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REGIONAL ACCESSIBILITY OF HIGHER EDUCATION IN RUSSIA

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REGIONAL ACCESSIBILITY OF HIGHER EDUCATION IN RUSSIA[3]

Despite the unified system of admission to universities in Russia, applicants can still face unequal access to higher education. This can lead to an inefficient choice of the educational strategy and result in the increased inequality. This paper analyzes the barriers which restrict the interregional accessibility of higher education in the context of the Unified State Exam (USE). We propose an analytical model, reflecting the influence of channels such as family, school characteristics, and place of birth, on the educational strategies of youth. We assume that these factors affect the likelihood of being enrolled at university both directly and indirectly through USE scores. Given the unequal regional economic development and the differences in educational opportunities, we argue that university choice can be limited for certain cohorts of applicants, depending on their place of origin, because of differences in the magnitude of the barriers. An empirical examination of the model, based on data from the longitudinal study 'Trajectories in education and careers', shows that students from Moscow or Moscow Region are most likely to enroll at university, since they face the lowest barriers. The problem of the accessibility of higher education is more acute for residents of large cities or regional capitals: their likelihood of matriculating is limited by a large number of factors (cognitive abilities, SES, school characteristics). Residents of other settlements (small towns or villages), are least likely to be admitted to university, facing the highest barriers and gender inequality.

Keywords: higher education, accessibility of higher education, regional educational markets, the Unified State Exam

JEL Classification: I21, I23, I24

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Introduction

This paper examines the barriers to higher education in Russia for different cohorts of university applicants, depending on their place of origin. We focus on various factors of the educational strategies of youth, such as family, school characteristics, and place of birth, arguing that they can have both a direct and indirect impact on the accessibility of higher education, despite the unified system of admission to universities in Russia. The Russian system of admission to higher education underwent a major institutional transformation with introduction of the Unified State Exam (USE) in 2009 to unify the process of admission to higher educational institutions (HEIs). The reform was intended to make higher education more accessible by simplifying the admission procedure. Before the introduction of the USE, each university organized its admission program independently: each university had its own exams, which differed both in complexity and format, although formally the content of the entrance examinations corresponded to the high school curriculum. University requirements and the format of entry examinations were often highly specific, making the process of admission to highly selective universities complicated. As a result, the system created a high degree of inequality of opportunities among applicants, especially for applicants from the regions, who had less chance of becoming familiar with the requirements of a particular university (Prakhov 2016a, 2016b). The exams in each university required the physical presence of the applicant, creating an additional educational mobility problem (Prakhov, Bocharova 2019).

The USE is a set of standardized examinations conducted in the final year of high school. The results are sent to university admission offices directly[4]. Universities admit students on the basis of their individual USE results, publishing the lists of admitted students on the Internet, which means students do not need to travel. Since the USE is a standardized exam, it was assumed that its introduction would reduce the degree of inequality, since the requirements for all applicants were the same. Such external assessment would contribute to an increase of the 'objectivity and fairness in admission to educational institutions' (Bolotov 2005; Prakhov, Yudkevich 2015, 2019).

However, despite the unification of the admission process, inequality of access to HEIs still persists as students from big cities, small towns and rural areas have different levels of access to higher education due to inequalities in economic and educational regional development (Carnoy et al. 2018). In other words, the USE represents a unified set of

[4] Students may apply to up to 5 universities.

requirements and procedures, but individual educational opportunities differ across regions and towns. Previous studies have shown that factors, in addition to individual student's abilities, namely family and school characteristics, play an important role in determining accessibility to higher education (Anikina et al. 2014; Konstantinovskiy 2010; Prakhov 2016a; Prakhov, Sergienko 2020; Sá et al. 2006). In the regional context, the problem of access to higher education can manifest itself even more strongly. The impact of family and school factors on the access to HEIs for applicants from large and small cities can be more significant, since such residents are initially different in SES, and there are different levels of the regional development of secondary and high school education. The increasing influence of these factors is closely interconnected to the impact of the regional features of socio-economic development on individual educational pathways. In addition, regional characteristics can influence educational opportunities through the uneven development of higher education markets, i.e. the choice available to applicants.

The problem of the accessibility of higher education in small towns and rural areas can be worse in comparison with the situation in large cities, first, due to the lower availability of tuition-free places for students and the lower number of alternative universities. Thus, the specifics of the Russian regions, characterized by the uneven development of local higher education markets, can put applicants in unequal positions despite the unified system of admission (Abankina et al. 2012; Acemoglu, Pischke 2001; Agasisti et al. 2020; Aleksandrova 2005; Frenette 2006; Gromov et al. 2016; Sá et al. 2006; Spiess, Wrohlich 2010). Secondly, students from different regions and localities are characterized by a high variation in the factors limiting access to higher education. These barriers include family SES and the characteristics of schools. In small towns (and in rural areas, in particular), the proportion of parents with a degree is lower, as is the share of affluent families, which negatively affects the probability of university application and admission (Andres, Looker 2001; Anisef, Frempong 2005; Barcinas 1991; Brannstrom 2008; Huong et al. 2019; Ibragimova, Frants 2020; Kirby, Conlon 2005; Lauer 2002; McCracken, Barcinas 1991; Shabanov 2014; Zamfir 2017). In addition, the quality of the regional educational services may be lower than in large educational centers. Since the quality of secondary and high school education affects the further choice of the educational pathway (Kirby, Conlon 2005), this may impose additional restrictions on access to HEIs. Thirdly, levels of socio-economic regional development and especially the features of regional labor markets, which affect the prospects of university graduates, are important in determining educational opportunities (Konstantinovskiy 2010; Lauer 2002).

This study assesses the interregional accessibility of higher education in Russia and explains the direct and indirect influences of the barriers to higher educational for different cohorts of students. The paper has the following structure. Section 1, based on a literature review, presents a classification of the factors limiting access to higher education, and an analytical model of university choice in a regional context. The model shows direct and indirect mechanisms of inequality in higher education. We provide a description of the Russian case to support the logic of the analytical framework. Section 2 contains the empirical testing of the model based on data from the longitudinal study 'Trajectories in Education and Careers',[5] identifies the cohorts of students who may encounter different levels of accessibility to higher education, and provides a comparative analysis of their higher educational paths. We analyze the determinants of university choice by applicants depending on the place of origin, and the differences between different cohorts of students of Russian universities are examined. As a result, we reveal barriers to higher education in a regional context, and provide policy implications for smoothing interregional differences in access to education.

1. Analytical framework

This section presents an analytical model of the accessibility of higher education in the regional context. Based on the results of previous studies, we first identify a set of barriers associated with the accessibility of higher education, and then focus on the mechanisms that influence of such factors. We argue that the same factor (for example, parental education or school background) can have both a direct and an indirect impact on the educational strategies of students (via USE scores) and, therefore, on the accessibility of higher education.

