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SHIFTS IN SCHOOL RATINGS BASED ON RELATIVE GAIN OF KNOWLEDGE MEASURING

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Abstract

In response to the broadening requirements put on schools, the concept of "value added" has been introduced as an indicator of the actual contribution of schools to the learning of individual pupils. This article analyses the added value in education of secondary schools of the Moravian-Silesian region in the years 2007–2010, 2008–2011 and 2009–2012, using the method of Relative Gain of Knowledge. Gain of individual schools and subjects in these years is compared using two coefficients – the coefficient of absolute change and coefficient of total change. These coefficients enable us to assess how significant the interannual change of value added of individual subjects and schools is.

1 Introduction

Current society and social situation have schools face a constant stream of new problems and ambitious challenges that create significant pressure on increasing their quality. In terms of management, schools can react by changing the quality management system of teaching and learning of pupils. This means to acquire relevant information about the way pupils learn and to find out which areas are in excellent conditions and which are not, and try to sustain their current status or rectify any imperfections, respectively. The concept is built on the two main reasons for the evaluation of school results. The first reason represents school's responsibility for its results; the second reason is school's need to continuously improve its results. One of the possible methods of school evaluation is the measurement of value added in education.

2 Material and methods

Dividing schools into levels

Individual schools had their value added of education of pupils measured with the method of relative gain of knowledge (Malčík, Malach, 2010). For further analysis, schools were divided by their rating in individual results (e.g. the relative gain in Czech Language between 2007 and 2010 or the relative gain in Maths between 2008 and 2011, etc.) evenly into 4 levels, i.e. quartiles:

1st level . . . . 0–25 %,
2nd level . . . . 25–50 %,
3rd level . . . . 50–75 %,
4th level . . . . 75–100 % .

We had data from individual schools containing paired results from the subjects of Czech, Maths and English in years 2007 and 2010; 2008 and 2011; and 2009 and 2012. For the paired results, we determined the relative gain of knowledge of 2007–2010, which is designated RGK07–10; relative gain of knowledge of 2008–2011, designated RGK08–11; and relative gain of knowledge of 2009–2012, designated RGK09–12.

Coefficients of absolute and relative change

Within the individual gain of each subject, we introduced two coefficients that characterise the changes in rating of individual schools in the 4 levels (Malčík, Malach, Krpec, 2011). The following chart marks each field with its corresponding symbol.

Subject		2nd indicator			
		1st level	2nd level	3rd level	4th level
1st indicator	1st level	a_{11}	a_{12}	a_{13}	a_{14}
	2nd level	a_{21}	a_{22}	a_{23}	a_{24}
	3rd level	a_{31}	a_{32}	a_{33}	a_{34}
	4th level	a_{41}	a_{42}	a_{43}	a_{44}

Table 1

Introducing the c_{ac} coefficient:

$$c_{ac} = \frac{(a_{12} + a_{23} + a_{34} + a_{21} + a_{32} + a_{43})}{6} + 2 \cdot \frac{a_{13} + a_{24} + a_{31} + a_{42}}{4} + 3 \cdot \frac{a_{14} + a_{41}}{2}$$

where c_{ac} is the *coefficient of absolute change*.

We should introduce another coefficient:

$$c_{tc} = \frac{-a_{12} - a_{23} - a_{34} + a_{21} + a_{32} + a_{43}}{6} + 2 \cdot \frac{-a_{13} - a_{24} + a_{31} + a_{42}}{4} + 3 \cdot \frac{-a_{14} + a_{41}}{2}$$

where c_{tc} is the *coefficient of total change.*

3 Results

Changes in the division of schools into the 4 levels between the relative gain of knowledge of 2007–2010, relative gain of knowledge of 2008–2011 and the relative gain of knowledge of 2009–2012.

Table 2 shows the distribution of school shifts in Czech between the relative gain of knowledge of 2007–2010 and 2008–2011.

Czech		RGK08–11			
		1st level	2nd level	3rd level	4th level
RGK07–10	1st level	14 %	3 %	6 %	2 %
	2nd level	8 %	8 %	5 %	5 %
	3rd level	0 %	11 %	8 %	6 %
	4th level	3 %	3 %	6 %	13 %

Table 2

Table 2 shows that 43 % of schools stayed in the same level of Czech in RGK08–11 as they were in RGK07–10. Around 14 % got worse by one level, 11 % got worse by 2 levels and 2 % of schools got worse by 3 levels. On the other hand, 25 % of schools improved by one level, 3 % improved by 2 levels and 3 % improved by 3 levels. Although 11 % of schools deteriorated by 2 levels, in general the number of schools that improved their quality was higher than the number of schools that got worse.

