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What Affects The Ability To Accumulate The Best Applicants By Russian Universities? The Application Of Quantile Regression Model

Abstract

The aim of this paper is to evaluate which university's characteristics have the greatest impact on the competitiveness of universities in their ability to attract better students in Russia. We examined the impact of three groups of factors,related to teaching, research and entrepreneurial activities of universities. The quantile regression model was applied for the subsample of public and private higher education institutions localized in Russia.

The results prove that not only traditional, teaching-related factors affect the attractiveness of the universities. We found that the research quality and entrepreneurial experience both increase the ability to accumulate the best applicants by Russian universities. However, the synergy between training, research and business activities is not always achieved. The importance of science and business-oriented activities varies between public and private institutions. According to the results from the quantile regression the importance of the certain factors differs between the quantiles of the dependent variable distribution.

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Our findings might be useful for the governmental authorities during the universities' assessment as well as for the higher education institutions themselves – in order to define their strategic development and attract better students.

Keywords: *higher education institution, universities' competitiveness, Russian education system, students, quantile regression*

1. Introduction

The gap between education and science in Russia results in a great opposition between universities as educational institutions and the Russian Academy of science. This was inherited from the Soviet time, when the main aim of the universities was to teach, while science was mostly concentrated in the Russian Academy of science and various research institutes. Later, this system was changed, and different kinds of universities appeared, with a variety of functions. Currently, there are special types of higher education institutions in Russia: federal and national research universities. While the majority of universities receive public funding mostly for education, the main aim of federal and national research universities is to be a national-level centres of applied and fundamental researches.

On the contrary, academies are concentrated on a certain area of research, like health or agriculture. The so-called "institutes" specialize in training specialists for specific professions, and carry out the relevant research studies.[1] In the sector of higher education in Russia there are also a lot of private institutions, which are mostly small-scale organizations that train students in many fields, especially in the humanities and social sciences. Obviously, the variety of educational institutions can hardly be integrated in one system, and a certain contradiction between their functions make the strategic goals setting for this sector very challenging.

Besides, a number of new problems appeared and need to be solved. On the one hand, Russian universities still face a problem of inadequate government funding, shortage of qualified specialists (European Commission, 2012), corruption, declining number of younger academic staff or low quality of incoming students (Smolentseva 2003, 2015). On the other hand, universities have to be involved in building the knowledge-based economy. It means the necessity of enhancing the competitiveness, strengthening the connections between science, education and business and promoting the interactions between

[1] http://www.russianenic.ru [access date: 20.06.2016].

teaching and research-related activities. Simultaneously, various actions need to be initiated to improve the education quality.

In this paper we concentrate on competitiveness of the Russian universities and try to find the determinants of their attractiveness for entrants. In the core of our interest is the impact of traditional characteristics of teaching process and the role of science and business-oriented actions. While the new reality brings universities close to entrepreneurial paradigm and requires the knowledge-oriented modernisation of their business processes, a focus should be on the consequences of such reorientation for the educational process, because it is the main priority for the universities.

We hypothesize that especially the business-related activities might not always support universities' attractiveness. Another question is whether the educational prestige is affected by research quality and science performance or not. According to this, we used the entrants' scores – average results from the EGE tests.[2] They provide information about the quality and prestige of higher education institutions. The higher the average results of the EGE in a university, the more prepared entrants are coming there. In our research we are trying to estimate what the factors affect the choice of this best entrants.

This paper is organized as follows. The next part of this paper provides the discussion about the determinants of universities' attractiveness. In section 3 the data is described and the preliminary analysis is done. Part 4 presents basic information about the quantile regression model. The empirical results are provided in the part 5, while in the part 6 we discuss them. Finally, in the 7th part the conclusions are drawn.

2. What determines the attractiveness of the universities?

There are several different dimensions of universities' attractiveness that can be singled out from the universities rankings' analysis (Buela-Casal et al., 2007). Very often the rankings are based on the weighted values of various indicators that refer to different functions of the universities: teaching and education, infrastructure, international integration, quality of research, etc. Another source of information for attractiveness factors can be found in the literature of students' choice. The paper

[2] EGE (Edinyi Gosudarstvennyi Eksamen – Unified State Examination) is the test taken in the end of the last school year and consists of several subjects, some of them obligatory and some of them optional. The students compete with their EGE scores while apply to universities, so the "best" universities take "best" students.