We define access to higher education as the opportunity of entering university through the results of selection based on the identification of the applicant's knowledge, regardless of SES. Socio-economic factors can affect the selection process itself and the decision of a student whether to enter a HEI, which can also limit educational choice (Prakhov, Yudkevich 2019). In this paper, higher education is considered accessible if during the decision-making and the admission process, only the scholastic abilities of a student are taken into account, and any other socio-economic factors (including family, schooling, and regional characteristics) do not affect any of the stages of university choice. Consequently, when factors other than ability significantly influence educational trajectories, they can be considered barriers limiting

[5] See https://trec.hse.ru/en/.

accessibility to higher education. Next, based on the results of the previous studies, various types of such barriers are considered, and the mechanisms of their influence on educational choice and accessibility of higher education are examined.

There are several factors in the unequal access to higher education. Individual abilities (which are usually unobservable), in the context of standardized exams, are *directly* related to the choice of educational strategy (for example, continuing high school) and the chances of entering university (Light, Strayer 2000; Roshchina 2005; Stepantsov, Kuzminov 2012). However, the exam scores, often used in research as indicators of aptitude, reflect not only the innate or acquired cognitive abilities of the student; other factors, such as family or school characteristics, can influence academic performance. Consequently, individual scores are determined by a set of different characteristics and represent a function of several variables (individual, family, school, regional), i.e. the educational production function (Hanushek 1979). That is why, in addition to individual abilities, accessibility to higher education may be limited by other factors affecting the student's academic performance. In this case, we can talk about the *indirect influence* of family, school and regional characteristics on accessibility to higher education through exam scores. However, the same factors may determine educational trajectories and accessibility to higher education *directly*. Next, we consider these characteristics and the mechanisms of their influence on educational outcomes and accessibility to higher education in more detail.

Researchers highlight the importance of family characteristics, such as income, parental education, parental involvement in schooling, their expectations regarding the future of their children, their inclusion into social networks, etc. (Anikina et al. 2014; Konstantinovskiy 2010; Prakhov 2016a; Prakhov et al. 2020; Sá et al. 2006). The *direct* influence of the family income is expressed, for example, in the ability to pay university tuition fees. In addition, wealthier families are often included in social networks that help their children to be admitted into top universities (Aleksandrova 2005). *Indirectly*, the financial situation of the family affects accessibility to higher education by affecting the results of the USE. More affluent parents have more resources for hiring tutors, paying for pre-entry courses, or can afford extracurricular educational services in specialized schools and benefit from peer-effects, which can have a positive effect on USE results (Burke, Sass 2013; Prakhov, Yudkevich 2019). In families which can afford to have only one parent working, the other parent can devote more time to the child(ren), which can have a positive effect on academic progress. Children from less affluent families perform worse in primary school than children from more affluent families (Sirin 2005), and academic performance in primary school leads to educational success in the future. Consequently, children from poorer families with worse

results in primary school are less likely to get higher education. At an early age, the child gets the skills that increase individual productivity in the future, for example, teamwork, attention, motivation and self-control. Investing in early childhood education has the greatest future returns, and the earlier the investment is made, the greater the return (Heckman 2000).

The *direct* influence of parental education can be expressed, for example, through parental attitudes to higher education. According to Andres & Looker (2001), the likelihood of entering university will be higher if at least one of the parents has higher education. Agupusi (2019) says that the higher the level of parental education, the more years a child will spend on schooling, consequently, the likelihood of entering university will be higher. Tsiplakides (2018) shows that children from families with less educated parents are underrepresented at high-status universities, which means that these people have greater barriers to entering such HEIs. Parental education can *directly* influence the choice of educational trajectory, since people with higher education value it more and want their children to have higher education. Children from educated families can more easily overcome difficulties connected with entering higher education (Agupusi 2019; Aschaffenburg, Maas 1997). The importance of parental education is *indirectly* manifested through the results of the USE: for example, people with higher education, as a rule, do not experience difficulties in helping a child with homework. By helping children with their homework, parents increase the chances of their children getting a USE high score. For example, Cheng (2017) has shown that children from families with more educated parents study better at school and have higher educational achievements in general, and González et al. (2020) argue that the level of parental education positively influences children's cognitive development. Lin (2020) even found that parental education can positively affect children's educational achievements genetically. The genes of educated parents increase their children's chances of continuing their studies at university. Parental involvement also increases academic performance (Hara, Burke 1998; Prakhov et al. 2020), which in turn increases the likelihood of being admitted to university.

Another important factor for accessibility to higher education is the school. School characteristics include the availability of specialized classes, the type of institution, the presence of extra subjects and training (Prakhov 2016b), the quality of teachers, school financial resources, and the competence of the principal (Uvarov, Yastrebov 2014). Schools can contribute to the accessibility of higher education through cooperation with universities or by providing additional information about the USE (the *direct* effect). Moreover, good schools are characterized by the practice of students copying the strategies of their classmates. This can result in students being guided by the choice of university of their classmates: if the

majority of people in the class strive to get into good universities, then the rest are likely to copy this strategy.

The school *indirectly* affects the accessibility of higher education through the quality of educational services. For example, in top-schools or schools with specialized classes, students can receive a better quality education, which will have a positive impact on student achievement. Good schools practice selection during admission, so stronger students initially may get into such educational institutions. In addition, it is often possible to get into top schools using financial resources (if the school provides paid educational services) or social ties (through acquaintances), which can be beneficial for students from certain backgrounds. Children from families where their parents received higher education have a better chance of getting into a specialized school or a stronger group (Aschaffenburg, Maas, 1997). In Russia, it was shown that vocational education and training (VET) graduates, compared to high school graduates, are less likely to enter HEIs (Voznesenskaya et al. 2004) because VET graduates received education of a poorer quality, which, in turn, affects USE results when they decide to apply for university. As mentioned, there is also the peer effect in schools: children tend to do better if most of their classmates get good grades. This can also affect USE results.

In regional contexts, the problem of accessibility to higher education may manifest itself even more strongly. In addition to the differences in the levels of regional socio-economic and educational development and the resulting unequal opportunities for choosing a university, the influence of the family and school factors, mentioned above, when comparing urban and rural students can be more pronounced, since such residents differ from each other by SES (Kirby, Conlon 2005; Anisef, Frempong 2005) and school characteristics (Bolliger 2015). The influence of family characteristics as a channel for the inequality of access to higher education can be aggravated by regional characteristics: for example, rural residents are often less educated and have lower incomes. In addition, the quality of education in rural schools is often lower than in urban schools. Rural schools also have fewer opportunities for cooperation with universities and have less information about the USE exam.

The regional factor can also influence the choice of the educational trajectory through the uneven development of local higher education markets. This influence is manifested in the distance to the nearest university (or to the university where the individual would like to enroll) and the availability of transport, in the features of the local labor market, and in the level of urbanization of the settlement (Konstantinovskiy 2010). For example, the proximity of a HEI to the student's hometown has a positive effect on the likelihood that he/she will enroll there. If a VET institution is located closer, then the individual is more likely go there

(Abankina et al. 2012; Frenette 2004; Sá et al. 2006; Spiess, Wrohlich 2010). Prospective students need to be psychologically prepared to move from their hometowns to another city or region in order to continue their studies (Andres, Looker 2001; McCracken, Barcinas 1991). In addition to the influence of geographical accessibility on the decision of individuals to enter university, there is a significant the influence of the distance on the choice of specialization: students living a greater distance from HEIs are less likely to study Art, Law, Engineering, Science, and Medicine (Flannery, Cullinan 2014). Figure 1 illustrates the main channels of inequality in access to higher education and the directions of their influence.

