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THE BARRIERS OF ACCESS TO ELITE HIGHER EDUCATION IN RUSSIA

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Despite the trends of massification of Russian higher education and recently introduced standardized entry exams, university applicants still may face barriers during the process of admission. As a result, they may be admitted to less selective universities, which generally offer low quality education programs as opposed to selective universities. This paper examines the factors which influence student choice of university as measured by the level of university selectivity. We show that university selectivity can be determined not only by the Unified State Exam scores among admitted students (the main criteria of applicant selection in Russia), but by characteristics that are not directly related to the applicants' abilities: parental education, family income, cultural capital, as well as by features of secondary school (type of school and class specialization) and level of investment in pre-entry coaching. These factors raise questions about equal opportunities for admission and the accessibility of top quality higher education for applicants from disadvantaged backgrounds.

Keywords: accessibility of higher education, elite higher education, Unified State Exam, educational strategies of students

JEL codes: I21, I24, I28

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Introduction

The accessibility of higher education is one of the most important issues in contemporary educational policy. Russia, where serious admission reforms are taking place, is no exception. One of the most significant recent reforms was an institutional transformation of admission to universities and the introduction of the Unified State Examination (the USE) instead of high school and university-specific exams. Before the USE each Russian university had the right to set up its own format of entry exam, forcing applicants to choose a preferred university in advance and attend various pre-entry coaching programs within a particular university. Certainly, the tuition was not free and applicants from less affluent households could not afford to attend those courses (Prakhov, 2012). Nowadays, the exam is standardized and has a single format for all Russian applicants. In theory, this could increase the accessibility of higher education.

However, despite the trends of massification of higher education (more than 35% of youth are university students), elite universities, which are very selective and offer high quality educational programs, are still not easy to enter for students from disadvantaged backgrounds. In other words, even in the system of mass higher education there can be a situation when applicants with high social status are admitted to selective universities, while those with low social status to less selective ones.

According to the models of college choice (Vossensteyn, 2005), educational decisions are influenced by various factors: individual (school achievement/performance, gender), family (parental education, family income, social and cultural capital), and school characteristics (type of school, class specialization). Moreover, pre-entry coaching (private tutoring) matters as well, and patterns of coaching can be closely related to the factors mentioned above (Prakhov, 2012).

Thus, restrictions on access to higher education may take place at different levels: individual, family, and institutional (education system). In this paper we analyze the main characteristics that distinguish students of elite and non-selective Russian universities and how these characteristics influence admissions.

This research is crucial in the current institutional conditions of admission to Russian universities, especially soon after the unification of admission procedures. Indeed, if the USE is a common exam for all high school graduates, and the process of application does not require extra costs and allows students to submit their applications to several universities (Ampilogov et al., 2012), where in most cases the USE is the only criteria for student selection, this should lead to matching students and universities on the basis of personal USE results and university selectivity. In other words, applicants with equal USE should apply to universities of the same level of selectivity, regardless of family and school background, and the distribution of students on the basis of these characteristics should be similar.

However, there is research which examines the various admissions mechanisms which give more opportunities to students from wealthy and more educated families (Baird, 1967; Hearn, 1991; Prakhov, Yudkevich, 2012). As a result, the share of students from the most affluent families is greater in elite (selective) universities (Blackburn, Jarman, 1993; Leathwood, 2004). Moreover, there is a difference of opportunities on the labor market depending on the difference in quality of higher education. Research has shown that, on average, the returns from higher education (in terms of a salary) in elite universities exceed those from non-selective higher education institutions (Solmon, Wachtel, 1975; Monks, 2000; Chevalier, Conlon, 2003). Even when controlling for academic achievement, students from families with low levels of social and cultural capital earn more if they graduated from elite universities (Berg Dale, Krueger, 2002). This problem is compounded by the fact that even in developed countries the gap between the 'poor' and 'wealthy' people is increasing, despite the existing mechanisms of student support (Haveman, Smeeding, 2006). In the long run, this could lead to more social segregation, when mass education does not contribute to social mobility, as the pathways of people from advantaged and disadvantaged backgrounds will diverge. In Russia, this problem is barely researched and needs more attention.

According to the research questions, we state the following hypotheses:

Hypothesis 1. Students of selective universities have higher USE scores than those of non-selective ones. This hypothesis reflects the possibilities of the USE as a mechanism of student selection and states that university selectivity is positively associated with personal USE results.

Hypothesis 2. Students from families with higher social status (level of income, parental education, level of cultural capital) are over-represented in selective universities. Thus, the composition of the student body varies from university to university depending on family factors. As a result, students from families with high social status are at selective universities, which, in turn, leads to an increase in income in the future, and increases social differentiation.

Hypothesis 3. Graduates of so-called magnet schools with special classes are more represented in selective universities than in non-selective universities. This means that high school and its characteristics are not neutral in the admission process and influence the educational outcomes.

Hypothesis 4. In selective universities students were more often engaged in pre-entry coaching programs (private tutoring) before admission. The overall level of investment in additional training is greater for selective universities than for non-selective schools. This type of preparation is often unavailable to some applicants due to financial and/or geographical barriers. Therefore those who attend such programs learn more, improve their USE scores, and have

better chances for successful admission to selective universities despite the transition to the unified examination system.

This study is based on data from ‘Monitoring of the Education Markets and Organizations’³ (Russian national survey of university students in 2012), which contains information on personal characteristics, as well as family, school and university features. We incorporate the data of the Ranking of Russian universities in 2012⁴ (according to the average USE score among admitted students).

