

Funding organisations: the case of regional public schools in the Czech Republic and Slovakia

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Abstract

Reforms in financing public education are often connected to the redesign of school funding formulas, which present a powerful and efficient tool for providing an effective redistribution of public finance for school organisations. A properly designed formula can, via a bundle of variables, help to adjust differences between schools and mitigate fluctuations to stabilise the sector. Thus, various coefficients are chosen and set by the decision-making authorities; they are based particularly on the political arguments revolving around the relative importance of various indicators. Given these facts, the aim of the present paper is to carry out a comparison of three funding formulas in order to evaluate the allocation of funds to the regional schools with regard to their scope as far as the number of students is concerned. In order to reflect the consequences of different formula funding regimes, the paper presents the results of a comparative study based on the correlation analysis method. It offers unique and comprehensive results pertaining to the impacts of different school funding methods, proving that a bundle of well-designed compensatory factors is able to balance the discrepancies caused by the different sizes of schools. The results are supposed to enable decision-making bodies to rethink and reconsider their strategies for the modern funding of regional schools.

Keywords

funding formulas, allocation, regional schools, public expenditures, reforms

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Introduction

In the search for effective financial policies in education, it is necessary to undertake the constant evaluation of redistribution and

allocation of public resources intended for schools that are supposed to provide public education on different levels. Analysing

various aspects of educational finance helps to clarify the efforts made by countries in education as well as its possible impact on future national economic and social perspectives (Adu and Denkyirah, 2017; Tulegenova et al., 2021). Bowman and Zuschlag (2022) explore possible relationships between fiscal intervention and other key areas of education policy. Public educational expenditure indicators may help to show how and where financial resources are allocated and what changes they cause over time. According to Kyung and Polachek (2011), the proceedings concerning the planning of resource use, the monitoring of the use of funds, transparency and reporting, as well as incentives for the effective use of school funding play an essential role. The concept of efficiency relates the outcome of a process to its input (Wößmann and Schütz, 2006). LaFortune et al. (2018) point out the importance of the students' evaluation as one of the indicators that can measure effective funding methods. It might be misleading to limit the scope of consideration of effective funding in education to only one or two aspects of cost and monetary allocation. The mixed methods approach is most likely to lead to effective education reforms (Grosskopf et al., 2014). BenDavid-Hadar (2018) states that allocating resources to schools based solely on an isolated indicator does not seem to be sufficient. His research shows that designing a composite mechanism that integrates both equity and improvement issues is likely to be more suitable. The right choice of funding method appears to be an ongoing struggle between, on the one hand, more simplification and thus less weight given to local differences and, on the other hand, more complexity and thus more consideration for local specificities (Fazekas, 2012). The regression-based approach underlying the School Finance Indicators Data system is presented by Baker and Chingos (2019), who find significant consistencies and use the weighted average approach to characterise state school finance systems.

Well-designed structural reform can reduce learning gaps, but does not have immediate measurable effects. The appropriate analysis of different methods may provide useful information on the effects of using public money spent on educational institutions. The topic of the present study is the funding of regional education. The paper deals with the funding methods undertaken by the state policies that aim to provide a functional school network of regional education. The objective of the present study is to compare three funding formulas used for funding regional schools in the Czech and Slovak Republics and to present the results of a survey undertaken in Central Europe with a view to comparing the implications of funding approaches. The reason for choosing those countries is the ongoing process of reforms in the area of education. As described further, there are differences in the design of funding formulas that are supposed to distribute funds from the state budget.

The document is organised as follows: at the very beginning, an overview of the administration of expenditure on education will be given. Consequently, the different approaches of funding methods are explained. The main part compares the methods used in both countries; finally, the results of the analysis are given and discussed.

1. Literature review

Much work has been done on cross-country analyses by the OECD, whose report on equity and quality in education is helpful for studying the different schemes of school funding in different countries. The OECD review (OECD, 2017) gives an overview of policy measures and goals regarding school funding, allocation models that are aligned to a school system's governance structures, and linking financing procedures at different levels in different countries. Further important sources were individual country re-

ports published in Education and Training Monitor 2019 (EU, 2019) by the European Commission, including the main education and training indicators.