(Zemtsov et al., 2015) provides a review of theoretical models and empirical studies of high school entrants' decision criteria.

Although the importance of high quality education for improving the universities' attractiveness among future students is undisputed, it is probably the widest and hardest area of the university's activity to be defined. Hence, it is impossible to approximate it using a single measure of performance. To characterize the quality of education process we can use the measures of "input" factors, like: modern equipment, access to books and journals provided by libraries, availability of accommodation in dormitories, number of well-qualified lectors, mobility programmes implementation (e.g. international courses and student exchange), range of innovative subjects, level of education fees (for private institution), etc.

Attracting the best students is one of the most important aim of the university. Its image is however build not only on education-related factors, but also on other activities, the importance of which grew during the first and second "revolutions" in the higher education system (Etzkowitz 1998). Those factors are research (added as the second mission of university in the higher education's first "revolution") and business activities (which extended university's activity in the second "revolution").

While the positive impact of educational performance is rather obvious, it is hard to say the same about the next two areas of university's activities. The influence of research-intensive environment on teaching activities (and so, attractiveness for applicants) is complex and debatable (e.g. Prince et al., 2007). Previous studies provided inconclusive results. Some of researchers, like Brew (2010) proved the positive impact of science-related activities on education, while another conclude there is no relationship between those two areas (Jenkins 2004). Finally, some of the authors found them as competing activities (Hacker and Dreifus 2010). Mägi and Beerkens (2015), who examined if the research-active academics are good teachers, found the positive relation between the scientific experience of lectors and their teaching skills. However, the relationship varied across disciplines, type of institutions, what might explain unclear evidences from other studies. In this case, it is quite possible that we can't guarantee the improvement of educational attractiveness by focusing on research-related activities of the university. The conditions to be achieved by the university to gain profits from such kind of work are rather specific and not necessarily impact the education quality.

The role of business-related activities is also disputable. One of potential advantages that student gain from the cooperation between the university and employers is better quality of alumni careers. The additional one is the wide opportunities of internships in firms, when students are able to apply their academic knowledge. Except the direct impact of business relations on educational process, there might be indirect effect of being involved into entrepreneurial activities. As

pointed by Lee and Rhoads (2004), academics who are actively involved in business activities tend to be more committed to teaching. However, shifting universities which are non-profit organizations towards being active entrepreneurs might affect negatively the education quality. Academics might treat teaching less serious or even neglect their responsibilities because of entrepreneurial activities. Especially, if the benefits from business-related work are higher than the basic academic salary, they might choose such activities over teaching.

The listed above factors do not close the list of the determinants of universities' attractiveness for applicants. The prestige of academia, opinion of others or localization of the institution might also affects the popularity of a particular university. However, as they are not in the centre of our interest, we omit further description of their role.

3. Database and preliminary analysis

We used data from 719 higher education institutions (universities) localized in Russia. The data came from the Ministry of Education of the Russian Federation Monitoring. As a measure of ability to attract the best applicants (dependent variable) we used an average of applicants' results of the EGE tests. The EGE tests serve both as the final school exam and the university entrance exam (Denisova-Schmidt and Leontyeva 2014).

The explanatory variables were specified to represent three strategic goals of the universities: student-oriented, science- oriented and entrepreneurial. We characterize first of them widely, by: availability of academic teachers (*teach*), access to infrastructure (*equipment*), students' characteristics (*full_time_s*, *CIS_stud*), further fate of alumnus (*unempl*) and specialisation of university in educational process (*HHI* and *economic*). The science-oriented goal of the university is measured by the impact of academic personnel'publications on science (*publ*). Finally, the entrepreneurial goal is defined by the indicators of innovation and business activities (*foreign, c_income*) and links to enterprises (*entr_agreem*). The names, definitions and summary statistics for variables are provided in Table 1.

All explanatory variables are for 2013, while the dependent variable was calculated for 2014. We used one-year lag in order to avoid the potential endogeneity and causality in our results. While for the teaching-oriented explanatory variables we expect the positive impact on the educational competitiveness (except the measure of unemployment among graduates), the influence of business and science activities might be both positive, negative or do not affect the educational process at all.

