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THE EFFICIENCY OF REGIONAL HIGHER EDUCATION SYSTEMS AND COMPETITION IN RUSSIA [1]

This paper explores the correlation between the degree of competition between higher education institutions (HEIs) and the efficiency of regional higher education systems using evidence from the Russian Federation. The choice of the regional system of higher education as a unit of analysis is explained by the features of the Russian system of higher education, especially by "closeness" in the borders of regions. We propose a special approach for the evaluation of the regional higher education system efficiency from the public administration perspective. Using data envelopment analysis (DEA), we investigate the efficiency of higher education systems in the regions and compare the results with the extent of higher education competition within them. The results indicate that higher efficiency scores and higher competition between HEIs in Russian regions are positively correlated. Moreover, by introducing socio-economic context status as a grouping parameter, we are able to specify the conditions of this relationship. The study explores that correlation between efficiency and competition is stronger in developing and low-performing regions. At the same time, higher education systems in developed regions consist of different HEIs, which create a competitive environment, although their efficiency level varies considerably. Taking into account all limitations of the study, these results contain several important issues for policy-making and higher education research discussions. They challenge the universalistic assumptions for the direction of higher education development.

Keywords: higher education, efficiency, competition, competitive environment, regions, regional system of higher education, socio-economic context, Russia, data envelopment analysis, Herfindahl-Hirschman index

Introduction

Policymakers have objective limitations (politically, socially and economically) in order to provide efficiency enhancement in the public sector. A number of policy approaches regard the concentration of resources as one of the driver of efficiency increasing [1]. For the post-massified era in higher education, it seems natural to seek a balance between providing generous access while assuring a level of quality which effectively contributes to social and economic development. Despite the fact that measuring efficiency in higher education is a difficult task, it is still an important issue for the public sector, and for higher education itself in particular. Policy often seeks the optimal point between the "invisible hand of the market" and targeted public investment in social development, usually made by government. It means that issue of 'competition management' and practice of regulatory impact assessment on competition (RIA) becomes an important instrument of public administration.

The goal of this paper is elaborate on policy-makers approaches to the issue of relationship between the intraregional competition of higher education institutions (HEIs) and the efficiency of regional higher education systems. Thus, aiming this, we make the first step to explore the correlation between named phenomena within different contexts. We show that in some contexts, the efficiency of higher education systems is connected with the amount of competition in the higher education market. Using data from the large and highly diversified national higher education system of Russia we present the differences in the efficiency of local HEIs coinciding with the regional market situation, and the rivalry of those HEIs.

In order to contribute to the discussion on the role of competition in higher education, in the first section of the paper, we describe the importance of competition for higher education efficiency. HEIs as organizations are multi-purpose, and any set of HEIs taken as a system is a complicated sample. It is an issue of interest for policy makers because of the reformation processes, especially mergers, in higher education across national systems in Europe and elsewhere. Academically, this issue is of interest to clarify the notions of efficiency and competition, their sources and the assumptions behind them.

In the second section, we measure the efficiency of regional higher education systems in Russia based on a set of indicators relevant for na-

tional higher education, and addressing HEI performance indicators. The measurement employs data envelopment analysis (DEA). We compare these results with our measurement of the extent of competition for students between HEIs in the regions, using the Herfindahl-Hirshman index (HHi). Finally, we refine the analysis of the relationship by splitting the sample regarding regional socio-economic characteristics. The correlations open the discussion on the balance between market-competition forces and targeted public governance which shape the higher education sector.

Higher Education Efficiency and Competition

Efficiency in higher education is complex for academics and university administrators because of the nature of the social sphere and it has became a mainstream issue for research and policy-making [2, 3, 4, 5] thanks to the growing managerialism [6, 7] of universities, national and global competition [8], and the public demand for greater accountability [9, 10, 11].

One reason lies for this in the consequences of the massification of higher education across the world [12]. The expansion both in terms of participation and the rising non-university educational sector has blurred the boundaries of higher education systems regarding their institutional constitution [13, 14, 15]. Along with the HEI landscape becoming more complex, the aspiration for its adjustment to the various (and sometimes inharmonious) public and private needs is growing. This discussion refers to ways to increase the efficiency of public fund allocation [16], or particular institutional strategies for enhancing performance. For instance, institutional mergers [17] often address the task of enhancing performance, since generally this measure is perceived as a concentration of resources [18].

Developing the idea of an evaluative state [19], these strategies to improve efficiency and effectiveness indicate the changing role of the State and the level of competition in higher education systems. As Horta et al. [20, p. 150] note, "the government's main objective has been to increase the efficiency and effectiveness of the institutions, within a regulated context which is clearly related to the state supervision model, where the state fosters competition between the institutions in a higher education market" (cit. from [21]).

Much attention has been paid to the issue of the role of the State and the market in higher education (e.g. [22, 23, 24]). The response of HEIs and systems to market competition has been widely discussed by academics and policy-makers [25].