In order to analyse and understand the formula funding schemes, it is necessary to monitor the school finances and consequently search for the principles that might allow for designing the policies in order to intervene with new approaches. There are numerous legal, political, and philosophical approaches for managing the redistribution and allocation of finance in the public school system. Baule (2019), Betts and Roemer (2005), and Baker and Chingos (2019) concentrate mainly on understanding the principles of school budgeting. There are useful studies on formula funding of schools (Bischoff, 2009; Levacic, 2008 a, b; Levacic and Downes, 2004; Ross and Levacic, 2000) that provide categorisation of the different variables (e.g. number of pupils, socio-economic background of pupils) and coefficients. Levačić (2008) defines the objectives that are suitable for the evaluation of different funding formulas: efficiency, equity, integrity, administrative cost, accountability and transparency and sensitivity to local conditions. Levačić (2008) defines three main theoretical schemes for designing the funding methods of the organisational units that exploit the line-item approach. The method is based on using historical expenditure, trends, historical analysis and revenue data, justified with some supplemental programme and performance information. Its advantage lies in its complexity. Conversely, it can provide only a limited amount of explicit information for decision-making bodies about the activities and needs of the school organisational units. According to Hanushek (1991), two assumptions regarding school finance are: (1) that traditional school funding, which relies on local funds mostly raised by property taxes, creates sizable disparities between the education available to rich students from sub-

urban locales and poor students from urban and rural locales; and (2) that the inequities in the quality of schooling resulting from the fiscal system are to be corrected by the courts to compel the legislature to provide disadvantaged youth with better schooling.

In the present paper, a comparative analysis of funding methods for regional schools is given. Regional schools are public schools that are founded by regional authorities and financed from public sources. They are obliged to follow the laws and methodical rules set on the national level, yet at the same time they maintain certain personal and decision-making autonomy. The regional schools provide either general or vocational education to young people from the ages of 12 to 20.

Total expenditure on regional education in the countries which are the subject of the comparison herein consists of both current and capital expenditure. Current expenditure includes the salary of educational staff, spending on the goods and services needed each year to operate schools, while capital expenditure refers to spending on the assets purchased for longer than one year. The differences in the relative proportions of current and capital expenditure across countries may reflect the degree to which countries invest in the modernisation or construction of new facilities. For the present study, current expenditure will be analysed as the current expenditure per student, influenced by different costs such as teachers' salaries, pension systems, the cost of teaching hours and teaching materials, the number of students enrolled in the education system or policies to attract new teachers (Belfield, 2000). According to Odden (2001), spending on education is allocated between current and capital expenditure that affects the provision of educational and other complementary services, the level of staff salaries, the material conditions under which institutions exist (via the expenditure on school buildings and maintenance) and the ability of the education

system to adjust to changing demographic and enrolment trends. Odden (1998) also states that current expenditure by educational institutions can be further subdivided into three broad functional categories: i) teachers' salaries and other compensation; ii) compensation of non-teaching staff; iii) other current expenditure (including teaching materials and supplies, ordinary maintenance of school buildings, provision of meals and dormitories to students, and rental of school facilities).

Another method of redistribution of funds for schools is the so-called zero-based budget (Caldwell et al., 1999). This method does not refer to the previous year's expenditures; each item in the income of the unit must be justified. The income of the unit based on this method is calculated by dividing operations into decision units and consequently aggregating them to decision packages on the basis of programme activities and goals. It is useful to involve staff in planning and allocating resources for different reasons. This might lift public confidence as well as involvement in the planning process. On the other hand, this personal participation requires sufficient staff time and paperwork. The so-called decentralised participative mechanism is likely to become a quite popular strategy as it offers school leaders and staff the opportunity for suitable and effective resource allocation. While the method of site-based budgeting may be a highly effective strategy for addressing local needs, certain preconditions are needed to make it work effectively. Finally, site-based budgeting (Caldwell et al., 1999) uses local administrators to participate in effective funding practices and clear communication between state and district leaders. Their knowledge of funding methods and regional educational strategy are crucial for a consistent allocation of funds for making decisions on funding and allocating public sources for schools. In the absence of these important factors, resource allocation is unlikely to be an effective "lever for change".

