Barriers Limiting Access to Quality Higher Education in the Context of the USE:

Family and School as Constraining Factors

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Abstract. Despite massification of higher education in Russia and standardized entry examinations, candidates may still encounter some obstacles while trying to enter a university. Access to higher education can be limited at different levels: personal (lack of competencies required to enter a specific university), family (social and cultural status of parents), or institutional (the schooling system). Being affected by these factors, a candidate might only qualify for a non-selective university offering curricula of lower quality. This paper uses the data provided by the Monitoring of Education Markets and Organizations and by the ranking assessing the quality of admission to higher education institutions to evaluate the factors affecting the choice of university based on the level of its selectivity. It appears that opting for a selective higher education institution not only depends on the USE (Unified State Exam) points obtained by the candidate (the major criterion of admission in the Russian Federation) but is also determined by the factors that are not directly associated with the candidate's skills: father's education, financial standing of the family, its cultural capital, school characteristics (type of school, specialization in the class), and the amount of financial investments in test preparation courses. All together, these factors challenge the equality of opportunities for candidates and the accessibility of quality higher education for students from low-income families.

Keywords: accessibility of higher education, selective universities, non-selective universities, the Unified State Exam (USE), educational strategies of candidates, cultural capital, investments in test preparation.

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Ensuring the accessibility of higher education[1] to students with different socioeconomic statuses is one of the most important goals of modern educational policies. The issue has been discussed active-

[1] Accessibility to higher education is understood as chances of entering a higher education institution through knowledge-based selection, regardless of social status.

ly both in developed and developing countries, and the Russian education system is no exception.

Despite the trend towards massification of higher education (more than 35% of young people in Russia today are enrolled in higher professional education programs), universities with high competition for tuition-free places (selective universities), which usually offer high-quality educational programs, may still be inaccessible for students from disadvantaged backgrounds. In other words, even mass higher education can't prevent the discrimination between candidates with high social status entering selective universities and those from low-income families entering non-selective institutions.

According to student choice models [Vossensteyn, 2005], educational decisions may be affected by a number of factors: personal (academic performance, gender), family (parental education, financial status of family, social and cultural capital), and school (type of school and class specialization) characteristics. An important part is played by pre-entry courses, the patterns of which may be closely related with the aforementioned factors [Prakhov, 2013]. Families differing in their financial, social and cultural resources also show different behavioral strategies in choosing a university and preparation courses, which in the end affects whether a student will study in a selective or non-selective university.

Thus, access to higher education can be limited at different levels: personal (lack of competencies required to enter a specific university), family (social and cultural status of parents), or institutional (the schooling system). In this paper, we analyze the fundamental characteristics that discriminate between students of selective and non-selective universities in Russia and evaluate factors affecting the choice between these two types.

The issue is particularly interesting under present-day institutional conditions of admission to Russian universities, especially soon after the standardization of entry requirements and the introduction of the Unified State Exam (USE) in an attempt to equalize school graduates' chances of getting enrolled. The USE is common for all high school graduates, and the application procedure (submission of USE certificates) is rather simple, allowing students to apply to more than one university, most of which accept USE scores as the only admission criterion. That said, indeed, the perfect equilibrium would be if students were enrolled at universities whose selectivity corresponded to their USE scores. That is, the USE suggests (for its goals to be achieved) that applicants with equal USE scores should enter universities of equal selectivity, regardless of their family and school backgrounds, and the distribution of students based on these characteristics should be similar across different universities, regardless of their degree of selectivity.

However, there are numerous studies examining various admission mechanisms that give more opportunities to students from

wealthier families due to higher levels of income, parents' education, social and cultural capital [Prakhov, Yudkevich, 2012; Baird, 1967; Hearn, 1991]. As a result, the proportion of students from the most well-to-do families is much higher in selective universities [Blackburn, Jarman, 1993; Leathwood, 2004]. Moreover, graduates from universities of different selectivity have unequal opportunities in the labor market. On the average, return on selective university education (assessed through graduates' salaries) is higher than that on non-selective university education [Solmon, Wachtel, 1975; Monks, 2000; Chevalier, Conlon, 2003]. Control of academic performance makes researchers conclude that students from less affluent families could earn more if they graduated from universities of higher selectivity [Dale, Krueger, 2002]. The gap between the "poor" and the "rich" is getting wider even in developed countries over time, despite the existing student support mechanisms [Haveman, Smeeding, 2006]. This may aggravate social segregation when even mass university education isn't enough to ensure social mobility. In Russia, this issue is covered insufficiently and requires more attention.

This paper tests the following hypotheses:

1. Students from families with higher social status (level of income, parental education, level of cultural capital) are represented more in selective universities than in non-selective ones. In other words, it's not only depending on USE scores that the composition of the student body varies from university to university. The social status of a family may definitely affect both the choice of institution and pre-entry coaching strategies. Besides, social status may contribute to academic achievements thanks to financial opportunities of parents, the level of social and cultural capital in the family, and investments in the human capital of children. As a result, students from families with high social status get enrolled at selective universities.

