Inequity in a decentralised education system – evidence from Poland

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Decentralisation of education is associated with risk of increased spatial inequality in terms of inputs and the quality of service, as with other public services. Most countries attempt to prevent inequality both through establishment of national standards for educational services and the redistribution of financial resources to neutralise the effect of uneven local tax bases. This study investigates the effectiveness of these measures in Poland. Using panel data at a municipal level, it was shown that, despite the various compensatory instruments employed by central government, the local tax base significantly influences local spending on lower secondary schools. Average teaching time and additional services offered to students were compared between the most affluent and the poorest Polish *gminas* (municipalities). The findings indicated that teaching time did not vary significantly according to prosperity. Also, there was no significant difference in the mean teacher hourly wage. However, more affluent and poorer municipalities differed with respect to individual support and additional services offered to students.

Keywords: decentralisation of education, local government, inequality, teaching time, teacher wage.

Decentralisation of the financing of education – major issues

Proponents of educational decentralisation and decentralisation of public services in general point to the many advantages of such policy, above all the fact that decentralisation allows improvement of the quality of services and ensures greater satisfaction of the diverse demand for public goods (Oates, 1972; Thiebout, 1956). The basic mechanisms in this context include, firstly, better information on local needs for better allocation of resources, secondly, ensuring that citizens have more democratic control over education and thirdly, increased competition. There are warnings, however, about growth of inequalities favouring externally centralised education, and the advantages of central management, which is more cost-effective and based on better allocation of human resources (Herbst, 2012).

The most serious critical arguments against fiscal federalism concern the impact of decentralisation on inequalities. It is suggested that a policy of decentralisation has significant impact on the territorial differentiation of expenditure, which in turn translates into differentiation of educational services. The optimum social investment in human capital depends on how educational expenditure is distributed to students. This study, it is hoped, may contribute to the economic debate concerning impact

of decentralisation of educational finance on territorial inequalities. It may also guide decision makers towards a better balance between the contradicting demands of local needs (requiring some degree of decentralisation) and ensuring universal educational standards, including the need for equality (which, in turn, theoretically, should be facilitated by centralisation).

Since the 1980s, educational systems in many countries have been decentralised and deregulated in the areas of management, finance and organisation. Input indicators such as expenditure and indicators on the side of outcome are commonly used in empirical studies dedicated to the effects of such policies, e.g. external examination results. The aim of this paper is to examine the impact of the local tax base[1] on educational expenditure in lower secondary education in Poland using empirical data. The focus is therefore on the former type of indicator. The effects of unequal outlays on teaching outcomes would merit separate analysis. The normative assumption is that equal access to education is desirable to ensure greater social cohesion and equity. It is believed that public policy should reduce inequalities in student access to education, and that opportunity should not be restricted by place of residence.

Polish *gminas* spend an average of 37% of their budgets on education, yet there are significant disparities in this respect. In some places educational expenditure is as much as 60% of total budgetary expenditure, while this amounts to just 20% in others. Education, an area of local government activity subject to far-reaching standardisation, generates high and inflexible cost, 70% of which is covered by the government subsidy (Herbst, Herczyński and Levitas, 2009). As often

happens in decentralised systems, tensions emerge between various levels of authorities concerning the division of financial obligation (Roelke, Green and Zielewski, 2004). Representatives of Polish local authorities assert that the subsidy is decidedly too low and regulations applied to educational services – especially those concerning teachers' salaries – remain too rigid, making it excessively difficult for the local government (especially in poorer areas) to fulfil their tasks; these issues are a topic of lively public debate in Poland. The Supreme Chamber of Control also turned its attention to the growing problems reported in 2008. In the municipalities where education subsidy amounts to 20% of the budget (relatively low), it covered only 80% of expenditure, while covering more than 100% of actual expenditure in the less affluent, where subsidy contributes to between 30% and 40% of the budget revenue. This led the authors of the report to express concern about the extent to which some standards for education are met in the Polish decentralised system (NIK, 2008).

Significant questions are raised by the above observations: does a gmina's own revenue translate significantly into outlay on education in reality? If so, how strong is the dependence? Is it stable over time? What are the trends? If local expenditure on education depends on the financial situation of the gmina, is this so because poorer gminas spend too little, or because more wealthy ones finance non-standard services? And finally, what aspects of education are under-financed in less well-off and "superlatively" financed in the more wealthy areas? Are inequalities manifest in the number of classes offered to students, teachers' salaries, equipment provided, or are they expressed in some other way?

Course and effects of decentralisation in selected countries

The experience of countries that decentralised education management generally shows

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[1]   The term local tax base (*lokalna baza podatkowa*), borrowed from English, is used interchangeably with local government revenue, from local taxes, the local government share in personal and corporate income taxes (revenue to the state budget), local fees and income from the management of municipal assets.

that decentralisation favours local authorities with greater financial resources and higher human capital, while it is disadvantageous for those with lower resources, owing to which it may have negative side effects both on the outlays and for educational outcomes in poorer areas. Schools in wealthier communities are more likely to draw benefit from the process of decentralisation. Yet, it must be stressed that the effects of decentralisation in various systems are not always easily comparable, firstly because of the range of decentralisation models applied, and secondly because the systems themselves significantly differ and so respond differently to the introduction of otherwise similar solutions (c.f. Herbst, Herczyński and Levitas, 2009).

Anglo-Saxon countries traditionally have some of the most centralised education systems and there is an obvious tendency to counteract the effects of differentiation of the local government tax base on educational outlays (Brimley and Garfield, 2002). In the 1980s and 1990s, there was a powerful, international rise in decentralisation (although the United States is an important case of the opposite trend). During that period, various countries, from the immense India to the small Burkina Faso, from democratic Australia, Norway and Spain to authoritarian Argentina, decentralised their education systems. The policies of decentralisation took various forms. In Cambodia in the form of networks of cooperating institutions, while an education voucher scheme entered operation in Chile and Sweden. The trend towards decentralisation did not bypass Poland: it influenced the reforms of the late 1990s and the creation of one of the most decentralised systems of school finance in Europe. Analyses of decentralisation in various education systems do not yield clear conclusions in terms of impact on equality of services. However, most researchers agree that decentralisation increases inequality between areas in terms of outlays and outcomes. Two countries are a particular focus for attention, as their

decentralisation was far reaching: Sweden and Chile.