Although we do not insist on the existence of a market in higher education [24], a market "lens" can provide a better understanding of HEI behaviour and diversity of HEIs in a system. By "market" we do not mean the free market philosophy of classical liberalism; the higher education market is seen more as cooperation between the state and HEIs, where the state is the coordinator and initiator of marketization [21, 26]. According to these terms, different types of markets exist for all HEIs, both public and private. Although the allocation of funding is often non-competitive (direct distribution to HEIs), "markets" appear in competition for R&D grants and students. Competition for students is an extremely significant market, especially for the higher education systems that mostly rely on funding from tuition fees.

As above discussion reveals, the higher education system efficiency and competition between HEIs are strongly knitted together, yet causality between them is not the case for investigation here. Research shows that the performance of universities is an outcome of the environment where they are located [27]. In this regard, a competitive environment can boost HEI activity and increase the efficiency of the higher education system. The external environment and different levels of socio-economic development can play a no less important role in determining the features of university performance than governance structures [28]. The function of universities is closely linked to the economies of their local region [29].

In order to answer our basic question of whether competition and efficiency in higher education systems are interrelated, we refer to the case of Russia. This question becomes especially urgent due to the new government program regarding establishment regionally-oriented flagship universities, aimed to facilitate regional development. This reform is supposed to stimulate universities mergers that reduce the level of competition in the region.

Russian Higher Education

Higher education reforms in Russia include improving the effectiveness of the HEIs, primarily in terms of educational quality [30] including improving international rankings (Decree of the President of the Russian Federation, 2012). With dozens of regions national policies have to take regional diversity into consideration.

Russian Higher Education and Regional Borders

An analysis of market forces and efficiency would be incomplete without taking into account the characteristics and environmental factors that

shape the Russian national higher education system. According to Trow's classification [13], Russia has a universal higher education system, notably in terms of access. By 2013–2014 there were 969 HEIs (and 1482 satellites[1]) in Russia, 578 public HEIs (and 949 satellites) (here and following all statistics are from the Federal Statistic Agency, unless otherwise specified). The total number of students is 5,6 million. The proportion of students aged 17–22 is 84 % [31].

Along with massification, there is a high level of heterogeneity (see [32] for diversity in Russian higher education), and regional heterogeneity [33, 34]. HEIs have a non-uniform geographical distribution, about 40 % of HEIs are located in the Central Federal District. In particular, 23 % of Russian HEIs are in Moscow, while several regions are without HEIs.

The funding system of higher education from public sources is based on regional factors in administrative borders (detailed below). Although the federal government primarily regulates the issues of higher education development and imposes a "one-size-fits-all" policy to all regions [35], the region is an established segment from a socio-economic perspective (population mobility and labour market). Regional higher education systems are characterized by high level of "closeness". Cross-country migration is relatively low, the majority of students choose to study in their city or region of origin (The Center of Sociological Forecast, 2004). Moreover, funding for universities considers regional factors (in accordance with the regional development priorities, local authorities agree to HEI applications for budget funding). Thus, the higher education market (competition for students and funding) operates within administrative regions [34].

The legacy of the Soviet planning system still determines some of the characteristics of higher education associated with regions [32]. After the break up of the USSR, the explicit stratification and regional distribution of universities disappeared. New socio-economic and political circumstances forced universities to find their niches in the market economy. This resulted in the diversification of the supply side in higher education [36]. Some HEIs grew rapidly, and new ones were established in response to a favourable regional environment. However, some HEIs found themselves in isolation, unable to adapt to the new social and economic demands of their regions [33].

Do Russian HEIs Compete for Students?

Along with permission of private HEIs establishment, the public sector was modified by the introduction of a dual tuition fee system. Currently the funding of public universities consists of two major sources—public funds distributed according to student numbers (special formula and quota) and funds from tuition fees.

Public funding is allocated competitively on the basis of 12 parameters of educational and research activity. The Ministry of Education and Science determines the overall number of students supported by the state.[2] This procedure also includes a regional dimension—the estimated number of students need to be approved by regional authorities in accordance with regional labour market requirements. Every year public and private HEIs apply for the number of students that they are planning to attract. Private HEIs attract less than 1 % of all students supported by the state [37], public HEIs compete for almost all students receiving public funds.

Concerning tuition fees, privateness consolidated its position in the public sector. In public HEIs, 46 % of students are funded by public sources and 54 % by households. It makes the students body paying tuition fees in public HEIs three times larger than the whole student body in the private sector. Taking into account students in private HEIs, 61 % of Russian students are paying tuition fees. Competition for students on the basis of tuition fees is a reality in Russian higher education. Tuition fees are not strictly limited the minimum and maximum tuition fee can differ by a factor of ten even within the same region.

Such a mixed system of higher education funding determines the development of market mechanisms. The competition for students is one of them. The public funding scheme forces HEIs to compete with each other not only student numbers, but also for improving higher education and research quality—better HEIs get more budget-funded students. A mixed scheme also promotes competition between private and public HEIs for those students who are willing to pay for their education. The funding scheme stimulates competition between public institutions, and between the private HEIs and the privatized parts of public HEIs. This competition is reinforced by the closeness of the regional higher education systems within administrative boundaries.