2. Graduates of specialized schools/gymnasia and classes are more represented in selective universities than in non-selective institutions. This means that high school and its characteristics do affect the choice of university and the result of entry examinations. Therefore, it becomes clear that secondary education, i. e. the initial educational conditions, plays an important role in shaping students' educational trajectories even when they pass the USE.

3. Students of selective universities were more often engaged in pre-entry coaching programs before admission, investing in and spending on additional training more than students of non-selective universities. Unlike USE materials—study guides and online resources—extracurricular coaching, which is often to be paid for, is unavailable to some high school students due to financial and/or geographical barriers. Those who attend such programs learn more (scoring

better in the USE as a result) and have better chances of being admitted to selective universities. Thus, pre-entry coaching retains its importance, despite the transition to the unified examination system.

This study is based on the data of the Monitoring of Education Markets and Organizations (the 2012 survey of students in higher professional education institutions; the sample includes first- and second-year students)[2] and the 2012 Ranking of quality of admission to Russian state universities.[3]

The paper is organized as follows: Chapter 1 describes the general results of empirical research on selective (elite) and nonselective higher education. On the basis of this review, we develop a logical educational choice model. Next, we analyze the present-day specifics of admission to universities in Russia, describe source data and research methods, and analyze the distribution of students in universities of different selectivity on the basis of various characteristics. Based on the analyzed distributions, we discuss factors that influence the choice of university of a specific selectivity. The final chapter contains conclusions and recommendations.

1. Results of Research on Elite Higher Education

There is a lot of research concerned with high-quality education, despite the actual transition from elite to mass higher education in developed and many developing countries over recent decades [Bai, 2006; Halsey, 1993; Trow, 2000; Trow, 2006; Kivinen, Hedman, Kaipainen, 2007; Pretorius, Xue, 2003]. Best-quality education and universities are still referred to as elite (elite higher education, elite universities). This definition is quite explicable, as empirical research reveals two essential features of such education: (1) there is a very high proportion of students from families with high social status in elite universities [Blackburn, Jarman, 1993; Leathwood, 2004]; (2) the return on elite university education exceeds the average return on higher education [Solmon, Wachtel, 1975; Monks, 2000; Chevalier, Conlon, 2003].

In this research, we will not use the term “elite” in the context of the Russian higher education system. We believe there are no histori-

[2] Monitoring of Education Markets and Organizations is an annual survey of students, parents, teachers, administrators, and employers, which is designed to create a database required to analyze the current processes in the Russian education system, to make forecasts, and to develop the educational policy. See: http://memo.hse.ru/en/.

[3] The Ranking of quality of admission to Russian universities is a joint project of the HSE and RIA Novosti, which is formed on the basis of USE scores of students admitted to universities (on tuition-fee or tuition-free basis). In this paper, we rank universities on the basis of the average USE scores among freshmen. See: http://www.hse.ru/ege/second_section2012/.

cal grounds for this, i. e. no traditions of Russian universities admitting the elite only. Instead, we give our preference to the term "selective," which means there is a high level of competition among applicants to such universities.

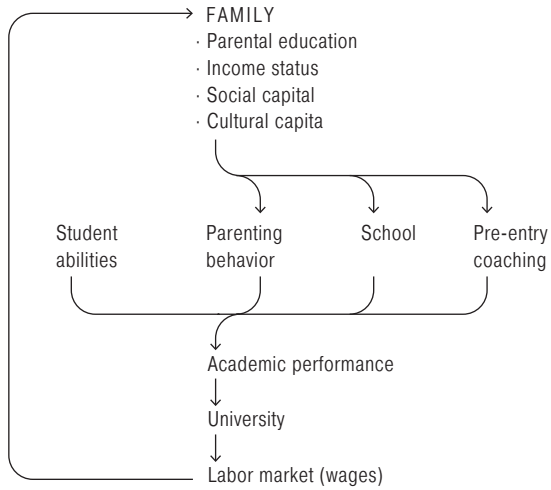
It would be logical to look at the phenomenon of varying higher education quality through student choice models, educational trajectories of students (i. e. the consistent choice of educational programs of specific levels), and factors that influence such trajectories. Thus, foreign researchers find that the process of university choice is multi-stage [Vossensteyn, 2005], being influenced at each stage by several economic and social factors, which, in their turn, can be divided into the following fundamental groups: personal, family-related, and school-related. In general terms, the student choice model is presented by Hans Vossensteyn [Vossensteyn, 2005. P. 35]. Consequently, factors that are not directly related to students' abilities can affect their educational choices.

Unsurprisingly, the most prospective students study in more selective universities (e. g. [Hearn, 1984]), because better performance in high school exit exams increases their chances of being admitted to a preferred university. Additionally, there is evidence suggesting that educational trajectories of students from various backgrounds differ significantly [Chapman, 1981; Hossler, Stage, 1992].