Sweden is a special case, where a sudden and rapid transition from a uniform and centralised education system to a strongly decentralised system developed with reference to values like free choice and competition. Thus, it is a model for proponents of decentralisation worldwide, while critics readily point to the negative effects of the Swedish reforms. The data concerning Sweden are a subject of a wide-ranging debate and are also often used instrumentally and selectively to support ideological positions. However, methodologically advanced analysis over various periods yielded unclear results (Björklund, Clark, Edin, Fredriksson and Krueger, 2006). Based on panel data from the years 1989–2002, Ahlin and Mork claimed that income of local government did not play an increased role as a result of decentralisation, because – taking expenditure per student and the number of students per teacher as indicators – the impact of the tax base after decentralisation turned out to be even smaller than before. Therefore, it was concluded that decentralisation in Sweden did not deepen educational inequality (Ahlin and Mork, 2007).

In the case of Chile, it confirmed the hypothesis of growth of inequality. Winkler and Rounds (1996) compared levels of expenditure and cost-efficiency of poor and rich areas before and after reform. Inequalities in expenditure increased after decentralisation, but as regards efficiency, results did not lead to clear conclusions. Research concluded that local governments were responsible for part of the resources dedicated to public education, but differences between authorities in terms of fiscal capability generated inequalities in school expenditure per student. Then, in terms of the high value of the central education subsidy (almost 90% of expenditure on education), all students could count on a relatively good guaranteed level of service.

The World Bank study of the education reform in Russia showed that regions with higher per capita income spent more on education, whilst after 1992, the poorest regions found it difficult to provide the basic conditions for good learning outcomes. Several attempts to create an efficient equalising mechanism were undertaken – in the regions and in the lowest level bodies (territories), which, however, did not lead to an improvement, since too many regions needed redistribution of significantly limited resources (Canning, Moock and Heleniak, 1999).

Tsang (1996) showed that the financial situation in poor and rural areas deteriorated after decentralisation in China. Remuneration of teachers was suspended or their pay was delayed. Educational expenditure per student was more strongly correlated with the regional product per capita. Reforms favoured privileged schools at the expense of regular schools, they favoured school in urban areas at the expense of schools in rural areas and schools from economically developed regions at the expense of schools from underdeveloped regions (in the former, expenses were twice as high as in the latter). The hypothesis quoted above also found confirmation in the case of Albania, where decentralisation was not accompanied by additional central funding which could equalise opportunities. As a result, there were significant differences in expenses per student – the highest expenditure was almost three times higher than the lowest (Fiszbein, 2001).

Opposite conclusions were drawn from data from Mexico and Argentina, where regional differences in learning outcomes for kindergartens and primary schools decreased in the period of decentralisation. It included the percentage of pupils who repeated a year, terminated education early or completed primary school (Prawda, 1993). Some governments, being aware of the possible negative effects of decentralisation, undertook preventive actions, e.g. the offer of education vouchers for poor citizens introduced in Colombia.

In the United States, there is an opposite trend with respect to the other countries discussed: the education system, strongly decentralised in the past, is now undergoing gradual regulation. This is justified by the need to reduce inequalities in local education expenditure. Decisions of U.S. courts from the 1970s undermined the constitutionality of financing education from local land and real property taxes, as it contradicted the law that guaranteed all children a specific level of access to education. Thus, state authorities needed to reform finance of education. Its main goal was to equalise expenditure in richer and poorer regions. The results of those policies were subject to numerous analyses, the results of which mostly supported the thesis that decentralisation of educational finance in the United States had a significant impact on reduction of differences in spending between rich and poor regions (Silva and Sonstiele, 1995; Manwaring and Sheffrin, 1997; Murray, Evans and Schwab, 1998; Hoxby 2001; Card and Payne, 2002). Card and Payne additionally established that equalisation of the level of expenditure led to equalisation of test results between groups selected on the basis of family background (Card and Payne, 2002).

The issues of financing education in the decentralised Polish system were described by Herbst, Herczyński and Levitas (2009). Authors analysed the revenue of local and regional government, paying special attention to education subsidy and showed the differentiated urban, rural, and urban–rural situation of gminas, in addition to those with a higher and lower financial potential. They also dealt with the structure of gmina expenditure on education and its dynamics. Conclusions from the studies concerning inequalities were the following: firstly, differentiation of the financial effort of gminas could not be explained with reference to one

factor, such as an authority's own revenue. Secondly, expenditure per student in primary schools differed strongly according to type of gmina, which was higher by 28.9% in rural gminas than in urban gminas, whereas expenditure of lower secondary schools per pupil was much less diversified by gmina type. Thirdly, different sizes of schools were one of the major reasons for differentiation of per student costs, and the effect was particularly marked at primary schools in relation to features of the local settlement network. Fourthly, the group of gminas, for which subsidy was inadequate for education and related pastoral care, was extremely diverse, and included both wealthier and poorer gminas in both rural and urban areas. The issue of the relationship between the tax base and the level of expenditure per student in Poland was examined by Jakubowski and Topińska (2006). They showed that although the wealth of a gmina was positively correlated with expenditure per kindergarten pupil, the effect did not relate to expenditure on primary school pupils. In addition, the relationship between education expenditure and gmina revenue did not change between 1998 and 2003. The conclusion of a study by Levačić (2007) was that expenditure per primary school pupil in cities was strongly related to the revenue of the city per inhabitant and only weakly to the subsidy obtained per pupil, whereas the situation was the reverse in rural gminas – their own revenue was less significant, and expenditure per pupil was strongly correlated with the subsidy per pupil. Levačić reached different conclusions than Jakubowski and Topińska, identifying the spatial inequalities in outlays on education mainly in cities. The analysis of variability of student expenditure proposed by Herbst, Herczyński and Levitas (2009) revealed, in the case of cities, a weak but noticeable relationship between growth of revenue per inhabitant with increased expenditure per student (a 10% increase in revenue corresponded to an increase in expenditure

of 1.5%). In the case of rural gminas the correlation was much weaker (a 10% increase in income corresponded to an increased expenditure of 0.8%).

The studies reported – despite some discrepancies – confirmation that decentralisation of the system of financing of education increased inequality, both in outlays and outcomes. Otherwise, centralisation of the education system was an efficient policy tool that allowed the differences between poorer and richer regions to be reduced. This conclusion, however, was made on the basis of information from wide ranging reforms in starkly contrasting countries. Ultimately, the problem of decentralisation and inequality remains insufficiently examined, especially accounting for the fact that policy that works in one country does not necessarily work in another.

Institutional solutions introduced with the education decentralisation process vary according to country. Motivation for decentralisation is also varied. A more thorough analysis of specific national models for decentralisation may allow identification of solutions that are the most efficient from the perspective of improving quality of education and at the same time, avoid excessive differentiation in terms of local government expenditure.