2. Methodology

The present study reveals the facts pertaining to funding methods and summarises the data collected from the official school reports and government authorities to discern the real consequences of the chosen methods on the allocation of funds intended to fund regional education at the secondary level. For the purposes of the present research, the framework for international educational expenditure is built around three dimensions: i) the type of schools considering educational programmes; ii) the size of the school, referring to the number of students enrolled in the school unit; iii) expenditure on the salaries of the pedagogical and non-pedagogical school staff.

The inductive approach is based on statistical methods, making use of correlation analysis and comparison of the predefined samples in order to generalise the findings. In order to proceed with the comparison, it was necessary to create homogenous categories of analysed schools with the same field of study. The chosen schools are of different sizes (number of students) and from different regions, excluding the capital cities. Given that the funding formula in the Czech Republic was changed in 2020, there are two groups of analysed data from that country, namely Sample (1) and Sample (2) – funding based on the student basket formula and the Phmax formula – and one group for the Slovakian sample (3).

In order to gain comparable results, the selection of schools was necessary. Therefore, the study does not take into consideration the particularities of specific professional or vocational schools. Altogether there are 50 Czech and Slovakian public secondary grammar schools covered in the present research providing secondary education in the same area of study.

The proceedings of the comparison were based on the following assumptions and methods – see Table 1.

Table 1. Three data samples are used to proceed with the comparative analysis

Sample (1):	Cost of salaries of pedagogical and non-pedagogical staff at regional schools in the Czech Republic – student basket formula
Sample (2):	Cost of salaries of pedagogical and non-pedagogical staff at regional schools in the Czech Republic – Phmax formula
Sample (3):	Cost of salaries of pedagogical and non-pedagogical staff at regional schools in Slovakia – normative funding system with variables

Source: own elaboration

Consequently, the data on salaries for teachers and other staff for 2019 and 2020 were collected and calculated for one unit (one student). The data were collected from the Annual Reports published by the schools on the websites, the documents published by the Czech Ministry of Education (MEYS, 2020, 2021) and documents and data published by the Ministry of Education, Science, Research and Sport of the Slovak Republic (MESRS, 2020, 2021). Using the MS Excel correlation analysis tool, three Pearson correlation coefficients will be calculated and

transformed into scatter plots labelled by groups. The Pearson correlation coefficient (rp) measures the strengths of the linear relationships and provides a useful tool for measuring the strength of the relationship between two variables. The two variables are the number of students at the schools (x) and the normative costs for salaries for each school allocated for one student (y), while n stands for the number of analysed schools. The calculation model of the Pearson correlation coefficient (rp) is formulated as follows:

$$r_p = \frac{n \cdot \sum_{i=1}^n X_i \cdot Y_i - \sum_{i=1}^n X_i \cdot \sum_{i=1}^n Y_i}{\sqrt{\left[n \cdot \sum_{i=1}^n X_i^2 - \left(\sum_{i=1}^n X_i \right)^2 \right] \cdot \left[n \cdot \sum_{i=1}^n Y_i^2 - \left(\sum_{i=1}^n Y_i \right)^2 \right]}}$$

Pearson correlation coefficient formulas return a value between -1 and 1, where $rp = 1$ indicates a strong positive relationship, $rp = -1$ indicates a strong negative relationship, and in cases where the result rp approaches zero, there is no relationship between the variables.

As mentioned above, in order to gain comparable results, the selection of schools is required. Therefore, the study does not take into consideration the particularities of specific professional or vocational schools. Altogether there are 48 Czech and Slovakian public secondary grammar schools covered in the present research.

The following text presents the differences and similarities between the samples.

Samples (1) and (2)

The system of regional educational funding in the Czech Republic is decentralised, and has undergone important changes over the last five years. On the centralised level, it is the MEYS, which is the main decision-making body, that decides on the total amount of money redistributed to regional schools. The role of the regional governments has changed their influence on the redistribution process and the use of school resources has diminished. The regional school fund-

ing reform was enacted in 2019 and introduced one year later in 2020. The reform mainly set a new formula for the funding scheme model of financing regional schools in the Czech Republic. The aim of the present research is to compare the previous and existing mechanisms. This research contributes to a better understanding of recent changes and the consequences and includes an international comparison with the Slovak system that has not undergone any changes to date.