The paper is organized as follows. Section 1 contains the general results of empirical research of elite (selective) and non-elite (nonselective) higher education. On the basis of this review, we formulate a logical model of education choice. Data and methodology of study are described in Section 2. In addition, we analyze the main distributions of students of different universities on the basis of personal, family, and school characteristics. Section 3 is devoted to the econometric analysis of factors which influence the level of university selectivity. Section 4 contains concluding remarks.

1. Features of elite education: who are the students of selective universities?

There is a lot of research concerned with the features of high quality education, despite higher education making a transition from elite to mass education in many countries in recent years (Bai, 2006; Halsey, 1993; Trow, 2000; Trow, 2006; Kivinen et al., 2007; Pretorius, Xue, 2003). However, the majority of well-known highly selective universities have retained their status, and questions of their accessibility are important both for researchers and policymakers. Higher education of the highest standards is usually called ‘*elite higher education*’, and universities which offer such programs are called ‘*elite universities*’. This definition emphasizes the nature of these universities, as evidence shows two important features of elite higher education: (1) there is a very high proportion of students from the most affluent families in such universities (Blackburn, Jarman, 1993; Leathwood, 2004); (2) returns from elite higher education exceed average returns from non-elite higher education (Solmon, Wachtel, 1975; Monks, 2000; Chevalier, Conlon, 2003). In this research, speaking about the Russian system of higher education, we will not use the term ‘elite’, as most of Russian universities in Soviet times used to

³ Monitoring of Education Markets and Organizations is an annual survey of students, parents, teachers, administrators, and employers, which is aimed at collection of data, necessary for the analysis of current processes in Russian education system, as well as for forecasts and educational policy development. See: <http://memo.hse.ru/en/>.

⁴ In this research we use data of the official Ranking of Russian universities (Ranking of admission quality), which is formed on the basis of USE scores of students, admitted to universities who study for free or pay tuition. We rank universities on the basis of the average USE scores among freshmen. See: http://www.hse.ru/ege/second_section2012/.

be deliberately egalitarian. Instead, we will use the term ‘selective’, which means that there is a high level of competition among applicants in such universities.

The phenomenon of varying higher education quality may be considered through the models of college choice, education trajectories of students (i.e. consistent choice of education programs at various levels), and factors which influence such trajectories. Thus, it was found that the process of college choice is multi-step (Vossensteyn, 2005), and at each stage the choice is influenced by several factors – economic and social – which, in turn, can be divided into several basic groups: personal, family, and school factors. The model of college choice as well as the set of impact factors is presented in Vossensteyn (2005, p. 35). Consequently, factors which are not related to student abilities directly can determine their education choice.

There is evidence that the education trajectories of students from various backgrounds differ significantly (Chapman, 1981; Hossler, Stage, 1992). It is unsurprising that the brightest students study in more selective universities (Hearn, 1984), because better academic performance in high school increases their chances of being admitted to a preferred university.

The importance of family and its characteristics is underlined in many related studies. The most important family factors (inputs) are parental education, income, and cultural capital. Thus, more educated parents, having studied at university, often pay attention to the academic performance of their children, devote time to communication with teachers, and directly participate in their education choice (Baker, Stevenson, 2007). This leads to an increase in the student’s achievement in school, and ultimately to a successful college choice. A high level of income is related to wider opportunities for consumption (Leibowitz, 1977) and enables parents to make an investment both in school training and extra pre-entry coaching by recruiting private tutors and advisors as well as to cover tuition in selective universities (Prakhov, Yudkevich, 2012). This gives children from affluent families certain advantages in comparison with other students (Baird, 1967; Hearn, 1991). Also, higher incomes and high levels of parental education are factors which set up expectations and parental behavior with respect to student’s position in society in the future (Davis-Kean, 2005). High levels of social and cultural capital in families, as well as environment, positively influence education outcomes, because parents with a high accumulated level of social and cultural capital, first, have sufficient ties among their friends who can help a student during the college choice process, and secondly, parents themselves are more involved in this process, which results in favorable effect too (Perna, Titus, 2005; Sandefur et al., 2006).

As for school characteristics, the results of research are controversial and depend on the sample, the level of aggregation and the variables included in the data analysis (Hanushek et al., 1996). Overall, school influence (e.g., expenses per pupil, ‘teacher-pupil’ ratio) is ambiguous

(Fowler, Walberg, 1991; Hanushek, 1997). However, there is empirical evidence to suggest that pupils of magnet schools demonstrate higher academic achievement compared to those from ordinary comprehensive schools (e.g., Gamoran, 1996). Thereby, graduates of magnet schools, having higher exam scores, have more opportunities for admission to selective universities.

One of the hypotheses of this research is a positive relationship between pre-entry coaching and university selectivity. This can be explained in the following way: students who use private tutoring and fill the gap in their knowledge are more successful during exit/entry exams and they can manage their applications more effectively and get into a selective university (Powers, Rock, 1999; Powers, 1993; Prakhov, Yudkevich, 2012; Prakhov, 2012).

