PRIMARY EDUCATION IN THE CZECH REPUBLIC FROM THE PERSPECTIVE OF PISA

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Abstract

Today the largest attention in the education is concentrated to secondary education and mainly on tertiary education. However, primary education should have also its share of attention, because currently an opinion in society is, that due to the declining fertility are lower requirements on students than before. Mainly they don´t need such a high knowledge in the entrance exams to high schools. The aim of this article is to find out whether this statement is true and knowledge of Czech students really declines.

The results of PISA project are evaluated in this article. PISA project includes currently all OECD countries and other 68 countries. Students at the age of fifteen years participate in this project, i.e. students of ninth grade of primary school, students of gymnasium and dance conservatory in the same age or students in the first year of high school.

The purpose of this article is to find out, which social factors have an influence on the results of students in PISA. This article examines the results of students in the Czech Republic in mathematics, reading and science. Finally a brief comparison with Germany will be made.

Key words: PISA, primary education, Czech Republic

JEL Code: I21, J11

Introduction

Currently is an opinion in society, that due to the declining fertility are lower requirements on students than before. Mainly they don´t need such a high knowledge in the entrance exams to high schools. The aim of this article is to find out whether this statement is true and knowledge of Czech students really declines.

In this paper will be researched possible impacts of socioeconomic effects on student results at PISA tests. Interrelationship will be examined between PISA results of Czech students and GDP per capita, unemployment rate, inflation rate, total fertility rate, percentage

of university graduates and the number of teachers at primary school. The same interrelationship will be examined for German students.

Furthermore focuses this paper on the results of the ESCS index, which is part of the PISA tests. ESCS index measures the economic background of the students.

1   PISA project

PISA (Programme for International Student Assessment) measures literacy of students in all OECD countries. This fact makes from PISA the largest and the most successful international project of this type. The advantage of this survey is that it gives information to politicians for suitable educational policy in all OECD countries. Results were in many countries an impetus for new, successful or unsuccessful reforms in the educational system of the country. (Sellar, Lingard, 2014) (Ertl, 2006) PISA survey measures literacy of students in reading, mathematics and science. This survey tries to find, how students can use their knowledge in everyday life. PISA survey runs every three years and each cycle focuses more on one of the surveyed areas. The last survey (in 2012) was focused on mathematics. (Palečková, Tomášek, 2013).

The results are presented in two ways. The first option is through the scores. The scores are the number of points on scales of results. The second option is the proficiency levels. Results will be presented on this paper by points on scale of results.

The following figure shows the results of the last survey in 2012. This figure shows the average results for both sexes for selected European countries.

Fig. 1: PISA average results 2012 in mathematics, reading and science
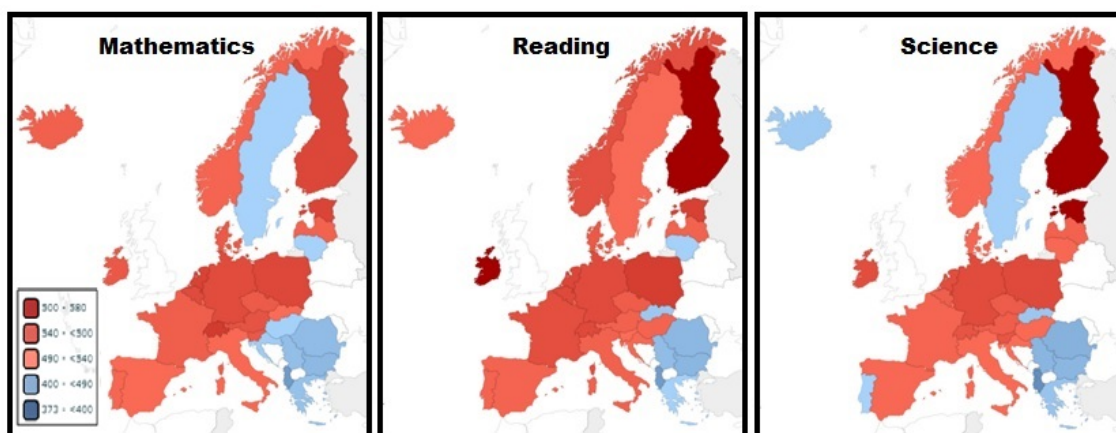
Source: PISA 2012, software OECD and own construction

The figure shows that the Czech Republic achieves in all three areas very similar results. The lowest results achieve Czech fifteen years old students in reading (493 points), second place belongs to mathematics (499 points) and the best results achieve Czech students in science (508 points).

In Germany are results very similar. The lowest results achieve Germany students in reading (508 points), second place belongs to mathematics (513 points) and the best results achieve Germany students in science too (524 points).

