



NATIONAL RESEARCH UNIVERSITY  
HIGHER SCHOOL OF ECONOMICS

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# **THE DYNAMICS OF INVESTMENT IN PRE-ENTRY COACHING AND THE RETURNS FROM PRIVATE TUTORING IN RUSSIA**

BASIC RESEARCH PROGRAM

WORKING PAPERS

SERIES: EDUCATION  
WP BRP 18/EDU/2014

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# **THE DYNAMICS OF INVESTMENT IN PRE-ENTRY COACHING AND THE RETURNS FROM PRIVATE TUTORING IN RUSSIA<sup>2</sup>**

This paper examines the patterns of pre-entry coaching and corresponding investment in private tutoring before and after the introduction of the Unified State Exam (the USE). We estimate the effectiveness of private tutoring in 2012 – a few years<sup>1</sup> after the USE became a prerequisite for admission to university. Data from the Monitoring of Education Markets and Organizations show that the main types of pre-entry coaching are still in demand despite the unification of admission requirements. The popularity of paid courses at a particular university has declined, and the prevalence of classes with tutors who are not related to university has risen. A few years after the introduction of the USE, the level of investment in pre-entry coaching in real terms barely changed; however, the returns from such an investment (expressed in the USE scores) are positive but moderate.

**Keywords:** dynamics of investment in pre-entry coaching, effectiveness of pre-entry coaching, the USE, educational strategies of students

**JEL codes:** C31, I21, I24, I28.

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## **Introduction**

Significant changes in the Russian system of higher education in the late 20<sup>th</sup> century led to the pre-entry coaching being consolidated as a new institution of which still forms an integral part of educational strategies of university applicants. Of course, private tutoring took place in the Soviet educational system as well, but pre-entry courses and classes with tutors became popular with the commercialization of higher education, i.e. the emergence of private universities, tuition-paid higher education and a corresponding rise in the number of applicants.

Pre-entry coaching over the last two decades was important for several reasons. First, the institutional framework for the admission process forced applicants to attend pre-entry programs within a particular university, because universities had broad autonomy in choosing the format of their entrance exams and the development of exam questions. Consequently, in order to be successful on the exam, it was necessary to have information on the specific requirements of a particular university, as well as skills to address examination tasks. In other words, in some cases pre-entry courses and classes with tutors turned into the mechanism of how to solve a particular test in a particular university.

Second, pre-entry coaching existed due to the gap between knowledge that students got in high schools and university requirements, although formally they both complied with the official school program.

Third, sometimes such extra classes could be treated as an informal guarantee that an applicant would be enrolled in the university. Such ‘guarantees’ took place when an applicant attended pre-entry courses within a particular university, which gave certain benefits for the participants. In addition, applicants could attend classes with tutors from the desired university.

On the one hand, this strategy itself increased chances of being admitted because a tutor could have access to the typical examination tasks and share them with an applicant. On the other hand, a tutor could be a member of an examination board and assist an applicant during the exam. Thus, such classes were a hidden form of a bribe. Moreover, such a system of extra classes and a non-transparent process of admission created opportunities for paying bribes directly to people who were responsible for admission. In other words, the institutional framework created a favorable ground for corruption and unequal access to higher education.

In 2001 the Unified State Exam (the USE) was introduced in several Russian regions as an experiment. The USE is a standardized exam which combines elements of high school exit exams and university entrance exams. In 2009 the USE became obligatory for all Russian high school graduates and the main (and in the most cases the only) criterion for student selection. The specifics of this exam can reduce the need for pre-entry coaching because the USE is not

only the entry exam, but a high school exit exam as well, so there is an opportunity to shift pre-entry coaching to high schools. Moreover, with the introduction of the USE, applicants do not need to prepare according to the specific requirements of particular universities, because the standardized form of the exam offers the same variants of the test for all Russian high school graduates. In the end, universities have almost lost the ability to influence the admission process; that is why informal payments for private tutoring should become irrelevant.

Nevertheless, evidence shows that even after the introduction of the USE, pre-entry coaching still exists, and many families continue to pay for private tutoring for their children. Does this mean that pre-entry coaching has not lost its relevance and can improve the chances of being admitted even under a standardized exam? Or can pre-entry coaching be considered a mechanism of cultural inertia, where a stable institution continues to function despite the changing environment?

In this paper, we look at the dynamics of the following features of pre-entry coaching: the prevalence of different types of coaching, as well as family expenditures for such classes. First, we describe the general characteristics of this process from 2006 to 2012, then we estimate the level of investment in pre-entry coaching. Finally, we analyze the effectiveness of paid extra classes a few years after the introduction of the USE.

The empirical part of this paper is based on the data obtained from a national Russian education survey – Monitoring of Education Markets and Organizations (MEMO)<sup>3</sup>. We use the results of the annual survey of the first-year university students from 2006 to 2012. The questionnaires gathered information about patterns of pre-entry coaching before going to university. There were also questions about the socio-demographic status of students, and high school characteristics. This information is used as the control variables.

## 1. Literature review

The prevalence of pre-entry coaching in the Russian educational system before the introduction of the USE has been emphasized in several papers. For example, based on the data from MEMO, Roschchina and Lukyanova (2010) concluded that for the period from 2006 till 2009 the proportion of students who attended different pre-entry coaching programs varied from 57.9% (in 2006) to 53.5% (in 2008). Furthermore, the authors estimated the average level of investment in private tutoring: the average monthly fee for classes with private tutors working in the university the student was admitted to increased from 3.000 rubles (\$110 USD)<sup>4</sup> in 2006 to 4.100 rubles in 2009 (\$129 USD) in Russian regions, and from 7.000 (\$258 USD) to 9.000

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<sup>3</sup> See <http://memo.hse.ru/en/> for more information.

