2002; str. 123)

Budgetary and political process is related to voting scheme and also to bargaining power of interest groups. In case of strong interest group it is difficult to cut spending important for it. It mean that even when grants for this spending decrease spending are stable. (and we can observe fiscal replacement kind of asymmetry). On the other hand, when spending are not defended by strong interest group, they fall very quickly (and we can observe super fly-paper effect) (Borge L., Rattso J. 1995).

Taking all above problems of median voter model into account, today very often in econometric and formal analysis it is replace by local politicians demand model. Such model will be used also in this paper

Second generation of fiscal federalism theories provide further explanations for fly paper-effect and asymmetry reaction for grants. For example Inman suggests that "The flypaper effect is a consequence of an inability of citizens to write complete "political contracts" with their elected officials" (Inman R; 2008; p 7) Asymmetry of information between agent- local governors and principal (citizens) is well explanation for lack of link between public revenues- transfers and citizens fiscal decisions. That is why fly-paper effects and also super fly-paper effect could be grater in bigger local units.

The principal –agent problem also could be used to understand game for grants between local and central government. Local governors try to present that they need to receive grant. That is why grants are not exogenous for the local spending policy but endogenous. (Dahlberg M. et al. 2008) It could mean that local governors do not change their tax policy in response to grants, because they want to be beneficent of grants in next periods. It means also that in case of changing central rules of grants, the spending policy will change. For example when central government decide to stopped supporting particular spending- local governors which used these transfers in previous period, just cancel this spending and start to look for another granted tasks. (and there is super – flypaper effect) The power of this effect depend also on local revenues elasticity. For example in case of not efficient local taxes and important share of transfers in local budget we could expect stronger super-flypaper effect (Mello L. 2002) Also hard budget rules impose super- flypaper effect. On the other hand in case of efficient local revenues and soft budget rules we could expect "fiscal replacement" form of asymmetry. (Levaggi, R., Zanola R. 2003)

As indicated there are many explanations of the phenomenon of fly-paper and asymmetry effects of grants. These effects are not anomaly but ordinary practice of local spending. From the point of view of central government it is worth to understand it and take into account in transfers policy. Important is to understand the power of this effect and in case of changing grants- the sign of asymmetry.

Below it will be present the Polish local governments' tasks related to education and educational grants- which are vital part of Polish local governments budgets. The significance of education create important question about local spending strategies related to it. Especially, as will be presented, in time of important demographic changes which impose modifications in local and central policy related to education and its finance.

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

a. Sub-sovereign responsibilities in pre-tertiary education

Sub-sovereign government in Poland consists of three levels. At the lowest – local level, there are 2478 municipalities (gmina). There are 307 urban municipalities (gminy miejskie), 582 mixed municipalities (gminy miejsko-wiejskie) and 1589 rural municipalities (gminy wiejskie). The intermediate tier is made up of 314 counties (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[4]. Those units, and especially municipalities and cities with powiat's rights

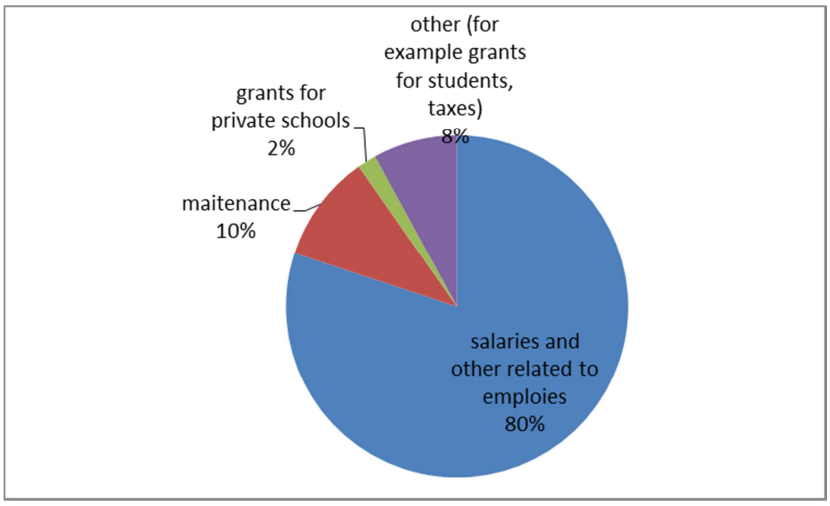
[4] Gminas tasks, are defined by law very broadly- all local tasks, which are not given to other units, and there are also enumerated list of 20 obligatory tasks related with social (like education, culture, health care)and communal services (like water supply, roads and transport), and also local development.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