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[1] These are the forms of higher education institutions that exist in Russia in a large scale. A satellite (branch) higher education institution is an entity, which is physically distant from its original (parent) university but affiliated with it.

[2] So-called controlled students numbers — admission quota guaranteed by state.

Approach

Efficiency

Data envelopment analysis (DEA) is used to assess the efficiency of the regional higher education system. In order to calculate the efficiency scores for higher education, many empirical studies use DEA in specific countries (e.g. [38, 5]) and from international comparative perspective (see a detailed review in [39]). Abankina et al. [40] also evaluated the performance of Russian HEIs using DEA. However, few studies compare the efficiency scores at the system level. One example is the evaluation of educational performance in Italian regions [41].

This method estimates the relative efficiency score as the distance from the production frontier. DEA as a nonparametric technique considering each region as a decision-making unit (DMU) using inputs to produce outputs [42]. Each DMU tries to maximize the efficiency ratio (outputs over inputs) choosing the best set of weights.

Considering the peculiarities of higher education in contrast to other industries we implement an output-oriented approach which means that DMUs maximize their outputs while inputs are considered to be constant. One more assumption we make is that education systems are characterized with a constant return of scale (CRS). Thus, we assume that each region faces the same efficiency frontier that seems most relevant for the education sector, where the scope of production cannot influence the output and efficiency (see [41]). The CRS was taken into account as a configuration for calculations. We use the FEAR package in R to produce efficiency scores [43].

For DEA we use the following input and outputs:

Input 1:[1] the funding for regional higher education system per normalized number of students;

Output 1: the number of students (bachelor, master or their equivalent) per 10000 population;

Output 2: the number of enrolled full-time students per number of school-leavers who passed the state university entrance exam (2013–2014);

Output 3: the share of students in efficient (see below) HEIs.

The total funding of the regional higher education system was chosen as a basic indicator of input. It is typical for efficiency evaluations to use it as an input parameter not only in the commercial sphere, but in the public sector as well

[5]. The indicator is normalized per number of students.[2]

Output 1 reflects access as one of the most important higher education performance indicators. Higher education access is controlled by the government and demanded by society (see e.g. "Progress in higher education reform across Europe Governance Reform", CHEPS). This parameter indicates the social mission of regional higher education. We chose this indicator because it depicts the government commitment to provide a minimum guarantee of free access to higher education.

Output 2 is the response of higher education systems to student demand, which is a parameter of higher education performance [33]. It is estimated by the ratio of a number of enrolled full-time students secondary of the school leavers from region located in the region. If the ratio is bigger than one, it means that the regional system of higher education attracts students from other regions. This indicator detects to what extent regional higher education facilitates a positive impact on regional socio-economic development [44] in terms of, for example, increasing the human capital of the region, or direct financial outputs from visiting students.

Output 3 assesses the objective parameters of the quality of the regional higher education system from the government perspective. Generally, government action is considered the execution of the public will. In 2012, the Ministry of Education and Science of Russia established a special annual monitoring of HEI performance, including more than 100 parameters which all universities and satellites are obliged to measure. The Ministry defined seven indicators in various dimensions as determining HEIs' effectiveness. If HEI has more than four indicators in the "red zone", this institution is recognized as ineffective. The Ministry considers these results as the evidence for policies towards these universities finance for programs of development, or to be merged. Output 3 calculated as the normalised number of students in effective HEIs per total number of students in the particular region.

Competition

After calculating the efficiency scores over Russian regions, we compare them with the variables describing the level of competition for students between HEIs in the regions. The estimation of competitive markets in education is relatively

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[1] The single input is appropriate for many researches (e.g. Madden, et al. 1997; Sibiano and Agasisti, 2013), it allows to reasonably interpret the data.

[2] We use normalized students numbers, measured as overall number of full-time students, 25 % of evening courses' students and 10 % of part-time students. Government and HEIs commonly use this measure for financial statistics and operations

Descriptive statistics of data set and data sources

		min	mean	max	SD	Source
Input 1	Funding of regional HE system per normalized number of students, thousand rub.	117,76	212,89	545,97	0,37	Federal Statistics Agency, 2014
Output 1	Number of students (bachelor's, master's level or their equivalents) per 10000 population	71,9	343,4	740,5	0,32	
Output 2	Number of enrolled full-time students per number of school-leavers, who passed the USE (2013–2014)	0,10	0,76	2,77	0,53	
Output 3	Share of students in efficient HEIs	0,05	0,81	1,00	0,21	The Monitoring of HEIs Efficiency, 2013

developed. However, the research mostly explores secondary education (e.g. [45, 46, 47]). Modelling competition in higher education is related to price formation [48].