<sup>4</sup> According to the annual average exchange rates: [http://www.gks.ru/dbscripts/cbsd\\_internal/DBInet.cgi?pl=2018006](http://www.gks.ru/dbscripts/cbsd_internal/DBInet.cgi?pl=2018006).

rubles (\$284 USD) in Moscow for the same period. The dynamics of expenditures for private tutors from other universities is the same, although such classes were cheaper.

Galitskiy and Levin (2010) analyze total investment in pre-entry coaching in the 2007-2008 academic year. According to MEMO, about one third of applicants families from Moscow paid for pre-entry courses (in Russia, except Moscow, the proportion of such families was 26.6%), more than 13% of Moscow families made payments to private tutors from the university where the student was admitted (in Russia – 6.3%), and the same proportion of families paid to the tutors from other universities (in Russia – 22.5%). Total annual investment for families of applicants from Moscow was: 18.100 rubles (\$730 USD) for pre-entry courses, 78.300 rubles (\$3.156 USD) for classes with tutors from the same university, 48.800 rubles (\$1.967 USD) for tutors from other universities. For families from Russian regions (outside Moscow), the same indicators of investment were: 13.300 rubles (\$536 USD), 37.300 rubles (\$1.504 USD), and 13.000 rubles (\$524 USD), correspondingly<sup>5</sup>. If we compare with 2006, there is a positive trend for all types of investments in pre-entry coaching (Galitskiy, Levin, 2008).

Other data confirm the prevalence of pre-entry coaching during the pre-USE period. Thus, according to data from the survey of high school graduates from the biggest Russian cities, in 2008 more than 35% of applicants attended pre-entry courses within the university, about 6% attended other general courses, and around 44% of students had classes with tutors (Andrushchak et al, 2010). The average monthly fee for pre-entry courses was 4.454 rubles (\$180 USD)<sup>6</sup>.

The research on educational strategies of university applicants shortly after the national introduction of the USE shows that extra coaching did not lose its popularity despite the unification of entry requirements. In the largest Russian cities about 29% of high school graduates attended pre-entry courses within the university, more than 7% of students attended other courses, and more than 39% of enrollees attended classes with tutors (Andrushchak et al, 2010). On average, they paid 5.624 rubles (\$227 USD) per month for pre-entry courses, and 573 rubles (\$23 USD) per class with private tutors.

The reasons for the prevalence of pre-entry coaching before the introduction of the USE were discussed above. The effectiveness of extra classes under the standardized examination system is not that obvious. In (Prakhov, 2012, 2014b) it was shown that shortly after the introduction of the USE, attendance in pre-entry coaching programs in the biggest Russian cities could bring applicants up to 3 extra USE points out of 100. Prakhov and Yudkevich (2012) argue that private tutoring can be a mechanism which gives applicants from the most affluent families

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<sup>5</sup> Calculations are only for those families who made certain types of investment in pre-entry coaching.

<sup>6</sup> Data on expenditures in classes with tutors are not available.

some advantages during the process of admission. After a few years after the obligatory emergence of the USE, families have had enough time to adjust their educational strategies towards new institution of students' selection. But are extra classes still effective?

A few years after the USE became mandatory, the effectiveness of pre-entry coaching was tested with regard to the level of selectivity of the university where an applicant was admitted to, by using structural equations (Prakhov, 2014a). It turned out that expenditures in pre-entry coaching are positively related to the level of university selectivity as measured by the average USE score among admitted students. Private tutoring correlates with the chances for being admitted in a selective university both directly and indirectly, via personal USE results.

Pre-entry coaching is widespread not only in Russia. Similar programs are implemented in many North American, South American, European and Asian countries (Tansel, Bircan, 2006; Bray, Kwok, 2003; Guimarães, Sampaio, 2013). There are several studies that investigate the effectiveness of private tutoring in terms of the results of final tests and exams (for example, Becker, 1990; Powers, 1993; Powers, Rock, 1999). These studies show that just like in Russia, the effects of pre-entry coaching are positive but low.

We should note that the evaluation of the effects of pre-entry coaching is associated with certain difficulties. The corresponding regressions (econometric models) may have an endogeneity problem, caused by the fact that the decision about attendance to pre-entry courses or classes with tutors can be intentional and can be dependent on a set of family factors and school characteristics. In order to solve this problem, previous studies used a modified educational production function, and on this basis the absolute and relative effects of pre-entry coaching were estimated (Prakhov, 2012). In (Prakhov, 2014b) an IV (instrumental variables) method was applied. In this paper we use propensity score matching (a quasi-experimental approach), which helps to estimate the treatment effect on the outcome variable (Stuart, 2007, 2010). In our case, the treatment effect is attendance to a paid program of pre-entry coaching (either paid courses or classes with tutors). We are interested in paid programs because they are concerned with the decision of monetary investment. In other words, we want to estimate the effect of monetary investment in pre-entry coaching, and the outcome variable is the student achievement expressed in final USE scores.

Most studies of students' educational strategies and features of pre-entry coaching were conducted in statics, i.e. for a certain period of time (academic year). Roshchina and Lukyanova (2010) demonstrate the dynamic aspects of the prevalence of pre-entry coaching and household expenditures for the period from 2006 to 2009, i.e. when the USE was a pilot program in several regions. In this paper we consider the characteristics of pre-entry coaching in dynamics during a period of institutional transformation of admission procedures, and we analyze the effectiveness

of pre-entry coaching for the time when the USE was presented as the main (and in most cases the only) admission criterion for several years.