Over the past twenty years, the Russian higher education system has undergone many changes, among which are: a sharp increase in the number of universities, the emergence of private universities, and a transformation to a system of mass higher education. These changes were accompanied by the emergence of new formal and informal institutions concerned with university entry. Before the introduction of the USE, each university had a right to establish its own system of entry exams. In many cases, such a system was not transparent. This created possibilities for corruption at the stage of university admission. University professors and members of admission committees who were responsible for student enrollment could take bribes for assistance during entry exams. This could be a direct bribe or a 'hidden' one, i.e. a fee for private tutoring with a professor involved in private tutoring. According to the surveys, more than 10% of households paid direct bribes during admission in 2006 (Levin, Galitskiy, 2009). Indirect bribes were concerned with pre-entry courses within a certain university and classes with private tutors who worked there. Thus, in 2008 (i.e. one year before the introduction of the USE) over 28% of applicants attended courses, and more than 37% were involved in classes with tutors (Roshchina, Lukyanova, 2010). Hence, informal payments were widespread and created inequalities in the admission process. This gave more opportunities to the students from affluent households. Levin and Galitskiy (2008) argue that such levels of corruption are dangerous and could lead to segregation in Russian society. Researchers revealed barriers which influenced the accessibility of higher education in Russia at that time (Roshchina, 2005, 2006; Shishkin, 2006). Family, school, and private tutoring were among them.

The introduction of the USE in 2009 was aimed to give more opportunities to the applicants regardless of their social status. The USE is a standardized exam, and since its official emergence most universities have lost the right to conduct their own entry exams, and the USE results have become the only criterion for students' selection. Universities cannot influence the results of admission, and private tutoring in a specific university and/or with a specific professor should have become unnecessary, because the program of the exam is the same for all applicants.

Moreover, the USE is a high school exit exam as well, so high school graduates can prepare for the USE with their school teachers during classes. However, the accessibility of elite higher education still can be limited to the certain groups of applicants. In this paper we look at the barriers of access to elite higher education after the introduction of the USE.

According to the results of previous studies, we can build the following logical chain. Advantaged families, having high levels of education, income, social and cultural capital, put more effort into assisting their child in enrollment to selective universities. This effort is related to parental behavior, how they raise their children, as well as with parental involvement in the choice of school and patterns of pre-entry coaching. All these factors, along with the innate abilities of a student, positively influence his or her achievement as measured by exit exams. As a result, according to performance during exams, as well as under family influence, students from families with higher socioeconomic status are at selective universities. Education in such institutions gives them a number of advantages after graduation in the labor market, expressed in high returns from higher education, i.e. in higher level of income compared to graduates of less selective universities. In other words, students with a set of personal, family and school characteristics enter selective universities and get a favorable position in the labor market in the future.

If we consider this process in dynamics, it may cause a ‘vicious circle’, where individuals with the most favorable initial (pre-university) characteristics benefit in the future and subsequently confer these characteristics to the next generation – their children. Such a process becomes cyclical and leads to the divergence of trajectories of people with low and high socioeconomic status and further segregation (the first get into non-selective universities, the last into selective universities), where mass education cannot cope with functions of social mobility (social lift).

The process described above, is presented on Fig. 1.

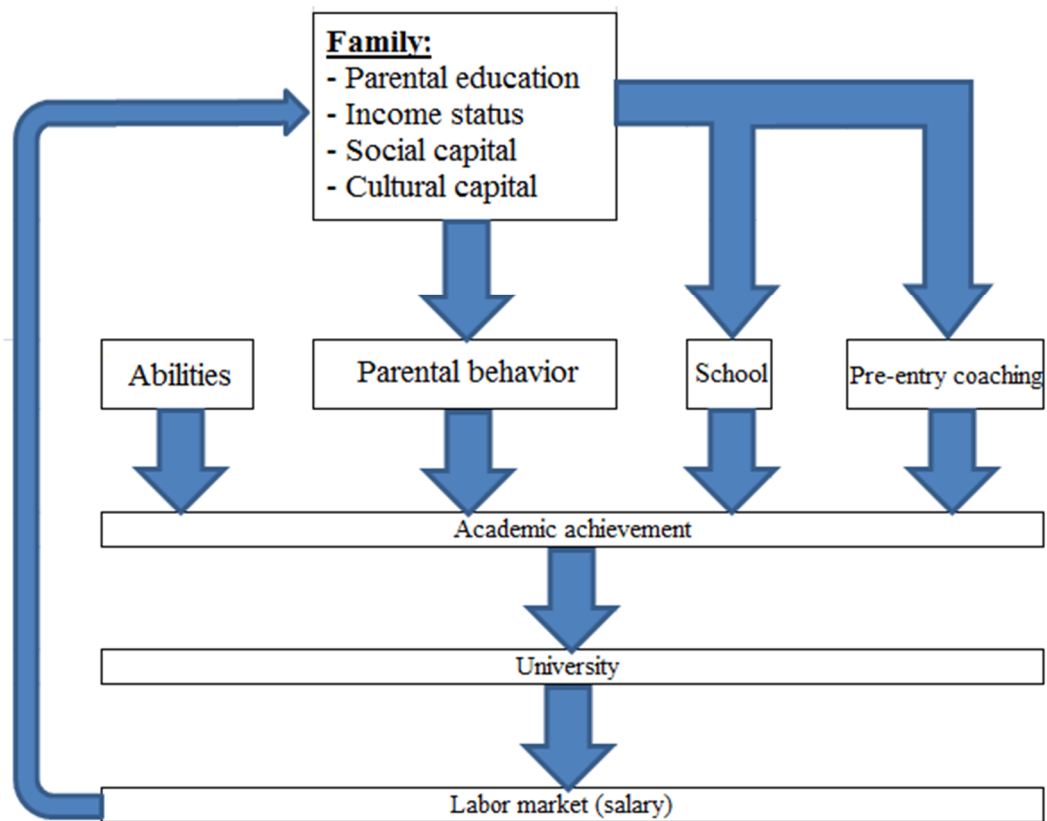


Figure 1. The model of university choice in dynamics

2. Data and methodology of the study

This research is based on the data of the Monitoring of Education Markets and Organizations, a 2012 survey of university students. Students were asked about their current education in university, previous educational experience, features of university choice, their future plans, and their socioeconomic background. We included only first and second year students in the analysis.