In order to estimate the level of competition, we use a reciprocal form of HHi. A wide range of studies use this type of index to evaluate the internal diversification of HEIs [49, 50, 51, 52], which corresponds to the degree of competition or monopolization. In a study of marketization, Teixeira et al [53] use HHi to evaluate diversification at the regional level (program diversification)—formula 1. There are some attempts to evaluate regional competition from a more common perspective—competition among organizations [33, 34].

Formula 1—the competition index:

$$D_j = \sum_i \left(\frac{X_{ji}}{x_j} \right)^2, \qquad (1)$$

where x_{ji} is the number of students in institution i in region j, X_j is the total number of students in HEIs within region j. The index takes a value from 0 to 1. The lower the value, the higher the level of competition.

Data

We use data from 82 Russian regions, not taking into account Nenets Autonomous Area (with no higher education institutions). Table 1 describes our dataset and data sources. The variation over the regions is relatively high.

In order to evaluate the performance of regional higher education systems we calculate the share of students in those HEIs were indicated as "at risk of being ineffective" [37]. We use data from the monitoring of HEI performance (http://indicators.miccedu.ru/monitoring/). The analysis uses the same database to estimate the competitive environment in regional higher education systems. In order to calculate HHi, we use the number of HEIs and their size in terms of the student body in each region.

Results

DEA Efficiency Scores and Competition Environment

A DEA analysis provided efficiency scores for each region. As we use overall funding as input, and run an output-oriented model, the scores show how spending (private and public) works in different higher education systems. The distribution of scores is shown in Figure 1; Table 2 shows the descriptive statistics.

Table 3 describes the difference between input and outputs in average numbers between four groups of regions distinguished by their efficiency. In general, efficiency is determined by lower funding and higher output, however the relationship is not direct. Five of the most efficient regions have relatively different input-output ratios.

Our basic question concerns the relationship between the efficiency scores and the competitive environment in higher education systems. The calculated HHi has lower variance than DEA Efficiency scores shown in Table 2 and Figure 2. Moreover, there are clear outliers. These five regions (Table 4) are highly monopolized. These systems include only a few HEIs—one public HEI, and one or two satellites of public or private HEIs. In the Jewish Autonomous Region (Evreyskaya Avtonomnaya Oblast) there is one private HEI and in Chukotka there are only two satellites of public HEIs.

Pearson's correlation between efficiency scores and HHi is (−0.34) and it is significant at a 99 %

Descriptive statistics — DEA efficiency scores and Herfindahl-Hirschman index

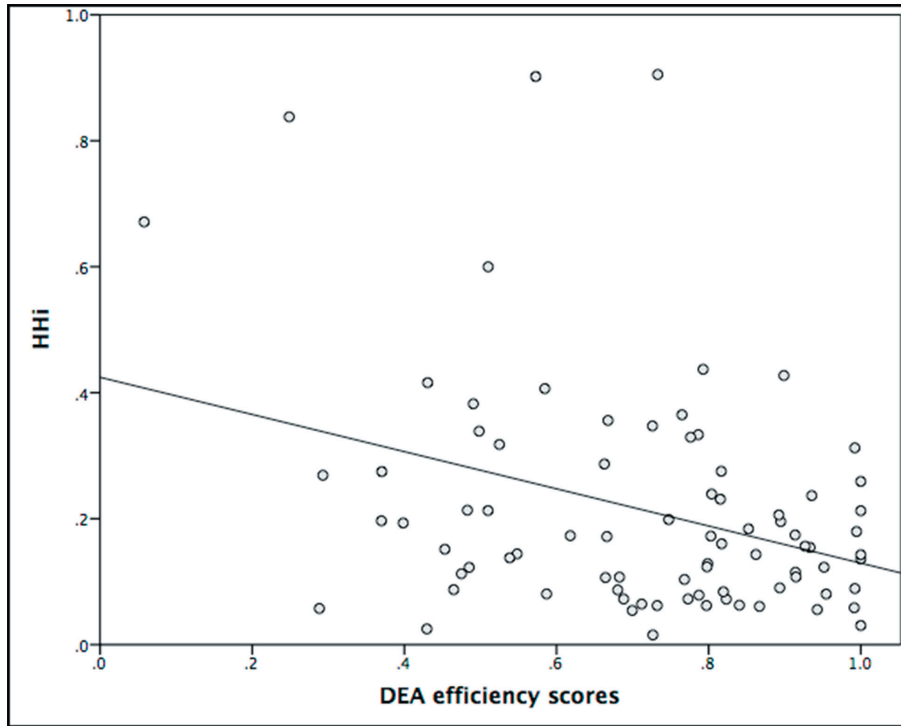|	Min	1st Qu.	Median	Mean	3rd Qu	Max	SD
DEA efficiency scores	0,06	0,55	0,77	0,72	0,89	1,00	0,21
HHi	0,02	0,09	0,16	0,21	0,27	0,91	0,18