## **2. Methodology of the study**

### **2.1. Methodology-1. The dynamics of the prevalence of pre-entry coaching programs and corresponding investment in private tutoring in Russia**

This paper is based on data from the Monitoring of Education Markets and Organizations. There are annual surveys of students at various levels of education, including university students. We have data for the period from 2006 to 2012. To estimate the prevalence of pre-entry coaching programs and the dynamic of investment in these classes, we use the questionnaire answers of the first-year students. We do not consider the answers of other students in order to avoid intersections of observations in different years and because we need the investment in pre-entry coaching during the same academic year to be comparable among students.

Every year the questionnaire contained the following questions about the types of pre-entry coaching which were used by the applicants before admission to the university.

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**Did you attend any pre-entry courses or classes with tutors before being admitted to this university?** *(Choose all that apply)*

1. Classes with tutors from this university
  2. Classes with tutors from other universities
  3. Paid pre-entry courses in this university
  4. Other paid pre-entry courses
  5. Free pre-entry courses in this university
  6. Other free pre-entry courses
  7. I did not attend pre-entry courses or classes with tutors
- 

The wording of this question did not change over the 60year research period, therefore it is possible to map the dynamics of the prevalence of different types of coaching. In addition, students were asked about the monthly cost of these classes until 2009 (inclusive) for every type of pre-entry coaching, and how much they invested in pre-entry coaching in total after 2009 and beyond.

The questionnaires also contain data about personal, demographic characteristics of students and information on their schools.

## 2.2. Methodology-2. Propensity score matching

The second part of this study is based on data from MEMO, – the national survey of university students, which was conducted in 2012. This section discusses a cross-section of data taken only from this 2012 survey of first and second-year university students. We selected only those students who study in universities listed on the Ranking of admission quality<sup>7</sup> (universities are ranked on the basis of average USE score among freshmen). Students who do not study in universities where the USE is not the main criterion for selection (for example, theatrical and architectural universities), were excluded from further analysis. In addition, using the propensity score matching, we excluded observations with missing values in the main variables (USE scores, paid pre-entry coaching) and control variables. As a result, the unmatched sample has 555 observations. Descriptive statistics are presented in Table 1.

**Table 1.** Descriptive statistics of variables used in regression analysis (unmatched sample)

Variables	Min.	Max.	Mean	Std. dev.
Fact of paid pre-entry coaching (=1, if a student attended pre-entry courses or classes with tutors and paid a fee)	0	1	0.52	0.50
USE result in Mathematics	24	96	58.56	13.61
USE result in Russian	30	100	70.71	13.14
Average USE result on all exams taken	24	100	65.50	11.81
Mother's education (=1, if higher education)	0	1	0.68	0.47
Father's education (=1, if higher education)	0	1	0.57	0.50
Type of family (=1, if incomplete)	0	1	0.09	0.29
Family income per person (rubles per month)	2000	45000	21359	13599
Books at home	50	1250	354	329
Gender (=1, if male)	0	1	0.41	0.49
High school location (=1, if Moscow or St. Petersburg)	0	1	0.19	0.39
Class specialization (=1, if there is a certain specialization)	0	1	0.59	0.49
College, lyceum	0	1	0.12	0.33
Gymnasium	0	1	0.18	0.38
Magnet school	0	1	0.11	0.31
School with external studies	0	1	0.01	0.07
Year of study in university	1	2	1.54	0.50

As shown in the table, the attendance at paid pre-entry coaching programs is quite widespread. Our goal is to estimate the effectiveness of such classes, and to calculate how many additional USE points this tutoring could bring.

Propensity score matching was used as the main statistical analysis. This method has become more common in research which uses non-experimental data (Rubin, 2001; Stuart et al, 2008; Stuart, 2007, 2010) and allows us to assess treatment effects as if initially there was a breakdown into control groups and treatment groups. Our control group includes university applicants who did not attend paid pre-entry coaching programs, and did not invest money in

<sup>7</sup> See [http://ria.ru/ratings\\_academy/20120904/742829269.html](http://ria.ru/ratings_academy/20120904/742829269.html) for details.

pre-entry coaching. Our treatment group includes those applicants who attended paid courses or classes with tutors by investing money in pre-entry coaching.

The idea of propensity score matching is as follows. In the first stage for each observation we estimate the probability of attendance at paid pre-entry coaching programs (the probability of being in the treatment group) using the following logistic function:

$$\Pr(T_i = 1|X) = f(X_i'\beta) = \frac{1}{1 + e^{-X_i'\beta}}, \text{ where} \quad (1)$$

$\Pr(T_i = 1|X)$  – a probability that applicant  $i$  attended paid pre-entry courses or classes with tutors (attendance is expressed as a dummy variable  $T_i$ , which equals ‘1’ in the case of attendance, and ‘0’ in the absence of attendance),