In the Czech Republic, the direct costs sent to schools from the state budgets primarily include salaries for teachers and non-teaching staff, as well as covering the further professional development of teachers and other expenditures resulting from labour laws. Basic personal costs are centrally regulated. The operational costs of schools include maintenance of schools, energy expenditures, communal services, and small repairs. Conversely, the operational costs of schools are not included in national normative. They are distributed on the regional level by means of regional grants. Operational costs are allocated at regional level and the regional authorities allocate these funds to individual schools. Since the regional authorities are the founders of secondary schools, they are responsible for investments, maintenance, and operational costs as well.

The major change pertained to the method of allocation of the direct costs redistributed at central level that was previously designed through a system of per student normative amounts. This system has been used since 2001. On the one hand, the allocation system based on per student normative amounts was simple with a basic per student normative coefficient; on the other hand, it made quite difficult to budget for the coming school years (OECD, 2015). For example, for secondary schools, the regional normative amounts were designated to every educational programme regardless

of the size of the school and its geographical or demographic position. Thus, the key component on which the funding of regional schools was previously based was the number of students officially attending the school and the programme.

Furthermore, once the size of the student basket was approved, total expenditures could not be increased within the fiscal year (OECD, 2015). Another often reproached inconvenience of this method was its rigidity. It failed to include a rise in salary for teachers with more years of experience or who belonged to a higher category of qualification. This was a significant problem for the schools as, in the short term, the schools had only limited influence over this factor. Taking into consideration this unsystematic feature, the more experienced teachers represented uncertain financial costs which were not convenient in the long term.

In response to this criticism, the ministry elaborated a radical reform aiming at a complete change of the system of financing education. The goals set by the MEYS (2019) were declared as follows:

- (1) To allocate funds in a transparent and predictable way
- (2) To establish a more equitable system of allocating resources

The idea behind this was to acknowledge the legitimately higher costs of smaller schools that have lower enrolment rates due to their rural location. In order to compensate for the additional incurred costs or the losses caused by the decrease in the number of students, local governments were forced to use several methods to balance the school incomes or to increase school resources (Ondrušková and Pospíšil, 2021). In order to ensure an equitable system, the new Phmax formula was mainly expected to ensure the horizontal equity of funding across schools. The new funding approach includes elements that take the size of the school into account by means of weighting factors.

Sample (3)

In Slovakia, there is a high degree of decentralisation as well. The funding of schools is determined by a formula which is largely dependent on the number of students. The source of funding for school education and its distribution to individual schools are centralised (OECD, 2015). Just as in the case of the previous method used in the Czech Republic, the financing of regional schools in Slovakia has so far been normative-based. The Slovakian approach can be characterised by the concept of “internal efficiency” (Lockheed, Hanushek, 2015), according to which the normative-based method tends to achieve lower costs per student by either increasing the number of students or reducing the number of teachers through the constant improvement of educational standards. The normative funding amount per school is determined by personnel costs, calculated as salary, normative and other operating costs. The state budget allocates funds to schools according to the number of pupils as well as personnel. When it comes to secondary education, the state budget only contributes the funds to those services that serve as “systematic preparation for an occupation”, a category defined by the law (OECD, 2015). The Ministry of Education in Slovakia maintains a database that enables them to calculate the allocation of funds for the staff of each school. These data are used for the present research. There are similarities with the previous funding methods (Sample 1) as the Slovak schools formula allocation largely depends on the number of students, even though the normative per student varies by type of school and programme of study. It works on the

same basis as the former student basket formula which was in effect in the Czech Republic until 2020. The differences consist in the weights for student categories that are supposed to give different coefficients for the purpose of calculating the appropriate salary normative per student. These coefficients reflect differences in personnel costs per student that depend on the various aspects such as staff-student ratios for teachers and non-teaching staff. They are assumed for each type of school individually and are referred to as “personnel intensity” or the so-called Euro value of the salary norm (OECD, 2015). The Euro value of the salary norm for each type of school is the base norm multiplied by the school category weight. For the present comparative research, the salary normative is calculated for 24 different school categories.