Table 1. Description and summaries for explanatory variables

Name	Description	Public universities		Private universities	
		N	mean	*N*	mean
ln(teach)	the total number of faculty members to 1000 students (as natural logarithm)	453	4.289	266	3.681
equipment	the share of the cost of modern (not older than 5 years) machinery and equipment in total cost of machinery and equipment	453	41.256	266	30.440
full_time_s	the share of full-time students in all university's students	453	61.440	266	26.456
CIS_stud	the number of foreign students from the CIS for 1000 graduates	453	2.775	266	2.714
unempl	the share of graduates who have applied for assistance in finding suitable work and recognized as unemployed	453	3.038	235	4.376
HHI	Herfindal-Hirshman index of university's specialization	453	45.382	266	59.459
economic	binary variable which takes the value of 1 for economic university[3] and 0 otherwise	453	0.033	266	0.459
ln(publ)	number of publications in the Web of Science / Scopus per 100 CPD (as natural logarithm)	453	1.235	266	0.546
ln(foreign)	revenues from R&D and educational activities from foreign sources (as natural logarithm)	453	3.262	266	1.286
ln(c_income)	revenues from university funds from income-generating activities per CPD (as natural logarithm)	453	6.162	266	6.936
entr_agreem	the number of enterprises that have signed contracts for training, per 1000 students	453	13.150	266	9.112

Notes: CIS – Commonwealth of Independent States (Russian Commonwealth).

Source: author's elaboration.

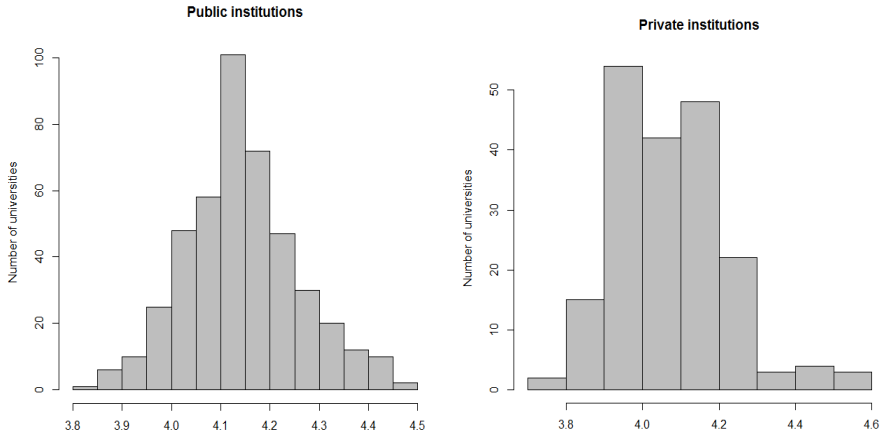
The statistically significant, positive impact of entrepreneurial and science activities of the universities would be interpreted as an evidence of the coexistence of traditional mission of academia and its new role of building university-industry-government relations. It might be also a sign that non-educational activities support universities to make them more attractive for potential students.

[3] By economic university we mean a university which specialize in economics and management. "0" stands for others, specializing in medicine, law, teaching, technical sciences etc.

In contrast, statistically significant, negative estimates for the characteristics of business work would be a signal that the implementation of the Triple Helix model by universities results in stagnation or relative decline of its traditional teaching role. Despite, it might also be an evidence of strong specialization of higher educational institution in particular area of activities. Hence, those institutions which are business-oriented do not compete for the best applicants.

Finally, it is possible that there is no relation between the university's ability to attract the best applicants and its business orientation. This scenario would be supported by insignificant estimates for the variables: *foreign*, *c_income* and *entr_agreem*. As mentioned in the Part 2 of this paper, it is possible if university is specialized in teaching and science and not involved in other activities.

Graph 1. Histogram of dependent variable for budget and non-budget institutions



Source: author's elaboration.

Two transformations of our dependent variable were made before further analysis. We use the natural logarithm instead of the nominal values of test results, because of long tail area of the EGE test results distribution. Additionally, we excluded from our sample the universities which have the average of EGE exams equal to zero as they did not take students in 2014. The share of eliminated universities in the whole sample is equal to 12%. Moreover, we conducted our analysis for public and private institutions separately. It is because budget and non-budget organizations differ in management style and government's social responsibilities (Locke et al., 2011, p. 103). Final distributions of our dependent variable for both subsamples are presented on Graph 1.

