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Efficiency Of Public Expenditure On Education: Comparing Croatia With Other NMS

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Background

Motivation

- Modern economies are becoming more knowledge-intensive and service-oriented, which makes human capital more important than ever for mid-term and long-term growth
- Thus, education, the main channel of governments' influence on human capital formation, became important research subject in the field of economic growth
- Public expenditure on education is one of the most sizeable functional government expenditures so it has substantial impact on allocation of resources
- Developed societies need more educated people to contribute to further technological advancement
- On the other hand, sizeable fiscal deficits and public debts call for higher fiscal responsibility and increased efficiency of public expenditures. The policy attitudes regarding this trade-off are different across the EU member states

Existing literature

- Literature on endogenous economic growth (e.g. Wossemann, 2008; Krueger and Lindahl, 2001; Sianesi and Van Reenen, 2003)
- Educational efficiency (e.g. Afonso and Aubym. 2006; Aristovnik, 2013; Aristovnik and Obadić, 2014)

Methodology

Data Envelopment Analysis (DEA)

- DEA is a deterministic, non-parametric, linear programming technique that provides a piecewise frontier by enveloping the observed data points, and yields a convex production possibilities set
- Popularized by Charnes et al. (1978)
- DEA score reflects the distance between the respective data point, in this paper a country, and the best practice point which lies at the frontier

$$\theta^* = min\theta \tag{1}$$

subject to

$$\sum_{j=1}^{n} \lambda_j X_{ji} \leq \theta x_{i0} \quad i = 1,2,\ldots,m; \tag{2}$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} \geq Y_{r0} \quad r = 1,2,\ldots,s; \tag{3}$$

$$\sum_{j=1}^{n} \lambda_j = 1 \tag{4}$$

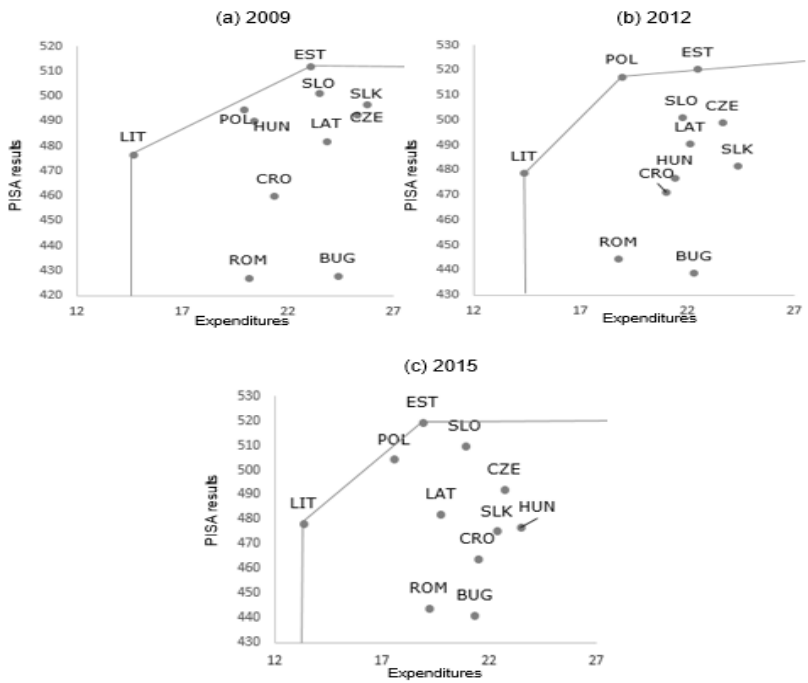
$$\lambda_j \geq 0 \quad \mathrm{j} = 1,2,\ldots,\mathrm{n}; \tag{5}$$

Data

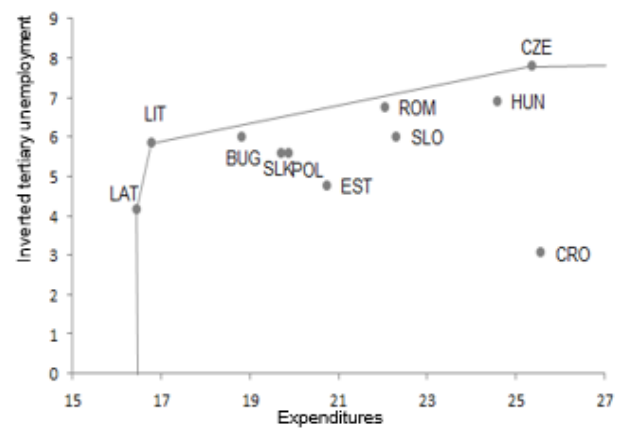
Data sources

- Research is based on publicly available secondary data obtained from the web sites of international institutions
  - Data on PISA results were obtained from OECD database
  - Data on expenditure on secondary education were obtained from UNESCO database on education and data on expenditure for tertiary education are from the World Bank database on education