In contrast to the Czech Republic, the active participation of executive staff is much more important in Slovakia. In the latter country, the school director is charged with the preparation of the annual budget, while the regional authorities are obliged to discuss the predicted costs and year-on-year changes with the directors before the budget is approved. The directors have considerable discretion and are much more involved in the planning and funding.

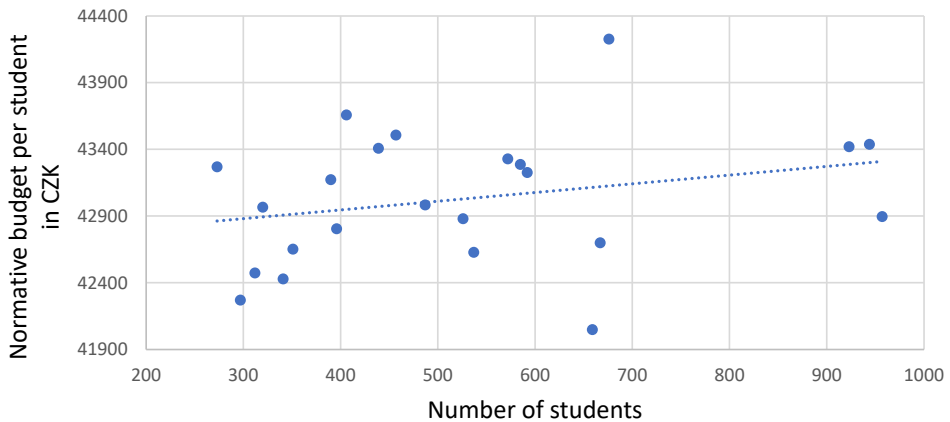
3. Research results

The first analysed Sample (1) gives an idea of the dependence of the funds on the size of the school formerly applied in the Czech Republic. The identification of the analysed group and the rp1 are shown in Table 2 and Figure 1.

Table 2. Identification of Sample 1

Country	Czech Republic
Number of schools	24, three regions
Type/field of study	general secondary grammar school
Size of the school units	$273 < x < 986$
Analysed year	2019
Funding method	student basket formula
Pearson correlation coefficient Sample 1	$r_{pl} = 0.26$

Source: Authors' calculation based on the data collected from annual school reports and data provided by Ministry of Education of the Czech Republic.

Figure 1. Correlation analysis for sample 1

Source: own elaboration based on the annual school reports of 2019 and data provided by the Ministry of Education of the Czech Republic.

The value of $r_{pl} = 0.26$ indicates a positive relationship between the number of students in the analysed sample and the normative for salaries for each school. This information means that the more students the school has, the higher the amount per student the school receives. There is a relatively evident strong dependence of the total amount of money received by the school unit on the size of the school. The more students who attend the

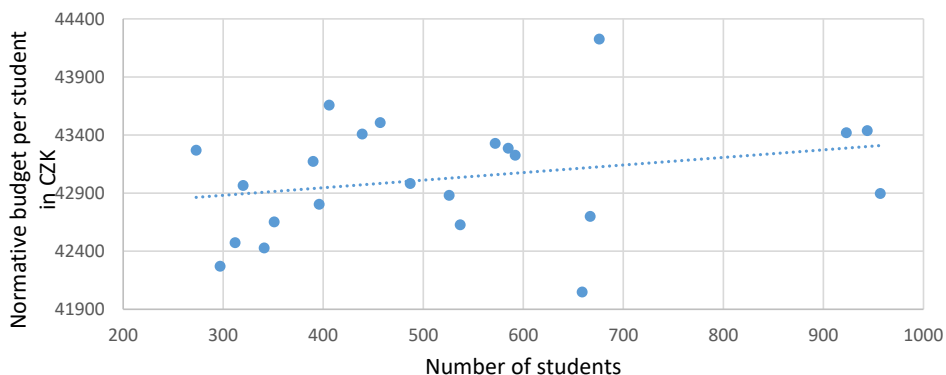
school, the more recounted normative funds per student the school unit receives. This method was changed in 2020 to the Phmax method based on various coefficients. The following outcomes represent the identical sample of school units as previously analysed; the difference is the year and the method of funding. Detailed information is given in Table 3 and Figure 2 respectively.