Fig. 1. *Distribution of regions by efficiency scores and competition level*
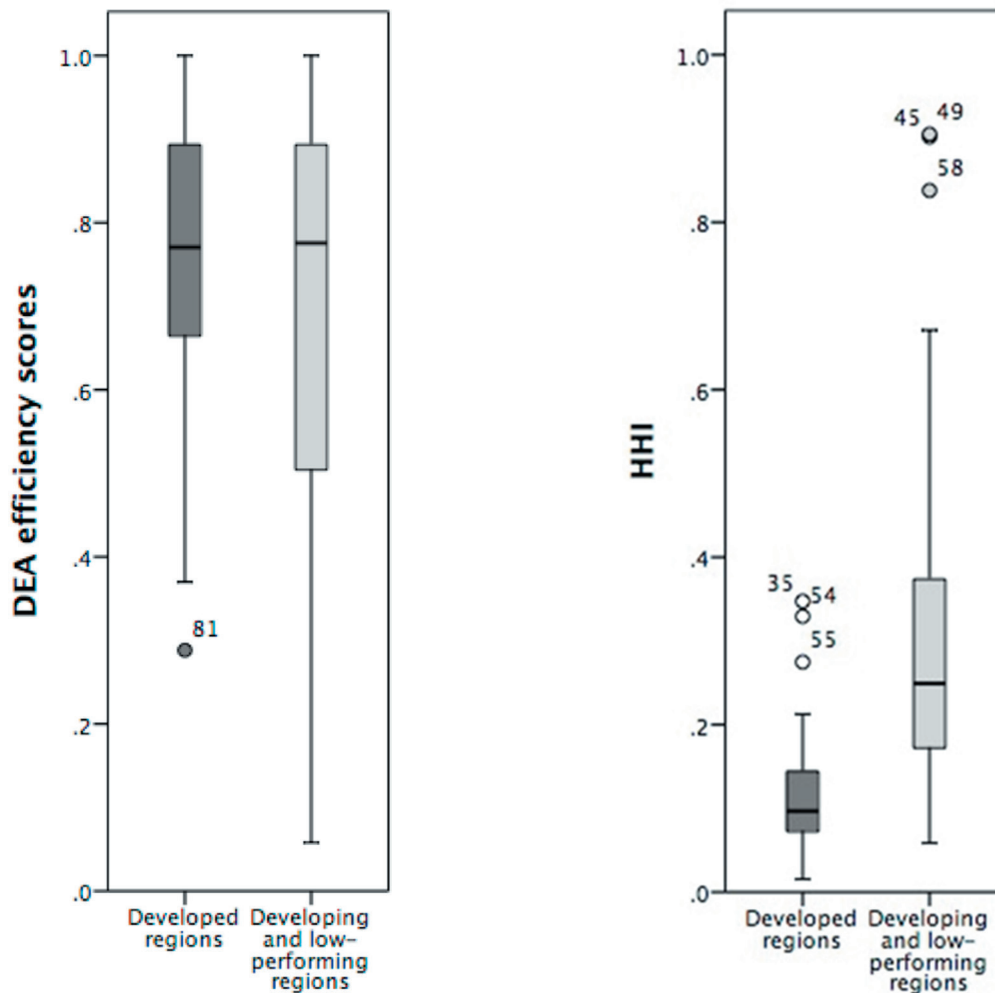

Fig. 2. *Distribution of efficiency scores and HHi by groups of regions*

Table 3

Average input and outputs values by groups

	N	Efficiency scores (range)	Group average			
			Funding per Number of Students (Norm)	Students per 10000 population	Number of enrolled full-time students per number of school-leavers	Share of students in "publically efficient" HEIs
1	20	0.058–0.54	295,96	275,77	0,51	0,79
2	20	0.54–0.76	224,36	353,40	0,83	0,92
3	21	0.77–0.892	174,29	348,16	0,80	0,94
4	21	0.893–1.00	161,44	393,51	0,89	0,94

confidence interval. Hence, the correlation falls into the average level, and it is negative. Figure 2 provides a visualization of this relationship with a decrease of HHi (decrease of monopolization); DEA efficiency scores are increasing. This result suggests that a higher level of competition is knitted together with higher efficiency.

Socio-economic contexts

Some studies show that the external conditions of regional economics correlate with university efficiency. Huggins and Johnston [54] argue that UK universities in more competitive regions are generally more productive than those that are located in less competitive regions. We compare regional higher education system performance and the level of monopolization for some regions differentiated by their socio-economic status.

In order to define groups of regions by their socio-economic characteristics, we classify regions into two groups—leaders and developed regions ($n = 42$), and developing and low-performing regions ($n = 40$) (RA Expert, 2007). This provides a more comprehensive view of the regions than pure parameters such as GDP per capita, population.

Figure 2 depicts the degree of difference within groups of regions regarding our main parameters—efficiency scores and HHi. Here we would like to emphasize several points. First, developed regions have a strong competitive environment in higher education. This group includes such regions as Moscow, Saint-Petersburg, the Republic of Tatarstan, Tomsk Region, which have the largest and the most developed higher education systems. However, the efficiency of these higher education systems varies significantly. Second, in terms of the extent of monopolization, the most diverse group is the group of relatively low-performing regions. In these regions, the situation can differ from one or two small HEIs in the whole region (Chukotka or Tyva Republic) out to the quite large and diversified systems of the Republic of North Ossetia-Alania, the Republic of Dagestan and Ivanovo Region.