Parental education, income, and cultural capital are the most important family factors. Thus, university-educated parents pay more attention to the academic performance of their children, spending their time communicating with teachers and directly participating in the educational choices of their kids [Baker, Stevenson, 2007]. This improves the academic performance of children at school and ultimately results in a successful choice of university. High-level income enables parents to invest both in school-based and extracurricular pre-entry coaching, to recruit private tutors and advisors as well as to pay tuition fees in selective universities [Leibowitz, 1977; Prakhov, Yudkevich, 2012], which gives children from affluent families certain advantages as compared to other students [Baird, 1967; Hearn, 1991]. Also, higher levels of parental income and education generate relevant parental beliefs and behaviors regarding the future social roles of students [Davis-Kean, 2005]. High levels of social and cultural capital in families, as well as environment, positively influence the educational trajectories of children, as parents with a high accumulated level of social and cultural capital have sufficient ties among their friends, who can help students make their choice and prepare for entry exams. Moreover, such parents are deeply engaged in the multistage student choice process themselves, giving their children necessary all support and assistance [Perna, Titus, 2005; Sandefur, Meier, Campbell, 2006].

As for school characteristics, the results of research are controversial and depend on the sample, the level of aggregation, and the

Figure 1. **The student choice model in dynamics**



variables included in data analysis [Hanushek, Rivkin, Taylor, 1996]. Overall, school influence (e. g., expenses per pupil, "teacher-pupil" ratio) on the choice of university is ambiguous [Fowler, Walberg, 1991; Hanushek, 1997]. However, there is empirical evidence to suggest that pupils of specialized schools demonstrate higher academic performance than those from general education schools (e. g. [Gamoran, 1996]). Thereby, graduates from mid-tier specialized schools have more opportunities for admission to selective universities as they score better in exit examinations.

One of the hypotheses of this research is that pre-entry coaching has a positive effect on the choice of university. This can be explained in the following way: students who attend extracurricular courses and fill the gap in their knowledge perform better in graduation/entry exams and can make a better use of their scores (Powers, Rock, 1999; Powers, 1993; Prakhov, Yudkevich, 2012; Prakhov, 2013) by entering a selective university.

According to the results of earlier research, we can build the following logical chain. Advantaged families with higher levels of education, income, social and cultural capital put more effort into assisting their child in enrolment to a selective university. This effort may include both parenting behavior and the involvement of parents in the choice of school and pre-entry coaching patterns. Family-related factors, along with the innate abilities of a child, affect the results of exit exams. As a result, high performance in exit exams and specific family characteristics bring students from families with higher socioeconomic status to selective universities. Education in such institutions provides them with a number of advantages in the labor market,

particularly with high levels of income compared to graduates of less selective universities.

If we analyze this process in dynamics (Figure 1), we can see 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. This cyclical divergence of trajectories of people with low and high socioeconomic status results in further segregation (the former get to non-selective universities, while the latter to universities of higher selectivity), where mass education is inefficient in performing the functions of social mobility (social lift).

2. Specifics of Admission to Universities in Russia Today

Over the past twenty years, the Russian higher education system has undergone a number of changes including the university boom, the emergence of private universities and tuition-fee places, and the gradual massification of higher education. New formal and informal entry-related institutions have appeared. Before the introduction of the USE, each university had the right to establish its own format and content of entry examinations (although formally the examination program complied with the requirements of the Ministry of Education). As organization of entry campaigns was nontransparent in many cases, it created possibilities for corruption at the stage of university admission. University professors and members of admission committees who were responsible for student enrolment could take bribes for assistance during entry exams. Bribing could be direct (paying for enrolment) or "hidden" in the form of a fee for training with a private tutor who was also involved in entry campaign organization. According to surveys, more than 10% of households paid direct enrolment bribes in 2006 [Levin, Galitskiy, 2009]. Indirect ("hidden") bribes could be disguised as paying for pre-entry courses under the specific university, which guaranteed certain admission benefits, or for classes with private tutors who worked at the university. Thus, in 2008 (i. e. one year before the USE was introduced) over 28% of applicants attended pre-entry courses, and more than 37% were involved in classes with tutors [Roshchina, Lukyanova, 2010]. Hence, informal payments were widespread and created unequal access to higher education, giving more opportunities to students from affluent families. Levin and Galitskiy [2008] believe such levels of corruption are dangerous and could lead to segregation in Russian society.

Research of barriers affecting accessibility of higher education in Russia revealed the significance of family, school, and pre-entry coaching characteristics [Roshchina, 2005, 2006; Shishkin, 2006].

The introduction of the USE in 2009 was aimed at giving more opportunities to applicants regardless of their social status. The USE is a standardized exam, and its introduction deprived most universities of the right to conduct their own entry exams, with the USE scores

becoming the only criterion for student selection. Universities cannot influence the admission results anymore, and additional pre-entry courses with professors of a specific university become senseless, as the USE test 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 quality higher education can still be limited for certain groups of applicants. In this paper, we investigate into the barriers limiting access to quality (selective) higher education in the context of the USE.