2 Socioeconomic factors and PISA results

In this chapter are used results of the PISA survey from 2000 to 2012 (5 surveys) to search a relationship between the results of PISA and socioeconomic factors.

Socioeconomic factors include the following economic indicators – GDP per capita, unemployment rate and inflation rate. All three indicators have been chosen because they describe the macroeconomic environment in the Czech Republic. There will be researched whether any of these indicators have an impact on PISA results. Most likely will not established the affect between them. If so, it will be very weak affect.

In the case of social factors we can expect some relationship. For this analysis were chosen these social factors – total fertility rate, the percentage of university graduates and the number of teachers at primary school. Total fertility rate was chosen from the reason, which has been written in the paper abstract. In the last years is an opinion in society, that due to the declining fertility are lower requirements on students than before. Mainly they don´t need such a high knowledge for the entrance exams to high schools. So we can expect a direct relationship – less children means lower PISA results. For a better description were used values of the total fertility rate with delay of 15 years. This corresponds to the year of their birth. The number of university graduates increased almost triple over the last 12 years. (Šimpach, Langhamrová, 2014) It can be expected, that the educational environment in which children grow is more suitable for their education. Students should achieve more points. (Straková, 2007) For this reason has been chosen the percentage of university graduates as one of indicators. The number of teachers at primary school has been chosen, because their number declined in last years. It will be interesting to observe an impact of this decline.

PISA results are once in every three years, so it isn't a complete time series. For this reason was searched interrelationship by correlation analysis. The following table shows results of this analysis.

Tab. 1: Correlation between PISA results and selected socioeconomic factors in Czech Republic

PISA results	GDP per capita		Unemployment rate		Inflation rate		Total fertility rate		Percentage of university graduates		Number of teachers at primary schools	
	Corr.	S.E.	Corr.	S.E.	Corr.	S.E.	Corr.	S.E.	Corr.	S.E.	Corr.	S.E.
Czech Republic	0,11	(6,76)	-0,19	(6,68)	-0,23	(6,62)	0,14	(6,73)	0,07	(6,78)	0,01	(6,80)

Source: CZSO, PISA 2012, calculations in STATGRAPHICS, own construction

This table confirms an expectation regarding economic indicators. Statistically significant dependence haven´t been proved in neither case. Expectations haven´t been fulfilled even in the case social indicators – total fertility rate, the percentage of university graduates and the number of teachers at primary school. Statistically significant dependence hasn´t been proved in either case too. This confirms the high value of the standard error of estimate.

Based on these results we can say that none of these socioeconomic factors don´t affects individual results of 15 years old students. Influence has individual socioeconomic background of students.

Now will be analysed the same indicators for Germany. Expected results are similar like in the Czech Republic.

Tab. 2: Correlation between PISA results and selected socioeconomic factors in Germany

PISA results	GDP per capita		Unemployment rate		Inflation rate		Total fertility rate		Percentage of university graduates		Number of teachers at primary schools	
	Corr.	S.E.	Corr.	S.E.	Corr.	S.E.	Corr.	S.E.	Corr.	S.E.	Corr.	S.E.
Germany	0,93	(5,12)	-0,41	(12,28)	0,26	(8,59)	0,30	(6,75)	0,57	(11,06)	-0,90	(5,99)

Source: Eurostat, PISA 2012, calculations in STATGRAPHICS, own construction

The correlation coefficients were in Germany much higher than in the Czech Republic. It could mean, that between PISA results and socioeconomic factors is relationship. Unfortunately, statistically significant dependence hasn´t been proved in neither case. Based on these results we can say that results of 15 years old students are independent on these socioeconomic factors.

3   ESCS results 2012

Responsible policy of education should provide all students equal opportunities. It shouldn´t be important from which socioeconomic background they come. In PISA survey measures socioeconomic background of 15 years old students the ESCS index – the index of social, economic and cultural status. The ESCS index is based on three indicators – the highest education of parents (count of years of formal education by ISCED), the highest occupational status of parents (by ISCO) and the index of family property (very important part of this index is count of books at home). Results of the ESCS index are in the interval from -1 to +1. Positive value of this index says that the country has a better social, economic and cultural background than the OECD average. Negative value of this index says that the country is worse than the OECD average. (Palečková, Tomášek, Basl, 2010)

Students and schools fill in a questionnaire to get better information about background of students. Students fill in information about their family background, about their attitudes and their views on the school environment. Headmaster of primary schools fills in the questionnaire about school environment.

In this chapter, we focus only on the last PISA survey from 2012. The following figure (Fig. 2) shows the relationship between the average score of students in mathematics (y-axis) and the average ESCS index (x-axis). This figure shows a direct correlation – the average results grow with a rise of the average ESCS index. Countries lying nearby the centre line have the closest relationship. Results of the Czech Republic (red in the figure) are showing, that the Czech Republic is country with is slightly above the average results in mathematics and slightly below the average ESCS index. Their relationship demonstrates that the socioeconomic background of 15 years old students has influence on results of PISA survey.