Financing education in Poland

Education subsidy

Primary and secondary schools are financed in Poland in two stages. At the first stage, central government divides funds between local and regional authorities: 2479 gminas (municipalities), 380 poviats and the 16 voivodeships which are the managing authorities for schools. In turn, these authorities are responsible for direct financing of schools.

Dividing the education subsidy, the Ministry of Education is obliged to account for size and specificity of a school system in a given area. These calculations do not

cover kindergartens, which are financed from a gmina's own revenue[2].

The education subsidy is a significant transfer of finance; it accounts for around 20% of the average gmina revenue (21.4% in 2011). However, it is not sufficient to cover all the costs of providing primary and secondary education. Data collected at national level show that the subsidy covers remuneration for teachers and administrative personnel; costs which account for around 70% of what local governments spend on education (Herbst, Herczyński and Levitas, 2009). The remaining expenditure on primary and secondary schools, in addition to pre-school education comes from other revenue.

The education subsidy is transferred to each local government from the central budget as part of the general subsidy. As it is general revenue (non-allocated) and local governments have full freedom in how to spend, theoretically, they could finance activities completely unrelated to education using the funds from the education subsidy. The subsidy is divided according to a complex algorithm established by the ministry, introduced in 1996. During the first ten years of operation, it underwent significant change. Since 2005, it has had the following form:

$$S_i = D_i(A \sum_{j=1}^{k} w_j N_{ij}) \qquad (1)$$

where:

S_i – means the subsidy received by gmina[3] i;
A – financial standard (estimated cost of education) per student;
w_j – weights assigned to specific student categories;
N_{ij} – the number of students in category j in gmina i;

D_i – refers to the component reflecting the average qualifications (structure according to professional advancement stages) of teachers in the gmina and against the average structure nationally.

Initially, the formula incorporated 21 weights referring to various student categories. It was based exclusively on the principle the "money follows the student" and did not take into account the costs of school maintenance or teacher salaries. After some years, the number of parameters almost doubled (reaching 41), which – due to the construction of the algorithm – significantly reduced the significance of each. More importantly, however, the algorithm has evolved. The approach "money follows the student" has been superseded with a mixed approach, which incorporated not only the number of students (of various categories), but also formal qualifications of teachers employed.

Most of the weights incorporated in the algorithm (1) are intended to reflect the unit differences in the cost of teaching various types of students, e.g. students with disabilities, students from ethnic minorities, students at specific types of vocational school. The most important parameter, accounting for almost 90% of variance between gminas at the per student level, is the weight on the basis of which additional funds are awarded to rural schools and schools in small towns with populations under 5000. This solution is justified since unit costs are higher in gminas with smaller school units. However, the actual differences in costs do not fully correspond to the values of weights in the algorithm. In 2011, the ratio between the average school size in cities and villages was 1.44 for primary and 1.09 for lower secondary schools. Meanwhile, the weight of the algorithm in rural areas and small towns was 1.38 both for primary and for lower secondary schools. A list of the most important weights in the subsidy algorithm is presented in Table 1.

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[2] From 2013, gminas have also received designated subsidy for kindergartens from the ministry.

[3] The formula takes similar general form for gminas, poviats and voivodeships, but since lower secondary schools (being the subject of this study) are run by gminas, we will mostly refer to this tier of local government.

Table 1
Selected weights of the education subsidy algorithm, 2011

Student category	Weight ("standard" student = 1)
Primary and lower secondary school students for children and teenagers residing in rural areas.	1.38
Primary and lower secondary school students for children and teenagers residing in towns with a population of up to 5 000.	1.38
Students with impairments or disabilities.	1.8–10.5 (depending on the type of impairment/disability)
Students of units and schools for national and ethnic minorities.	1.2
Students from upper secondary schools providing vocational training.	1.19
Students of lower secondary school for children and teenagers.	1.04
Students of bilingual units.	1.17
Students in sports units.	1.2–2

Finance sourced from outside the education subsidy

As mentioned above, the education subsidy covers around 70% of total expenditure at the primary, lower and upper secondary levels. The main source of the remaining 30% is from local governments' own revenue and other financial input from the central budget. Own revenue is raised by local taxes and charges (land and property tax playing a major role), sales and rental of property owned by local governments, and from the local government share in personal and corporate income tax. As a result of the public finance reform of 2004, the share of tax income at the disposal of local government (gmina) increased from 27.6% to 39.3% in the case of the personal income tax and 5% to 6.71% from corporate taxation. Income tax collected centrally is the main contribution to local government revenue. In 2011, income taxes accounted on average for 39.2% of local governments' own revenues, and 20% their total revenues. However, due to the territorial differentiation of the tax base, revenues from income tax were much higher in cities than rural areas. Income taxes in cities account for a much higher proportion of local budgets than in rural areas (26% and 12% respectively).

Gminas' own revenues, calculated per inhabitant, vary significantly. In 2010, income amounted to an average of PLN 1559, with a standard deviation of PLN 1168. The value of the 10th centile (the value separating 10% of gminas with the highest revenue) was PLN 541, while the 90th centile was PLN 1862). The scale of differentiation of that revenue, an important source of educational finance, was a motivating factor for the analyses and this article.

As regards transfers from the central budget (other than the education subsidy), the most important is the so-called compensatory subsidy. This can be obtained by all local governments when their own revenue per capita is lower than 92% of the national average. The greater the difference between the tax base of a gmina and the national average, the more funding it receives. The compensatory subsidy accounts for 4.5% of total revenue of local governments on average. In the case of cities, it plays a negligible role

(0.6%), while of great importance in rural gminas (11.6%).

Research methods and data

In this article, the interdependence between gminas' own revenues and outlays on lower secondary education is analysed (expenditure, teacher salaries, teaching hours). The analysis is confined to outlays at lower secondary level[4] owing to the substantive scope of the study, the length of which would be excessive if reported at each separate learning stage. In this study, various techniques were used to estimate the influence of the local tax base on education expenditure. Firstly, a weighted least squares regression analysis was performed using for 2478 gminas over the period 2002–2010, estimating parameters for separately for each year (weight based on pupil numbers in each gmina). This allowed determination of the importance of the local tax base for outlays on education, and also captured the dynamics of that relationship. Estimate equations take the following form:

$$y_{it} = \beta_{xt} x_{it} + \beta_{zt} z_i + \lambda_t \eta_i + \varepsilon_{it} \qquad (2)$$

where:

y_{it} – means the total expenditure of gmina i in year t on lower secondary education (chapter 80110 of budget classification) calculated per school unit;

x_{it} – vector of independent variables, variable over time (e.g. gminas' own revenue per capita);

β_{xt} – vector of coefficients for independent variables, variable over time;

Z_i – vector of observed gmina characteristics, time invariant;

β_{zt} – vector of coefficients determining the impact of characteristics invariable over time on dependent variable;

η_i – unobserved characteristics of gminas, invariable over time, that affect dependent variable;

λ_t – coefficients for unobserved gmina characteristics;

ε_{it} – estimation error.