Table 3. Identification of sample 2

Country	Czech Republic
Number of schools	24, three regions
Type/field of study	general secondary grammar school
Size of the school units	$273 < x < 986$
Analysed year	2020
Funding method	Phmax funding system
Pearson correlation coefficient Sample 2	$r_{p2} = -0.23$

Source: own elaboration based on the annual school reports of 2020 and data provided by the Ministry of Education of the Czech Republic.

Figure 2. Correlation analysis for sample 2



Source: own elaboration based on the annual school reports of 2020 and data provided by the Ministry of Education of the Czech Republic.

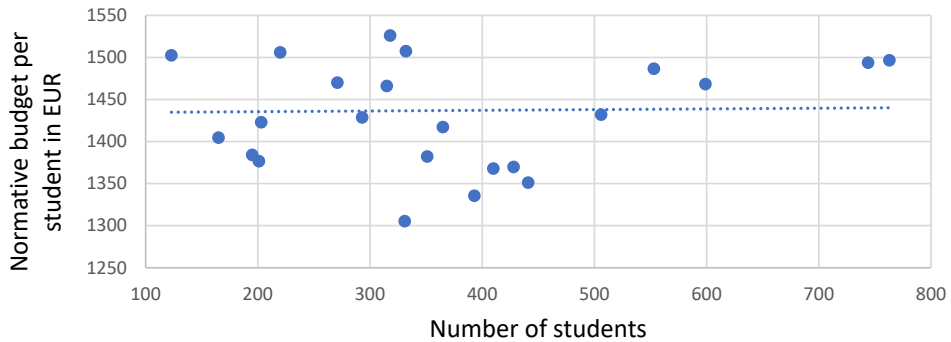
The value or $r_{p2} = -0.23$ signifies a negative relationship between the number of students in the analysed sample of schools and the normative cost of salaries for each school. It means the more students the school has, the lower the amount of money per student the school receives. This is the exact opposite of the result for the previous value r_{p1} . In practice, it means that the smaller schools in

terms of number of students receive a higher recounted normative per student. The impact resulting from the changes in funding formula are evident and will be discussed below, after presenting the outcome of an analysis of the Slovakian sample of schools. The information on the sample and calculation results are presented in Table 4 and Figure 3.

Table 4. Identification of sample 3

Country	Slovak Republic
Number of schools	24, three regions
Type/field of study	general secondary grammar school
Size of the school units	$123 < x < 992$
Analysed year	2020
Funding method	normative funding system with variables
Pearson correlation coefficient Sample 2	$r_{p3} = 0.02$

Source: own elaboration based on the annual school reports of 2020 and data provided by the Ministry of Education of the Slovak Republic.

Figure 3. Correlation analysis for sample 3

Source: own elaboration based on the annual school reports of 2020 and data provided by the Ministry of Education of the Slovak Republic.

The value of $r_{p3} = 0.02$ indicates almost no relationship between the variables, namely the number of students in the analysed sample of Slovakian schools and the calculated normative for salaries per student for each school. The value of r_{p3} reflects the use of different variables, and consequently the funding calculated for each school is adjusted according to the individual needs of each unit in the sample.

4. Discussion

The results reveal interesting findings. As regards Sample 1, the analysis confirms that the student basket formula does not support eq-

uity; conversely it tends to favour the schools in densely populated areas. As a result of this, it makes the funding allocation system excessively simple and weak. The formula is too simplified with its limited variables (Ladd, 1999). It considers neither regional differences nor local needs. This confirms that relatively more funds tend to be transferred to more populated areas and urbanised regions than to more remote districts with smaller average class sizes. Consequently, the funding system has undergone abrupt changes with the transformation of the funding formula. The modifications are evident.