4. Quantile Regression

We applied quantile regression (QR) model to explore potential instability of relationship between explanatory and dependent variable. The QR approach was introduced by Koenker and Basset (1978) as a natural extension of traditional linear regression model. The QR model can be expressed as:

$$Y_i = \mathbf{X}_i' \boldsymbol{\beta}_{(\tau)} + \boldsymbol{\varepsilon}_{(\tau)i} \quad \text{with} \quad Q_{(\tau)}(Y_i \mid \mathbf{X}_i) = \mathbf{X}_i' \boldsymbol{\beta}_{(\tau)}, \tag{1}$$

where $i = 1,\ldots, n$ is the index for observations, τ is considered a quantile from the range $\tau \in [0,1]$, Y_i is the dependent variable, $\mathbf{X}$ is a matrix of regressors (as in the Table 1), $\boldsymbol{\beta}$ is a vector of parameters to be estimated, $\boldsymbol{\varepsilon}$ is a vector of residuals. The error term must satisfy the quantile restriction is the form: $Q_{(\tau)}(\boldsymbol{\varepsilon}_{(\tau)i} \mid \mathbf{X}_i) = 0$.

While in the standard regression model we concentrate on the average relationship between a set of predictors and dependent variable, based on the conditional mean-value function $E(Y_i|\mathbf{X}_i)$, in the QR model the relation between dependent and independent variables is described using the conditional median (or τ-th quantile) function $Q_{(\tau)}(Y_i \mid \mathbf{X}_i)$. The coefficient estimates are interpreted as being analogous to standard linear regression but with concentration on the particular part of the distribution of the outcome variable (Trzpiot 2009, 2011). Hence, we are able to achieve more complete picture about the impact of regressors on each part of the outcome variable distribution.

The QR estimator for τ-th quantile is obtained by solving the minimization problem in the following form:

$$\min_{\boldsymbol{\beta}\in\Re} \frac{1}{n}\left[\sum_{i\in\{i:Y_i \geq \mathbf{X}_i'\boldsymbol{\beta}\}} \tau \left| Y_i - \mathbf{X}_i'\boldsymbol{\beta} \right| + \sum_{i\in\{i:Y_i < \mathbf{X}_i'\boldsymbol{\beta}\}} (1-\tau) \left| Y_i - \mathbf{X}_i'\boldsymbol{\beta} \right| \right] = \min_{\boldsymbol{\beta}\in\Re} \frac{1}{n} \sum_{i-1}^{n} \rho_{(\tau)} \boldsymbol{\varepsilon}_{(\tau)i}, \tag{2}$$

where $\rho_\tau(\cdot)$ is so called "check function", defined as:

$$\rho_{(\tau)}\left(\boldsymbol{\varepsilon}_{(\tau)i}\right) = \begin{cases} \tau \boldsymbol{\varepsilon}_{(\tau)i} & \text{if} \quad \boldsymbol{\varepsilon}_{(\tau)i} \geq 0 \\ (\tau - 1)\boldsymbol{\varepsilon}_{(\tau)i} & \text{if} \quad \boldsymbol{\varepsilon}_{(\tau)i} < 0 \end{cases}. \tag{3}$$

The commonly mentioned advantage of the QR is robustness to outliers and heavy-tailed distribution. Moreover, the QR model avoids the restrictive assumption that the error term is identically distributed over all conditional distribution.

5. Empirical results

We begin from the description of the results for publicly funded universities and after that present the results for private institutions.

5.1. Public higher education institutions

First, we estimated OLS model with universities' characteristics and found that these models explain about 50% of the total variation of the dependent variable. Then we tested OLS residuals for heteroscedasticity and found significant regional variation. Hence, in the second step, we added the regional fixed effects to our model. The determination coefficient increased to 56%, what suggests that around 6% of the total dependent variable variation is the effect of regional inequalities (Table 2).

The results from both models (Table 2) prove the positive impact of teaching-related features of the publicly funded universities on their ability to require the best applicants. The growth of "the total number of faculty members per student" improves the university's attractiveness for potential students. Moreover, labour market demand for alumni is also taken into account by applicants. The better the labour market perspectives of graduates are, the better applicants (with higher EGE scores) want to study in such an academia. Finally, modernisation of the university's infrastructure positively affects its ability to attract the best applicants.

Table 2. Estimation results for public universities.