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[5]- is education or more preciously responsibility for financing and managing schools and non-school institutions associated with pre-tertiary education. Since 1999, there are the 3 main types of pre-tertiary schools in Poland- 6-years primary school; 3-years gymnasium (lower-secondary level); 2-4 years post-gymnasium schools (upper secondary schools-general or specialized lyceum, technical schools). Compulsory education starts when children are 6 years old[6] 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.

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) 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. Also private schools receive from local budgets special grants calculated according to number of their students. The structure of local operational expenditures for primary and lower secondary education is visible below.

Figure 1 Structure of municipalities current expenditure for primary and lower-secondary education in 2011



Source: Own calculation based on budgetary data

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

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

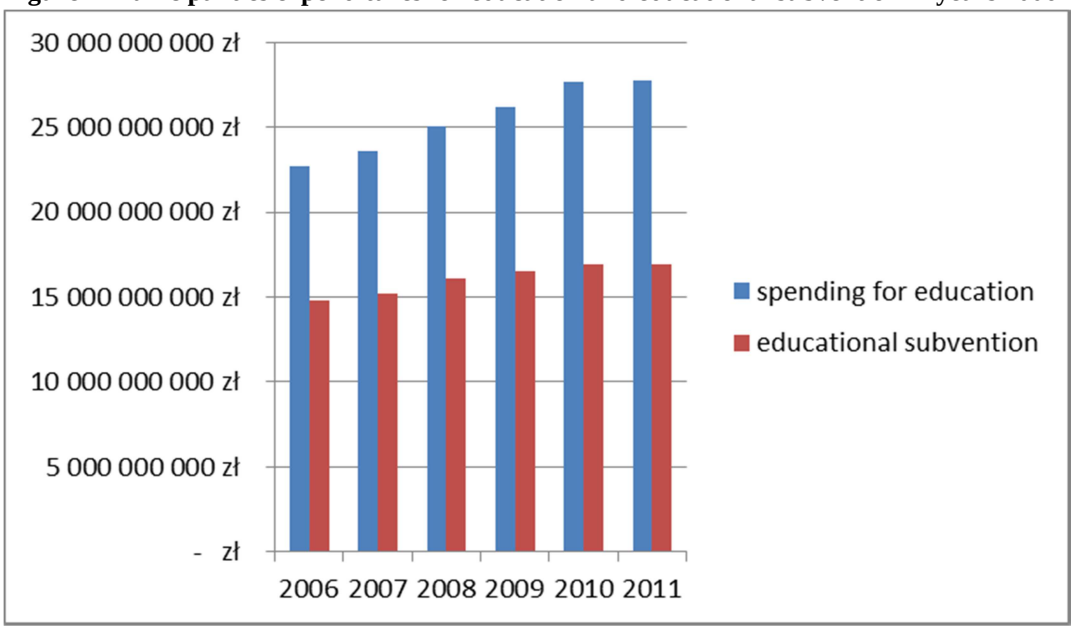
Simultaneously, local governments are not the only actors which construct local education. The schools program need to fulfill national curriculum for particular level and type of school, (but usually are much more comprehensive). The accomplishment of it is analyzed by territorial representatives of 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[7]. It means in practice, that 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. The base salary, were (thanks to Teachers Union and central government agreement) valorized several times in last 5 years and it is today 10,5% higher in real terms then in 2007[8]. 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. In practice local units pay teachers more, than obligatory minimum. So even not elastic, the most important part of educational spending is related to local own spending policy.