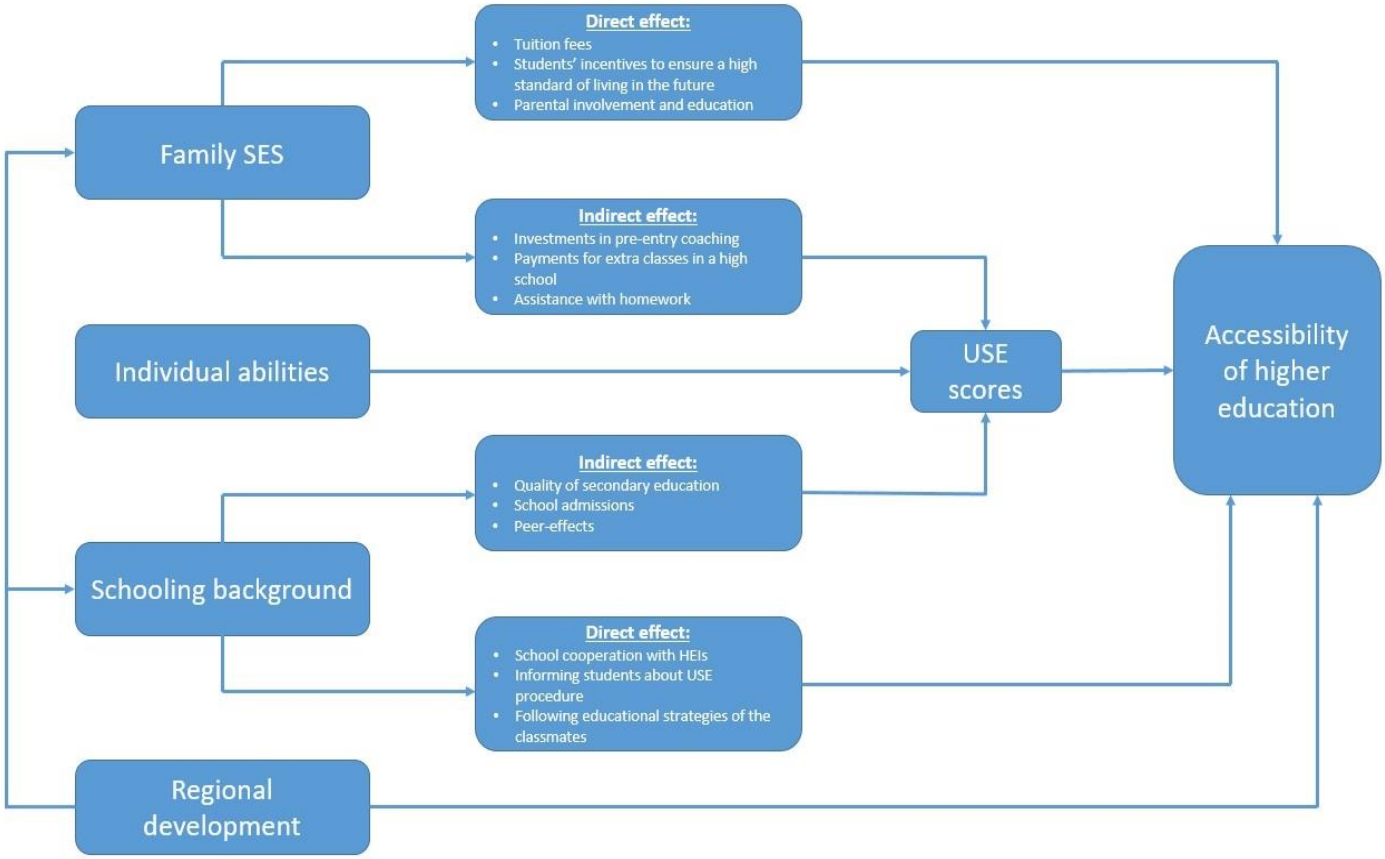

Figure 1. Analytical framework of the study

As we examine the Russian case and the interregional context, we distinguish three cohorts of students who may face different levels of accessibility to higher education: residents of Moscow or Moscow region (hereinafter Moscow), students from large cities or regional centers, and students from other settlements (small towns or rural areas). Given the huge territorial inequality in Russia, we can assume that high school graduates from large cities, where higher education markets are more developed, have the greatest advantages over students from other regions and smaller settlements. Such advantages existed before the introduction of the USE, but we expect that their influence still remains significant even after

the standardization of the admission rules, especially for graduates of Moscow high schools who applied to the HEIs in their hometown. Moscow students can benefit from their geographical position for several reasons.

First, the Moscow higher education market is the most developed: there are 107 state and 46 private HEIs, which is about 20% of the total number in Russia. 7 out of the 10 top Russian universities are located in Moscow. Thus, Moscow students can expect a greater return on higher education, which is a beneficial consequence of admission.

Secondly, Muscovites have the opportunity to study in the same region where they graduated from high school. They do not need to move to another city for higher education, they do not need to rent or buy housing, since they are more likely to have the opportunity to live with their parents, and there is also no need to spend money on trips home. In addition, these students will not face the psychological barriers of having to move and living separately from parents.

Thirdly, before the introduction of the USE, Moscow students had ample opportunities for additional pre-entry coaching, since they could attend courses at a particular university, as well as hire tutors, who often worked at the chosen HEI. Despite the standardization of the admission process, the need for additional training remains and pre-entry classes have not lost their popularity (Prakhov 2017). In Moscow, opportunities for additional training are more favorable, since there is a wide range of courses, and a large number of qualified tutors. In addition, it is possible to prepare for the USE within high schools, and Moscow is represented by many high-quality schools. Students from other large cities (for example, St. Petersburg, Tomsk, Novosibirsk, Yekaterinburg) where the regional higher education markets are more developed are also in a beneficial position.

High school graduates from villages and small towns may face a number of barriers caused by interregional differences. For young people from some regions, the choice of a university may be limited due to the underdevelopment of local educational markets. The need to move to another region leads to additional transaction costs. The problems of such inequality can be especially severe for villagers. Rural schools may be of lower quality, which limits the availability of higher education for local residents, and salaries in villages tend to be lower than salaries in urban areas (Huong et al. 2019; Ibragimova, Frants 2020; Kirby, Conlon 2005; Shabanov 2014; Zamfir 2017), which can limit the educational mobility of youth. The opportunities for pre-entry coaching in rural areas are also limited.

2. Empirical assessment of interregional accessibility of higher education in Russia

We use data from the longitudinal study 'Trajectories in Education and Careers', implemented by HSE University (Malik 2019). The sample is representative and includes respondents from different Russian regions, different types of municipalities, and different types of educational institutions. The sample was formed on the basis of the TIMSS 2011 sample. In the first wave of the survey, conducted in 2012, 3,827 9-grade students from 42 regions were interviewed. The second and the third waves took place in 2013–2014, and included students who entered the 11th grade or those in VET at the time of the survey. The fourth wave took place after potential enrollment in HEIs.