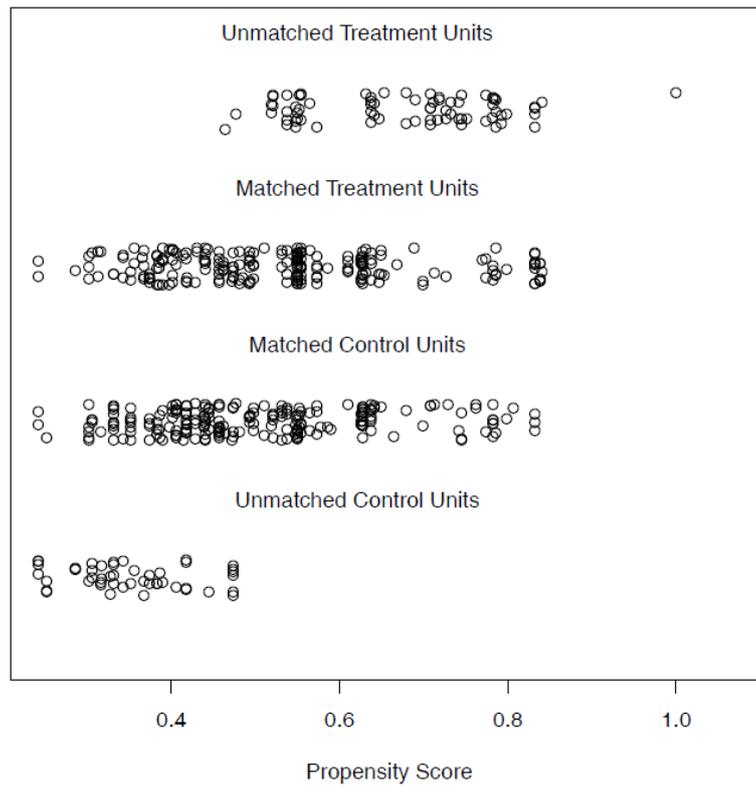
$f(X_i'\beta)$  – logistic function,

$X_i$  – a vector of independent variables,

$\beta$  – a vector of regression coefficients.

For each observation, we calculate the individual propensity score, i.e. the probability of attending a paid pre-entry program. Then, we run the propensity score matching model, where an observation from the treatment group is matched with an observation from the control group, and these observations should have approximately matching propensity scores. Our sample has almost half the applicants who attended pre-entry courses and/or classes with tutors, which is why we choose 1:1 method, according to which one observation from the control group is matched only with one observation from the treatment group, and those matched pairs form a sample for further analysis. Moreover, we apply two more conditions for selection: (1) each pair of matched observations should be identical in terms of gender and year of study in university (for example, first-year males should be matched with first-year males), (2) absolute standardized difference in means should not exceed 50% (*caliper* = 0.5).

As a result, we get 432 observations, which constitute the matched sample; there are 216 pairs from the control and treatment groups; 48 observations from the control group and 75 observations from the treatment group were excluded. Figure 1 shows the structure of groups and the distribution of propensity scores.



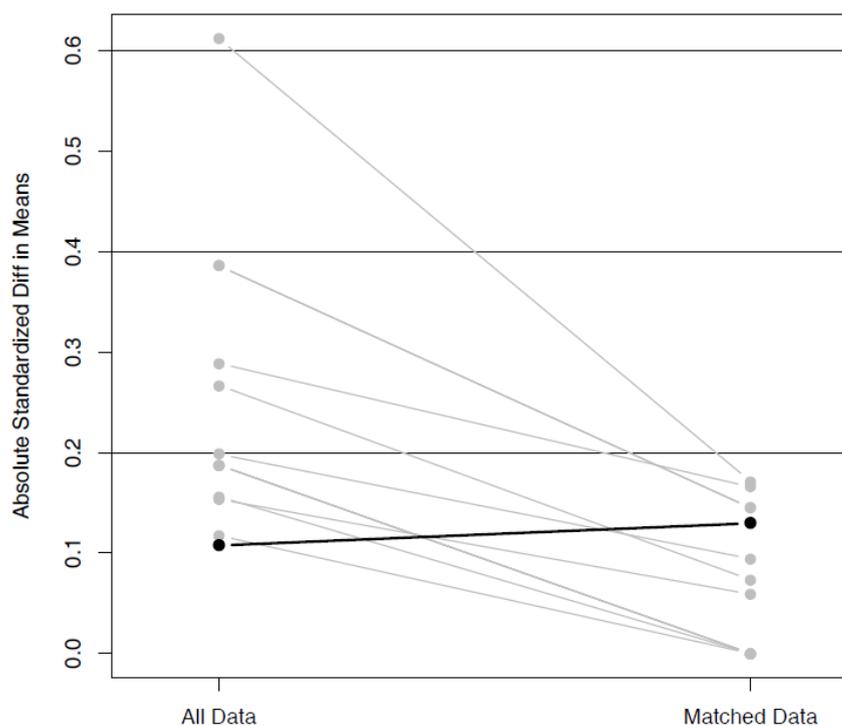
**Figure 1. Propensity score matching**

Now we compare the change of means of control variables before and after matching (Table 2). Note that corresponding values are presented for only statistically significant covariates, which were included in logit regression on the first step of analysis.

**Table 2. Mean values of independent variables**

Variable	Unmatched sample		Matched sample	
	Treatment group	Control group	Treatment group	Control group
High school location	0.27	0.10	0.19	0.13
Father's education	0.74	0.62	0.70	0.67
Gender	0.37	0.46	0.36	0.36
Year of study in university	1.50	1.58	1.55	1.55
GPA in high school: 3 out of 5	0.07	0.10	0.07	0.07
GPA in high school: 4 out of 5	0.26	0.35	0.29	0.33
GPA in high school: only 4 and 5 out of 5	0.47	0.42	0.50	0.44
GPA in high school: 5 out of 5	0.19	0.13	0.13	0.16
Class specialization	0.66	0.52	0.63	0.56

As we see, after propensity score matching control and treatment groups look more identical than before in terms of mean values of covariates. The quality of procedure is shown in Figure 2, where we see the change in absolute standardized differences in means after matching, and these differences diminished for each covariate except one.