Expenditure for maintenance and supplies needed for education[9] are less important than salaries. In primary schools in 2011 they posed about 11% of whole spending, in gymnasiums it was even less- 9%. There are only limited regulations related to them.

b. 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 2 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

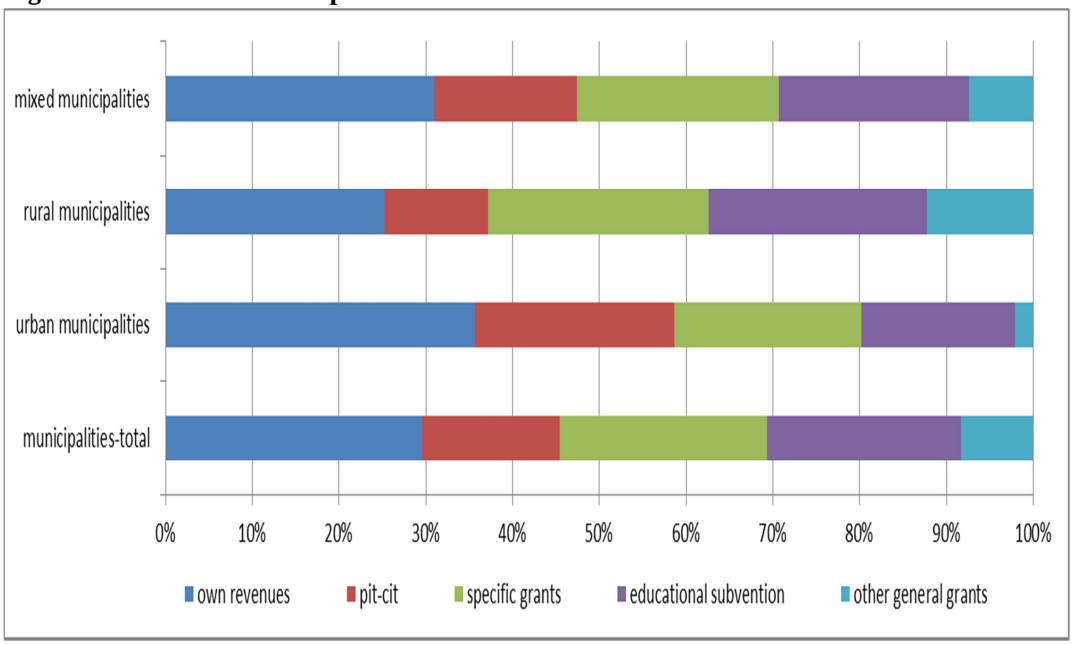
[7] Till 2009 the Kurators' opinion about existence (or not) of public school was obliged for local units, today it is only auxiliary.

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

[9] In this category, are spending related with stationary, office supply 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 2011, for primary schools and gymnasiums

subvention covered about 61% of spending related to schools' education in gminas. It mean local governments finance education also from their own revenues.
The most important part of these revenues are in Poland local taxes, and especially property tax and shared central taxes - PIT (personal income tax) and CIT (commercial income tax), but the structure of local governments revenues is very diversified. The most independent, due to high share of local and shared taxes in revenues are urban muicipalities. Rural gminas, are more dependent on central grants- general and specific (see chart below). Polish farmers do not pay PIT and that is why revenues from this shared tax are less important in rural gminas, than in urban or mixed municipalities. Calculated per capita own revenues and shared taxes were in 2011 about 1650PLN on urban municipalities, 1350 PLN in mixed gminas and 1150 PLN in rural.

Figure 3 Structure of municipalities' revenues in 2011



Source: Own calculation based on GUS and budgetary data
Mentioned above differences 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. There are also not defined minimum level of all local spending related to education. That is why spending for education are very diversified (see table below).

Table 1 Differences in operational spending per pupil (in zł) in municipalities in 2011

Type of municipality	mean	min	max	cv	N
Urban municipalities	7134.207	4864.87	15767.9	0.16	225
Rural municipalities	8893.362	5272.87	24527.5	0.15	1492
Mixed-municipalieties	8085.879	5044.82	12334.61	0.13	557
ALL	8521.516	4864.87	24527.5	0.16	2274

Source: Own calculation based on GUS and budgetary data (only municipalities analyzed in empirical part)
On one hand these differences in local spending for education are exemplification of decentralization of education and also differences in costs (when rural municipalities pay more for every student than urban). On the other it, raises questions about vertical equity. Those question is especially important in time of public finance crisis, which (as in other countries) is visible in local government budgets from 2009.
The other problem, which also need to be mentioned here is demographic changes. In lasts years there are less children at schools- the ratio pupil per teacher and also pupil per school decreasing every year Its mean that education calculated per pupil is more costly.