In order to answer our research questions we divided universities into three groups according to their level of selectivity (on the basis of the ranking of admission quality), i.e. the meaning of the average USE score among admitted students:

- Universities with a low level of selectivity (average USE score ≤ 61 out of 100; 214 observations; 24.8%);

- Universities with a medium level of selectivity ($61 < \text{average USE score} < 70$; 367 observations; 42.5%);

- Universities with high level of selectivity (average USE score ≥ 70 ; 282 observations; 32.7%).

Descriptive statistics

The relationship between school achievement and university selectivity

USE results (as the USE can be considered as a high school exit exam) should be correlated with university selectivity, because higher USE scores positively influence the probability of university enrollment. According to the results of the correlation analysis, this relationship is positive and statistically significant. The coefficients of correlation are the following:

$$\text{Corr (average USE score; USE result in mathematics)} = 0.331;$$

$$\text{Corr (average USE score; USE result in Russian)} = 0.450;$$

$$\text{Corr (average USE score; average personal USE result)} = 0.423.$$

Family characteristics

Family is an important input which determines educational strategies of students and university choice. As stated above, most studies underline the significant relationship between parental characteristics (their education, income, level of social and cultural capital) and student performance. Next, we consider the relationship between the main family characteristics and university selectivity.

Parental education

Table 1 demonstrates the positive relationship between parental education (both mother's and father's) and university selectivity. The proportion of students who have parents with higher education is much higher in universities with a high level of selectivity than in less selective ones.

Table 1. The relationship between parental education and university selectivity

Parental education	Mother				Father			
	University selectivity			Sample	University selectivity			Sample
	Low	Med.	High		Low	Med.	High	
Secondary education or lower	6.5%	4.4%	5.0%	5.1%	7.0%	4.6%	3.2%	4.8%
Vocational education	31.3%	28.9%	16.0%	25.3%	35.0%	28.3%	16.7%	26.2%
Incomplete higher education	11.2%	7.4%	7.4%	8.3%	7.9%	6.8%	4.6%	6.4%
Higher education	41.6%	49.9%	59.2%	50.9%	30.4%	39.5%	57.4%	43.1%
Higher education and a degree	4.2%	5.2%	5.7%	5.1%	2.3%	4.9%	5.7%	4.5%
No parent	1.9%	1.1%	1.4%	1.4%	11.7%	8.7%	6.4%	8.7%
Rather not say	3.3%	3.3%	5.3%	3.9%	5.6%	7.1%	6.0%	6.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Family income

Another crucial factor which may determine educational choice and outcomes is family income. There are several explanations as to why children from wealthy families are more often enrolled in selective universities (via pre-entry coaching, level of social capital and so on). According to the relationships shown in Table 2, we can conclude that, in general, there is a statistically significant positive correlation between income status and university selectivity.

Table 2. The relationship between family income and university selectivity

Income status	University selectivity			Sample
	Low	Medium	High	
Sometimes we do not have money for food	1.4%	1.6%	2.2%	1.8%
We have money for food, but we are restricted in other daily expenses	6.1%	5.7%	1.4%	4.4%
We have money for daily expenses, but buying clothes is rather difficult	10.8%	8.5%	6.5%	8.4%
We have enough money for food and clothes, but buying a TV or a fridge is rather difficult	30.2%	28.4%	34.4%	30.8%
We are quite well-off, but in order to buy a car or for an expensive holiday we would have to borrow money	44.8%	43.7%	42.4%	43.6%
We are affluent, we can afford an expensive holiday and an expensive car	6.6%	12.0%	13.0%	11.0%
Total	100.0%	100.0%	100.0%	100.0%

Number of books at home

This variable is closely related to the level of cultural capital of a family, and in a series of studies it is a significant predictor of educational choice. It is believed that a large number of books at home indicates a high level of cultural capital. Consequently, in this case parents are able to assist their child in the choice of university. Table 3 shows a positive relationship between the number of books at home (the level of cultural capital) and the level of university selectivity: the more books at home, the higher the chance that the child will be admitted to a selective university.

Table 3. The relationship between the number of books at home and university selectivity

Books at home	University selectivity			Sample
	Low	Medium	High	
Less than 100 books	35.2%	25.1%	14.9%	24.3%
101-250 books	31.9%	26.0%	24.6%	27.0%
251-500 books	18.8%	23.8%	33.1%	25.6%
501-1000 books	8.5%	16.7%	17.8%	15.0%
More than 1000 books	5.6%	8.5%	9.6%	8.1%
Total	100.0%	100.0%	100.0%	100.0%

School characteristics

According to our hypotheses, university selectivity may be related to the type of school and class specialization. Thus, graduates of magnet schools and specialized classes are often more motivated for high quality higher education compared to graduates of comprehensive schools without any specialization.

Type of school

Distributions of graduates of different types of schools in universities of low, medium, and high levels of selectivity are presented in Table 4. It shows that in transition from low-selectivity to high-selectivity the proportion of comprehensive school graduates decreases, while the proportion of the gymnasium graduates, schools with gymnasium classes, and magnet schools increases.