Secondary education



Tertiary education



Source: authors

Results

Secondary education

2009	Efficiency score	Real input	Optimal input	Possible reduction
Estonia	**1**	**23.1**	**23.1**	**0**
Lithuania	**1**	**14.7**	**14.7**	**0**
Poland	0.95	19.9	19	0.9
Hungary	0.87	20.4	17.8	2.6
Slovenia	0.87	23.4	20.4	3
Slovakia	0.76	25.8	19.5	6.3
Czechia	0.73	25.3	18.5	6.8
Romania	0.73	20.2	14.7	5.5
Croatia	0.69	21.4	14.7	6.7
Latvia	0.67	23.8	15.9	7.9
Bulgaria	0.6	24.4	14.7	9.7

2012	Efficiency score	Real input	Optimal input	Possible reduction
Estonia	**1**	**22.5**	**22.5**	**0**
Lithuania	**1**	**14.4**	**14.4**	**0**
Poland	**1**	**18.9**	**18.9**	**0**
Slovenia	0.78	21.7	16.9	4.8
Romania	0.77	18.8	14.4	4.4
Latvia	0.71	22.1	15.8	6.3
Czechia	0.71	23.6	16.7	6.9
Croatia	0.69	21	14.4	6.6
Hungary	0.67	21.4	14.4	7
Bulgaria	0.65	22.3	14.4	7.9
Slovakia	0.61	24.3	14.7	9.6

2015	Efficiency score	Real input	Optimal input	Possible reduction
Estonia	**1**	**18.9**	**18.9**	**0**
Lithuania	**1**	**13.3**	**13.3**	**0**
Poland	0.96	17.6	16.8	0.8
Slovenia	0.84	20.9	17.6	3.3
Latvia	0.7	19.8	13.9	5.9
Romania	0.7	19.2	13.3	5.9
Czechia	0.67	22.7	15.2	7.5
Bulgaria	0.63	21.3	13.3	8
Croatia	0.62	21.4	13.3	8.1
Slovakia	0.6	22.3	13.3	9
Hungary	0.57	23.4	13.3	10.1

Tertiary education

	Efficiency score	Real input	Optimal input	Possible reduction
Czechia	**1**	**25.4**	**25.4**	**0**
Latvia	**1**	**16.5**	**16.5**	**0**
Lithuania	**1**	**16.8**	**16.8**	**0**
Romania	0.95	22.1	20.9	1.2
Bulgaria	0.92	18.8	17.3	1.5
Hungary	0.87	24.6	21.3	3.3
Poland	0.85	19.7	16.7	3
Slovakia	0.84	19.8	16.7	3.1
Slovenia	0.8	20.7	16.6	4.1
Estonia	0.77	22.3	17.3	5
Croatia	0.65	25.6	16.5	9.1

	Efficiency score	Real input	Optimal input	Possible reduction
Czechia	**1**	**25.4**	**25.4**	**0**
Latvia	**1**	**16.5**	**16.5**	**0**
Lithuania	**1**	**16.8**	**16.8**	**0**
Poland	**1**	**19.7**	**19.7**	**0**
Estonia	0.95	20.7	19.7	1
Bulgaria	0.88	18.8	16.5	2.3
Slovakia	0.84	19.9	16.8	3.1
Slovenia	0.75	22.3	16.8	5.5
Romania	0.75	22	16.5	5.5
Hungary	0.74	24.6	18.3	6.3
Croatia	0.71	25.6	18.3	7.3

Source: authors

Conclusions

Conclusions – Croatia in focus

- Input-oriented DEA approach used in this research showed that Croatian educational system is a laggard among NMS. Problem is especially pronounced in tertiary education
- The result is robust and in line with the most of previous empirical tests. In general
- The finding is that there is a room for substantial reduction of inputs, up to 10%, and the results suggest that such savings of public funds might be attainable without significant deteriorations of educational outputs
- Policy relevance: allocative inefficiency of use of public resources is always a cause of concern

Methodological limitations

- Measuring output in secondary education by average PISA scores of three dimensions involves significant error when there are large variations in results across dimensions. Indeed, this is the case in Croatia
- DEA's strict separation of inputs from outputs in a complex system such as education is artificial

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Thank you for your attention