The list of dependent variables used is presented in Table 2. The explained variable is local gmina expenditure on lower secondary schools (calculated per class). Many researchers use a measure of expenditure per student. However, for these purposes, the expenditure calculated per class was more appropriate. In every education system, 70–80% of all costs are the salaries of teachers and administrative employees. Since the ratio of teachers to the number of classes is similar in different schools and in different gminas, expenditure per student largely depends on the size of classes; the smaller the class, the higher the expenditure. Smaller classes do not necessarily mean higher teaching quality. Although some studies confirm that class size has a significant impact on student achievements, size is also related to population density. Small, relatively isolated local communities in Poland generally have smaller schools with smaller classes than large cities[5], yet mainly not for the reason that local governments strive for higher teaching quality, but because the population is more dispersed. Students from these areas have limited access to cultural goods and their school equipment is inferior to urban schools. Lower class size is related to many negative factors, some of which cannot be controlled in a regression model. Therefore expenditure calculated per unit is better justified than the educational outlays indicator. High expenditure per class may be explained by three causes:

- more teaching hours per unit (the need to hire more teachers);
- school building and equipment above the national average;
- high teacher salaries.

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[4] Specifically, lower secondary schools excluding special facilities.

[5] In 2011, the average size of class in primary school in rural areas was just 15, while it exceeded 20 in Warsaw.

Table 2
List of independent variables in regression models

Name of variable	Description	M	SD
Own revenue	Gmina's own revenue per capita (PLN)	1 159.26	1 171.05
Education subsidy	Education subsidy obtained by gminas (calculated only for lower secondary school pupils) calculated per pupil (PLN)	6 642.13	1 010.79
Compensatory subsidy	Compensatory subsidy received by the gmina per capita	350.26	231.06
Class size	The average class size (number of pupils) in lower secondary schools managed by the gmina	21.65	2.73
School size	The average size of lower secondary school (number of pupils) managed by the gmina	190.63	94.71
Population density	The population density in the gmina (people per square kilometre)	221.95	470.65
Urban gmina[a]	Variable 0–1	0.12	0.32
Rural gmina[a]	Variable 0–1	0.24	0.42

[a] The reference category is the mixed urban–rural gmina.

Each of the above can be treated as an indicator of local school quality. Therefore, expenditure per unit serves as a good endogenous variable for our model. Although an analysis of regression with the method of least squares for subsequent years will enable capture of the dynamics of the relationship between the local tax base and expenditure on schools, it is beyond doubt that it cannot provide the full picture, owing to the lack of variables that characterise schools, local governments and communities. Unobserved gmina characteristics may cause overestimation or underestimation of the impact of the local tax base, depending on whether the features are positively or negatively correlated with expenditure per unit. Therefore, in the second step of analysis, panel regression for data from the years 2002–2010 is carried out in which the gmina effect remains constant. The equation takes the following form:

$$y_{it} = \beta_{xt} x_{it} + \eta_i + \varphi_t z_t + \varepsilon_{it} \qquad (3)$$

where the observed and unobserved time invariant characteristics of the gmina are included in variable η_i, which can be defined as the "gmina effect"[6]. Equation (3) also contains 9 nominal variables (z_t) which define the year. The coefficients for those variables will help to determine the impact of factors specific for a given year (e.g. regulations) on educational expenditure of all gminas.

In the subsequent steps of the analysis, the number of teaching hours calculated per class, extracurricular services and assistance to students, as well as average teacher pay in the poorest and richest gminas (the gmina's own revenue per capita is the indicator here) are compared. This allows determination of the aspects of teaching for which inequalities in outlays between rich and poor gminas are of the greatest importance, providing that there is indeed a budget revenue impact on the quality of teaching.

The research data originated from three sources. Data on budget expenditure, own revenue and contextual data characterising gminas in the years 2002–2010 were from

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[6] The specificity of the model with random effects was rejected according to the Hausman test.

the GUS Local Databank (public statistics). The data source for education subsidy was the Ministry of Education. The subsidy data were calculated in such a way that the subsidy for managing lower secondary schools was calculated for each gmina, ignoring subsidies for other educational tasks. Data on the number and use of class hours and teachers' pay were drawn from the Educational Information System (*System Informacji Oświatowej*, SIO) from September 2011.

Results

Impact of subsidy on local government education expenditure
In the first step, the least squares regression analysis was carried out for the period 2002–2010. Here the focus was on selected model coefficients without presentation of the full results of the nine estimates. Of particularly interest was flexibility of local expenditure calculated per class to various categories of gmina revenue: own revenue, revenue from the education subsidy and

the compensatory subsidy. For regression the variables presented in Table 2 for each year were introduced. The corrected R^2 fluctuated between 0.1 in 2002 to 0.22 in 2008.

The influence of various revenue categories on education expenditure (regression coefficient) is presented in Figure 1. In the context of the inequality resulting from the tax base, the most important conclusion is: the coefficient of own revenue for each year was positive and statistically significant at a level of $\alpha = 0.01$. The influence of own revenue on education expenditure decreased, however, in the period 2002–2010. At the beginning of the study period, a 10% increase of the local tax base corresponded to a 2% increase in expenditure per lower secondary school unit. At the end of the decade this had increased by 1%, while the dependence remained statistically significant.