**Figure 2. Changes in absolute standardized differences in means after propensity score matching**

Before going to the second step of analysis, we run  $t$ -tests on statistical difference in means of USE results between control and treatment groups (Table 3).

**Table 3. Mean values of dependent variables**

Variable	Means		P-value	Difference in means
	Treatment group	Control group		
USE result in Mathematics	59.48	56.66	0.033	2.82
USE result in Russian	72.06	69.19	0.020	2.87
Average USE result on all exams taken	66.74	63.93	0.012	2.81

The differences in means are significant at 5%-level. As shown in Table 4, those who attend paid pre-entry classes, get on average 2.8-2.9 USE points more than those who do not invest in pre-entry coaching. Next, on the second step, we test treatment effect (the relationship between attendance of paid private tutoring programs and USE results) using a regression analysis. We estimate the following model (OLS method):

$$Y_i = \alpha + \gamma T_i + Z_i' \delta + \varepsilon_i, \text{ where} \quad (2)$$

$Y_i$  – dependent variable, which reflects in different models final USE result in Mathematics, Russian, and average USE score on all subjects taken,

$T_i$  – the fact of attendance of paid pre-entry programs (a dummy variable, as in the previous case),

$Z_i$  – a vector of control variables (father’s and mother’s education, type of family, natural logarithm of monthly family income per person, number of books at home, gender, school location, class specialization, type of school, year of study in university),

$\alpha, \gamma, \delta$  – regression coefficients,

$\varepsilon_i$  – error term.

We are interested in a coefficient  $\hat{\gamma}$ , which shows an increase in USE score due to paid pre-entry coaching. We include control variables in the model, but we should note that in propensity score models the coefficients of covariates usually are not interpreted.

### 3. Results

#### 3.1. The prevalence and the investment in pre-entry coaching

The dynamics of the main types of pre-entry coaching are shown in Figure 3. According to the data, by 2008 there was a slight decline in the proportion of applicants who attended extra classes. However, we cannot conclude that there is a tendency of reduction in the popularity of pre-entry coaching, since courses and classes with tutors remain popular among applicants.

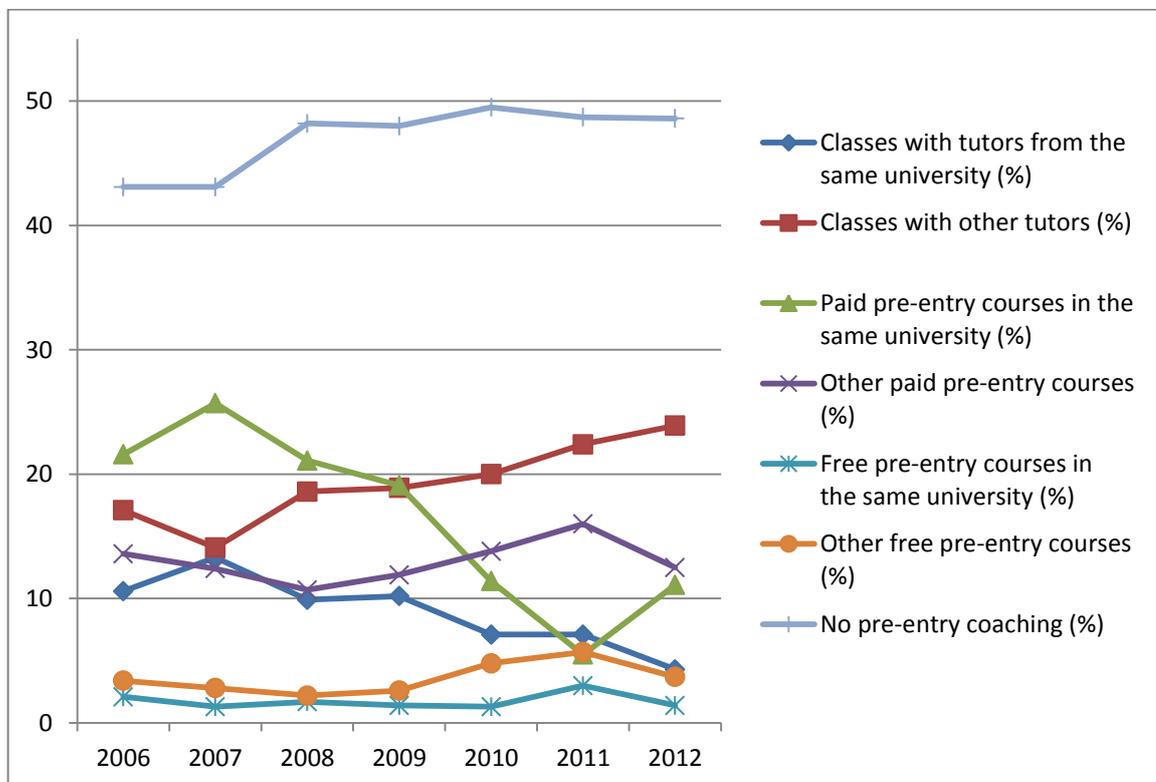


Figure 3. The dynamics of pre-entry coaching in Russia 2006-2012

Consider the features of classes with tutors. As stated above, before the introduction of the USE, tutors from universities played an important role and provided not only teaching, but general information support to the applicants. With the introduction of the standardized admission procedure, tutors' roles lost their significance. This is supported by our data; for the considered period there was a steady downward trend, which shows a decline in the proportion of applicants who attend classes with tutors at the same university (from 13.3% in 2007 to 4.3% in 2012). At the same time, the popularity of tutors who are not associated with the university where an applicant was admitted, increases (from 14.1% in 2007 to 23.9% in 2012). This can be explained by the introduction of the USE, where the need for specific knowledge about requirements of the particular university disappeared, and tutors started to prepare students not for the exams in a particular institution, but for the USE instead. The growth in the popularity of these tutors, however, can indicate an existing gap between the knowledge that applicants receive in high schools, and the USE requirements (otherwise preparation in high school would be sufficient).