Table 4. The relationship between type of school and university selectivity

Type of school	University selectivity			Sample
	Low	Medium	High	
Comprehensive school	66.8%	59.7%	48.6%	57.8%
Comprehensive college, lyceum	14.5%	10.4%	13.5%	12.4%
Gymnasium, school with gymnasium classes	11.2%	16.9%	19.9%	16.5%
Magnet school	5.6%	10.6%	14.5%	10.7%
External studies	0.5%	0.5%	0.7%	0.6%
Other type of school	1.4%	1.9%	2.8%	2.1%
Total	100.0%	100.0%	100.0%	100.0%

Class specialization

This indicator is related to the university choice and the choice of university of a certain selectivity level as well. For instance, graduates from specialized classes are expected to be more informed about possible choices of admission, because class specialization (for example, mathematics or chemistry) can determine the specialization at university. Studying subjects in-depth allows for a better grade in the standardized USE subject, increasing the total USE score and bringing more opportunities for enrolment in a selective university.

It is shown in Table 5 that in selective universities more than 68% of first and second year students graduated from classes with a specialization, while in universities with low level of selectivity this proportion decreases to 44%.

Table 5. The relationship between class specialization and university selectivity

Class specialization	University selectivity			Sample
	Low	Medium	High	
No	56.1%	44.1%	31.2%	42.9%
Yes	43.9%	55.9%	68.8%	57.1%
Total	100.0%	100.0%	100.0%	100.0%

The relationship between education strategy and university selectivity

Education strategies of students can influence the final choice of university. When speaking about education strategies, we mean the strategies of pre-entry coaching (preparation), i.e. attending courses and/or classes with tutors (private tutoring), monetary investment in pre-entry coaching (tuition), as well as other mechanisms of admission.

Pre-entry coaching

Table 6 shows various forms of pre-entry coaching and contains an estimation of average expenses for coaching.

Students of highly selective universities were engaged in classes with tutors (both within their university and in other institutions) more often than those of less selective ones. The proportion of students who took classes with tutors who do not teach in their particular university is higher than the proportion of those students who attended classes with tutors from their university. This means that under the USE, matching between a tutor and a specific university is not as important as it was before the introduction of the USE. Students of highly selective universities more often attend tuition-paid pre-entry courses within their university, while students of medium selective universities prefer other tuition-paid courses. Students of low selective universities attended tuition-free courses.

In general, we can say that students of highly selective universities decide to attend various programs of pre-entry coaching more often (69.1%) than other students (50% low selectivity, and 48.2% medium selectivity). In other words, admission to the most selective universities correlates with pre-entry coaching (the most important are classes with tutors).

As for the monetary investment in pre-entry coaching, the highest level of expenditure is made by students who are admitted to medium-selective universities (14,799 rubles, or US\$ 476 per month), while students of low-selective universities spend considerably less (7,051 rubles, or US\$ 227 per month). If we compare these amounts to the same indicators in 2008 and 2010 (Androushchak et al., 2010), we may say that on average, the expenses for pre-entry coaching have increased, while the proportion of coached students remained almost the same. Hence, this means that even under a standardized examination system, students still have external training in order to improve their chances of successful admission to university.

Table 6. General characteristics of pre-entry coaching

Type of pre-entry coaching	University selectivity			Sample
	Low	Medium	High	
Tutors from this university	5.1%	3.8%	6.7%	5.1%
Other tutors	22.0%	22.3%	37.6%	27.2%
Tuition-paid pre-entry courses within this university	9.3%	7.9%	13.8%	10.2%

Other tuition-paid pre-entry courses	8.9%	16.1%	15.2%	14.0%
Free pre-entry courses within this university	4.7%	1.1%	1.4%	2.1%
Other free pre-entry courses	4.2%	4.6%	2.1%	3.7%
No coaching	50.0%	51.8%	30.9%	44.5%
Average investment in pre-entry coaching, rubles per month	7051	14799	12971	12172

Mechanisms of admission

Different universities may use various mechanisms to attract students. Although the USE is the main criterion for selection, some universities have the right to hold their own entry exams, in addition to the USE. Table 7 describes the corresponding distributions. The proportion of students admitted on the basis of the USE only is lower in highly selective universities, while the percentage of freshmen who sit both the USE and university-specific entry exams (which are usually offered by selective institutions) is the highest. About 4% of students of selective universities were admitted on the basis of the Olympiad for high school students.

Thus, we can argue that students of selective universities attend pre-entry courses or classes with tutors, sit additional university-specific exams, and use the results of their participation in Olympiads more frequently than students of other universities.

