The Determinants of Expected Returns to Higher Education in Moscow

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Abstract. Based on the data from the cohort longitudinal study "Educational and Career Trajectories", factors affecting absolute and relative expected returns to education (RE) are investigated. Surveys of Moscow students show that academic performance assessed by the Unified State Exam (USE) scores is an important predictor of students' salary expectations. Besides, expected RE also correlates positively with college selectivity. Students in private colleges expect to be paid lower than those in state universities. Social and cultural capital of the family (parental education, number of books at home) may influence salary expectations indirectly, through academic performance. Students from wealthier families expect to have a higher RE than their disadvantaged peers, and so do boys as compared to girls. Students working part-time expect to be paid higher than non-working students after graduation but anticipate a lower return on investment in relative terms.

Keywords: higher education, selective universities, private colleges, state universities, student expectations, expected return on education, salary expectations, social capital, cultural capital.

Economic agents make most of their decisions under uncertainty [Delavande, Giné, McKenzie 2011]. However, even when an agent is perfectly rational, the only thing they know for sure is the probability distribution of future period scenarios. This fact dictates the need to investigate how individuals develop their expectations.

Why are expectations that important? Once formed, they influence directly agents' economic incentives associated with consumption, employment, investment decisions, etc. For instance, expectation of a future increase in earnings boosts consumption today, thus promoting output. Inflation expectations and perception of the national unemployment policy are important factors forming the labor supply curve. Expecting an increase in the bond interest rate, investors try to sell their bonds, thus reducing their value. In the foreign exchange market, expectations of change in the national currency market value

affect the triggers for buying or selling, thus influencing the exchange rate. Therefore, decisions in most diverse markets can be based on expectations and affect, and in turn, the choice of strategies for future periods, thus ensuring the long-term equilibrium.

Expectations in economics represent a relatively new field of research: "Works by classical economists will hardly touch upon the problems of uncertainty or expectations; even when Keynes reflects on the problem of expectations and their importance for the decision-making process, expectations are taken for granted and thus don't play any significant role in the development of Keynesian macroeconomic theory" [Hashem Pesaran 2002:192]. It was only in the second half of the 20th century that economists turned their attention to formation of expectations and to investigating the factors that consolidate economic agents' expectations. At that time, the development of this field of study received a boost, giving birth to various theories explaining the expectation phenomenon.

In this paper, we study income expectations of undergraduate students. The study is aimed at assessing the factors that influence the development of salary expectations by having a college degree (absolute expected returns to higher education) and the percent exceedance of expected salary with a college degree over expected salary without a college degree (relative expected returns to higher education).

We focused our research on 2014/15 Moscow high school graduates admitted to colleges that same year. In a sample like this, respondents come from the same region, so they deal with the same price levels, the same average salary, and the same average spending level. In this case, we can assume that they may have homogeneous ideas of economic indicators that are not influenced by regional characteristics (as would be the case in a mixed-region sample). The vast majority of Moscow high school graduates who went on to college did so in Moscow, and only few continued their education in colleges in other regions. Consequently, such students are very likely to work in Moscow after graduation, i. e. we will be dealing with the same Moscow labor market when analyzing expectations of earnings and returns to education.

In view of this, the novelty of this study is determined by the specific sample features: low mobility of applicants (most Moscow high school graduates enter Moscow colleges), homogeneous student perception of the higher education market structure (since it is easier to compare colleges within one city than all over the country) and of the Moscow labor market, i. e. the overall neutrality of regional characteristics in the development of salary expectations. Hence, we can assume and test empirically the effects of college characteristics on the expected returns to higher education. We intend to reveal differences in the expectations of students attending the most and the least selective colleges and demonstrate how those expectations correlate

with college selectivity and the fact that graduates of the top-ranked colleges are, on average, paid higher. The findings are interpreted in terms of the human capital theory, i. e. in terms of the costs and benefits associated with higher education.

The practical relevance of the research is as follows: economic expectations of individuals play an important role in their choices, which is confirmed by studies on different types of markets. Consequently, salary expectations in the higher education market and in the labor market can influence decision making both in selecting an educational trajectory, namely the level (vocational or tertiary) and the quality of education (a specific educational institution), and in developing future employment preferences. Analysis of salary expectation determinants will reveal the role played by characteristics that are not related directly to individual (innate)abilities: family, school education, and the college selected—making it possible to discuss the problem of unequal chances in the labor market as early as at the start of college studies. Research findings can be used both by households (students and their parents) in selecting a college and by the government in elaborating a higher education policy designed to reduce inequality of access to higher education and mitigate its effects in the labor market. In other words, findings will allow the development of targeted support measures for the most disadvantaged students who did not benefit from the college admission process unification. In addition, the study contributes to the theory of human capital and the economic expectations formation theory as applied to the higher education market and the labor market.