As expected, expenditure on lower secondary schools was strongly and positively dependent on the value of education subsidy obtained by gminas. The dependence weakened with time. In 2002, a change of 10% in
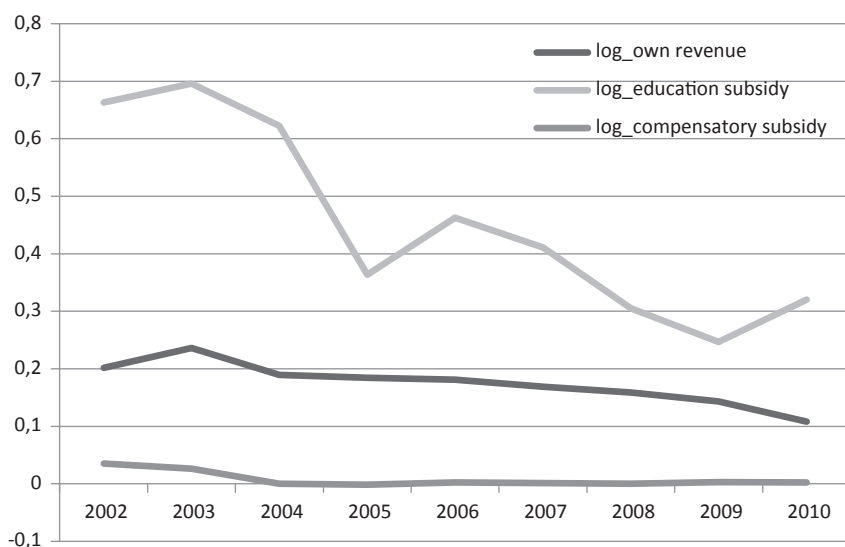

Figure 1. Flexibility (regression coefficient) of education expenditure calculated per school unit against different gmina revenue categories (2002–2010).

Table 3
Model with fixed effects of gminas[*]

Log expenditure per unit	Coefficient	Standard error	t	p > t
Unit size	0.018128	0.001058	17.13	0.000
School size	-0.00027	2.68E-05	-10.11	0.000
Population density	-5.3E-05	2.94E-05	-1.80	0.073
Log own revenue	0.106199	0.010926	9.72	0.000
Log education subsidy	0.312788	0.037609	8.32	0.000
Log compensatory subsidy	-0.00851	0.001814	-4.69	0.000
Constant	8.26133	0.089484	24.50	0.000

Number of objects 2 473

Number of observations 21 582

R^2: within = 0.6372

between = 0.0220 overall = 0.2987

$F(14; 19\ 095) = 2395.76$ Prob > F = 0.0000

corr(u_i, Xb) = -0.2295

[*] Coefficients for nominal variables determining the year, which were incorporated in the specification, are not shown.

the value of the subsidy entailed a change in the expenditure per lower secondary school unit at a level of 6.6%. A similar growth or increase at the end of the decade was related to a 3% change in expenditure; the dependence was, however, still statistically significant at a level of 0.01.

The compensatory subsidy, in turn, only had a statistically significant (although weak) influence on financing of schools in the years 2002–2003. Later, dependence became negligible.

The observed reduction in flexibility of expenditure per unit in relation to total own revenue in the first decade of the 21st century was accompanied by a reduction in the differentiation of expenditure per class unit between gminas – during the study period, the variation coefficient of that expenditure reduced from 0.48 to 0.34.

The least squares method entails the risk of error in estimation of the equation coefficients. It is possible that some unobserved features of the local school system (gminas) could affect the estimated contribution from variables included in the equation to explain the education expenditure calculated per unit. In order to solve that problem, panel regression was used, taking into account the constant gmina effect. The results are presented in Table 3. All explaining variables, besides population density, emerged as statistically significant (at the level of 0.01), the determinants of expenditure per unit in lower secondary schools. The average class size had a positive influence on expenditure calculated per class, suggesting a tradeoff: either the gmina decides to have smaller classes (i.e. more comfortable teaching conditions or easier student access to the teacher), or it decides to have bigger classes to save money, but spends more money per unit (e.g. by offering higher pay to teachers, financing extracurricular activities or buying better equipment). An increase of class size by one pupil entails an increase in expenditure per unit of 1.8%.

Interestingly, if the unit size is controlled, average size school has a negative influence on expenditure per unit. Bigger schools allow

local governments to save money (probably due to lower administrative costs). A difference of 100 students translates into a 2% change in expenditure per school unit.

The education subsidy has a positive impact on expenditure; the flexibility coefficient is 0.31.

Local tax base and expenditure for educational purposes

A gmina's own revenue – playing a key role in this analysis – also has a positive impact on expenditure per class, which shows that gmina wealth shapes local standards in public educational service. A 10% difference in the tax base leads to a 1% difference in expenditure per class in lower secondary schools. Finally, the results show that a higher subsidy per capita is accompanied by lower education expenditure per unit. Of course, it would be problematic to suggest a causal effect in this case. A high compensatory subsidy is obtained by local authorities with low own revenue (this is both the intention of the regulator, and the mechanism for calculating the subsidy), so, in view of the important influence of own revenue on educational outlays, the negative correlation of expenditure on education and the compensatory subsidy obtained is not surprising. However, the results show that, as regards financing of educational tasks, compensatory transfers do not contribute to the elimination of the difference in the financial potential between more and less affluent local authorities. Gminas obtaining higher compensatory subsidy per capita (those whose tax base is much lower than the national average) record lower expenditure per school unit.

Comparing the richest and the poorest gminas (the 10th decile against the 1st decile according to the tax base per capita) in terms of differences in outlays on selected educational services as in the earlier stage of the analysis, research is again limited to lower secondary schools[7]. Firstly, teaching hours per class are analysed, then additional services offered to students, concluding with a comparison of monthly and hourly pay of teachers.

In terms of own revenue per capita, in gminas from the highest decile the average weekly teaching hours per unit numbered 48; in gminas from the lowest decile, just 40. This difference amounts to 20% less weekly studying time in schools in the poorer gminas. Figure 2 illustrates that the situation results from both different timetabled hours for general subjects and from unequal learning support (from psychologists, speech therapists, librarians and school counsellors). Help from support teachers (*nauczyciel nietablicowy*) was much more frequently offered to pupils in richer gminas.

Comparison of the average weekly number of teaching hours for specific subjects shows that the difference in the case of general subjects results mostly from a higher (by 35%) number of hours of learning a foreign language and physical education in gminas from the highest decile (Figure 3). This does not necessarily mean that the average student in a rich gmina spends 35% more time learning a foreign language than a student in a less wealthy community. Following the provisions introduced by the ministry, foreign language classes with more than 24 students must be divided into two groups. Richer gminas are usually located in urban areas with higher population densities where classes are larger, so they are more often divided into groups.