3. Research Data and Methods

The research is based on the data of the Monitoring of Education Markets and Organizations (a 2012 survey of students in higher professional education institutions). Only first- and second-year students were covered by the sample, as they can give the most precise answers to questions on the specifics of preparation for entry examinations, including expenses on pre-entry coaching. The respondents were asked about their current studies in university, school education, university choice and pre-entry training, their future plans, and socioeconomic background.

We divided universities into three groups according to their level of selectivity based on the Ranking of quality of admission to Russian universities, i. e. on the mean USE score among students admitted on a tuition-free basis:[4]

- universities of low selectivity (average USE score $\leqslant 61$; 214 observations; 24.8%);
- universities of medium selectivity ($61 <$ average USE score < 70; 367 observations; 42.5%);
- universities of high selectivity (average USE score $\geqslant 70$; 282 observations; 32.7%).

The USE creates conditions under which a candidate may choose between several options. In the models analyzed below, each student is assigned one observation referring to the university of their final choice. In theory, two candidates with equal USE scores have equal choice opportunities, as the USE score is most times the only selection criterion. In this paper, we analyze how candidates from families with different socioeconomic status deal with this choice.

[4] In this research, universities of high selectivity include those in the "green" category of the Ranking of quality of admission to Russian universities, i. e. where the average USE score of students admitted to tuition-free places is above 70. The classification of universities into the other two categories differs from the one accepted by the Ranking in order to complete the groups. The selectivity index was regarded as a quantitative variable in regression analysis.

4. Descriptive Statistics

4.1. Relationship between school achievement and university selectivity

Exit examination performance should correlate with university selectivity, because higher USE scores normally increase the chances of getting admitted. Correlation analysis shows that exit USE scores also correlate positively with the average USE score among those enrolled. The following statistically significant correlation coefficients were observed:

Corr (average USE score in university; USE score in mathematics) = 0,331;
Corr (average USE score in university; USE score in Russian) = 0,450;
Corr (average USE score in university; average USE score in all subjects) = 0,423.

It's no surprise that correlation coefficients are rather high, since the Quality Admission Ranking is formed on the basis of individual USE scores gained by each candidate admitted on a tuition-free basis. However, this result was obtained when we analyzed tuition-free and tuition-paying students jointly.

4.2. Family characteristics

Family characteristics represent an important factor that determines educational strategies and the choice of university. Empirical studies reveal that parental education, income, and social and cultural capital have a positive influence on student achievement, as well as the status and reputation of the selected college or university. Next, we will consider the relationship between fundamental family characteristics and university selectivity.

4.2.1. 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 of high selectivity than in less selective ones.

4.2.2. Family income

There are several explanations as to why children from wealthier families are more often enrolled in selective universities: thanks to investments in pre-entry coaching, the level of social capital, etc. Table 2 contains data that allow for a conclusion that the correlation between family income and university selectivity is positive. It becomes obvious, for example, when we compare the least advantaged families (the first three income groups) with the most affluent ones (the last three income groups).

4.2.3. Number of books at home

The number of books at home reflects the level of a family's cultural capital, and a series of studies regard it as a significant predictor of educational choice. Parents with a sufficient cultural capital are able to assist their child in making the right choice of university. Table 3 shows a positive relationship between the number of books at home (the level of cultural capital of a family) and the level of university selectivity: the more books at home, the higher the chances that the child will be admitted to a selective university.

Table 1. **The relationship between parental education and university selectivity** (%)

	Mother				Father			
	University selectivity				University selectivity			
Parental education	Low	Medium	High	Total	Low	Medium	High	Total
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 + 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
No answer	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

Table 2. **The relationship between family income and university selectivity** (%)

	University selectivity			
Family income	Low	High	Medium	Total
Sometimes we don't have money for food	1.4	1.6	2.2	1.8
We have enough money for food but other daily expenses are limited	6.1	5.7	1.4	4.4
We have enough 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, a fridge, etc. is rather difficult	30.2	28.4	34.4	30.8
We are quite well-off but would have to borrow money to buy a car or to go on an expensive vacation	44.8	43.7	42.4	43.6
We are affluent, we can afford to buy an expensive car or to go on an expensive vacation	6.6	12.0	13.0	11.0
Total	100.0	100.0	100.0	100.0

4.3. The relationship between university selectivity and school characteristics

One research hypothesis is that university selectivity may be related to the type of school and class specialization. Graduates of specialized schools or classes may be more motivated to get a high-quality higher education in a selective university than graduates of general education schools or unspecialized classes.