The empirical basis of the research is represented by the data obtained in the multi-panel longitudinal study *Educational and Occupational Trajectories* conducted by the Center for Cultural Sociology and Anthropology of Education (Institute of Education, National Research University Higher School of Economics (HSE)) in cooperation with the Public Opinion Foundation[1].

The article is structured as follows: chapter one sums up the key findings of previous research on the role of economic agents' expectations in decision making and the significance of expectations in educational choices. Based on the data on expected and realized returns to education and the factors that affect them, we construct the research framework and formulate hypotheses to be tested empirically. Chapter two provides a data description and assessment of expected returns to education depending on college major. Chapter three presents the results of a correlation analysis of the key variables. Chapter four contains regression analysis results. The final chapter offers conclusions and directions for further research.

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[1] For more detail, see https://trec.hse.ru/.

1. Expected returns to higher education: previous research findings

The expectations of economic agents represent their subjective evaluations of how various economic parameters will be realized in the future. Expectations about future periods that are formed today are extremely important as they will reflect upon further decision making, since most individual decisions are long-term in nature [Delavande, Giné, McKenzie 2011]. Up until recently, researchers used to be rather skeptical about the viability of empirical analysis of expectations, doubting their predictive power. However, the most recent studies show that respondents understand questions about the future quite well and provide adequate answers to them, while expectations as such are effective in predicting the behavior of economic agents in future periods [Ibid.].

Indeed, expectations of individuals contribute to the development of their behavioral patterns in various economic sectors and various markets. For example, if depositors doubt the solvency of a bank, they are more likely to withdraw their deposits urgently, which can ultimately result in a banking runs [Calomiris, Mason 1997; Jacklin, Bhattacharya 1988]. In the foreign exchange market, investors' expectations about the national currency exchange rate in the future influence the value of foreign stocks and depositary receipts [Eichler 2011], while the value of securities depends on investors' inflation expectations as well as expectations of a company's profitability ratios [Keran 1971]. Subjective inflation expectations of companies also play an important role in market performance [Henzel, Wollmershäuser 2008].

The significance of agents' expectations is not restricted to financial markets. Agricultural [Nerlove, Bessler 2001] and labor market [Sandell, Shapiro 1980] development is also subject to the influence of market participants' expectations. In this regard, special attention must be paid to the income and career expectations of economic agents and the effects they have on decision-making processes and consumption dynamics. Thus, subjective perceptions of labor mobility affect the consumption redistribution patterns: positive career expectations decrease the probability of redistribution, unlike negative ones [Rainer, Siedler 2008]. Income growth expectations are associated with actual income growth, and consumption growth is associated with expected income variations [Jappelli, Pistaferri 2000]. Besides, income expectations are also connected with other major life decisions, such as having a child [McCrate 1992].

As we can see, expectations of future earnings strongly influence the development of individual behavioral (economic) strategies. College students are no exception, being likely to develop expectations regarding their earnings after graduation. Research of behavioral patterns shows that students who expect to work in higher-paying economic sectors tend to consume more than their less ambitious peers at college already [Gustman, Stafford 1972]. This means that student expectations regarding future salaries determine their current consumption rates.

While *actual* returns to education have been investigated in a number of studies and assessed using plenty of empirical assessment methods (for an overview, see [Diagne, Diene 2011]), studies on *expected* returns to education are much less numerous. Meanwhile, salary expectations and expected returns to education are crucial factors in selecting an educational trajectory: expectations contribute to demand for education and affect the choice of both major and college. In other words, according to the human capital theory [Becker 1962, 1964; Schultz 1961; Dickson, Harmon 2011], these expectations contribute to the choice of the level of investment in human capital[2].

Why study student expectations? First, in terms of educational choice, expectations regarding the costs and benefits of higher education may become barriers of access to such education. Children from less advantaged families (with low levels of income, social and cultural capital) tend to overestimate the *costs* associated with higher education, and such expectations can discourage them from obtaining higher education [Grodsky, Jones 2007]. On the other hand, positive expectations of the *benefits* from(returns to) education promote the demand for educational services [Jensen 2010]. Besides, education decisions are also affected by parental expectations. For instance, individual salary and employment expectations determine the choice of college for boys; girls' individual expectations have no such predictive power, yet their choice is affected a lot by the expectations of their mothers [Attanasio, Kaufmann 2014]. Another study of the same authors revealed a significant correlation between youth expectations and choosing the level of education [Attanasio, Kaufmann 2009].