We test the proposed analytical model empirically. First, we present the key variables which reflect academic achievements (individual abilities) and educational strategies, together with factors which may act as the barriers to higher education (family characteristics and school characteristics). Second, we consider the main educational trajectories of Russian students, depending on the region where they graduated from high school. Here we split the sample into three main cohorts of students, representing three main types of the settlements. We show the differences in the educational pathways depending on the cohort. Third, we estimate the probability of the choice of the corresponding strategy for each cohort using regression analysis. Logistic regressions of the determinants of attendance of high school and successful university enrollment are presented. According to the analytical model, these regressions allow an empirical assessment of the direct and indirect relationship between the potential barriers and educational outcomes, and show the differences between three cohorts of students. Fourth, we focus on the students and examine the relationship between university selectivity and individual, family and school inputs.

The descriptive statistics for the key variables are presented in the Appendix (Table A1). Maternal and paternal education, family income and the number of books at home are family characteristics. Parental education is coded as a binary variable, which take the value of 1 if a parent has higher education, 0 otherwise. School characteristics are represented by the binary indicators 'specialized school in the 9th grade', 'specialized school in the 11th grade' and 'classes with in-depth study of certain subjects in the 11th grade'. The variables 'Attended high school' and 'Enrolled in HEI' characterize the type of educational strategy chosen by the student, where '1' denotes the fact of being in high school or entering university, 0 otherwise. The results of state examinations make up a block that describes individual academic achievement. The results of the Basic State Exam (BSE), which is compulsory after the 9th grade, vary from 2 to 5, while the USE is scored out of 100. The BSE

(USE) scores in compulsory subjects were calculated as the average of the marks in Russian and Mathematics. Admission quality ranking (AQR)[6] represents the level of university selectivity and is calculated as the average USE score required for getting a state-subsidized position.

A quantitative assessment of the educational strategies of students depending on the type of settlement is presented in Table 1. In order to determine the differences in the educational strategies of youth from a regional perspective, the respondents were classified in three groups: 9th grade graduates (1) from Moscow (9%, or 324 students), (2) from large cities[7] or regional centers (39%, or 1,365 students), (3) from other towns or rural areas (52%, or 1,835 students). Moscow has the largest number of HEIs compared to other regions. There are fewer universities in large cities and regional centers, but there is a number of large higher education centers (for example, St. Petersburg, Tomsk and Novosibirsk). In other cities and villages, higher educational choice is limited.

Table 1. Educational strategies of students depending on the type of settlement

Type of the settlement (regional cohort)	**The share of enrolled in high school after the 9th grade**	**The share of enrolled into universities among all students**	**The share of enrolled into universities among high school graduates**
All students	0.68	0.57	0.83
Moscow	0.77	0.68	0.89
Large cities or regional centers	0.7	0.63	0.88
Other settlements	0.65	0.51	0.78

The initial assessment of educational strategies indicates the regional disparities in the access to higher education. Students from Moscow are in a better position compared to the rest of the students: the share of students in high school and the share of those enrolled in university among them are the highest. The lowest rates are shown for students from small towns or rural areas: this cohort is the most numerous and most vulnerable.

Next, we consider the educational strategies of youth in more detail. We start with an evaluation of the regression models of binary choice (logistic regressions) in order to assess the probability of attending high school versus attending VET. We offer two main

[6] See https://ege.hse.ru/.

[7] According to the classification presented in the Urban Planning Code of the Russian Federation, a large city is a settlement with a population of 250,000 or more.

specifications. The first one (one-step) uses a linear regression of the BSE scores and is evaluated as an indicator of academic achievement (Equation 1). However, BSE results themselves are not random and may depend on a number of other variables, such as family and school characteristics. Broadly speaking, BSE scores represent an educational production function and therefore must be assessed separately. In order to do this, we propose a second (two-step) specification where the BSE estimates predicted by the linear regression are included in the model of the binary choice of educational strategy as independent variables (Equation 2). Such a specification allows us to assess the direct, indirect and cumulative effects of family and schooling on the probability of attending high school. Cumulative effects are expressed in the one-step specification. Indirect effects are expressed through the influence of these characteristics on the BSE results at the first step, and then through the influence of the BSE scores on the educational strategy at the second step. Formally, the models can be expressed as:

$$\Pr(High\ school = 1) = f(BSE, Family, School, Controls) \quad \text{(Eq. 1)}$$

$$\begin{cases} \Pr(High\ school = 1) = g(\hat{BSE}, Controls) \\ BSE = h(Family, School, Controls) \end{cases}, \quad \text{(Eq. 2)}$$

where $\Pr(High\ School = 1)$ is a binary variable, reflecting the probability of attending a high school;

BSE is the average individual BSE score in compulsory subjects (Russian and Mathematics);

$\hat{BSE}$ is the predicted individual BSE score in compulsory subjects;

Family is a vector of family characteristics;

School is a vector of school characteristics;

Controls is a vector of control variables;

$f(\cdot)$, $g(\cdot)$ are logit functions;

$h(\cdot)$ is a linear function.

The marginal effects are reported in Table 2, which shows the direct and indirect effects for each cohort of students. For Muscovites, only indirect effects, such as maternal education and the number of books at home, are significant (see the results of the auxiliary linear regression in Table A2 in Appendix). The probability of admission to university of residents from large cities, regional centers and other settlements is indirectly influenced by maternal education, the number of books at home, family income, and gender. The only significant

direct effect is gender: girls are more likely to continue education in high school. Regressions show that students from Moscow face the fewest barriers.

Table 2. The determinants of high school attendance (logistic regression; dependent variable: high school attendance)

Sample	**All sample**		**Moscow**		**Large cities or regional centers**		**Other settlements**	
Specification / **Independent variables**	**1Step**	**2Step**	**1Step**	**2Step**	**1Step**	**2Step**	**1Step**	**2Step**
BSE score in compulsory subjects	0.305*** (0.017)	0.766*** (0.053)	0.094** (0.046)	0.596*** (0.174)	0.279*** (0.030)	0.688*** (0.078)	0.275*** (0.024)	0.795*** (0.082)
Maternal education	0.138*** (0.022)	-	0.188** (0.067)	-	0.075* (0.038)	-	0.174*** (0.032)	-
Family income	0.001*** (0.000)	-	-0.001 (0.000)	-	0.001*** (0.000)	-	0.001** (0.000)	-
Number of books at home	0.001** (0.000)	-	-0.001 (0.001)	-	0.001 (0.001)	-	0.001 (0.001)	-
Specialized school in the 9th grade	0.007 (0.021)	-	0.084 (0.067)	-	-0.014 (0.037)	-	-0.001 (0.030)	-
Male	-0.046** (0.021)	0.083*** (0.023)	-0.047 (0.060)	-0.018 (0.061)	-0.016 (0.037)	0.081** (0.039)	-0.051* (0.031)	0.107** (0.034)
Student from Moscow	0.036 (0.049)	-0.012 (0.054)	-	-	-	-	-	-
Student from a large city or regional center	0.015 (0.023)	-0.004 (0.022)	-	-	-	-	-	-
R-squared	0.210	0.086	0.148	0.090	0.228	0.098	0.183	0.076
Number of obs.	2401	2618	136	138	673	716	1096	1213

Standard errors in parentheses. Significance levels: *** – 1%, ** – 5%, * – 10%.