Table 3. **The relationship between the number of books at home and university selectivity** (%)

Number of books at home	University selectivity			Total
	Low	Medium	High	
Fewer 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
501–1,000 books	8.5	16.7	17.8	15.0
Over 1,000 books	5.6	8.5	9.6	8.1
Total	100.0	100.0	100.0	100.0

Table 4. **The relationship between type of school and university selectivity** (%)

Type of school	University selectivity			Total
	Low	Medium	High	
General education school	66.8	59.7	48.6	57.8
General education college/lyceum	14.5	10.4	13.5	12.4
Gymnasium/School with gymnasium classes	11.2	16.9	19.9	16.5
Specialized school	5.6	10.6	14.5	10.7
School of external studies	0.5	0.5	0.7	0.6
Other	1.4	1.9	2.8	2.1
Total	100.0	100.0	100.0	100.0

4.3.1. Type of school

Distributions of graduates from schools of different types among universities of low, medium, and high selectivity are presented in Table 4. The latter shows that the proportion of general education school graduates decreases, while the proportion of graduates from gymnasia, schools with gymnasium classes, and specialized schools increases as we go from less selective to more selective universities.

4.3.2. Class specialization

Whether students have some specialization or not in their final year can also affect their choice of university, in terms of selectivity level as well. For instance, graduates from specialized classes are expected to be more informed about available university options, because class specialization can determine their major (field of study) at university. Besides, in-depth study of specific subjects allows for better subject-specific USE scores, all other factors being equal, and thus it increases the total USE score and improves the chances of being enrolled in a university of higher selectivity. Table 5 shows that about 70% of first- and second-year students in highly selective universities graduated from specialized classes, the proportion decreasing to 44% in universities of low selectivity.

4.4. The relationship between educational strategy and university selectivity

We understand educational strategies as techniques of pre-entry coaching, i. e. the choice of university courses and/or classes with tutors (private tutoring), the amount of monetary investment in pre-entry training, and mechanisms of admission.

Table 5. **The relationship between class specialization and university selectivity** (%)

Specialized class	University selectivity			Total
	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

Table 6. **General characteristics of pre-entry coaching**

Type of pre-entry coaching	University selectivity			Total
	Low	Medium	High	
Tutors from the university (%)	5.1	3.8	6.7	5.1
Tutors from other institutions (%)	22.0	22.3	37.6	27.2
Tuition-paid pre-entry courses offered by the 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 provided by the university (%)	4.7	1.1	1.4	2.1
Other free pre-entry courses (%)	4.2	4.6	2.1	3.7
No pre-entry coaching or courses (%)	50.0	51.8	30.9	44.5
Average investment in pre-entry coaching, rubles per month	7,051	14,799	12,971	12,172

4.4.1. Pre-entry coaching

Table 6 shows various types of pre-entry coaching and estimates average expenses on coaching.

Students of highly selective universities were engaged in classes with tutors (either provided by their universities or other institutions) more often than those of less selective universities. The proportion of students who attended classes with tutors from their university was much lower than the proportion of those whose tutors had nothing to do with the university of choice. This means that ties between a tutor and a specific university are not as important in the context of the USE as they used to be before the exam was introduced. Students of highly selective universities attended tuition-paid pre-entry courses offered by their university more often than students of medium selective universities, who preferred third-party tuition-paid courses. Students of low selective universities report to have attended tuition-free courses with their university.

Overall, students of highly selective universities attended various pre-entry courses more often than others, with the proportion of 69.1% as compared to 50% in universities of low selectivity and 48.2% in medium selectivity universities. That is to say, admission to a highly selective university correlates with pre-entry coaching (classes with tutors playing the most important role).

As for monetary investments in pre-entry coaching, the highest level of expenditure is shown by students admitted to medium-selective universities (14,799 rubles per month), while students of low-selective universities spend considerably less (7,051 rubles per month).

Table 7. **Mechanisms of admission** (%)

Mechanism of admission	University selectivity			Total
	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, high school academic competition awards, results of pre-entry classes, etc.)	0.9	1.6	0.4	1.0
I took the USE but 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 was admitted without any examination (on the basis of an agreement between school/college and university, high school academic competition awards, results of pre-entry classes, 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	2.8	2.7%	2.1	2.6
Total	100.0	100.0	100.0	100.0

If we compare these amounts to the same indicators in 2008 and 2010 [Andrushchak, Prakhov, Yudkevich, 2010], we can say that expenses on pre-entry coaching have increased on average, while the proportion of coached students has remained virtually the same. Hence, students opt for extracurricular pre-entry training in order to improve their chances for successful admission to university even in the context of the USE.

4.4.2. Mechanisms of admission

Although the USE is the main selection criterion, some universities have the right to hold their own entry exams. Table 7 describes distributions of students in universities of different selectivity by the mechanism of admission. The proportion of students admitted on the basis of the USE only is the lowest in highly selective universities, while the percentage of freshmen who take both the USE and university-specific entry examinations (usually offered by selective institutions) is the highest. Besides, a relatively significant proportion of selective university students are admitted on the basis of their high school academic competition awards.

Thus, the educational strategies of candidates who get admitted to highly selective universities are consistent in that the students attend pre-entry classes, take university-specific exams, and benefit from their high school academic competition awards in addition to the USE more often than students of other universities.