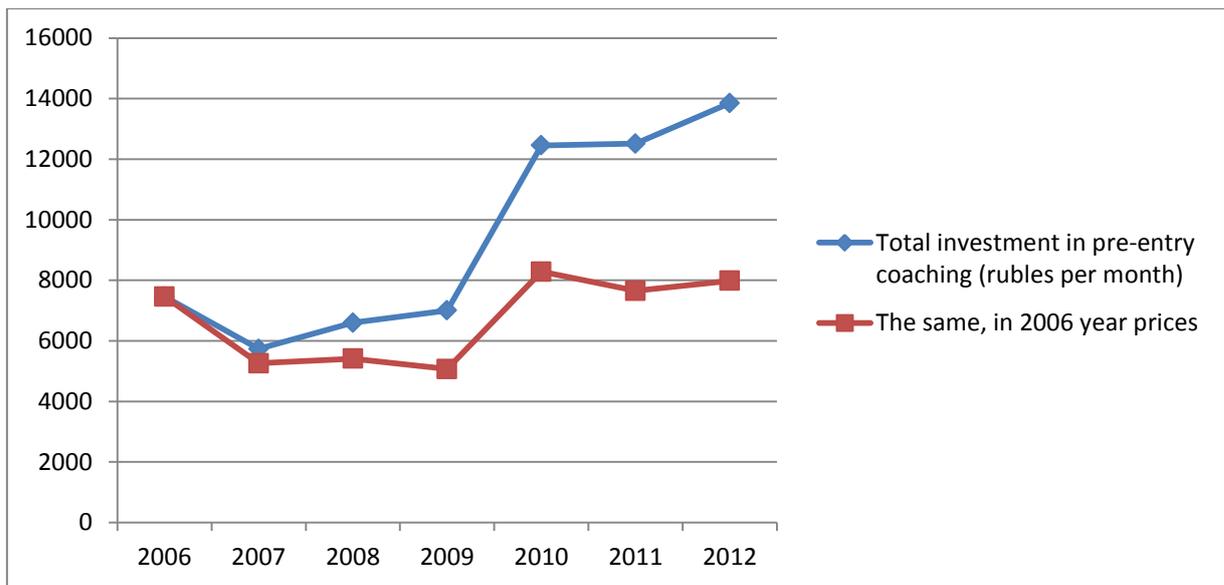
The dynamics of the prevalence of paid pre-entry courses in a particular university is the same as the dynamics of classes with tutors from a particular university, but the decrease in the proportion of students there is more dramatic (by more than two times). In 2007, the proportion of students who attended these courses was 25.7%, but in 2011, it was 5.5%, although this indicator increased to 11.1% in 2012. At the same time, there is evidence of a slight increase in the prevalence of other paid courses, from 2008 to 2011, but in 2012 the proportion of those who attended such courses decreased to 12.5%. In general, we may conclude that the prevalence of pre-entry courses declined.

The proportion of applicants who attended free courses is small and has almost not changed during the considered period.

In general, matching links between students and particular universities during the period before and after the introduction of the USE have been weakened. In other words, the USE expanded university choices for students, because there was no longer a need for a specific investment in preparing for a particular university. However, more than half of the university applicants still attend these classes, as they did prior to the standardized exam. Thus, pre-entry coaching is still a significant component in students' educational strategies, but now students can learn without being tied to a particular university.

As stated above, before 2009, students were asked about their level of investment in pre-entry coaching for each type of classes separately, but starting from 2010 they were asked about their total investment in pre-entry coaching. Therefore, there are some problems in comparing expenditures before and after 2009, because the amount of total investment in pre-entry coaching

before 2009 was calculated synthetically, i.e. based on expenditures reported for each type of coaching. However, the classification of coaching, which was stated in the questionnaires, was incomplete and university applicants could invest in other types of pre-entry coaching, in addition to those that were listed as potential answers. Therefore, the calculated levels of total investment until 2009 may be underestimated. That is why corresponding changes between 2009 and 2010 should be interpreted with caution. Figure 4 shows the dynamics of total investment in pre-entry coaching in nominal and real terms. The jump in investment after 2009 does not necessarily reflect the introduction of the USE. This could be due to changes in the wording of the question about investment in pre-entry coaching.



**Figure 4. The dynamics of total investment in pre-entry coaching 2006-2012**

Nevertheless, we can estimate households' expenditures for each year, as well as considering the dynamics of total investment in pre-entry coaching for two periods (before and after the introduction of the USE) separately. Even though there is a stable upward trend in nominal prices from 2007 till 2012, we cannot conclude that there is a significant change in expenditures for each period in real terms. Given this, the level of total investment in pre-entry coaching from 2007 to 2009 and from 2010 to 2012 hardly changed.