Table 7. Pathways of admission to university

Mechanism of admission	University selectivity			Sample
	Low	Medium	High	
I did not take the USE, I was admitted on the basis of university entry exams, tests, or interview	8.9%	2.5%	7.4%	5.7%
I did not take the USE, I was admitted without any examination (on the basis of an agreement between school/college and university, or on the basis of results of an Olympiad, etc.)	0.9%	1.6%	0.4%	1.0%
I took the USE, but I was admitted on the basis of university entry exams, tests, or interview	4.7%	5.7%	7.8%	6.1%
I took the USE, but I was admitted without any examination (on the basis of an agreement between school/college and university, or on the basis of results of an Olympiad, etc.)	0.9%	2.7%	4.3%	2.8%
I was admitted on the basis of the USE results only	75.2%	81.1%	55.7%	71.3%
I was admitted on the basis of the USE results as well as university entry exams	3.3%	2.5%	20.2%	8.5%
I was admitted on the basis of an interview only	3.3%	1.1%	2.1%	2.0%
Other options	2.8%	2.7%	2.1%	2.6%
Total	100.0%	100.0%	100.0%	100.0%

Consequently, we can identify several characteristics that distinguish the distributions of students who study in universities of varying selectivity. First, it is their achievement, measured by the USE scores. Second, students differ by family characteristics: parental education, family income, and cultural capital. Third, school characteristics (type of high school and class specialization) are different for students of selective and non-selective universities. Finally, education strategies of students concerned with pre-entry coaching and mechanisms of admission to universities are not the same. In other words, all the hypotheses were confirmed: university selectivity is related to (1) student academic performance, (2) family factors, (3) school characteristics, and (4) education strategies (except for the fact that on average, students of medium-selective universities spent more on pre-entry coaching than those of highly selective ones). Consequently, the analysis of the corresponding distributions allows us to conclude that students from various universities differ not only in their achievement; there are significant distinctions in social status and educational background as well⁵. Hence, it is possible to speak about the limited access to high quality higher education for students with low socioeconomic status, despite the mass system of Russian higher education in general.

However, the analysis of distributions does not account for the joint influence of different characteristics on university choice and considers each factor separately in isolation from other variables which can be correlated with it. For example, family characteristics can determine school choice, as well as investment in pre-entry coaching and USE results. In order to test these relationships empirically, in the following section we present the results of a regression analysis.

3. Estimation of factors which influence university choice

The main variable which reflects the level of university selectivity is the average USE score among admitted students (*USE_university*). According to the results of the empirical research and the analysis of the distributions in the previous section, we assume that this indicator is dependent on the vector of individual (personal USE score – *USE_personal*), family (**Family**), school characteristics (**School**), and the patterns of pre-entry coaching (**Tutoring**), i.e. we can write down the level of university selectivity as a function in the following way:

$$USE_university = f(USE_personal, \mathbf{Family}, \mathbf{School}, \mathbf{Tutoring}). \quad (1)$$

⁵ We should mention that our sample contains students, who graduated from high schools in different Russian cities. That is why distributions from Tables 1-7 were analyzed in subsamples: (1) graduates from Moscow and St. Petersburg, (2) graduates from other cities. The results of subsample analysis are the same as general results. Moreover, we have analyzed similar distributions for students who study for free and for those who pay tuition in university, separately. As in the previous case, distributions were similar, and the conclusions coincide with general results.

However, personal USE results may also depend on family characteristics, school features, and additional coaching. This relationship is shown in research on student achievement (e.g., Woessmann, 2003). Thus, personal USE results also can be presented in a functional form:

$$USE_personal = g(\mathbf{Family}, \mathbf{School}, \mathbf{Tutoring}). \quad (2)$$

At the same time, decisions about school choice and the choice of pre-entry program and the corresponding investment in private tutoring can be made by parents. In other words, it is also influenced by family characteristics:

$$\mathbf{School} = h(\mathbf{Family}), \quad (3)$$

$$\mathbf{Tutoring} = l(\mathbf{Family}). \quad (4)$$

Consequently, in model (1) there may be a potential problem of endogeneity, which may lead to biases in the estimates of regression coefficients. On the other hand, we can incorporate equations (2-4) to the initial equation (1) and rewrite it in the following way:

$$USE_university = f(g(\mathbf{Family}, h(\mathbf{Family}), l(\mathbf{Family})), \mathbf{Family}, h(\mathbf{Family}), l(\mathbf{Family})) = q(\mathbf{Family}). \quad (5)$$

The empirical strategy of the estimation of the model of university choice (see Fig. 1, p. 8) involves a regression analysis of the models (1-5) and a further comparison of the coefficients of the model (5) to the linear combination of the coefficients from the models (1-4).

A regression analysis of the first model allowed the identification of a set of statistically significant variables (Table 8) and the presentation of the corresponding equation in the following way:

$$USE_university = \eta + \theta \cdot USE_personal + \lambda_1 \cdot Educ_f + \lambda_2 \cdot \ln(Income) + \lambda_3 \cdot Books + \mu_1 \cdot Specialization + \mu_2 \cdot College + \mu_3 \cdot Magnet_school + \rho_1 \cdot \ln(1 + Investment) + v, \quad (6)$$

where:

Educ_f – father’s education (a dummy variable, which equals ‘1’ if father has higher education, ‘0’ otherwise),

$\ln(Income)$ – a natural logarithm of family average monthly income per person,

Books – a number of books at home,

Specialization – class specialization (‘1’, if there is any class specialization, ‘0’ otherwise),
College – a dummy variable which equals ‘1’ if a student graduated from college or lyceum, ‘0’ otherwise,

Magnet_school – a dummy variable which equals ‘1’ if a student graduated from a magnet school, ‘0’ otherwise,

$\ln(1+Investment)$ – a natural logarithm of the investment in pre-entry coaching, increased by one,

$\eta, \theta, \lambda_i, \mu_j, \rho_1$ – regression coefficients,

v – error term.