Consequently, we can identify several characteristics that distinguish the distributions of first- and second-year students in universities of varying selectivity. First, it is performance in high school exit examinations (the USE scores). Second, students differ by family characteristics (parental education, family income, cultural capital). Third, school background (type of high school and class specialization) is different for students of selective and non-selective universities. Finally, educational strategies of students concerned with pre-entry coaching and mechanisms of admission to universities are not the same. In other words, all the hypotheses have been confirmed: university selectivity correlates positively with school characteristics, pre-entry coaching (except that students of medium-selective universities spent on average more on pre-entry coaching than those of highly selective universities), and family factors. Based on these distributions, we can conclude that students in universities of varying selectivity differ in their social status and educational background.[5] Hence, we can observe limited access to high-quality higher education for students with low socioeconomic status, despite the overall massification of Russian higher education.

However, the analysis of distributions does not take into account the joint influence of different factors on student choice, considering each factor in isolation from other variables it may correlate with. For example, family characteristics may affect the choice of school, the pattern of investing in pre-entry coaching, and the USE performance. In order to prove these relationships empirically, we will build regression models in the following chapter to consider the joint effects of personal, family and school factors as well as specifics of pre-entry coaching on the level of university selectivity.

5. Estimation of factors which influence student choice

The main variable that reflects the level of university selectivity is the average USE score among admitted students (*USE_university*). According to the results of empirical research and evaluation of the distributions in the previous chapter, we assume that this indicator is dependent on the vector of personal (*individual USE score, USE_personal*), family (*Family*), school characteristics (*School*), and the patterns of pre-entry coaching (*Tutoring*), i. e. that it represents the following functions:

(1) $USE\_university = f(USE\_personal, Family, School, Tutoring)$.

[5] The sample included students who graduated from high schools in different cities of Russia. That is why the distributions in Tables 1–7 were analyzed in subsamples: (1) graduates from Moscow and Saint Petersburg; (2) graduates from other cities. The results of subsample analysis provide the same conclusions as overall sample results. Moreover, we have analyzed similar distributions among students who study for free and those paying tuition in isolation. As in the previous case, distributions were quite matching.

Table 8. **Influence of various factors on university selectivity. Dependent variable: the average USE score among admitted students (*USE_university*)**

Variable	Coefficient representation	Coefficient value
Personal USE result (USE_personal)	q	0,221*** (0,031)
Father's education (Educ_f)	l_1	2,088*** (0,741)
Logarithm of per capita family income (ln(Income))	l_2	0,955** (0,463)
Number of books (Books)	l_3	0,003** (0,001)
Class specialization (Specialization)	m_1	3,414*** (0,770)
College/Lyceum (College)	m_2	–2,367** (1,156)
Specialized school (Specialized_school)	m_3	2,485** (1,260)
Logarithm of investments in pre-entry coaching (ln(1+*Investment*))	r_1	0,301*** (0,083)
Constant	h	37,218*** (5,007)
R^2		0,295
Standard error	n	7,38373
Number of observations		451

Note. Standard error values are given in parentheses; **, *** denote 5% and 1% significance, respectively.

A regression analysis of model (1) allowed for the identification of a set of significant variables (Table 8) and the presentation of the relevant equation in the following way:

$$USE\_university = h + q \times USE\_personal + l_1 \times Educ\_f + l_2 \times \ln(Income) + \\ + l_3 \times Books + m_1 \times Specialization + m_2 \times College + \\ + m_3 \times Specialized\_school + r_1 \times \ln(1+Investment),$$

where:
Educ_f stands for father's education (a dummy variable which equals 1 if father has higher education or 0 otherwise),
ln(*Income*) is the natural logarithm of average monthly per capita family income,
Books is the number of books at home,

Specialization is class specialization (1 if there is any class specialization or 0 otherwise),
College denotes whether a student graduated from college/lyceum (dummy variable),
Specialized_school denotes whether a student graduated from a specialized school (dummy variable),
ln(1+*Investment*) is the natural logarithm of monthly investments in pre-entry coaching, increased by one,
h, q, l_i, m_j, r_1 are regression coefficients, and
n is standard error.

Based on the results of model (1) regression analysis, we may conclude that selectivity of admitting university is determined by personal USE scores of students (defined as the average USE scores in all subjects). Other things being equal, applicants with higher USE scores are admitted to universities of higher selectivity (i. e. the USE performs its screening function efficiently in this case). Nevertheless, the final choice of university is also affected by factors not related directly to student's abilities. Those are:

- *family characteristics* (*Family*): father's education (father's higher education increases selectivity by 2 points), family income (students from more affluent families are admitted to more selective universities), cultural capital (the more books at home, the higher university selectivity);
- *school characteristics* (*School*): graduates of specialized schools are admitted to more selective universities than students of general education schools, while college and lyceum graduates enter universities of the lowest selectivity (this may probably be because respondents could apply the terms "college" and "lyceum" to general education schools and basic vocational education institutions). Class specialization may add up to 3.4 points to university selectivity. Thus, school characteristics are just as important as family factors;
- *characteristics of pre-entry coaching* (*Tutoring*): applicants who invest more in pre-entry coaching have better chances of being admitted to a highly selective university.