Table 2 Number of pupils, teachers in schools provided by sub-sovereign government in years 2006-2011

	PRIMARY SCHOOL (provided by sub-sovereign government)				
	school year				
	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011
number of schools	13648	13452	13144	12995	12923
number of teachers	172863,78	172863,78	165365,56	162 405,69	159 745,33
number of pupils	2429495	2316996	2230438	2167651	2121108
pupils per teacher ratio	14,05	13,40	13,49	13,35	13,28
pupils per school ratio	178,01	172,24	169,69	166,81	164,13
	GYMNASIUM (provided by sub-sovereign government)				
	school year				
	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011
number of schools	6395	6438	6469	6486	6501
number of teachers	103440,36	103440,36	98008,16	97 329,15	96 093,18
number of pupils	1483841	1404836	1329937	1269173	1207081
pupils per teacher ratio	14,34	13,58	13,57	13,04	12,56
pupils per school ratio	232,03	218,21	205,59	195,68	185,68

Source: Own calculation based on GUS data

Simultaneously educational grant change. In most cases it is higher every year, but as visible in table below there are municipalities which receive less. Especially it was problem in 2011 when about 25% of local units received less educational grant than in 2010.

Table 3 Number of municipalities where educational grant calculated per number of students decrease comparing to previous year.

Type of municipality	2007	2008	2009	2010	2011
Urban municipalities	13	6	11	17	58
Rural municipalities	83	39	89	157	392
Mixed-municipalieties	16	8	20	40	123
ALL	112	53	120	214	573

Source: Own calculation based on GUS and budgetary data (only municipalities analyzed in empirical part)

Taking all together it is important to find if and how local units respond to educational grant and changes in it.

3. The empirical study

To analyze asymmetry reaction for changing in grants we have decide to use functional form proposed by Gramkhar (Gramkhar; 2002; p. 57).

The local government expenditures related to analyzed task are dependent on grant given for this expenditure, and another factors influencing local spending (like other revenues, costs characteristic, characteristic of politicians in locality, citizens characteristic). We could write:

$Eit=f(Git, Ait)$

Where Eit- expenditures in locality i in year t

Git- grant in locality i in year t

Ait- another factors influencing local spending of municipality i in year t

We assume that there is linear relationship, between local expenditures and the independent variables. To find if and how important is asymmetry in case of changing grant we could write

$Eit=a1+a2Git+a3Dit\Delta Git$; *(equation 1)*

Where, $\Delta Git=Git-Git-1$- represents difference in the size of grant in year t compare to year t-1

And Dit is dummy variable, where Dit= 1 if $Git<Gi(t-1)$ and 0 otherwise

If there are no asymmetry in reaction to changing in grants then $a3=0$; otherwise $a3\neq0$.

a2- represents the change in Eit in case of increasing Git

a2+a3- represents the change in Eit in case of decrease of Git

If $a3<0$, the result of decrease in Git is less important than in case of increase and we have got fiscal replacement.

In case of a3>0, the answer to decrease in Git is stronger than in increase- so we have got super –flypaper effect. 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 years 2006-2011. Altogether we have got data for 2274 units for these 6 years. We have decided to use panel data analysis.
i =1…2274 - municipality
t =2006; 2007; 2008; 2009; 2010; 2011 - year
Expenditures- Eit in our model are current expenditure for education in primary and lower secondary schools calculated per students in municipality. (oper_all_psall)
Git- subv_psallit- is educational grant, also calculated per pupils in municipality
- DitΔGit - subpsall_diff_supsallneg- is difference in educational grant per pupil in year t compare to (t-1); if this difference is negative (grant is smaller than in previous year)
As Ait we have decided to use[10]:

Table 4 List of independent variables other than educational grant, used in our analysis[11]

name of variable	meaning of variable
group of variables which characterize local education and its costs in locality i	
school – size	average size of school; it is correlated to size of classes, number of pupils and well present school network in municipalities
group of variables which define local government (i) financial statement but also financial condition of citizens (visible in level of PIT)	
ownrevpc	own local revenues per capita
pitcitpc	revenues from pit and cit per capita

In our analysis we distinguished three types of municipalities- urban (with no rural areas), rural (with no cities) and mixed- municipalities with usually one city and few villages around. This is important because, as mentioned earlier in rural areas (in rural municipalities and rural parts of mixed municipalities) teachers receive an extra amendment to salary, also educational grant is higher. The other factor which is important in this differentiation is size of municipality. As visible below, cities are the biggest unit and rural municipalities are the smallest. It mean the management of urban municipalities is usually more "anonymous" than in rural areas.

Table 5 Average size of municipalities (in 2011)

Type of municipality	Average number of citizens	Sd of number of citizens
urban	26206.59	19205.12
rural	7008.38	3791.78
mixed	14856.76	9631.41

We used panel data analysis, where we have found important autocorrelation in time. 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); but LDV in case of short time series produced the "Nickell bias" (Zhu; 2012). So we used AR1 model.
We used panel data model with fixed effect[12] 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)
Finally our model is:
$Oper\_all\_psallit=\alpha i+\beta 1subv\_psallit+\beta 2subpsall\_diff\_supsallneg+\beta 3pitcit\_pcit+\beta 4ownrev\_pc+$
$\beta 5school\_sizeit+\beta 5year\_2007+\beta 6year\_2008+ \beta 7year\_2009+ \beta 8year\_2009+ \beta 9year\_2010+\varepsilon it$
– αi (i=1….n) is the unknown intercept for each municipality

[10] The other variables were taken into account, like structure of municipal council, deficit, social-spending but all were not significant in our model
[11] The basic statistic for these variables are in appendix 1
[12] To decide about fixed effect, we used Hausman test

- β1-β7 are the coefficients for our variables, The most interesting is significance and sign of coefficient β2- which represents a3 in equation 1 and also β1- which represents a2

And

εit=ρ εit-1+ξit

where ξit is i.i.d. (Lillard, Willis 1978; Lillard, Weiss 1979).

Table 6 Estimation results

	Oper_all_psall- urba	Oper_all_psall rural	Oper_all_psall-mixed
subv_psall	0.59	0.58	0.62
	(16.47)**	(40.11)**	(28.51)**
subpsall_diff_supsallneg	0.35	-0.14	0.31
	(3.91)**	(3.97)**	(7.47)**
pitcit_pc	0.36	0.80	-0.04
	(1.67)	(7.50)**	(0.27)
ownrev_pc	0.07	0.06	0.00
	(4.12)**	(3.32)**	(0.34)
school_size	-1.87	-2.90	1.11
	(2.66)**	(5.04)**	(1.76)
year_6	0.00	0.00	0.00
year_7	-268.22	-462.10	-348.84
	(7.81)**	(27.30)**	(15.50)**
year_8	-398.16	-644.52	-489.81
	(10.17)**	(35.63)**	(19.80)**
year_9	-256.28	-500.11	-398.89
	(8.68)**	(31.15)**	(18.71)**
year_10	-57.91	-190.62	-146.11
	(2.49)*	(15.15)**	(8.54)**
constant	4,035.80	4,283.64	3,476.94
	(22.54)**	(53.19)**	(33.84)**
N	1,125	7,460	2,785
Number of groups	225	1492	557
Number of periods	5	5	5
Rho-ar	0.46	0.45	0.49

Base for years- year 2011

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

The results of our analysis are visible in table no 6. Significant and the most important variable, explaining variation of expenditure for education is educational grant. It is quite obvious, taking into account this grant is calculated according to costs related to education. The other local government revenues are less important. PIT and CIT seems to explain differences in spending for education only in rural areas. On one hand it seems to be strange- as it was noticed PIT is not paid by farmers. On the other hand such local revenues occur mostly in rural municipalities which are near big cities (in suburban areas). Such municipalities are more wealthy than other "real" rural areas. Also citizens are richer. That is why in this rural- sub-group of Polish municipalities, revenues from PIT could really distinct different units and its demand for local spending. Own local revenues – significant in urban and rural municipalities- are not very important as explanation of differences in spending for education. Taking all together we could say, that educational grant- which is general grant according to law, is closer to specific grant in practice or we can say we have got important fly-paper effect in case of education and educational grant.