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[7] In quantitative research based on the data from the SIO, the fact that many schools form a part of school complexes (e.g. combined primary and lower secondary schools) is a problem. Teachers who work in such institutions are formally employees of the whole complex, which makes it difficult to investigate their working time for each school. However, it is possible owing to the fact that the SIO also contains details of teaching hours worked by each teacher in each school and also within school complexes. Therefore, this study covers all lower secondary schools, including those which are a part of a school complex. It refers exclusively to the teaching hours in lower secondary schools.
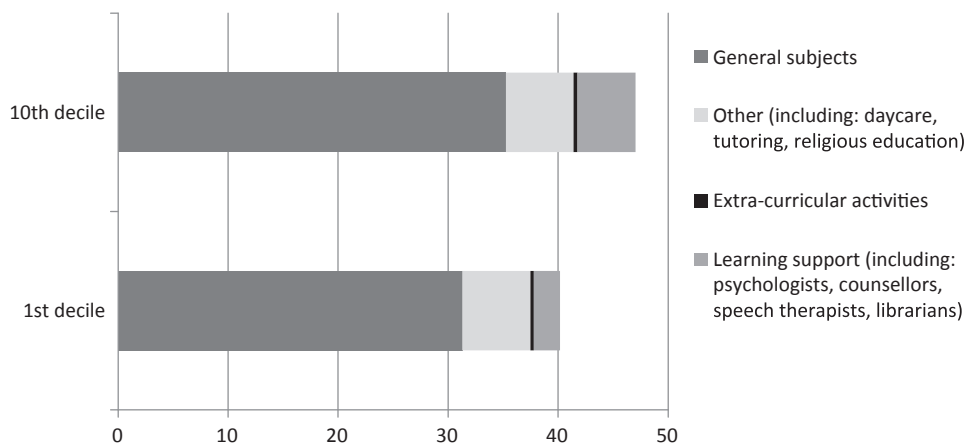
Figure 2. The average weekly number of hours of teachers' working time calculated per unit in gminas from the lowest and highest decile, in terms of own revenue per capita.

Formally, the number of hours of foreign language teaching is doubled, yet in reality nothing changes for pupils. The potential inequality between students from poor and wealthy gminas lies in the fact that they often learn foreign languages in better conditions (small groups), but they do not necessarily have more lessons.

On average, a higher number of extracurricular lessons, including physical education and more individual lessons, were offered in gminas from the highest income decile. Interestingly, schools from the lowest decile offered significantly more after-school care – this is probably a response to the needs of children and families in rural areas, where many pupils use organised school transport (Figure 4).

It seems that the biggest differences between the highest and the lowest decile
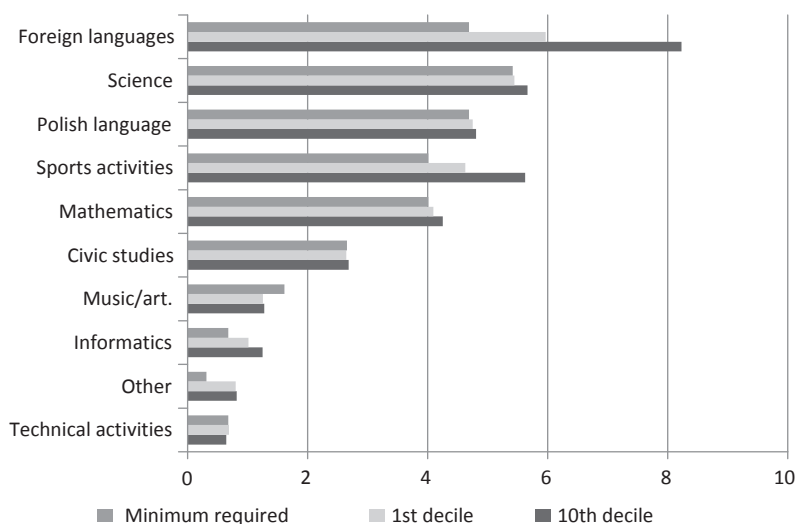

Figure 3. The average weekly teaching hours for general subjects per unit, in gminas from the lowest and the highest deciles, in terms of own revenue per capita, September 2011.
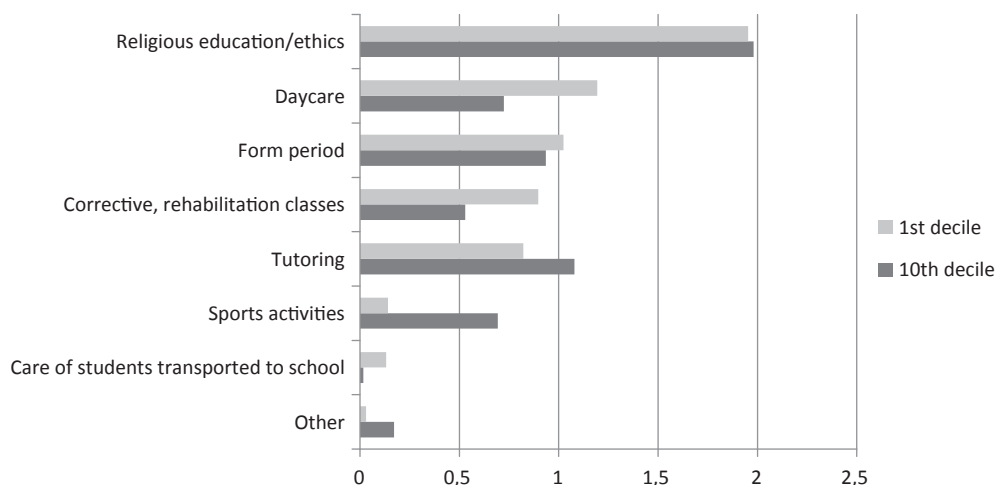
Figure 4. The average weekly number of hours of teachers' work (with the exclusion of teaching general subjects) calculated per one unit, in gminas from the lowest and the highest decile, in terms of own revenue per capita, September 2011.

of gminas in terms of tax base pertain to the average number of hours of support activities offered to students. Schools from the richest gminas offer significantly more consultation with school counsellors, psychologists with better access to assistant teachers (for disabled students) and to libraries (Figure 5).

Teachers' salaries are another dimension of inequality between local school systems.