Second, expectations also influence the choice of college major, which, in turn, affects the supply of graduate labor in relevant occupations in the long run [Arcidiacono, Hotz, Kang 2012; Staniec 2004]. College majors offering greater flows of future earnings tend to be more popular among school leavers than those with the highest starting salaries [Berger 1988].

The focus of our research is on the determinants of expected returns to higher education. Let us review the studies devoted to this issue. A number of works reveal a positive correlation between academic performance as compared to peers, which can be regarded as a "noisy" indicator of individual achievement, and salary expectations [Brunello, Lucifora, Winter-Ebmer 2004; Wolter, Zbinden 2001; 2002] as well as academic performance in high school [Webbink, Hartog 2004]. This fact is consistent with the assumptions of the human capital theory, as better academic performance can indicate a higher level of investment in human capital and should therefore imply higher returns on such investment. A positive correlation is also found be-

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[2] In a number of cases, similar findings are produced by using either expected or actual salaries and relative returns to education [Dominitz 2001].

tween academic performance, getting a scholarship for academic excellence, and subjective assessment of the value of education being obtained [Sequeira, Spinnewijn, Xu 2013].

Parents play an important role in the educational choices of their children, so family characteristics can also be predictors of expected returns to education. Such characteristics include parental education, but empirical data on its relationship with student expectations is ambiguous. Some studies establish a negative influence of the father's education on students' expectations [Brunello, Lucifora, Winter-Ebmer 2004; Smith, Powell 1990], while others reveal a positive relationship between parental education and returns to education [Gamboa, Rodríguez 2014]. There is also data on a positive correlation between the mother's education and the salary expectations of students [Brunello, Lucifora, Winter-Ebmer 2004]. Such discrepancies may result from the fact that students from less advantaged families tend to overestimate the benefits of higher education, while their peers from families with higher levels of social capital make more realistic predictions. In other words, the result may depend on the sample structure and the distribution of students by socioeconomic characteristics.

Income, another critical socioeconomic characteristic of a household, also exerts considerable influence on students' salary expectations [Gamboa, Rodríguez 2014; Botelho, Pinto 2004; Smith, Powell 1990; Webbink, Hartog 2004; Andrushchak, Natkhov 2010]. First, students from higher-income families tend to expect higher earnings themselves. Second, wealthier families can provide greater financial investments in human capital, which should yield better returns.

There is ample empirical evidence of gender differences in the formation of salary expectations. For the most part, girls make less ambitious predictions than boys [McMahon, Wagner 1981; Brunello, Lucifora, Winter-Ebmer 2004; Botelho, Pinto 2004; Anchor et al. 2011; Smith, Powell 1990; Webbink, Hartog 2004]. This can probably be explained by the fact that boys and girls see their post-graduation roles differently, e. g. girls can envisage parenting, not just working.

Income expectations of students also differ depending on the college major they choose [McMahon, Wagner 1981; Betts 1996; Webbink, Hartog 2004; Andrushchak, Natkhov 2010], which reflects actual salary differences depending on the occupation.

The first large-scale study on students' salary expectations in Russia was conducted in 2009 using a survey of high school graduates and their parents from 16 major cities of the Russian Federation [Andrushchak, Natkhov 2010]. The study has a number of limitations that are reflected in this paper. First, GrigoryAndrushchak and TimurNatkhov studied the expectations of school leavers who were going on to college. We have no information on whether they actually made it to college or not, or, if they did, to which one exactly. Second, we have no necessary data on high school exit examinations or

the USE[3] scores (if this option was available) of 2008/09 high school graduates. Third, the sample included provincial students from regions differing in levels of socioeconomic development and, as a consequence, in labor market parameters. However, the empirical research did not control salary expectations for the average income level in a region, for instance. Finally, the low rate of response to the question about salaries and the resulting small number of observations suitable for econometric analysis can reduce the explanatory power of the conclusions drawn by Andrushchak and Natkhov.

All of those limitations are dealt with in this study: we analyze first-year students, knowing their USE scores, college and major. All our respondents live in Moscow, so the higher education market and labor market characteristics are identical for all of them (regional socioeconomic characteristics do not vary). The number of observations available for empirical analysis exceeds, by several times, the relevant indicator of the previous study on salary expectations.

Human capital theory [Becker 1962, 1964; Schultz 1961] provides the theoretical framework for this research. We regard students as investors in their own human capital. Students (and their parents) can make both financial and intangible investments. For example, if a student demonstrates excellent academic achievement in high school, scoring well in the USE, we can say that he/she invests in his/her human capital more than his/her lower-performing peers. Positive effects on USE results can also be produced by social capital (e. g. more educated parents will encourage successful development of their child) and cultural capital, i. e. intangible investments in human capital. Apart from that, parents may invest financially in their child's human capital, e. g. by paying for supplementary courses, buying study materials, etc. Wealthier parents have more resources to make financial investments in the student's human capital. The lack of one type of investment can be compensated for by another to some extent, e. g. high-income parents may pay a tuition fee to ensure a place in a selective college for their child in the case when the latter didnot score well enough in the USE to qualify for a government-funded place.