The results of the auxiliary regression (Table A2 in the Appendix) show that the BSE scores of the students from Moscow are influenced by maternal education and the number of books at home (indicators of the socio-cultural capital of the family). BSE scores of the students from large cities, regional centers and other settlements are influenced by socio-cultural capital, family income and gender. Again, the weakest indirect impact of the barriers (directly affecting BSE scores) limiting access to education is revealed for residents of Moscow.

Following a similar logic, we estimate the probability of enrolling in university (Equations 3 and 4), but now we use the average USE score in compulsory subjects as an indicator of academic performance (Table 3). The auxiliary linear regression of the individual

USE score on the characteristics of family, school, and educational performance in high school is assessed separately (Table A3 in the Appendix):

$$\Pr(University=1)=k(USE,Family,School,Controls) \quad \text{(Eq. 3)}$$

$$\begin{cases}\Pr(University=1)=l(\hat{USE},Family,School,Controls)\\ USE=m(BSE,Family,School,Controls)\end{cases}, \quad \text{(Eq. 4)}$$

where $\Pr(University=1)$ is a binary variable, reflecting the probability of enrolling in university;

USE is the average individual USE score in compulsory subjects (Russian and Mathematics);

$\hat{USE}$ is the predicted individual USE score in compulsory subjects;

BSE is the average individual BSE score in compulsory subjects;

Family is a vector of family characteristics;

School is a vector of school characteristics;

Controls is a vector of control variables;

$k(\cdot)$, $l(\cdot)$ are logit functions;

$m(\cdot)$ is a linear function.

Table 3 shows that for each group of students there are both direct and indirect effects on the probability of admission to university. The barriers limiting access to higher education manifest themselves more strongly in 11th grade. The USE scores are positively related to the probability of admission in all specifications for all cohorts of students. The likelihood of admission to university by Muscovites indirectly (through predicted USE scores) depends on the BSE score and maternal education, and directly on studying in a specialized school in the 11th grade. The likelihood of admission to university for school graduates from large cities or regional centers is indirectly influenced by the BSE results, maternal education, family income, studying in a school with a specialization and in a class with in-depth study of subjects, and directly on studying in a specialized school, in a specialized class and attending extra classes at school. The likelihood of successful admission to HEIs for the students from other settlements indirectly depends on the BSE scores, maternal education, family income, studying in a school with a specialization, a class with in-depth study of subjects, and attending extra classes at school, and directly on family income, studying in a specialized school and gender (girls are more likely to enroll in HEIs).

Table 3. The determinants of enrolling in university (Logistic regression; Dependent variable: university enrollment)

Sample	**All sample**		**Moscow**		**Large cities or regional centers**		**Other settlements**	
Specification / **Indep. variables**	**1Step**	**2Step**	**1Step**	**2Step**	**1Step**	**2Step**	**1Step**	**2Step**
USE score in compulsory subjects	0.008*** (0.001)	0.015*** (0.001)	0.004** (0.002)	0.011*** (0.004)	0.005*** (0.001)	0.008*** (0.002)	0.012*** (0.001)	0.020*** (0.002)
Maternal education	0.034** (0.016)	0.028 (0.021)	-0.049 (0.042)	-0.076 (0.061)	0.022 (0.022)	0.031 (0.031)	0.055** (0.025)	0.047 (0.032)
Family income	0.001*** (0.000)	0.001** (0.000)	0.001 (0.000)	0.001 (0.000)	-0.001 (0.000)	0.001 (0.000)	0.001*** (0.000)	0.001** (0.000)
Number of books at home	0.001 (0.001)	-0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	-0.001 (0.001)
Specialized school in the 11th grade	0.013 (0.017)	0.046** (0.022)	0.027 (0.039)	0.099** (0.051)	0.023 (0.024)	0.059* (0.032)	-0.001 (0.029)	0.044 (0.034)
Class with in-depth studies	0.053*** (0.016)	0.086*** (0.021)	-0.032 (0.040)	0.073 (0.062)	0.021 (0.022)	0.086*** (0.032)	0.082*** (0.025)	0.091*** (0.030)
Extra classes at school	-0.020 (0.015)	0.018 (0.019)	-0.018 (0.050)	-0.058 (0.077)	-0.001 (0.022)	0.047* (0.027)	-0.035 (0.023)	0.004 (0.028)
Male	-0.023 (0.015)	-0.041** (0.019)	0.071* (0.041)	0.063 (0.052)	-0.031 (0.022)	-0.045 (0.029)	-0.028 (0.024)	-0.051* (0.029)
Student from Moscow	0.017 (0.029)	-0.011 (0.041)	-	-	-	-	-	-
Student from a large city or regional center	0.044*** (0.015)	0.033* (0.020)	-	-	-	-	-	-
R-squared	0.249	0.236	0.136	0.193	0.161	0.192	0.294	0.258
Number of obs.	1412	1419	113	119	474	491	802	789

Standard errors in parentheses. Significance levels: *** – 1%, ** – 5%, * – 10%.

An analysis of the model with real USE scores (one-step regression) shows significant cumulative effects: accessibility to higher education for the entire sample is influenced by USE results, maternal education, family income and studying in a specialized class; for Muscovites USE results and gender; for residents of large cities and regional centers only USE results; for residents of other settlements USE results, maternal education, family income and studying in a specialized class. The greatest number of barriers that limit access to higher education occur for students from small towns and rural areas, which confirms the results of a preliminary study of educational strategies (Table 1).

An auxiliary linear regression of USE scores (another version of the production function in education) shows that for Muscovites, USE scores positively correlate with BSE scores in compulsory subjects and maternal education. USE scores gained by the graduates from large cities or regional centers depend on BSE results, maternal education, family income (family characteristics), the fact of studying in a school with a specialization and in a class with in-depth study of subjects (school characteristics). The largest set of factors affect the USE score for graduates from other localities: BSE scores, maternal education, family income, a school with a specialization, a class with in-depth study of subjects, extra classes at school. We can conclude that the greatest manifestation of indirect effects (directly affecting USE results) is for students from small towns and rural areas – the largest cohort of Russian students.

Now we focus on enrolled students and consider the quality of their HEIs. First, we single out several cohorts of students of Russian universities, depending on the place of graduation from high school (or VET) and the location of the university (Table 4). This is necessary in order to assess the parameters by which the selected cohorts of students differ. As a result, it will be possible to draw conclusions about the influence of cognitive abilities, family and school characteristics on the formation of educational strategies by individuals, depending on their region of origin.