The results of model (1) regression analysis confirm virtually all the hypotheses stated above, identifying factors which may help certain groups of students get admitted to selective universities or, vice-versa, lead other students to less selective institutions. For example, father's higher education, graduation from specialized classes or schools can add approximately 8 points to university selectivity, which equals 36 additional USE points.

However, personal USE scores may also be affected by family, school, and pre-entry coaching characteristics, which is proved in research on student achievement (e. g. [Woessmann, 2003]).

Furthermore, the choice of school or pre-entry coaching pattern may be related to the socioeconomic status of a family. That is, regression analysis should consider the correlation between family characteristics and the specifics of school and extracurricular classes, as well as candidate performance. Alternative empirical assessment presented in the Annex produced results similar to those in Table 8. Therefore, the results obtained are largely consistent with the student choice models, which imply that the choice of university is affected not only by characteristics directly related with academic achievement but also by family, school, and pre-entry coaching factors.

6. Conclusion

This paper shows that despite the standardization of the requirements for university applicants in Russia and using USE scores often as the only selection criterion, the choice of university based on its selectivity is determined not only by personal USE scores but by other factors as well. We have established a positive relationship between university selectivity and family characteristics: father's education, family income, and the level of cultural capital. Graduation from specialized schools or classes also correlates positively with university selectivity. Besides, we have revealed a positive relationship between monetary investment in pre-entry coaching and university selectivity. In most cases, there was both direct influence of the abovementioned factors on university selectivity and indirect influence through personal USE scores. We may thus conclude that there is a set of factors (barriers) apart from the USE results that may restrict access to high-quality higher education in a number of cases. For example, such barriers include low parental income, insufficient level of cultural capital, or low quality of high school education. They generate inequalities among candidates and may limit access to quality education in selective universities despite the wide coverage of youth with higher professional education programs.

Influence of social status (in particular, parental characteristics) on the choice of university has long-term effects: graduates of selective universities will earn more, accumulate sufficient social and cultural capital, and eventually support their children in the learning process. Thus, the impact of a family's social status on university choice may exacerbate social segregation in the long run. Students from families with high levels of social and cultural capital will have more employment opportunities and higher salaries after graduation from selective universities. Meanwhile, graduates from universities with medium or low returns on higher education will have to make do with lower salaries, and universities with high return on higher education will eventually become hardly inaccessible for their children.

Barriers limiting access to quality higher education in Russia require decisive measures to be taken. The top-priority measures include: (1) providing information support to families with low levels of

social and cultural capital; (2) increasing accessibility of high-quality secondary education (for example, opportunities to study in specialized schools); (3) improving the quality of secondary education in order to narrow the gap between school programs and the USE requirements (of course, not by lowering the USE requirements to the existing school level); (4) decreasing the role of additional pre-entry coaching and replacing private tutoring with school-based classes; (5) enhancing information transparency of the opportunities provided by the USE.

Annex

The paper presents results of model (1) regression analysis:

USE_university = *f* (*USE_personal*, *Family*, *School*, *Tutoring*).

However, personal USE results (*USE*_personal) may also depend on family characteristics, school, and pre-entry coaching characteristics. Thus, personal USE results can be presented as the following function:

(2) *USE_personal* = *g* (*Family*, *School*, *Tutoring*).

At the same time, decisions on the choice of school and pre-entry patterns (as well as on investing in pre-entry coaching) can be made by parents. In other words, such decisions are also influenced by family factors:

(3) *School* = *h* (*Family*),
(4) *Tutoring* = *l* (*Family*).

Consequently, model (1) may possibly contain the problem of endogeneity, which may lead to biases in estimation of relevant regression coefficients. Yet, we can incorporate equations (2–4) into equation (1) by reducing the average USE score among admitted students to a function of vector of family factors and rewrite the whole equation in the following way:

(5) *USE_university* = *f* (*g* (*Family*, *h* (*Family*), *l* (*Family*)), *Family*, *h* (*Family*), *l* (*Family*)) = *q* (*Family*).

The empirical strategy of assessing the student choice models involves regression analysis of models (1–5) and subsequent comparison of model (5) regression coefficients to the linear combination of the coefficients calculated in models (1–4).