It is also true that the results of the students in the Czech Republic are correlated with their own the ESCS index and with the ESCS index of whole school. The values of the ESCS index are much different within schools. It means that students with similar socioeconomic background attend the same type of school. The table number 2 describes the results of ESCS index and results in mathematics for different types of schools in the Czech Republic.

Fig. 2: Average result and average index ESCS (PISA 2012 – Mathematics)
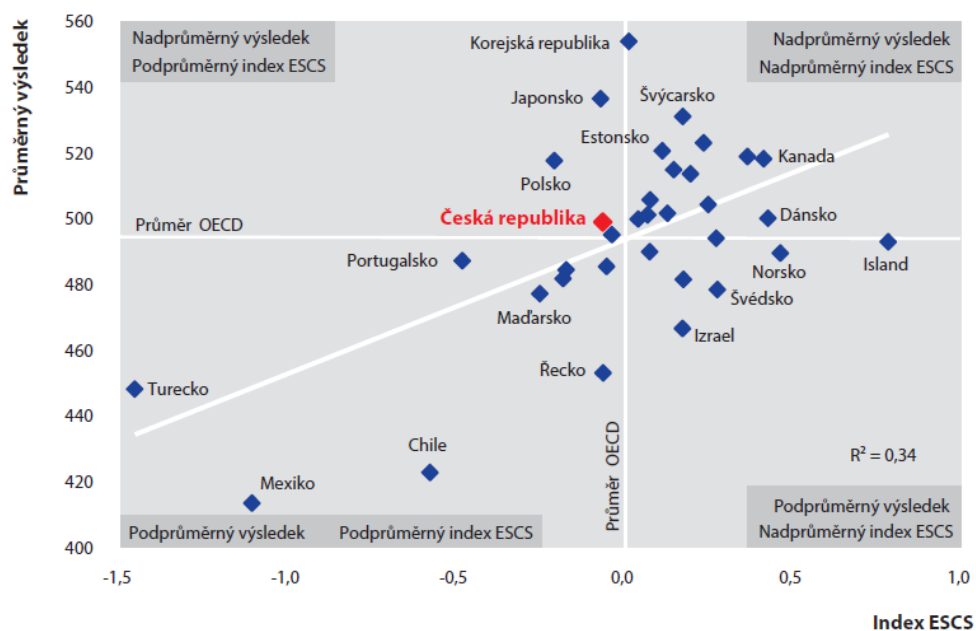
Source: Palečková, Tomášek, 2013

Tab. 2: Results in mathematics and socioeconomical status of students by type of school

	School	Average value of the index ESCS	Average results in mathematics
ISCED 2	Primary school	-0,17	476
	Lower secondary education	0,53	584
	Special school	-1,04	314
ISCED 3	Upper secondary education	0,57	619
	Gymnasium	0,33	585
	Secondary technical shool, secondary vocational school with Maturity	-0,06	515
	Secondary technical school, secondary vocational school without Maturity	-0,43	422
Total		**-0,07**	**499**

Source: Czech school inspectorate, 2014, own construction

The table shows that the student's results are really depend on the type of school. Their family background is different too. In ISCED 2 have students of Special schools the worst results. Students of Lower secondary education have the best results in PISA scores (above average) and in their socioeconomic background too.

In ISCED 3 have students of Upper secondary education the most above average results. Their standard of living is significantly higher than the standard of living of other groups. Students of Secondary technical school and secondary vocational school without Maturity have the worst results.

These results confirm that there exists the direct linear relationship between the value of ESCS index (or socioeconomic environment) and the PISA results. Better socioeconomic background means higher PISA results. The best results have the students of Upper secondary education they have also the highest socioeconomic status. Maybe this relate to the fact that their sorting at early age doesn´t depend on their abilities, but it does depend on their social origin. It means that grammar schools are instrument of the privileged strata. (Matějů, Straková, 2003)

Conclusion

The results of Czech students in PISA survey aren´t affected by socioeconomic factors – GDP per capita, unemployment rate, inflation rate, total fertility rate, the percentage of university graduates in the Czech republic and the number of teachers at primary schools. The results of Germany students have been similar.

It has been demonstrated that the results of Czech students do depend on individual socioeconomic factors. The ESCS index describes these factors. Last PISA survey from 2012 shows that the average results of students has the direct linear relationship between the value of ESCS index and the PISA results.

The best results have the students of Upper secondary education. In their case doesn´t depend their sorting at early age on their abilities, but it does depend on their social origin. It means that grammar schools are instrument of the privileged strata.

Acknowledgment

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