Table 4. Cohorts of Russian university students in the regional context (*number of students in parentheses*)

University region / **School region**	**Moscow (and Moscow Region)**	**Regional center or a large city**	**Other settlement (small town or rural area)**
Moscow (and Moscow Region)	(Cohort 1) Students who graduated from a high school in Moscow and enrolled in a HEI of the same region (*316*)	-	-
Regional center or a large city	(Cohort 2) Students who graduated from a high school in a regional center or a large city and enrolled in a HEI in Moscow (*61*)	(Cohort 3) Students who graduated from a high school in a regional center or a large city and enrolled in a HEI in a regional center or a large city (not necessarily the same one) (*1,279*)	-
Other settlement (small town or rural area)	(Cohort 4) Students from other settlements who enrolled in a HEI in Moscow (*73*)	(Cohort 5) Students from other settlements who enrolled in a HEI in a regional center or a large city (*689*)	(Cohort 6) Students from other settlements who enrolled in a HEI in the settlement of the same size (*1,054*)

Figure 2 represents the geographical distribution of high school graduates and first-year university students. The share of students located in large cities or regional centers is 66%. Around 16% of students are in Moscow, the share of students who are enrolled in HEIs located in small towns or rural areas is 18%. This shows the nature of educational mobility: students move to large cities and educational centers, or to Moscow. Small towns are the least attractive for higher education.

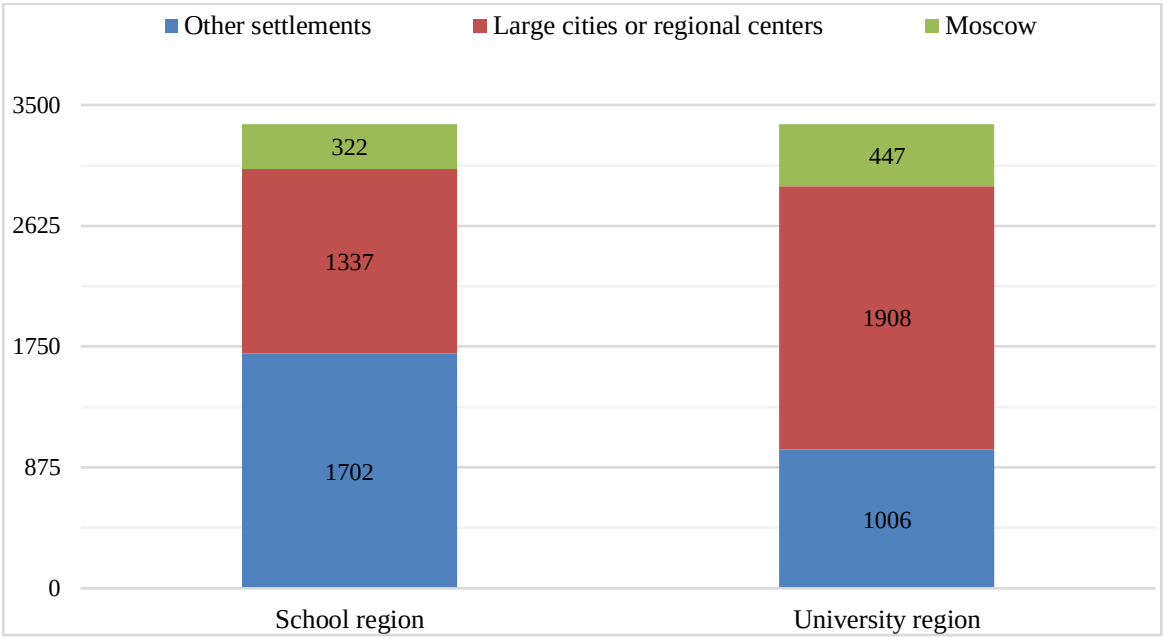

Figure 2. Student cohorts

Descriptive statistics on the student characteristics are presented in Table A4 in the Appendix. USE scores are a noisy indicator that correlates with the cognitive abilities of the student, since they are also influenced by both school and family characteristics. The admission quality ranking reflects the level of university selectivity, since it indicates the level of competition between applicants for state-subsidized places. Students from large cities who have enrolled in a university in Moscow have the highest USE scores. Students from large cities or regional centers tend to choose more selective universities compared to Muscovites and get higher USE scores. The least selective universities are chosen by the students from small towns or rural areas, who entered universities located in settlements of the same size. Students of the last cohort gets the lowest USE results.

Parental education, the number of books at home, and family income represent family characteristics that can act as barriers to higher education. The type of school (specialized school or not) can be also considered as a potential barrier. Moscow students who attended school in Moscow have the highest family income and the highest number of books at home

compared to other student cohorts. However, students belonging to this cohort are less likely to study in specialized schools compared to graduates of schools from large cities, and the level of education of their parents is often lower compared to students who have moved from large cities or regional centers to Moscow. The lowest level of income, a small number of books at home, and a low level of parental education are characteristic of university students from the last cohort. It can be concluded that in the regional context, the problem of inequality in access to higher education is more acute, because families in rural areas, in small settlements (and cities that are not large or regional centers) have the lowest income, the lowest levels of parental education, and the lowest level of cultural capital.

Next, we evaluate linear regression models of the admission quality ranking (AQR) in order to assess the determinants of the university selectivity (i.e. the quality of higher education). Following the previous strategy, we also estimate empirical models in two specifications: with the inclusion of the real individual USE score in compulsory subjects (one-step OLS; Equation 5), and using a system of simultaneous equations, which includes the predicted USE score from the auxiliary regression (2SLS; Equation 6):

$$AQR = x(USE, Family, School, Controls) \quad \text{(Eq. 5)}$$

$$\begin{cases} AQR = y(\hat{USE}, Family, School, Controls) \\ USE = z(BSE, Family, School, Controls) \end{cases}, \quad \text{(Eq. 6)}$$

where, *AQR* is the admission quality ranking (an average USE score among admitted applicants on a tuition-free positions);

USE is the average individual USE score in compulsory subjects (Russian and Mathematics);

$\hat{USE}$ is the predicted individual USE score in compulsory subjects;

BSE is the average individual BSE score in compulsory subjects;

Family is a vector of family characteristics;

School is a vector of school characteristics;

Controls is a vector of control variables;

$x(\cdot),\ y(\cdot),\ z(\cdot)$ are linear functions.

Table 5 shows that for Muscovites, AQR is correlated with USE results, and is indirectly affected by BSE scores and the maternal education. Gender is also statistically significant: girls are admitted to more selective universities.