Regression analysis of models (3) and (4) didn't reveal any significant influence of family characteristics on the choice of type of school (a multinominal regression was tested for model (3)) or on the lev-

Table A1. **Influence of family, school, and pre-entry coaching factors on the USE scores. Dependent variable: the average USE score in all subjects (USE_personal)**

Variable	Coefficient representation	Coefficient value
Father's education (*Educ_f*)	b_1	2,152** (1,073)
Number of books (*Books*)	b_2	0,006*** (0,002)
Candidate gender (*Gender*)	b_3	-2,703** (1,057)
Class specialization (*Specialization*)	g_1	4,816*** (1,069)
Logarithm of investment in pre-entry coaching (ln(1+*Investment*))	d_1	0,326*** (0,123)
Constant	a	59,462*** (1,182)
R^2		0,127
Standard error	e	11,129
Number of observations		457

Note. Standard error values are given in parentheses; **, *** denote 5% and 1% significance, respectively.

el of investment in pre-entry coaching.[6] However, regression analysis of model (2) revealed a set of significant variables (Table A1) and allowed us to present the regression equation in the following way:

$$USE\_personal = a + b_1 \times Educ\_f + b_2 \times Books + b_3 \times Gender + \\ + g_1 \times Specialization + d_1 \times \ln(1+Investment) + e,$$

where:
Gender stands for student gender (dummy variable which equals 1 for males),
a, b_i, g_1, d_1 are regression coefficients, and
e is standard error.

The USE scores, as expected, are influenced by a number of family characteristics (father's education, number of books at home), as well as by student gender, class specialization, and level of invest-

[6] This may be because the sample included students from all over the country, while regional markets of pre-entry coaching differ in both programs and prices.

Table A2. **Influence of family, school, and pre-entry coaching characteristics on university selectivity. Dependable variable: the average USE score among admitted students (*USE_university*)**

Variable	Coefficient: representation	Coefficient: value	95% confidence interval	Design value	Lying within the confidence interval
Father's education (Educ_f)	t_1	2,225*** (0,647)	(0,999; 3,451)	2,564	Yes
Number of books (Books)	t_2	0,004*** (0,001)	(0,002; 0,006)	0,004	Yes
Candidate gender (Gender)	t_3	–1,412** (0,637)	(–2,619; –0,205)	–0,597	Yes
Class specialization (Specialization)	j_1	3,488*** (0,660)	(2,237; 4,739)	4,478	Yes
Specialized school (Specialized_school)	j_2	2,537** (1,099)	(0,454; 5,284)	2,485	Yes
Logarithm of monetary investment in pre-entry coaching (ln(1+*Investment*))	c_1	0,326*** (0,076)	(0,182; 0,470)	0,373	Yes
Constant	s	60,953*** (0,705)	(59,617; 62,289)	50,359	No
R^2		0,171			
Standard error	x	7,78770			
Number of observations		617			

Note. Standard error values are given in parentheses; **, *** denote 5% and 1% significance, respectively.

ment in pre-entry coaching. Type of school and family income are almost insignificant, but they can affect the USE scores indirectly, through other characteristics.

Next, we estimate model (5), which doesn't consider directly the influence of personal USE scores on university selectivity. The model retains family, school, and pre-entry coaching characteristics, as models (3) and (4) did not reveal any significant correlations between either family and school factors or family and private tutoring characteristics. Thus, based on the results of the regression analysis in Table A2, we can write down the final regression equation as follows:

(8) $$SE\_university = s + t_1 \times Educ\_f + t_2 \times Books + t_3 \times Gender + \\ + j_1 \times Specialization + j_2 \times Magnet\_school + c_1 \times \ln(1+Investment) + x,$$

where:
a, t_i, j_j, c_1 stand for regression coefficients, and
x is standard error.

Thus, the results of the model (5) regression analysis are close to those of the model (1) analysis, except that family income and studying in a college/lyceum are insignificant in model (5), while candidate gender is, vice versa, significant.

If we express the USE scores through explanatory variables from Table 9 and incorporate them into model (1), we will have:

$$USE\_university = p + qa + qb_1 \times Educ\_f + qb_2 \times Books + qb_3 \times Gender + \\ + qg_1 \times Specialization + gd_1 \times \ln(1+Investment) + qe + l_1 \times Educ\_f + \\ + l_2 \times \ln(Income) + l_3 \times Books + m_1 \times Specialization + m_2 \times College + \\ + m_3 \times Magnet\_school + r_1 \times \ln(1+Investment) + u,$$

i.e.

$$USE\_university = (p + qa) + (qb_1 + l_1) \times Educ\_f + l_2 \times \ln(Income) + \\ + (qb_2 + l_3) \times Books + qb_3 \times Gender + (qg_1 + m_1) \times Specialization + \\ + m_2 \times College + m_3 \times Magnet\_school + (qd_1 + r_1) \times \ln(1+Investment) + \\ + (qe + u), \quad (9)$$

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

$$\begin{cases} s = h + qa \\ t_1 = qb_1 + l_1 \\ l_2 = 0 \\ t_2 = qb_2 + l_3 \\ t_3 = qb_3 \\ j_1 = qg_1 + m_1 \\ m_2 = 0 \\ j_2 = m_3 \end{cases} \quad (10)$$

Next, we calculate the design values of the corresponding coefficients in linear combinations (see Table A2) to see if they lie within 95% confidence intervals. All the estimates (except the constant) are found to be lying within confidence intervals. It means that the initial model (1) does not contain factors that lead to assessment bias and thus can be adopted here.

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