Table 4 represents the expenditures for different types of coaching in nominal prices. There are no clear changes in investment in these types of coaching from 2006 to 2009 for each type. However, the average level of monthly investment in pre-entry coaching is quite significant, compared to the average monthly income of a Russian citizen. Therefore, in 2012 the average total investment was about 60% of the average monthly income<sup>8</sup>.

<sup>8</sup> Source: [http://www.gks.ru/free\\_doc/new\\_site/population/ufov/ufov\\_11kv.htm](http://www.gks.ru/free_doc/new_site/population/ufov/ufov_11kv.htm).

**Table 4.** The dynamics of investment in pre-entry coaching in Russia 2006-2012

Expenditures (Rubles per month)	Year						
	2006	2007	2008	2009	2010	2011	2012
Investment in classes with tutors from the same university	5824	7283	6294	4942	...	...	...
Investment in classes with other tutors	5509	3670	7069	4496	...	...	...
Investment in pre-entry courses in the same university	5838	4717	5102	7409	...	...	...
Investment in other pre-entry courses	8252	4091	3446	6871	...	...	...
Total investment in pre-entry coaching	7460	5733	6597	7004	12453	12513	13852
Number of observations	668	686	596	581	630	495	623
Exchange rate: Rubles per U.S. dollar	27.18	25.57	24.81	31.68	30.36	29.35	31.07

### 3.2. Estimation of the effectiveness of pre-entry coaching

In the previous subsection it was shown that even in the presence of the standardized exam households spend significant resources on pre-entry coaching, and investment during several years of the mandatory USE has hardly changed. It is important to question whether these people who invest money in private tutoring are receiving returns on their investment in terms of improved USE results. As noted above, such studies were conducted in Russia, but they examined the effectiveness of coaching shortly after institutional transformation of admission procedure. Moreover, the sample was limited to the 16 largest Russian cities (Prakhov, 2012, 2014a). In other words, that time households have not yet adjusted their educational strategies to the new system of admission, and the available sample was biased only to the largest cities and did not contain observations from other Russian cities and towns.

The results of regression analysis (step 2) are presented in Table 5. We have tested several models with different dependent variables, and with and without control variables.

Attendance of paid pre-entry coaching programs is positively related to the academic achievement of university applicants. However, we can note that despite of statistical significance, the values of coefficients  $\hat{\gamma}$  in different models are not high and do not exceed 3 points out of 100.

**Table 5.** Results of regression analysis

<b>Independent variables \ Dependent variables</b>	<b>USE result in Mathematics</b>	<b>USE result in Russian</b>	<b>Average USE result</b>	<b>USE result in Mathematics</b>	<b>USE result in Russian</b>	<b>Average USE result</b>
Fact of attendance of paid pre-entry coaching	2.820** (1.321)	2.866** (1.235)	2.810** (1.120)	2.314* (1.291)	1.875* (1.110)	2.227** (1.079)
Mother's education				0.857 (1.561)	1.601 (1.342)	1.391 (1.305)
Father's education				2.794* (1.565)	0.768 (1.345)	1.426 (1.308)
Incomplete family				-2.202 (2.488)	-2.358 (2.140)	-2.599 (2.080)
Natural logarithm of income				-0.280 (0.910)	-0.878 (0.782)	-0.884 (0.761)
Books at home				0.002 (0.002)	0.006*** (0.002)	0.004** (0.002)
Gender (male)				0.469 (1.380)	-7.134*** (1.187)	-3.392*** (1.154)
School location (Moscow or St. Petersburg)				-2.316 (1.929)	3.190* (1.659)	1.074 (1.612)
Class specialization				6.084*** (1.549)	5.593*** (1.332)	4.123*** (1.295)
College, lyceum				-2.315 (2.248)	-0.197 (1.933)	1.549 (1.879)
Gymnasium				2.344 (1.955)	5.675*** (1.681)	3.311** (1.634)
Magnet school				0.168 (2.216)	0.199 (1.906)	0.948 (1.852)
School with external studies				-19.207** (9.596)	1.332 (8.252)	-2.933 (8.022)
Year of study in university				1.652 (1.310)	-0.311 (1.126)	0.645 (1.095)
Constant	56.662*** (0.394)	69.190*** (0.873)	63.931*** (0.792)	51.018*** (8.891)	73.057*** (7.646)	66.739*** (7.433)
R <sup>2</sup>	0.01	0.01	0.01	0.10	0.24	0.13

Note: Standard errors in parentheses. \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.

When controlling for other variables the effect of pre-entry coaching becomes even lower, moreover for the USE results in Russian and Mathematics a level of significance decreases. This means that a few years after the introduction of the USE the effectiveness of pre-entry coaching is moderate (and this fact is consistent with previous results). Moreover, if we compare our results with those obtained from 2010 data, we may see that the gain in terms of extra USE points has decreased. However, we should note that coaching effects are still statistically significant. This may indicate the relevance of pre-entry coaching in some specific cases: for example, during the admission to elite universities with high USE scores (and high competition) among applicants, when the difference in scores among admitted students is low, so every extra point matters.

Appendix (Table A1) shows the results of regression analysis of the equation (2) on initial sample (before exclusion of observations which contain missing values) and on unmatched sample. The results of that analysis are similar to the results of analysis of matched sample: paid extra classes are positively related to the USE results, this relation is statistically significant, but the effect is moderate and is in a range of 2-3 points out of 100. Note that in models presented in the Appendix we can give an interpretation to the control variables. In all models tested, high school graduation in a class with a certain specialization is positively related to the USE results, and the returns from this exceed the returns from pre-entry coaching twice. Hence, under a standardized system of examinations and admission the role of a right choice of high school can be more important than a choice of a program of pre-entry coaching.