Table 5. The determinants of the university selectivity (linear regression; dependent variable: AQR)

Sample	**All sample**		**Moscow**		**Large cities or regional centers**		**Other settlements**	
Specification / **Indep. variables**	**1Step**	**2Step**	**1Step**	**2Step**	**1Step**	**2Step**	**1Step**	**2Step**
USE score in compulsory subjects	0.257*** (0.020)	0.234*** (0.039)	0.254*** (0.087)	0.163*** (0.163)	0.261*** (0.034)	0.247*** (0.063)	0.250*** (0.027)	0.258*** (0.052)
Maternal education	1.032** (0.500)	0.987* (0.553)	2.345 (2.229)	3.253 (2.428)	0.869 (0.809)	0.742 (0.904)	1.029 (0.671)	0.810 (0.730)
Family income	0.001*** (0.000)	0.001*** (0.000)	0.001 (0.000)	0.001 (0.000)	0.001* (0.000)	0.001* (0.000)	0.001*** (0.000)	0.001 (0.000)
Number of books at home	0.002 (0.001)	0.001 (0.001)	0.002 (0.005)	0.001 (0.005)	0.002 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)
Specialized school in the 11th grade	1.008* (0.522)	0.978* (0.569)	2.440 (1.933)	2.886 (2.051)	1.490* (0.828)	1.050 (0.933)	0.446 (0.737)	0.483 (0.789)
Class with in-depth studies	-0.718*** (0.048)	-0.236 (0.524)	0.485 (1.971)	1.155 (2.129)	-0.859 (0.815)	-0.371 (0.902)	-0.608 (0.642)	-0.336 (0.694)
Male	-1.892*** (0.482)	-1.855*** (0.521)	-4.736 *** (1.900)	-5.081*** (2.086)	-1.774** (0.796)	-1.432* (0.866)	-1.353** (0.656)	-1.481** (0.698)
Student from Moscow	6.430*** (0.889)	6.656*** (0.939)	-	-	-	-	-	-
Student from a large city or regional center	-0.432 (0.503)	-0.441 (0.549)	-	-	-	-	-	-
Constant	48.075*** (1.283)	49.624*** (2.201)	53.502*** (6.071)	58.828*** (10.929)	47.648*** (2.027)	48.596*** (3.433)	48.390*** (1,748)	48.847*** (2.965)
R-squared	0.265	0.181	0.253	0.188	0.126	0.118	0.190	0.101
Number of obs.	982	909	84	82	371	349	514	469

Standard errors in parentheses. Significance levels: *** – 1%, ** – 5%, * – 10%.

For graduates from large cities or regional centers, the quality of admission is related to the USE, and indirectly to BSE scores, maternal education, family income, a school with a specialization in the 11th grade, a class with in-depth study of certain subjects (Table A3 in Appendix). Direct effects are established for family income and gender. For graduates from other settlements, USE scores are statistically significant, indirect effects for BSE scores, maternal education, family income, school with specialization, class with in-depth study of subjects, extra classes at school are revealed. Direct effects are significant for gender. For all

students, admission to selective universities is most strongly limited by USE scores. USE results are influenced by the greatest number of factors for students from small towns or rural areas. Again, we have shown that this cohort of students is in the most disadvantaged position. It is difficult for them to enroll in a selective university, which may affect the returns to higher education in future.

The analysis of the model with the included real USE score makes it possible to assess the cumulative effects of the influence of various factors on the AQR. Table 5 shows that for the entire sample, the following factors are significant: USE results, maternal education, family income, studying in a specialized school and in a class with in-depth study of subjects, gender, and residence in Moscow. For Moscow graduates, USE results and gender are among significant factors, for graduates from large cities or regional centers AQR is related to USE results, family income, graduation from a specialized school, and gender, while for the graduates from other localities USE results, family income and gender are statistically significant.

Conclusion

This study analyzed the barriers which limit access to higher education in a regional context in Russia. Based on previous studies of accessibility to higher education, an analytical model of the *direct* and *indirect* effects of family, schooling and regional barriers to higher education was presented. The model suggests that even under the unified system of university admission, there are still certain cohorts of students who may benefit from the standardized procedures, and other students may remain at a disadvantage. We argue that a unified indicator of academic achievement itself (individual USE scores) can play the role of a mediator, i.e. a factor through which the family and school characteristics indirectly affect the accessibility of higher education.

Such inequalities may arise not only due to the differences in SES or school characteristics (which has been confirmed in previous studies), but the degree of inequality can be exacerbated by variation in regional macroeconomic indicators and by the uneven development of high school and university markets in the regions. This is the main theoretical contribution of the study.

The analytical model was tested empirically based on data from the longitudinal panel study ‘Trajectories in Education and Careers’. The regression analysis revealed significant direct and indirect relationships between student characteristics and educational pathways, and such relationships differ between different cohorts of youth. For example, it was shown that students from Moscow more often continue their education in high school after the 9th

grade, less often students of large cities or regional centers, most rarely students from other settlements. In addition, the probability of enrollment in HEIs is the highest for Moscow students, while students from large cities or regional centers make such a choice less often, and the share of university applicants among young people from other settlements is the smallest. This suggests that inequality in access to education is established at least two years before entering university.

Access to higher education is least limited for residents of Moscow. Higher USE scores are received by those Muscovites who have received higher BSE results, and by those whose mothers are more educated (indirect effects). Those Muscovites who received high USE scores and those who attended schools with a special status are more likely to enter a university (direct effects). The level of selectivity of the university in which Muscovites study, depends only on individual USE results and on gender. Family income does not have a significant effect on the likelihood of being enrolled in a selective university. Hence, Moscow students are in the most beneficial position and they face the least number of barriers to higher education.

To a greater extent, access to higher education is limited for residents of large cities or regional centers. USE scores are correlated with higher BSE results, maternal education, family income, studying in schools with a specialization and in classes with advanced study of subjects (indirect effects). The probability of admission to an HEI depends on USE scores (indirect effects that affect the USE results also play a role), graduation from a specialized high school, or a class with in-depth study of subjects, or attendance of extra classes (direct effects). The level of university selectivity is influenced by USE results, family income and gender. In other words, the chances of getting into an HEI for these students are more limited compared to those of Muscovites.

Most of all, access to higher education is limited for residents of small towns or rural areas. USE scores are positively related to individual BSE results, maternal education, family income, and school characteristics (indirect effects). The highest chances of enrollment in university are among those who received the highest USE results (the influence of indirect effects), and for those students from affluent families and with a sound educational background (direct effects). The level of university selectivity for students from small towns depends on USE scores, however, getting a good result on the exam is limited by a large number of factors, so it is difficult for them to enter a selective university.

Through the estimation of simultaneous regression equations, it was empirically shown that accessibility to higher education is limited by both *indirect* effects (student performance is a production function in education) and *direct* effects, the influence of which can be more

significant in a regional context due to regional socio-economic and educational differences. First, it has been shown that students from different settlements face different sets of barriers to higher education, which indicates the presence of interregional inequality. Second, econometric models (for example, the estimation of the educational production function) have shown that USE as a measure of achievement can have a mediating effect and provide indirect links between student background and educational pathways. This means that factors which influence the accessibility of higher education can be formed long before actual admission to the university. This is the main methodological and empirical contribution of the study, and the same patterns may take place in many developing countries, characterized by a strong variation in individual and regional socio-economic characteristics, and experiencing segmentation of educational quality.

In other words, the results indicate that, despite the introduction of the USE, accessibility to higher education for people with different socio-economic characteristics from different regions has not been ensured. Unequal access to higher education remains in the regions: access to higher education is the easiest for residents of Moscow, and the most limited for residents of small settlements or rural areas. This can lead to an ineffective choice of educational trajectory, which can become a mechanism for the spread of inequality. That is why it is necessary to take measures to develop regional education markets, because these steps may smooth out inequality in access to higher education.

Special attention should also be paid to support the residents of rural areas, because the problem of obtaining higher education for them is most acute. Possible measures include, for example, improving the quality of educational services provided by schools in the smallest settlements, including the creation of specialized schools or classes with in-depth study of subjects. This measure is necessary to improve the quality of education provided in settlements with the least developed educational services, since the level of education strongly affects the likelihood of an individual continuing to study at university. An increase in the quality of school education in regions with the least developed educational markets could help to reduce the impact of school characteristics on access to higher education.