Variable	No regional fixed effects			Regional fixed effects		
	Coeff.	Std Coeff.	Robust S.E.	Coeff.	Std Coeff.	Robust S.E.
const.	3.565***	0.000	0.090	3.658***	0.000	0.091
ln(teach)	0.062***	**0.264**	0.022	0.038***	**0.160**	0.023
equipment	0.0005***	0.111	0.000	0.005***	0.102	0.000
full_time_s	0.002***	**0.240**	0.000	0.002***	**0.288**	0.001
CIS_stud	0.001	0.047	0.001	0.002	0.069	0.001
unempl	-0.003**	-0.095	0.001	-0.003**	-0.094	0.001
HHI	0.001***	**0.196**	0.000	0.001***	**0.217**	0.000
economic	0.077***	0.113	0.027	0.067***	0.099	0.023
ln(publ)	0.016***	0.141	0.005	0.015***	0.133	0.005
ln(foreign)	0.003**	0.094	0.001	0.002***	0.077	0.001
ln(c_income)	0.024***	**0.210**	0.006	0.024***	**0.214**	0.007
entr_agreem	-0.0004**	-0.085	0.000	-0.0004***	-0.096	0.000
Adj R^2	0.5094			0.5642		

Significant at the 0,01 level ***, 0,05 **, 0,1 *.

Source: author's elaboration.

Moreover, the university's specialisation also exerts a positive influence on its attractiveness. Non-diversified institutions with a focused specialization, such as medical colleges or law schools, are able to attract better applicants. Besides, higher EGE scores are required to enter the majority of the economic universities in Russia.

Science and business activities of the university were found as statistically significant and positive related with accumulation of applicants. Institutions with higher scientific potential are preferred by applicants over those with poor research position. Moreover, universities with higher revenues from R&D activities and funds from income-generating works engage better applicants. This suggests that entrepreneurial activities bring additional value to academia and can be important for the applicants when they make their choice, which university to enter.

We used standardized coefficients to compare the importance of teaching, science and business-related activities for applicants. We found that the share of full-time students is the most important parameter to attract the best applicants. This can be easily explained by the difference between the EGE scores of the full-time and part-time students. Applicants who achieved higher scores in EGE tests prefer to study full-time, while those whose results are lower study part-time. Except this, the level of university's specialisation (*HHI*), income-generating activities of university (*c_income*) and availability of academic teachers (*teach*) are of the highest importance for the applicants.

To explore the impact of explanatory variables on ability to attract applicants in more details, we applied quantile regression model. The results are provided in Table 3 and on Graph 2.

Table 3. Results from quantile regression for public universities

Variable	0.10	0.25	0.50	0.75	0.90
const.	3.664***	3.566***	3.697***	3.628***	3.711***
ln(teach)	-0.002	0.015	0.029	0.058*	0.038
equipment	0.0003	0.0005	0.0004*	0.0004*	0.0004
full_time_s	0.002**	0.002***	0.002***	0.002**	0.002***
CIS_stud	0.002	0.001	0.002*	0.002	0.001
unempl	0.001	-0.0002	-0.002	-0.003	-0.007**
HHI	0.001***	0.001***	0.001***	0.001***	0.001***
economic	0.036	0.052	0.060**	0.049**	0.022
ln(publ)	0.018**	0.014*	0.021***	0.017**	0.012
ln(foreign)	0.005**	0.003*	0.001	0.002	0.001
ln(c_income)	0.026*	0.034**	0.021**	0.023***	0.028***
entr_agreem	-0.0006**	-0.0006**	-0.0004*	-0.0004***	-0.0003
AIC	-933	-940	-950	-955	-942

Significant at the 0,01 level ***, 0,05 **, 0,1 *.

Source: author's elaboration.