## **Conclusion**

In this paper we examined the prevalence of pre-entry coaching before and after the introduction of the USE in dynamics. It was shown that the percentage of university applicants who attended extra classes did not change significantly. However, the prevalence of particular types of coaching has changed. When the USE became mandatory, a share of applicants switched from classes within the same university they were admitted to (pre-entry courses and classes with tutors) to classes with tutors, who are not related to the desired university. This trend exists because under standardized system of admission the matching student to a particular university during preparatory process does not matter, because now such pre-entry courses and classes with tutors cannot give those guarantees and benefits during admission they used to give before. Hence, extra coaching is still in demand.

The levels of investment in pre-entry coaching were estimated. During the period 2010 – 2012 (after the introduction of the USE) the average level of total investment in pre-entry courses and classes with tutors was 12-14 thousand rubles (400-470 U.S. dollars) per month, and this indicator has a tendency for growth in nominal values, but after adjustment for inflation this trend disappears.

With a help of propensity score matching the effectiveness of paid pre-entry coaching programs was estimated. We report statistically significant positive relationship between the fact of attendance of paid pre-entry courses or classes with tutors, and the USE results in Mathematics, Russian, as well as the average USE score on all subjects taken. However, applicants from treatment group (those who attended extra classes) get no more than 3 extra USE points out of 100 than those from control group. After control for individual, family and school characteristics the effect of paid pre-entry coaching becomes even more moderate. At the same time statistical significance of coaching indicates that pre-entry coaching can improve the USE results; however the effect is not that large.

Note that the sample we use has a selection bias. Certainly, propensity score matching, which is quasi-experimental and applied to non-experimental data, partially solves this problem, because propensity score matching is made with a set of control variables, however some variables, which influence the choice of pre-entry coaching, can be missing or simply unobservable. For example, we cannot measure students' motivation toward certain studies. As a result, this can lead to the overestimation of regression coefficients. At the same time, even if this is true, we can argue that in our models we estimated the upper border of coefficient which reflects the effect of coaching. As we saw above, the inputs of pre-entry coaching to the USE score are not high, so the real (unbiased) effect will be even lower. Consequently, we can argue that paid pre-entry coaching does not lead to the large increase of the USE results.

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## Appendix

**Table A1.** Results of regression analysis

Independent variables	Sample	Initial sample			Unmatched sample		
	Dependent variables	USE result in Mathematics	USE result in Russian	Average USE result	USE result in Mathematics	USE result in Russian	Average USE result
Fact of attendance of paid pre-entry coaching		2.742*** (1.056)	3.259*** (0.917)	2.494** (0.979)	2.645** (1.151)	2.709*** (1.026)	2.816*** (0.977)
Mother's education		-0.023 (1.253)	0.801 (1.084)	0.860 (1.156)	0.779 (1.358)	1.261 (1.211)	0.978 (1.153)
Father's education		2.851** (1.236)	2.022* (1.065)	2.303** (1.140)	2.955** (1.338)	2.095* (1.193)	2.166* (1.136)
Incomplete family		-3.669* (1.967)	-0.661 (1.711)	-2.090 (1.754)	-2.901 (2.057)	-1.613 (1.834)	-2.597 (1.746)
Natural logarithm of income		-0.232 (0.707)	-0.935 (0.615)	-1.293** (0.659)	-0.069 (0.780)	-0.883 (0.695)	-1.024 (0.662)
Books at home		0.004** (0.002)	0.007*** (0.001)	0.005*** (0.002)	0.002 (0.002)	0.006*** (0.002)	0.004*** (0.002)
Gender (male)		2.056* (1.054)	-6.237*** (0.912)	-2.725*** (0.976)	1.160 (1.148)	-6.802*** (1.024)	-3.095*** (0.975)
School location (Moscow or St. Petersburg)		2.345* (1.370)	-1.359 (1.180)	-0.942 (1.306)	-1.901 (1.555)	2.456* (1.386)	0.714 (1.320)
Class specialization		5.954*** (1.225)	4.674*** (1.061)	3.931*** (1.137)	5.749*** (1.334)	5.409*** (1.189)	4.080*** (1.133)
College, lyceum		-1.248 (1.739)	1.057 (1.514)	1.342 (1.615)	-1.766 (1.880)	-0.063 (1.676)	1.490 (1.596)
Gymnasium		1.612 (1.563)	5.287*** (1.368)	3.064** (1.413)	2.139 (1.650)	4.738*** (1.471)	3.237** (1.401)
Magnet school		-0.292 (1.835)	0.994 (1.584)	0.596 (1.685)	-0.697 (1.984)	0.040 (1.769)	0.359 (1.685)
School with external studies		-17.181** (7.702)	-0.422 (6.724)	-7.656 (6.580)	-17.492** (7.655)	-2.089 (6.825)	-7.726 (6.500)
Year of study in university		2.225** (1.036)	0.168 (0.901)	0.849 (0.955)	2.459** (1.121)	-0.303 (0.999)	0.653 (0.951)
Constant		44.763*** (8.003)	74.808*** (6.952)	72.019*** (7.487)	47.787*** (7.637)	72.711*** (6.810)	67.850*** (6.485)
R <sup>2</sup>		0.119	0.235	0.146	0.118	0.248	0.155
Number of observations		665	673	565	555	555	555

Note: Standard errors in parentheses. \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.

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