The coefficient of absolute change in Czech between RGK07–10 and RGK08–11 is $c_{ac}(Cz)$ = 0.210 and the coefficient of total change in Czech between RGK07–10 and RGK08–11 is $c_{tc}(Cz)$ = -0.007. In the next part, we compare these results with the shift between RGK08–11 and RGK09–12.

Czech		RGK09–12			
		1st level	2nd level	3rd level	4th level
RGK08–11	1st level	13 %	7 %	4 %	1 %
	2nd level	4 %	8 %	6 %	7 %
	3rd level	4 %	6 %	8 %	7 %
	4th level	4 %	4 %	7 %	10 %

Table 3

Table 3 indicates that 39 % of schools stayed in the same level of Czech in RGK09–12 as they were in RGK08–11. Around 20 % got worse by one level, 11 % got worse by 2 levels and 1 % of schools got worse by 3 levels. Only 17 % of schools improved by one level, 8 % got better by 2 levels and 4 % got better by 3 levels.

The coefficient of absolute change in Czech between RGK08–11 and RGK09–12 is $c_{ac}(Cz)$ = 0.241 and the coefficient of total change in Czech between RGK08–11 and RGK09–12 is $c_{tc}(Cz)$ = 0.023.

If we compare these coefficients with those of previous years, we find out that the coefficient of absolute change between RGK08–11 and RGK09–12 is higher, which corresponds with the fact that a lower number of schools stayed on the same level and there are more significant shifts, e.g. 19 % of schools in RGK08–11 and RGK09–12 shifted by 2 levels, whereas between RGK07–10 and RGK08–11 it was only 14 % of schools.

More significant change, however, has occurred in the coefficient of total change, because while the shift was negative between RGK07–10 and RGK08–11 (-0.007), it was positive between RGK08–11 and RGK09–12 (0.023); this was caused mainly by the fact that only 3 % of schools improved by 3 levels and 2 % of schools deteriorated by 3 levels between RGK07–10 and RGK08–11, whereas between RGK08–11 and RGK09–12 4 % of schools improved by 3 levels and only 1 % of schools got worse. Moreover, a higher number of schools improved by 2 levels between RGK08–11 and RGK09–12 than between RGK07–10 and RGK08–11.

4 Discussion

Comparing the coefficients of school ranking between RGK07–10 and RGK08–11 and RGK08–11 and RGK09–12.

	Subject	RGK07–10 a RGK08–11	RGK08–11 a RGK09–12
Coefficient of absolute change c_{ac}	Czech	0.210	0.241
	Maths	0.277	0.147
	English	0.262	0.252
Coefficient of total change c_{tc}	Czech	-0.007	0.023
	Maths	0.030	0.000
	English	0.005	0.002

Table shows the changes of coefficients in each subject between RGK07–10 and RGK08–11, and between RGK08–11 and RGK09–12. Math is the most stable subject, as the coefficient of absolute change in RGK08–11 and RGK09–12 was reduced to almost a half of the previous coefficient – schools had stable results in Maths. Czech language witnessed a slight increase in the coefficient and therefore reduction of stability of school results. English experienced a slight "insignificant" increase in stability. Concerning the betterment and deterioration of school results, the periods of 08–11 and 09–12 witnessed a higher number of schools that gained significant improvement in relative gain of knowledge in Czech as opposed to those that produced worse results. Shifts to better or worse are almost symmetrical in Maths and English.

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5 Conclusion

The method of relative gain of knowledge measures the added value of education of pupils at schools, taking into account the high significance of their socio-economic factors. The test results show rather high shifts of schools in their ratings of relative gain of knowledge in individual subjects. This can be explained by the differences in the classes of individual years, in the quality of teachers or even by the situation when teachers change during the school year (sometimes even multiple times). The relative gain of knowledge of pupils can be analysed on the class level as well. Differences between the input and output results can be examined between boys and girls or between variously composed groups.