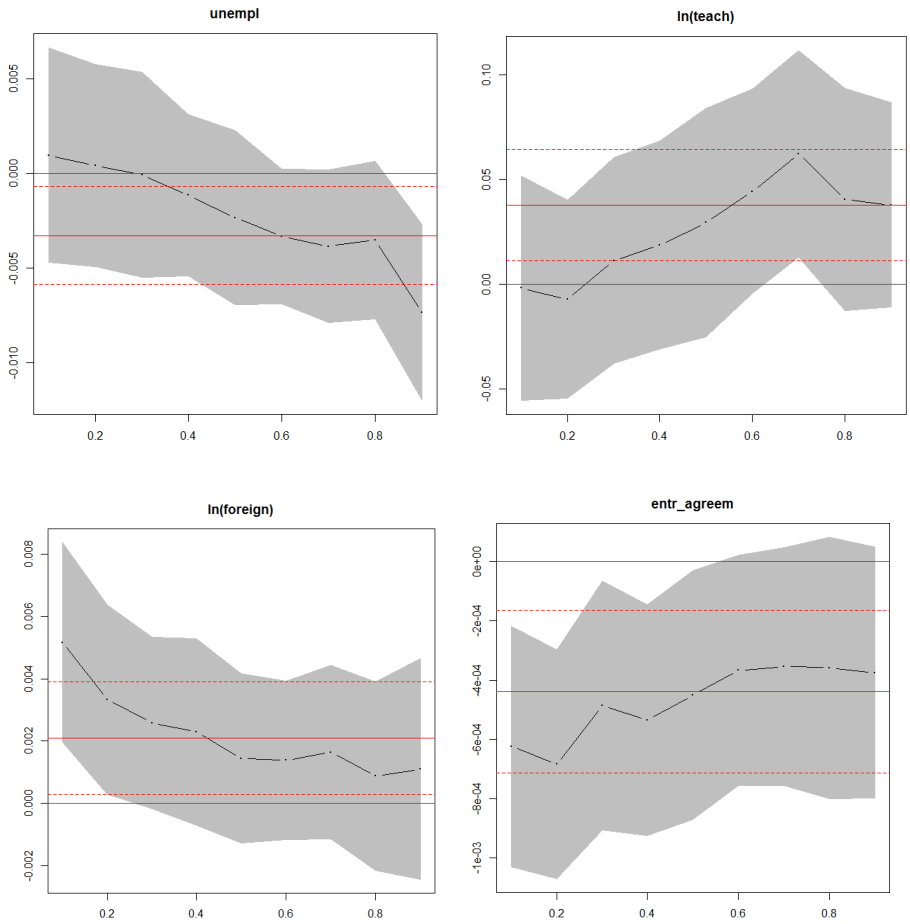
All factors which influence the best applicants engagement can be divided into two groups. The first one contains factors with the consistent impact on the distribution of the dependent variable, while the second group is formed with the universities' characteristics with an unstable impact.

The first group therefore contains: specialisation, science-related activities, income-generating university's work and the share of full-time students. The influence of these factors is the same on the attractiveness of the universities with the EGE scores higher and lower than the average.

In contrast, the impacts of the following factors are different for the universities with better and worse positions among applicants (Graph 2): R&D revenues, unemployment among graduates, number of enterprises that have signed contracts for training and number of teachers are.

The role of the revenues from R&D activities is more important in attracting better applicants for the universities with poor ability to accumulate the best potential students. The impact of this factor systematically decreases and is insignificant for the best universities. In contrast, the role of access to teachers rises along quantiles, what suggests that it is more important for the best universities than for the poor ones. Interesting is the impact of connectivity with factories (*entr_agreem*), measured by the number of contracts with enterprises. Although its role is minor (Table 2, standardized coeff.), its value is negative, what suggests that the best applicants prefer universities with small number of agreements over those with the large number of them. It might be explained by the relationship which universities had with big factories in the Soviet times. Universities with tight connections with factories were commonly regional (non-Moscow) institutions, concentrated more on supporting local industries by training than involved in classical higher education activities.

Graph 2. Selected results from quantile regression for budget organizations



Source: author's elaboration.

5.2. Private higher education institutions

Analogously to the public universities, we started our analysis from estimating the OLS model and after that we checked the stability of estimates using the quantile regression. Unlike the situation with the publicly funded universities, we did not find regional variability of the residuals, so we did not add fixed effects. The results from the OLS are presented in Table 4, while in Table 5 and on Graph 3 we provided the results from the quantile regression.

We were able to explain, using universities' characteristics, only 40% of the total variability of the dependent variable. It means that in case of private universities there are different factors which are responsible for creating the attractiveness among applicants. This conclusion is also supported by the insignificance of a half of the explanatory variables. Despite, similar to the publicly funded organizations, we found that the significant impact on the ability to attract the best applicants by private universities have their specialisation, science and business activities, characteristics of graduates and students.

Table 4. Estimation results for private universities.