It is also necessary to develop educational services aimed at preparing for the USE and BSE, so that residents of each region can receive educational services of a high standard. It is necessary to develop the educational system in the smallest settlements, and to help improve the quality of educational services provided by teachers, and increase the motivation of teachers in various educational institutions. The provision of information about the USE, about the possibilities of preparing for the USE, about strategies for entering universities, about the variety of universities (in the region of residence and in other regions), and about

the positive returns to higher education is also crucial. Special attention should be paid to families with the least social and cultural capital (where mothers do not have higher education, families with the lowest income level, families with the least cultural capital). For example, it is possible to introduce special support to alleviate the burden of transaction costs for an individual who has made the decision to obtain higher education outside his or her hometown. Such financial assistance (for example, educational vouchers) could cover the costs of educational mobility.

Policies must be developed and implemented in order to mitigate all barriers to higher education. Improving school quality and family support will lead to increased opportunities for university admission and subsequent positive returns to higher education on the individual level. Stimulating the development of regional educational markets will limit the 'brain drain' to other regions and will contribute to further regional development, contributing to an increase in educational returns at the regional level and for the whole country.

A promising area for future research is gender inequality. It has been shown that girls are more likely to be engaged in higher education than boys, they outperform boys on the BSE and USE, and are admitted to the more selective universities. On this basis, higher returns to higher education for girls can be expected. However, the literature indicates that there is a gender wage gap in the labor market in favor of men and it is important to trace how such inequality arises despite the more favorable initial conditions.

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Appendix

Table A1. Descriptive statistics

Variable	**N**	**Min**	**Max**	**Mean**	**Std. deviation**
Educational strategies:					
Attended high school	4138	0	1	0.65	0.47647
Enrolled in university	3612	0	1	0.57	0.49533
Admission quality ranking	1636	43.70	92.60	66.46	8.95393
Indicators of academic achievement:					
BSE score in Russian	3919	2	5	4.05	0.75557
BSE score in Mathematics	3804	2	5	3.89	0.81924
BSE score in compulsory subjects	3780	2	5	3.98	0.68621
USE score in Russian	2428	3	100	67.62	15.030
USE score in Mathematics	2419	3	100	50.92	17.143
USE score in compulsory subjects	2416	3	100	59.31	14.26267
Family characteristics:					
Mother's education	3174	0	1	0.36	0.48084
Father's education	2513	0	1	0.31	0.46143
Family income (rubles per month)	3136	10000	95000	26893	20442.80765
Number of books at home	3260	5	650	137.68	177.00660
School characteristics:					
Specialized school in the 9^{th} grade	3331	0	1	0.53	0.4993
Specialized school in the 11^{th} grade	3867	0	1	0.21	0.47647
Class with in-depth studies	3867	0	1	0.37	0.48288

Table A2. Educational production function-1 (Linear regression; Dependent variable: BSE score in compulsory subjects)

Sample / Independent variables	All sample	Moscow and the Moscow Region	Large cities and regional centers	Other settlements
Mother's education	0.305*** (0.029)	0.216** (0.106)	0.313*** (0.051)	0.330*** (0.044)
Family income	0.001*** (0.000)	-0.001 (0.000)	0.001*** (0.000)	0.001*** (0.000)
Number of books at home	0.000*** (0.000)	0.001** (0.000)	0.000*** (0.000)	0.000* (0.000)
Specialized school in the 9th grade	0.004 (0.027)	0.058 (0.109)	0.071 (0.051)	-0.017 (0.039)
Male	-0.278*** (0.000)	-0.023 (0.102)	-0.290*** (0.049)	-0.281*** (0.039)
Student from Moscow	0.149** (0.059)	-	-	-
Student from a large city or regional center	-0.003 (0.030)	-	-	-
Constant	3.836*** (0.029)	4.130*** (0.142)	3.728*** (0.000)	3.924*** (0.043)
R-squared	0.131	0.100	0.163	0.114
Number of obs.	2401	136	673	1096

Standard errors in parentheses. Significance levels: *** – 1%, ** – 5%, * – 10%.

Table A3. Educational production function-2 (Linear regression; Dependent variable: USE score in compulsory subjects)

Sample / Independent variables	All sample	Moscow and the Moscow Region	Large cities and regional centers	Other settlements
BSE score in compulsory subjects	11.127*** (0.482)	11.022*** (1.739)	11.288*** (0.835)	10.863*** (0.642)
Mother's education	2.972*** (0.622)	4.863** (1.739)	2.692*** (1.014)	2.949*** (0.860)
Family income	0.001*** (0.000)	0.001 (0.000)	0.001** (0.000)	0.001*** (0.000)
Number of books at home	0.002 (0.002)	-0.002 (0.005)	0.001 (0.003)	0.002 (0.002)
Specialized school in the 11^{th} grade	1.950*** (0.648)	-0.867 (1.951)	3.325*** (1.056)	1.529* (0.933)
Class with in-depth studies	1.867*** (0.598)	-0.357 (2.238)	3.080*** (1.018)	1.499* (0.819)
Extra classes in school	1.142* (0.600)	2.870 (2.238)	0.170 (1.065)	1.431* (0.788)
Male	0.095 (0.599)	-1.846 (1.962)	0.162 (1.020)	0.294 (0.814)
Student from Moscow	0.549 (1.109)	-	-	-
Student from a large city or regional center	0.341 (0.650)	-	-	
Constant	6.849*** (2.069)	12.027 (7.930)	6.111* (3.597)	7.863*** (2.728)
R-squared	0.381	0.363	0.398	0.375
Number of obs.	1305	112	453	723

Standard errors in parentheses. Significance levels: *** – 1%, ** – 5%, * – 10%.

Table A4. Descriptive statistics for admitted students for each cohort (mean values are reported)

Cohort / Variables	(1) Moscow → Moscow	(2) Large city → Moscow	(3) Large city → Large city	(4) Other settlement → Moscow	(5) Other settlement → Large city	(6) Other settlement → Other settlement	All sample
USE score in Russian	72.89	84.36	71.01	74.05	69.64	67.20	70.70
USE score in Mathematics	54.47	70.42	52.98	60.50	53.46	49.70	53.47
Admission Quality Ranking	73.2097	78.6306	65.6925	70.1978	65.2687	63.3023	66.5426
Mother's education	0.5714	0.8571	0.5278	0.5319	0.4662	0.4051	0.4952
Father's education	0.6040	0.6957	0.4663	0.4048	0.4059	0.3348	0.4365
Family income	45315	42083	33174	26562	29419	26314	31516
Number of books at home	257	234	182	174	137	143	168
Specialized school in the 11^{th} grade	0.6963	0.8571	0.6341	0.3830	0.4737	0.4795	0.5549
Attended high school	0.9787	0.9818	0.9501	0.9655	0.9688	0.8925	0.9492
Male	0.4307	0.4643	0.4008	0.4792	0.4367	0.3810	0.4145
Number of observations	316	61	1279	73	689	1054	3472

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