Table 8. Results of regression analysis #1. Dependent variable: the average USE score among admitted students (*USE_university*)

Independent variables	Symbol of coefficient	Coefficient
Personal USE result (<i>USE_personal</i>)	θ	0.221*** (0.031)
Father’s education (=1 if higher education, =0 otherwise) (<i>Educ_f</i>)	λ_1	2.088*** (0.741)
Natural logarithm of monthly income per person ($\ln(Income)$)	λ_2	0.955** (0.463)
Number of books at home (<i>Books</i>)	λ_3	0.003** (0.001)
Class specialization (=1 if yes, =0 if no) (<i>Specialization</i>)	μ_1	3.414*** (0.770)
College, lyceum (=1 if yes, =0 otherwise) (<i>College</i>)	μ_2	-2.367** (1.156)
Magnet school (=1 if yes, =0 otherwise) (<i>Magnet_school</i>)	μ_3	2.485** (1.260)
Natural logarithm of the investment in pre-entry coaching, increased by one ($\ln(1+Investment)$)	ρ_1	0.301*** (0.083)
Constant	η	37.218*** (5.007)
R ²		0.295
Standard error	v	7.38373
Number of observations		451

Standard errors in parentheses

*** p < 0.01, ** p < 0.05.

According to the results of the model (1) regression analysis, we may conclude that university selectivity is determined by personal academic performance (personal USE result represented the average individual score on all subjects taken). However, although *ceteris paribus* applicants with higher USE scores are admitted to more selective universities (in this case the USE copes with a function of screening), university choice is influenced by the characteristics which are not directly related to a student’s (innate) abilities as well. Those are:

1) *Family factors (Family)*: father's education (father's higher education increases the dependent variable by 2 points), income (students from more affluent families are admitted to more selective universities), cultural capital (the number of books at home positively influences the level of university selectivity);

2) *School characteristics (School)*: graduates of magnet schools are admitted to more selective universities compared to students of comprehensive schools, why graduates from colleges and lyceums perform worse. Class specialization may add up to 3.4 points to the indicator of university selectivity. Thus, school characteristics are just as important as family features.

3) *Characteristics of pre-entry coaching (Tutoring)*: investment in pre-entry coaching is positively related to the level of university selectivity. In other words, applicants who invest more in private tutoring have a better chance of admission.

The results of the regression analysis of the model (1) confirm almost all the hypotheses stated above and depict factors which may help some groups of students in admissions to selective universities, and vice-versa, lead other students to less selective institutions. For example, father's higher education, graduation from classes with a certain specialization in magnet school can add approximately 8 USE points to the university selectivity, and this effect is the same as 36 additional personal USE points.

As stated above, model (1) does not take into account the influence of family on the set of explanatory variables. A regression analysis of models (3) and (4) did not reveal any significant family influence on the type of school (with model (3) a multinomial regression model was tested), and on the investment on pre-entry coaching⁶. However, a regression analysis of model (2) identified significant variables (Table 9) and allowed us to present the regression equation in the following way:

$$USE_personal = \alpha + \beta_1 \cdot Educ_f + \beta_2 \cdot Books + \beta_3 \cdot Gender + \gamma_1 \cdot Specialization + \delta_1 \cdot \ln(1 + Investment) + \varepsilon, \quad (7)$$

where:

Gender – student gender (dummy variable, which equals '1' if male),

$\alpha, \beta_i, \gamma_1, \delta_1$ – regression coefficients,

ε – error term.

⁶ This can be explained in the following way: our sample includes students almost from every Russian region, and regional markets of private tutoring differ by the set of program, as well as by tuition fees.

Table 9. Results of regression analysis #2. Dependent variable: personal USE result (*USE_personal*)

Independent variables	Symbol of coefficient	Coefficient
Father's education (<i>Educ_f</i>)	β_1	2.152** (1.073)
Number of books at home (<i>Books</i>)	β_2	0.006*** (0.002)
Gender (<i>Gender</i>)	β_3	-2.703** (1.057)
Class specialization (<i>Specialization</i>)	γ_1	4.816*** (1.069)
Natural logarithm of the investment in pre-entry coaching, increased by one ($\ln(1+Investment)$)	δ_1	0.326*** (0.123)
Constant	α	59.462*** (1.182)
R ²		0.127
Standard error	ϵ	11.129
Number of observations		457

Standard errors in parentheses
 *** p < 0.01, ** p < 0.05.

Personal USE results, as expected, are influenced by family characteristics (father's education, the number of books at home), as well as by gender, class specialization, and investment in pre-entry coaching. The type of school and income are statistically insignificant, but they may influence personal scores indirectly, via other factors.

Next, we estimate model (5), i.e. the model without direct influence of personal USE results on university selectivity. We leave family factors, school characteristics and patterns of pre-entry coaching, as the empirical estimation of models (3) and (4) did not show significant correlations between either family and school, or between family and private tutoring. Thus, we have the following model:

$$USE_university = \sigma + \tau_1 \cdot Educ_f + \tau_2 \cdot Books + \tau_3 \cdot Gender + \varphi_1 \cdot Specialization + \varphi_2 \cdot Magnet_school + \chi_1 \cdot \ln(1 + Investment) + \xi, \quad (8)$$

where:

$\sigma, \tau_i, \varphi_j, \chi_1$ – regression coefficients,

ξ – error term.