Variable	Coeff.	Std Coeff.	Robust S.E.
const.	3.914***	0.000	0.092
ln(teach)	0.009	0.047	0.020
equipment	-0.0001	-0.032	0.000
full_time_s	0.003***	**0.499**	0.001
CIS_stud	-0.001	-0.058	0.002
unempl	- 0.004**	-0.116	0.002
HHI	0.001**	**0.202**	0.000
economic	-0.008	-0.027	0.023
ln(publ)	0.018*	**0.139**	0.010
ln(foreign)	0.006**	**0.132**	0.003
ln(c_income)	-0.003	-0.027	0.007
entr_agreem	-0.0001	-0.029	0.001
Adj R^2		0.408	

Significant at the 0,01 level ***, 0,05 **, 0,1 *.

Source: author's elaboration.

The importance of specialisation, measured by the HHI, is as high as for the public universities. More specialised universities (both private and public) are able to attract applicants with higher EGE scores. However, in contrast to the budget universities, we did not find significant difference between economic and non-economic private schools. It seems that the economic specialisation of private universities does not matter for applicants. However, we need to know that there is no down limit of the EGE scores in the private universities and so those students who could afford to pay for study chose such institutions. This makes difficulties in finding the objective factors of attractiveness.

In contrast to the publicly funded universities, the income-generating activity was found as insignificant for private institutions. It suggests there are no relations between the price of training and quality of entrants. If low quality institutions have high price for education, we observe a market failure. The impact on the average of EGE scores of the revenues from R&D and educational activities from foreign sources is positive and significant. Its importance is much higher for private universities than for the publicly funded ones.

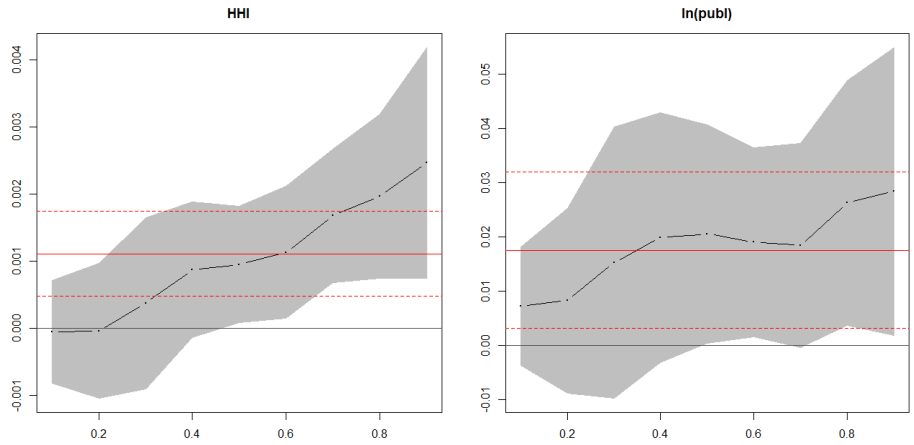
Table 5. Estimates from quantile regression for private universities

Variable	0.10	0.25	0.50	0.75	0.90
const.	3.861***	3.907***	3.931***	3.896***	3.967***
ln(teach)	-0.018	-0.008	0.022	0.022	0.010
equipment	0.0003	0.000	0.000	-0.0003	-0.001*
full_time_s	0.003***	0.003***	0.003***	0.003***	0.003**
CIS_stud	0.002	0.0001	-0.002	-0.004	-0.006*
unempl	-0.003	-0.002	-0.003	-0.003	-0.004
HHI	0.000	0.0003	0.001*	0.002***	0.003***
economic	0.013	0.018	0.001	-0.0002	-0.029
ln(publ)	0.007	0.003	0.020*	0.021	0.029*
ln(foreign)	0.008***	0.005*	0.005	0.004	0.004
ln(c_income)	0.004	-0.003	-0.011	-0.004	-0.0004
entr_agreem	0.000	-0.0001	-0.0002	-0.0004	-0.0006
AIC	-285	-291	-301	-259	-179

Significant at the 0,01 level ***, 0,05 **, 0,1 *

Source: author's elaboration.

Graph 3. Selected results from quantile regression for non-budget organizations



Source: author's elaboration.

The results from the quantile regression prove that, similar to the publicly funded universities, the impact of particular factors on attractiveness of private universities is unequal in each part of the distribution of the dependent variable. The evolution of the coefficient's values is however different for private and public schools. While the impact of specialisation was found stable for the publicly funded universities, we can see that its role rises for non-budget organisations. The change of attractiveness, being the result of higher specialisation, is higher for more desired private schools and lower for less

attractive universities (Table 5, Graph 3). The gain from the specialisation is greater when the private school is able to attract better applicants. The same trend was found for science-related activities.