The average monthly pay for a teacher in a wealthy gmina was in 2011 five percent higher than in a gmina from the lowest decile of own revenue per capita (Figure 6). However, taking into account the fact that school management bodies can use the extra hours flexibly, the monthly working time of two teachers employed for the same working hours does not imply the same number
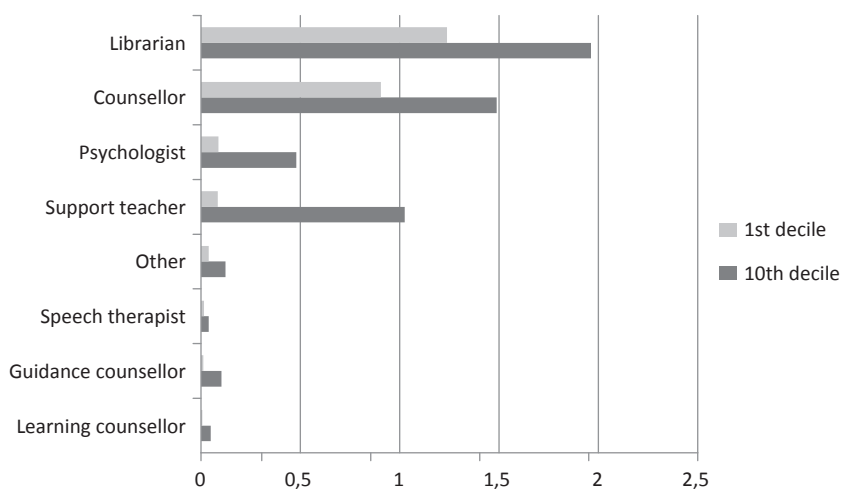

Figure 5. Average weekly number of hours of work of support teachers calculated per unit in gminas of the lowest and the highest decile, in terms of own revenue per capita, September 2011.
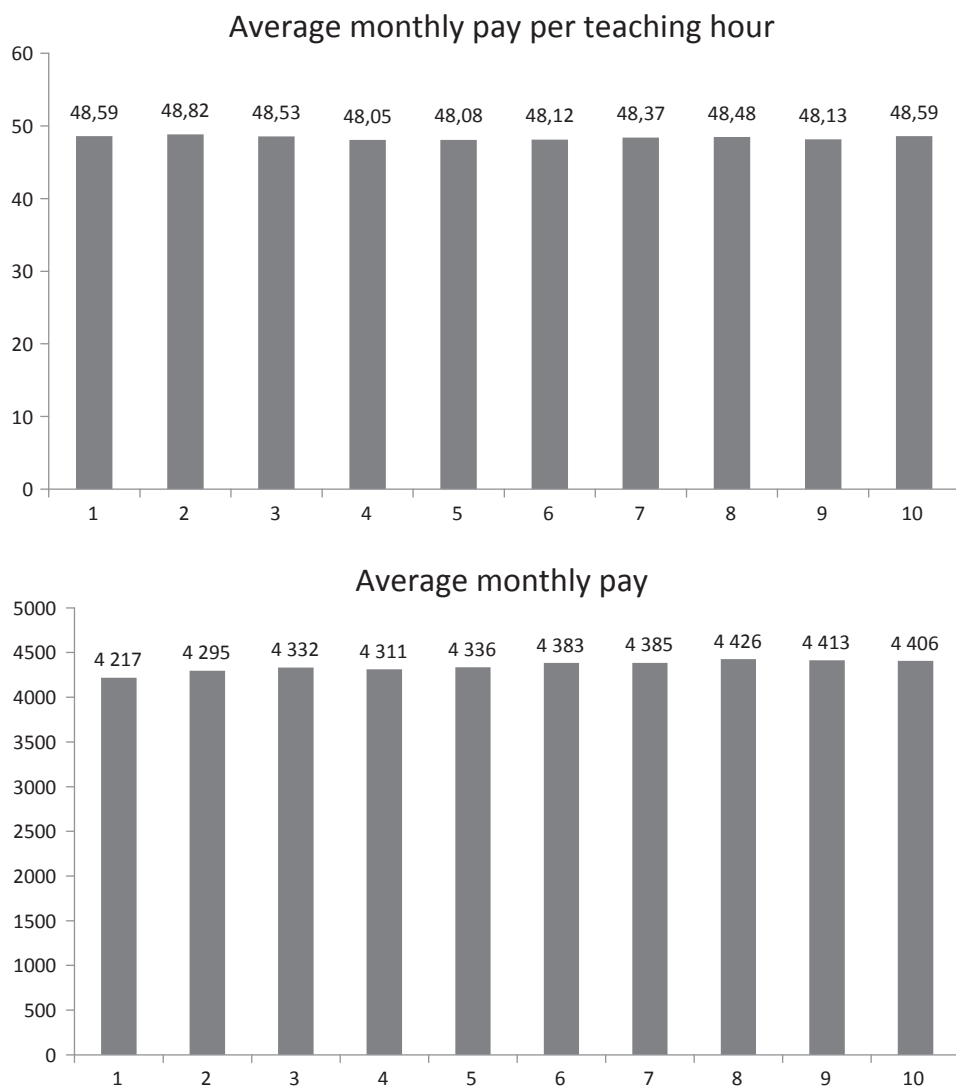
Average monthly pay per teaching hour

Average monthly pay

Figure 6. Average teacher pay (PLN) in the lower secondary schools in deciles of gminas in terms of own revenue per capita, 2011.

of teaching hours. Compared remuneration also includes pay for extra hours of work. Pay per hour of work, including extra hours would therefore be a better indicator for inequality in teacher wage. Calculation of the hourly rate leads to the rather unexpected conclusion that teachers' pay in poor and rich gminas are practically the same (Figure 6). In 2011, gminas with the highest tax base paid teachers on average PLN 48.60 per teaching hour – precisely the hourly rate in gminas with the lowest own income per capita.

Conclusions

In this article, the impact of the unequal wealth of Polish local governments on the outlays on lower secondary education was examined. With a weighted regression analysis,

using data from the years 2002–2010, it was shown that despite the operation of important compensatory mechanisms in the financing of local government, the local tax base has a significant impact on education expenditure (calculated per school unit), but that difference decreased with time. In 2002, a ten percent difference in own revenue per capita between gminas translated into a two percent gap in education spending per unit. Eight years later, similar differences in the tax base translated into a gap of 1.1%. One possible explanation for the decreasing influence of a gmina's own revenue on education expenditure is that rich gminas subsidise education increasingly less, while they concentrate on other expenses. As poorer gminas cannot reduce the level of education outlays below the minimum necessary for implementation of the framework teaching programme, differentiation of expenditure among gminas is decreasing. The confirmation of this would require further research.

In order to avoid the estimation errors related to omission of certain important characteristics of gminas in the regression analysis, estimation of the panel model with constant gmina effect for the period 2002–2010 was performed. The results confirmed the statistically significant positive impact of the local tax base on local expenditure per school unit in lower secondary education.

In the next section, based on ministry data for 2011, a detailed analysis was carried out for outlays of schools managed by gminas from the lowest and highest deciles in terms of their own revenue per capita. Three types of outlay were characterised: teaching hours for general subjects, additional support given to students and teachers' pay. Although there was a marked difference in teaching hours between the richest and the poorest gminas, to the disadvantage of the gminas with the lowest revenue, this was mostly attributable to foreign language teaching time. This resulted from language classes in richer gminas being more often divided into groups, rather

than there being more hours of tuition offered to students.