Table 10. Results of regression analysis #3. Dependent variable: the average USE score among admitted students (*USE_university*), personal USE results are excluded

Independent variables	Symbol of coefficient	Coefficient	Confidence 95% interval	Estimated value	Hit in the conf. interval
Father's education (<i>Educ_f</i>)	τ_1	2.225*** (0.647)	0.999; 3.451	2.564	Yes
Number of books at home (<i>Books</i>)	τ_2	0.004*** (0.001)	0.002; 0.006	0.004	Yes
Gender (<i>Gender</i>)	τ_3	-1.412** (0.637)	-2.619; -0.205	-0.597	Yes
Class specialization (<i>Specialization</i>)	φ_1	3.488*** (0.660)	2.237; 4.739	4.478	Yes
Magnet school (<i>Magnet_school</i>)	φ_2	2.537** (1.099)	0.454; 5.284	2.485	Yes
Natural logarithm of the investment in pre-entry coaching, increased by one ($\ln(1+Investment)$)	χ_1	0.326*** (0.076)	0.182; 0.470	0.373	Yes
Constant	σ	60.953*** (0.705)	59.617; 62.289	50.359	No
R ²		0.171			
Standard error	ξ	7.78770			
Number of observations		617			

Standard errors in parentheses
*** p < 0.01, ** p < 0.05.

Thus, the results of the model (5) regression analysis are almost the same as the results of the estimation of model (1) except in the significance of income, college or lyceum in model (1) and significance of gender in model (5). If we express personal USE results from Table 9 and incorporate them into model (1), we have:

$$\begin{aligned}
 USE_university = & \eta + \theta\alpha + \theta\beta_1 \cdot Educ_f + \theta\beta_2 \cdot Books + \theta\beta_3 \cdot Gender + \\
 & + \theta\gamma_1 \cdot Specialization + \theta\delta_1 \cdot \ln(1 + Investment) + \theta\varepsilon + \lambda_1 \cdot Educ_f + \lambda_2 \cdot \ln(Income) + \\
 & + \lambda_3 \cdot Books + \mu_1 \cdot Specialization + \mu_2 \cdot College + \mu_3 \cdot Magnet_school + \\
 & + \rho_1 \cdot \ln(1 + Investment) + \nu,
 \end{aligned}$$

and

$$\begin{aligned}
 USE_university = & (\eta + \theta\alpha) + (\theta\beta_1 + \lambda_1) \cdot Educ_f + \lambda_2 \cdot \ln(Income) + \\
 & + (\theta\beta_2 + \lambda_3) \cdot Books + \theta\beta_3 \cdot Gender + (\theta\gamma_1 + \mu_1) \cdot Specialization + \mu_2 \cdot College + \\
 & + \mu_3 \cdot Magnet_school + (\theta\delta_1 + \rho_1) \cdot \ln(1 + Investment) + (\theta\varepsilon + \nu).
 \end{aligned} \tag{9}$$

If we compare the coefficients of equation (9) to those of equation (8), we get the following system of equations:

$$\begin{cases} \sigma = \eta + \theta\alpha \\ \tau_1 = \theta\beta_1 + \lambda_1 \\ \lambda_2 = 0 \\ \tau_2 = \theta\beta_2 + \lambda_3 \\ \tau_3 = \theta\beta_3 \\ \varphi_1 = \theta\gamma_1 + \mu_1 \\ \mu_2 = 0 \\ \varphi_2 = \mu_3 \\ \chi_1 = \theta\delta_1 + \rho_1 \end{cases} . \quad (10)$$

Next, we calculate the estimated values of the corresponding coefficients in linear combinations (see Table 10) to see if there is a hit into 95% confidence interval. All the estimates (except a constant) are in the confidence intervals. This means that the initial model (1) does not contain factors which lead to estimation biases and we can adopt this model.

Hence, generally speaking, our results are consistent with the models of university choice, where the choice is guided not only by abilities and achievement, but also by other factors, such as family, school, and pre-entry coaching.

4. Conclusion

This paper shows that despite the unification of the requirements for university applicants in Russia and student selection on the basis of the USE scores, university choice and its selectivity are related not only to the personal USE results, but to other factors as well. We have established a positive relationship between university selectivity and family characteristics: father's education, income, and the level of cultural capital. School background, i.e. graduation from magnet schools and classes with a certain specialization, raises the level of university selectivity as well. There is a positive relationship between monetary investment in pre-entry coaching and university selectivity. In most cases, there was a direct influence of these factors, as well as the indirect impact of the above factors on university selectivity via personal USE results.

We may conclude that in addition to the USE results there is a set of factors which in some cases may restrict access to higher education of a high quality. For example, such barriers are low parental income, insufficient level of cultural capital, or low quality of high school education. Such barriers raise inequalities of access to higher education. And even under the mass system of Russian higher education and high enrollment of youth in higher education programs these may limit access to selective universities.

In the long run, graduates of selective universities will transmit their knowledge, social and cultural capital to their children, who will have advantages in admissions compared to their peers from disadvantaged backgrounds. This creates a potential problem of deeper segregation in society, when even mass education in Russia does not contribute to the function of a social lift, but creates further inequalities in the labor market and widens the gap between individuals from different backgrounds. In the future, this tendency can make higher education with high returns for students from disadvantaged families inaccessible.

Family and school barriers to elite higher education exist. Further action is needed in order to make elite higher education merit based. There are possible directions of work towards the increase of accessibility of elite higher education in Russia: (1) information support to families with low levels of social and cultural capital; (2) an increase of accessibility of specialized secondary education (i.e. magnet schools); (3) an improvement of the quality of secondary education (in order to decrease the gap between school program and USE requirements); (4) a decrease of the significance of the additional pre-entry coaching and the transfer of the process of preparation from private tutoring to schools, (5) an increase of information transparency on the opportunities of the unified examination system.

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