By introducing the bulk of coefficients the Phmax formula is supposed to meet the in-

dividual needs of the schools. The results of the research show higher flexibility and more personalised funding than might be predicted by the maximum of teaching lessons per one class or by the adjustments for each field of education and organisation of the classes. The Phmax method may contribute to more balanced funding as far as the size of the school is concerned by taking the groups and grades of particular educational establishments into account. As a result, the allocated amount for each school unit increases proportionally with the real teaching costs. This is due to the construction of the Phmax formula that includes weekly school hours, determined by the curricula for each school year, and lower expected class sizes for small rural schools or schools from remote and less populated regions. Another important element included in the funding formula is administrative costs, which represent proportionally higher administrative spending due to fixed costs to some extent in the case of smaller schools. In the Phmax formula they are calculated proportionally to the required spending on teacher salaries, which means higher coefficients for smaller schools. Conversely, in Slovakia the relative independence between the number of students at school and the amount of funds for staff salaries for each school reveals from the fact that the described method of financing incorporates variables that are able to achieve a more equitable allocation of funds. There are three existing categories that determine groups of students with special needs, all of which are integrated in common upper secondary classes. Besides the current normative costs, there is a subsequent allocation per the groups of students from, for example, socially disadvantaged backgrounds or for students with special needs. Conversely, in Slovakia the funding method reflects neither the population density nor the particularities of teaching staff at the schools. On the other hand, this could be balanced by the participation of the school management in the preparatory stage of the school budget. The comparative study

has revealed the weaknesses of the student basket formula, which is not able to reflect important factors that affect the equitable access of education. Furthermore, the normative financing is supposed to be effectively adjusted by the coefficients that could incorporate social and political aspects. Consequently, rather than funding formulas, a more important aspect for school funding seems to be the different formula coefficients that correspond to the set of policy objectives and reflect the policy preferences of the government.

The important message revealed in the course of the comparative analysis is that the funding formula that is limited to the basic parameter of the number of students is weak in terms of sensitivity to particular local conditions. From this perspective, the newly established funding method in the Czech Republic seems to meet the main policy objective, that being equal access to education. On the other hand, it is important to stress that, in contrast to Slovak school executives, the Czech headmasters are supposed to provide data on the school and calculate the Phmax coefficient themselves; Slovakian headmasters are more involved in the budgetary procedure and may claim their particular objectives.

Conclusions

By means of the correlation analysis, it was possible to undertake precise statistical research into three relatively homogenous samples of school units in terms of their size, type and country of residence, albeit financed via different funding methods. The results reveal important information that might have significant consequences for national educational systems. The research paper analysed three different types of school funding in order to provide a comparative analysis by means of tool correlation analysis. The analysis proved that even if the Slovakian concept of school funding is based primarily on the number of students, it can – by means of efficient incen-

tives – compensate for a rather rigid formula. The compensation factor provides efficient tools for certain needs and is thus sensitive to some local particularities. The research shows that the compensatory factors are able to balance the discrepancies caused by the different size of schools as far as the actual number of students is concerned. The calculation shows that the Slovakian method of funding is able to maintain a sufficient amount of flexibility as well as integrity, since it takes the local particularities into account. As for the Czech funding system, the analysis proved that by establishing a new calculation formula, the system has become more flexible as it goes beyond the pure number of students. In comparison with the student basket formula, the new Phmax formula considers the relevant factors in the allocation process. The newly established coefficients allow to take into account the groups and grades of the teacher categories, specialisation bonus for educational advisory services or methodologists.

The research shows that compensatory factors are able to balance the discrepancies in Slovakia caused by the different size of schools as far as the actual number of students is concerned. Equity is ensured by the number of students at each school, equitable access by addressing a further set of specific adjustments, and the total is consequently moderated by the directors who participate in the funding process. This personalised component is lacking in the case of the newly established funding system in the Czech Republic. The Phmax formula might have positive social aspects for remote regions with downward demographic trends as well as for small schools.

On the other hand, there is a high risk that it might result in inefficiencies and discrepancies in the educational system on both the national level, where it is likely to place an unnecessary financial burden on the state budget, and the regional level. The regions are responsible for the non-operating costs of the school units and are obliged to finance

the maintenance of the schools, which could be ineffective as well in case of schools with an unfavourable demographic situation. In that case, it is necessary to rethink the national strategy for regional education, which should be designed in accordance with the support and development of less populated rural areas. Adjusting the formulas to attach the proper benefits for educational organisations can become an effective tool for policy makers to advance equity objectives within a competitive framework in accordance with the policy design.

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