The gmina budget has some statistical impact on teachers' pay; yet, this effect completely vanishes when the fact that teachers have more contact hours on average in richer gminas is accounted for. The hourly rates of teachers did not depend on the level of gminas' own revenue.

Finally, students from poor and rich gminas have markedly unequal access to support and counselling activities, in particular, support from school counsellors, speech therapists, psychologists, assistant teachers and access to libraries.

With respect to the high degree of decentralisation, the observed inequalities seem rather negligible. Although rich gminas spent more on education than gminas with low revenue, the asymmetry of the education offered was most pronounced in the case of support tasks, not directly related to the teaching process. Besides foreign languages and physical education (in which cases higher outlays in richer gminas resulted from division of large classes into groups), teaching hours in rich and poor gminas were similar. Teachers' pay was also similar in both richer and poorer local authorities. This could mean – taking local differences in living costs into account – that teaching in less economically developed areas may be relatively more attractive. Furthermore, teachers working in rural schools or towns with populations of less than 5000 obtain an additional rural bonus, amounting to 10% of basic salary. That bonus, in compliance with the Teachers' Charter Act, is classified as a social benefit, and is not formally included with remuneration. For this reason, it could not be included in the analyses performed here.

The results of this analysis also indicated the key role played in a decentralised education system by standardisation of educational services from the perspective of territorial inequality. Services supporting the learning process are one aspect of education (at lower

secondary level), in which there are disturbing disproportions between rich and poor authorities. This is, however, the only service analysed here, which is not or is only to a very limited degree subject to central standardisation. If the goal of policy is to reduce inequalities in the education system, then it is an obvious recommendation that standards to these education-related services should be introduced.

Literature

Ahlin, A. and Mork, E. (2008). Effects of decentralization on school resources. *Economics of Education Review*, *27*(3), 276–284.

Björklund, A., Clark, M. A., Edin, P. A., Fredriksson, P. and Krueger, A. B. (2006). *The market comes to education in Sweden. An evaluation of Sweden's surprising school reforms*. New York, NY: Russell Sage Foundation.

Borge, L.-E. and Rattsø, J. (1993). Dynamic responses to changing demand: a model of the reallocation process in small and large municipalities in Norway. *Applied Economics*, *25*(5), 589–598.

Borge, L.-E., Brueckner, J. K. and Rattsø, J. (2012). Partial fiscal decentralization and public-sector heterogeneity: theory and evidence from Norway. CESIFO working paper no. 3954 category 1: public finance, October 2012. Retrieved from http://www.cesifo-group.de/portal/page/portal/DocBase_Content/WP/WP-CESifo_Working_Papers/wp-cesifo-2012/wp-cesifo-2012-10/cesifo1_wp3954.pdf

Brimley, V. and Garfield, R. (2002). *Financing education in a climate of change*. Boston, MA: Pearson Education Company.

Brueckner, J. K. (2009). Partial fiscal decentralization. *Regional Science and Urban Economics*, *39*(1), 23–32.

Canning, M., Moock, P. and Heleniak, T. (1999). Reforming education in the regions of Russia. World Bank Technical Paper No. 487. Retrieved from http://elibrary.worldbank.org/doi/pdf/10.1596/0-8213-4624-5

Card, D. and Payne, A. A. (2002). School finance reform, the distribution of school spending, and the distribution of student test scores. *Journal of Public Economics*, *83*(1), 49–82.

Faguet, J.-P. (2004). Does decentralization increase government responsiveness to local needs? Evidence from Bolivia. *Journal of Public Economics*, *88*(3–4), 867–893.

Fiske, E. B. (1996). *Decentralization of education. politics and consensus*. Washington, D.C.: The World Bank.

Fiszbein, A. (2001). *Decentralizing education in transition societies: case studies from Central and Eastern Europe*. Washington, D.C.: The World Bank.

Herbst, M., Herczyński, J. and Levitas, A. (2009). *Finansowanie oświaty w Polsce. Diagnoza, dylematy, możliwości* [*Financing of education in Poland. Diagnosis, dilemmas, opportunities*]. Warszawa: Scholar.

Herbst, M. (ed.). (2012). *Decentralizacja oświaty* [*Decentralisation of educatuion*]. Warszawa: ICM UW.

Hoxby, C. M. (2001). All school finance equalizations are not created equal. *The Quaterly Journal of Economics*, *16*(4), 1189–1231.

Jakubowski, M. and Topińska I. (2006). *Impact of decentralization on public service delivery and equity: education and health sectors in Poland 1998–2003*. Warszawa: CASE.

Levačić, R. (2007). World Bank study: a stocktaking of per capita financing in education in Poland. Washington, D.C.: The World Bank.

Manwaring, R. and Sheffrin, S. (1997). Litigation, school finance reform, and aggregate educational spending. *International Tax and Public Finance*, *4*(2), 107–127

Murray, S. E., Evans, W. N. and Schwab, R. M. (1998). Education–finance reform and the distribution of education resources. *The American Economic Review*, *88*(4), 789–812.

Najwyższa Izba Kontroli [NIK] (2008). *Wysokość części oświatowej subwencji ogólnej otrzymanej przez jednostki samorządu terytorialnego a wielkość wydatków faktycznie ponoszonych na realizację zadań oświatowych* [*The size of the general educational subsidies received by the local government units and the size of the expenditure actually incurred for the implementation of educational tasks*]. Retrieved from http://sejmometr.pl/nik_raporty/1311

Oates, W. E. (1972). *Ficsal federalism*. New York, NY: Hartcourt.

Roelke, Ch., Green, P. and Zielewski, E. (2004). School finance litigation, the promises of the third wave. *Peabody Journal of Education*, *70*(2), 104–133.

Prawda, J. (1993). Educational decentralization in Latin America: lessons learned. *International Journal of Educational Development*, *13*(3), 253–64.

Silva, F. and Sonstelie, J.(1995). Did Serrano cause a decline in school spending? *National Tax Journal*, *48*(2), 199–215

Tiebout, C. M. (1956). A pure theory of local expenditures. *Journal of Political Economy*, *64*(5), 416–424.

Tsang, M. C. (1996). Financial reform of basic education in China. *Economics of Education Review*, *15*(4), 423–444.

Winkler, D., Rounds, T. (1996). Municipal and private sector response to decentralization and school choice. *Economics of Education Review*, *15*(4), 365–376.