At this stage, it is clear that the efficiency of higher education systems in developed regions is

Table 4

Outliers by Herfindahl-Hirschman index

Region	HHI	Efficiency scores
Jewish Autonomous Region	0,60	0,51
Chukotka	0,67	0,06
Republic of Tyva	0,84	0,25
Republic of Altai	0,90	0,57
Republic of Ingushetia	0,91	0,73

Table 5

Pearson's correlation between DEA efficiency scores and HHi by socio-economic groups of regions

	Type of region	Correlation
1	Developed regions	−0.045
2	Developing regions and low-performing regions	−0.445**

not related to the competitive environment. The systems and factors that influence higher education system performance are far more complicated. This is supported by Pearson's correlation (Table 5) which is very low and insignificant.

The relationship between efficiency scores and the level of competition is higher in developing and low-performing regions. Within developing regions it is negative and significant at a 95 % confidence interval. The correlation within these regions is higher (−0.445) and significant. These results suggest that for higher education systems in developing and low-performing regions, a strong competitive environment might be very important for their efficiency.

For example, the efficiency of the Karelian higher education system has a low value (0.49), so the region is in the first quantile of the least efficient regions. By HHi Karelia is also in the marginal group (HHi = 0.38) which means the relatively high level of monopolization. More precise view on the system supports the assumption of the weak competitive environment. Although there are 10 HEIs, the system consists of only one relatively large public university in which concentrated 60 % of students in the region (and more

than 85 % of full-time students in region enrolls in this university).

Conclusion

The analysis in this study aims at bringing the light into the question of the relationship between higher education system efficiency and level of competition within the regional higher education system. The results indicate that higher efficiency scores and higher competition between HEIs in Russian regions are positively correlated. Moreover, by introducing socio-economic context status as a grouping parameter, we are able to specify the conditions of this relationship. The correlation between efficiency and competition is stronger in developing and low-performing regions. At the same time, higher education systems in developed regions consist of different HEIs, which create competitive environment, although their efficiency level varies considerably. This allows suggesting a hypothesis for the future discussions that the effectiveness of regional higher education systems in the developed regions may depend on a complex set of factors.

Our analysis of Russian higher education has limitations for cross-national policy implications. It is focused on one national higher education system with common rules which may not apply on supra-national scales. The choice of efficiency indicators is always debatable because they have to be locally determined, according to the national conditions and the peculiarities of the national higher education system. The competitiveness in other dimensions (for example, between different types of institutions) could be much more influential. Nevertheless, a large-scale and diversified system can provide important evidence for discussion about the competition in local markets and for policy considerations.

Even with these limitations, the results contain several important issues for policy-making and higher education research discussions. They challenge the universalistic assumptions for the direction of higher education development. We define that this policy instrument of "competition management" (for example by facilitation of university mergers) should be different for the diversified set of regions with various socio-economic conditions. We can assume that in less developed regions, the measures promoting or restraining competition have more impact. Yet, the issue needs more research in order to argue with the claims for enhancing the concentration of resources to improve efficiency.

There are several promising questions for the further research. The causality between the socio-economic conditions and the relations between competition and efficiency is an issue needing further investigation. The variety of local conditions allows for comparing the ties between competition and efficiency and other contexts: political, cultural, social. The mutual influence of efficiency and competition is also important.

Acknowledgements

References

1. Baumol, W. & Blinder, A. (2015). *Microeconomics: Principles and policy.* Cengage Learning, 528.

2. Abbott, M. & Doucouliagos, C. (2003). The Efficiency of Australian Universities: A Data Envelopment Analysis. *Economics of Education Review, 22(1),* 89–97.

3. Johnes, J. (2006). Data Envelopment Analysis and Its Application to the Measurement of Efficiency in Higher Education. *Economics of Education Review, 25(3),* 273–288.

4. Welch, A. R. (1998). *The Cult of Efficiency in Education: Comparative Reflections on the Reality and the Rhetoric.* Comparative Education, 34(2), 157–175. Retrieved from: http://www.scopus.com/inward/record.url?eid=2-s2.0–0001361360&partnerID=tZOtx3y1 (date of access: November, 5, 2015).

5. Nazarko, J. & Šaparauskas, J. (2014). Application of DEA Method in Efficiency Evaluation of Public Higher Education Institutions. *Technological and Economic Development of Economy,* 1–20.

6. Deem R. & Brehony, K. J. (2005). Management as Ideology: The Case of "New Managerialism" in Higher Education. *Oxford Review of Education, 31(2),* 217–235.

7. Deem, R., Hillyard, S. & Reed, M. (2007). *Knowledge, Higher Education, and the New Managerialism. Knowledge, Higher Education, and the New Managerialism: The Changing Management of UK Universities.* Oxford: Oxford University Press, 244.