6. Discussion

Our findings support the critique for taking the existence of synergic links between research and education as obvious (Elken and Wollscheid 2016). The positive impact of scientific activities on university's attractiveness depends on its potential. To accelerate the transmission of scholar achievements to education quality and further to attractiveness, university needs to achieve a particular rank. Scientific activity will be added-value for students in universities with recognizable quality of research. In private universities, where the scientific qualifications are lower than in the publicly funded institutions (Table 1), the gain from scientific activities for attractiveness is observed only for the best ones. In contrast, almost all public universities can improve their attractiveness for potential students by science-related work, because they achieved some initial level of scientific prestige.

The impact of business-related activities are even more complicated. In general, similar to research-teaching relations, we can say the entrepreneurial activities support the ability to attract the best applicants. However, such generalization omits all specific conditions which are hidden behind the relation. The revenues from R&D and educational activities support the increase of attractiveness but only in those public and private universities which enrol applicants with low scores. The greater value of EGE results for entrance is, the lower the impact of R&D revenues on university's attractiveness is. It seems that the best universities do not have to compete for best applicants by making more efforts concerning business activities.

The impact of contracts with enterprises on attractiveness are the opposite. In private universities, where the number of such agreements is usually low, there are no connections between business-related activities and the ability to attract the best applicants (Table 1). In publicly funded institutions such activity affects the teaching competitiveness but its role is small and negative.

Although universities are designed to bring together different activities, and creating synergies between teaching, research and entrepreneurial activities, it's not easy for them to extend their traditional mission which is education.

7. Conclusions

This paper examines the effect of the main determinants of universities' attractiveness by applying both linear and quantile regression models. Our study was done separately for budget (public) and non-budget (private) high education institutions localized in Russia. We used the data for 2013–2014 years, taken from the Ministry of Education of the Russian Federation Monitoring.

Our empirical findings confirm that the ability to attract the best applicants is defined not only by the teaching-related characteristics of academia but also by the quality of their research and entrepreneurial activities. However, the importance of science and business-oriented activities varies not only between public and private universities but also serves as a function of the average EGE scores. What makes the high competitive universities more attractive not always supports the attractiveness of less competitive institutions.

The positive impact of the research-oriented activities on the applicants' attraction is observed only for the top-ranked universities, mainly publicly funded. Also, we need to be conscious while interpreting the advantages of business activities for the education quality.

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Streszczenie

JAKIE CZYNNIK DECYDUJĄ O ZDOLNOŚCIACH DO POZYSKIWANIA NAJLEPSZYCH STUDENTÓW PRZEZ ROSYJSKIE UCZELNIE WYŻSZE? APLIKACJA MODELU REGRESJI KWANTYLOWEJ

Celem artykułu jest identyfikacja czynników, determinujących konkurencyjność uczelni wyższych w zakresie pozyskiwania najlepszych studentów. Główna uwaga położona została na weryfikacji trzech grup czynników – związanych z procesem kształcenia, reprezentujących jakość badań naukowych oraz wskazujących na powiązania biznesowe uczelni. W badaniu wykorzystano model regresji kwantylowej, którego parametry oszacowano oddzielnie na próbie publicznych i prywatnych szkół wyższych, zlokalizowanych w Rosji.

Uzyskane wyniki wskazują, że nie tylko tradycyjne czynniki, związane z procesem kształcenia, wpływają na atrakcyjność edukacyjną szkół wyższych. Istotny wpływ na zdolność do akumulacji najlepszych studentów ma jakość prowadzonych badań naukowych i powiązania uczelni z biznesem. Należy przy tym zauważyć, że osiągnięcie efektu synergii między działalnością naukową, edukacyjną i biznesową szkół wyższych nie jest łatwe i nie zawsze się udaje. Siła z jaką wspomniane czynniki determinują atrakcyjność edukacyjną różni się w zależności od typu uczelni (prywatna lub publiczna) oraz jest funkcją aktualnego potencjału jednostki.

Zawarte w pracy spostrzeżenia mogą być potencjalnie wykorzystane przez szkoły wyższe oraz władze w procesie ewaluacji orientacji strategicznej uczelni oraz do sformułowania rekomendacji w zakresie działań sprzyjających poprawie atrakcyjności szkół wyższych w oczach przyszłych studentów.

Słowa kluczowe: *instytucje szkolnictwa wyższego, system edukacji w Rosji, konkurencyjność*