The size of school is significant in urban and rural areas- smaller schools are more costly per pupil. In mixed areas- where schools are differentiated inside one municipality (different in town and villages) this correlation is not visible.

In all kind of municipalities the coefficient representing asymmetry reaction to changes in educational grants is significant. But the sign of this asymmetry is different in different kind of municipalities. In urban and mixed gminas we can observe super-fly paper effect (sign of coefficient is positive). It means that when educational grant decreases, spending for education decreases faster than in analogous increase of grant. It presents that for cities and mixed municipalities, education is not own task, but rather "contracted" by central government. They need to fulfill this task, but rather as central obligation.

In rural areas, the sign of asymmetry coefficient is negative- it means in case of decreasing educational grant, spending for education decreases but less than in analogous increase- so we have got fiscal replacement. The explanation of this phenomenon is policy. Rural gminas, as mentioned are rather small. Politicians are "close" to citizens, and all social tasks are very important for them and not very "elastic". The potential savings in education are more difficult than in bigger units. It is worth to notice that also year dummy variable is significant in rural municipalities, and relatively more important than in urban and mixed areas. The obligatory changes in teachers' remunerations are more visible in their budget and also it were more strictly followed.
It must be reminded that, rural municipalities' budgets are generally more dependent on central government transfers- so less elastic. (see figure 3). According to Levaggi and Zonolla (Levaggi, R., Zanola R. 2003) it should create rather super-flypaper effect, than fiscal replacement. And in opposite- urban municipalities which are more wealthy could afford fiscal replacement, not super-flypaper. So we could conclude that in case of education in Polish municipalities politics behaviors more influence spending policy than budgetary limits.

Conclusion

The aim of this paper was to analyze local governments spending response to changes in grants. As it was presented in case of education in Polish municipalities, this response is significant but different in different kind of local units. In urban and mixed municipalities, where there are more citizens, we can observe super-flypaper effect. Education, which is according to the law own local task, seems to be in these bigger municipalities rather obligatory tasks defined by central government. Also educational grant – which is a general grant- is closer to specific grant calculated only for education. The another sign of asymmetry was found in rural areas. There were also asymmetry- but of fiscal replacement kind. It means that for rural (smaller) municipalities education is really own task, important for them. The good explanation for these differences in response to changes in grant is politics. In smaller municipalities, where politicians are closer to citizens, changes in socially important tasks are more difficult. In urban areas, where policy and politics are more anonymous, such changes are easier. It is stronger than local budget limits. Such limits are more heavy in rural areas- so from the point of budget elasticity they should "escape" form less granted tasks, but they don't.

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Appendix 1 Basic statistics of independent variables in model

type of municipality		Subv_psall (n zł)	pitcit_pc (in zł)	ownrev_pc (in zł)	Schoolsize (in number of pupils)
	mean	5114.83	593.57	1033.04	369.02
	min	3271.47	159.44	321.07	57.50
	max	10116.26	1980.17	20386.48	809.00
urban	sd	1074.90	200.62	844.67	129.81
	mean	7099.85	289.40	704.45	129.29
	min	3722.65	66.27	148.27	42.67
	max	16834.01	6230.10	42061.21	535.00
rural	sd	1134.00	217.20	1112.01	46.28
	mean	6361.39	384.35	813.20	192.45
	min	3406.27	112.79	193.72	68.50
	max	15890.85	3251.80	33506.01	552.50
mixed	sd	1338.60	220.47	828.74	66.13
	mean	6722.563	342.75	763.60	168.48
	min	3271.47	66.27	148.27	42.67
	max	16834.01	6230.10	42061.21	809.00
ALL	sd	1333.368	235.27	1029.62	96.28