8. Marginson, S. (2006). Dynamics of National and Global Competition in Higher Education. *Higher Education, 52(1),* 1–39.

9. Alexander, F. K. (2000). The Changing Face pf Accountability: Monitoring and Assessing Institutional Performance in Higher Education. *Journal of Higher Education, 71(4),* 411–431.

10. McLendon, M. K., Hearn, J. C. & Deaton, R. (2006). Called to Account: Analyzing the Origins and Spread of State Performance-Accountability Policies for Higher Education. *Educational Evaluation and Policy Analysis, 28(1),* 1–24.

11. Huisman, J. & Currie, J. (2004). Accountability in Higher Education: Bridge over Troubled Water? *Higher Education, 48(4),* 529–551.

12. Guri-Rosenblit, S., Šebková, H. & Teichler, U. (2007). Massification and Diversity of Higher Education Systems: Interplay of Complex Dimensions. *Higher Education Policy, 20(4),* 373–389.

13. Trow, M. (2007). Reflections on the Transition from Elite to Mass to Universal Access: Forms and Phases of Higher Education in Modern Societies since WWII. In: J. F. Forest & P. Altbach (Eds). *International Handbook of Higher Education SE, 13(18),* 243–280. Springer Netherlands.

14. Huisman, J. & Kaiser, F. (Eds). (2001). Fixed and Fuzzy Boundaries in Higher Education : A Comparative Study of (Binary) Structures in Nine Countries. *Den Haag: Adviesraad voor het Wetenschapsen Technologiebeleid,* 114. Retrieved from: http://doc.utwente.nl/37714/ (date of access: November, 5, 2015).

15. Huisman, J. & van Vught, F. (2009). Diversity in European Higher Education: Historical Trends and Current Policies. In: F. van Vught (Ed.), *Mapping the Higher Education Landscape, 2(28),* 17–37. Netherlands: Springer.

16. Liefner, I. (2003). Funding, Resource Allocation, and Performance in Higher Education Systems. *Higher Education, 46(4),* 469–489.

17. Harman, G. & Harman, K. (2003). Institutional Mergers in Higher Education: Lessons from International Experience. *Tertiary Education and Management, 9(1),* 29–44.

18. Johnes, J. (2014). Efficiency and Mergers in English Higher Education 1996/97 to 2008/9: Parametric and Non-parametric Estimation of the Multi-input Multi-output Distance Function. *The Manchester School, 82(4),* 465–487.

19. Neave, G. (1998). The Evaluative State Reconsidered. *European Journal of Education, 33(3),* 265–284.

20. Horta, H. Y., Huisman, J. & Heitor, M. (2008). Does Competitive Research Funding Encourage Diversity in Higher Education? *Science and Public Policy, 35(3),* 146–158.

21. Amaral, A. & Magalhães, A. (2001). On Markets, Autonomy and Regulation the Janus Head Revisited. *Higher Education Policy, 14(1),* 7–20.

22. Dill, D. D. (1997). Higher Education Markets and Public Policy. *Higher Education Policy, 10 (3–4),* 167–85

23. Dill, D. D. (2003). Allowing the Market to Rule: The Case of United States. *Higher Education Quarterly, 57(2),* 136–57.

24. Marginson, S. (2013). The Impossibility of Capitalist Markets in Higher Education. *Journal of Education Policy, 28(3),* 353–370.

25. Brown, R. (2008). Higher Education and the Market. *Perspectives: Policy and Practice in Higher Education, 12(3),* 78–83.

26. Jongbloed, B. (2003). Marketisation in Higher Education, Clark's Triangle and the Essential. *Higher Education Quarterly, 57(2),* 110–35.

27. Braunerhjelm, P. (2008). Specialization of Regions and Universities: The New Versus the Old. *Industry and Innovation, 15,* 253–275.

28. Knott, J. H. & Payne A. A. (2004). The Impact of State Governance Structures on Management and Performance of Public Organizations: A Study of Higher Education Institutions. *Journal of Policy Analysis and Management, 23(1),* 13–30.

29. Kwiek, M. (2011). Universities, Regional Development and Economic Competitiveness: The Polish Case. *CPP RPS, 23,* 29. Retrieved from: http://www.cpp.amu.edu.pl/pdf/CPP_RPS_vol.23_Kwiek.pdf (date of access: November, 5, 2015).

30. Froumin, I. & Kouzminov, Y., (2015). *Supply and Demand Patterns in Russian Higher Education.* In: Schwartzman, S., Pinheiro, R. & Pillay, P. (Eds). Higher Education in the BRICS Countries Investigating the Pact Between Higher Education and Society. Netherlands: Springer Science & Business Media, 97–125

31. Nikolaev, D. & Chugunov, D. (2012) *The Education System in the Russian Federation Education Brief.* The World Bank Study, 48–59.

32. Froumin, I., Kuzminov, Y. & Semyonov, D. (2014). Institutional Diversity in Russian Higher Education: Revolutions and Evolution. *European Journal of Higher Education, 4(3),* 209–234.

33. Leshukov, O. & Lisyutkin, M. (2014). Modern Approaches to the "Regionalization" of Federal Policy in Russian Higher Education. *Working papers by NRU Higher School of Economics.* Series PA "Public Administration", 1–27.

34. Andruschak, G. V., Novikov, A. V. & Pavlyutkin, I. V. (2010) *Regionalnyy atlas ekonomiki vysshego obrazovaniya (pokazateli rynka) [Regional atlas of higher education economy (market data)].* Moscow — Yoshkar-Ola: Poligraficheskoye Predpriyatiye Centr Print (Center Print Printing Enterprise), 80.

35. de Figueiredo, R. & Weingast, B. R. (2002). *Pathologies of Federalism, Russian Style: Political Institutions and Economic Transition,* 1–39. Retrieved from: http://faculty.haas.berkeley.edu/rui/mpfrussia.pdf (date of access: November, 5, 2015).

36. Bain, O. (2003). *University Autonomy in the Russian Federation Since Perestroika.* NY: RoutledgeFalmer, 2–16.

37. Karelina I., Sobolev A. B. & Sorokin S. (2015). Monitoring deyatelnosti obrazovatelnykh organizatsiy — *initsiativa sistemnykh izmeneniy v vysshem obrazovanii [Monitoring of educational organizations activity* — initiative for system changes in higher education]. *Higher education today, 7,* 55–61.

38. Agasisti, T., Arnaboldi, M. & Azzone, G. (2008). Strategic Management Accounting in University: The Italian Experience. *Higher Education, 55,* 1–15.

39. Wolszczak-Derlacz, J. (2014). *An Evaluation and Explanation of (in) Efficiency in Higher Education Institutions in Europe and the U.S. with the Application of Two-Stage Semi-Parametric DEA.* IRLE Working Paper No. 114–14, 39. Retrieved from: http://irle.berkeley.edu/workingpapers/114–14.pdf (date of access: November, 15, 2015).

40. Abankina, I., Aleskerov, F., Belousov, Y., Zinkovskiy, K. & Petruschenko, V. (2013). Evaluation of Effectiveness of Universities Using Shell DEA-Method Analysis. *Educational Studies, 2,* 15–48.

41. Sibiano, P. & Agasisti, T. (2013). Efficiency and Heterogeneity of Public Spending in Education among Italian Regions. *Journal of Public Affairs, 13(1),* 12–22.

42. Charnes, A., Cooper, W. & Rhodes, E. (1978) Measuring the Efficiency of Decision-Making Units. *European Journal of Operational Research, 2,* 429–444.

43. Wilson, P. W. (2008). FEAR 1.0: A Software Package for Frontier Efficiency Analysis with R. *Socio-Economic Planning Sciences, 42,* 247–254.

44. Bluestone, B. (1993). *An Economic Impact Analysis.* Boston: John W. McCormack Institute of Public Affairs; The University of Massachusetts, 1–12.

45. Dee, T. S. (1998). Competition and the Quality of Public Schools. *Economics of Education Review, 17(4),* 419–427

46. Bradley, S., & Taylor, J. (2002). The Effect of the Quasi-Market on the Efficiency-Equity Tradeoff in the Secondary School Sector. *Bulletin of Economic Research, 54(3),* 295–314.

47. Bradley, S., Johnes, G. & Millington, J. (2001). The Effect of Competition on the Efficiency of Secondary Schools in England. *European Journal of Operational Research, 135,* 545–568.

48. Gu, J. (2015). Price Collusion pr Competition in US Higher Education. *Studies in Higher Education, 40(2),* 253–277.

49. Rossi, F. (2009). Increased Competition and Diversity in Higher Education: an Empirical Analysis of the Italian University System. *Higher Education Policy, 22(4),* 389–413.

50. Teixeira, P., Rocha, V., Biscaia, R. & Cardoso, M.F. (2012). Competition and Diversity in Higher Education: An Empirical Approach to Specialization Patterns of Portuguese Institutions. *Higher Education, 63,* 337–352

51. Teixeira, P., Rocha, V., Biscaia, R. & Cardoso, M. F. (2013). Competition and Diversification in Public and Private Higher Education. *Applied Economics, 45(35),* 49–58.

52. Lepori, B., Huisman, J. & Seeber, M. (2014). Convergence and Differentiation Processes in Swiss Higher Education: an Empirical Analysis. *Studies in Higher Education, 39(2),* 197–218.

53. Teixeira, P., Rocha, V., Biscaia, R. & Cardoso, M. F. (2014). Policy Changes, Marketisation Trends and Spatial Dispersion in European Higher Education: Comparing Public and Private Sectors. *Cambridge Journal of Regions, Economy and Society, 7(2),* 271–288.

54. Huggins, R. & Johnston, A. (2009) Impact of Higher Education Institutions on Regional Economies Initiative. *Government and Policy, 27(6),* 1088–1106.

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