It is logical to assume that students who have made considerable investments in their human capital themselves (e. g. by scoring well in the USE and entering a selective college) or received such investments from their parents should expect higher returns on those investments, i. e. returns to higher education. Therefore, a few hypotheses can be put forward.

Hypothesis 1. Students with higher USE scores expect higher returns to higher education in both absolute and relative terms as compared to their lower-scoring peers because the former have made higher intangible investment in their own human capital.

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[3] the Unified State Exam.

Hypothesis 2. Students from families with high levels of social and cultural capital (parental education and number of books at home) develop higher salary expectations, because these indicators correlate positively with the level of intangible investment in human capital.

Hypothesis 3. Family income correlates positively with salary expectations, being an important source of financial investment in human capital.

In addition, we offer some complementary hypotheses related to gender and learning process characteristics.

Hypothesis 4. Boys have higher salary expectations than girls, being more ambitious in their perception of the labor market.

Hypothesis 5. Students combining work and study expect higher starting salaries than their non-working peers, because their working experience will give them a competitive advantage in the labor market.

Hypothesis 6. Students attending private colleges often have less ambitious salary expectations than students at state colleges. These differences have to do with low selectivity of private colleges and lower quality of education programs they offer.

2. Research data
This paper uses the results of the *Educational and Occupational Trajectories* panel study. Since we are focused on the analysis of the salary expectations of Moscow high school graduates, this study is based on the data of a regional—Moscow—panel. The first wave of the survey was conducted in the 2012/13 academic year, when the students were ninth-graders. This was when the sample structure was realized: students were first of all grouped into geographic strata (depending on the administrative district); next, schools in each administrative district were grouped by type, and schools were randomly selected sampled for the survey (the total sample included 274 schools); further on, all of the ninth-graders in each of the sampled schools filled out the survey questionnaire. The second wave was conducted in the 2014/15academic year, when the former ninth-graders were either in their final year of high school or attending a vocational school. The third wave was realized in 2015, when the students were admitted to colleges, continued attending vocational schools, or entered the labor market. We only selected the students admitted to colleges and doing their first-year studies at the moment of the survey[4]. Descriptive statistics are presented in Table 1.

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[4] Such a sampling technique was dictated by the research objectives: we analyzed expectations of returns to higher education among people who had

Table 1. **Descriptive statistics**

Variable	Number of observations	Min.	Max.	Mean	Standard deviation
Expected salary (rubles per month)	1,050	20,000	150,000	56,300	23,633.53
Expected returns to higher education	1,050	0	3.71	1.17	0.80
Gender (= 1 if male)	1,050	0	1	0.43	0.49
USE score in Russian	1,050	27	100	77.08	12.21
USE score in mathematics	852	4	100	58.03	18.87
College selectivity (based on USE scores)	1,001	51.8	94.7	73.86	9.69
Mother's education (=1 if higher education)	934	0	1	0.69	0.46
Father's education (= 1 if higher education)	817	0	1	0.63	0.48
Maximum level of parental education (=1 if at least one parent with higher education)	974	0	1	0.77	0.42
Single-parent family (= 1 if yes)	1,038	0	1	0.09	0.29
Number of books at home	1,045	5	650	253.72	216.33
Family income(number of category)	990	1	6	4.14	0.99
Type of school (=1 if secondary general education school)	1,050	0	1	0.65	0.48
Private college (= 1 if yes)	1,035	0	1	0.09	0.28
Full-time student (= 1 if yes)	1,049	0	1	0.95	0.22
Tuition (= 1 if yes)	1,047	0	1	0.50	0.50
Work (= 1 if yes)	1,050	0	1	0.13	0.34
Personal income (rubles per month)	1,050	0	130,000	4,814.69	11,909.21

Note: The number of observations differs for the key variables. Most missing answers are explained by the fact that the sample includes students from both two- and single-parent families. Questions on family's financial status are normally considered to be sensitive, so respondents often answer them less willingly. Besides, the question was presented to students, not their parents, whose income usually forms the basis of material wellbeing, so students could find it difficult to assess the financial status of their families. Moreover, the name of the college and the department were not specified in a number of cases.

The key (dependent) variables involved in the empirical analysis include expected starting salary (rubles per month, in absolute terms) and expected returns to education (in relative terms). These variables were obtained from students' answers to the following questions.

53. What salary (based on today's prices, without adjustment for inflation) do you expect to be paid after graduating from the college you are attending? *(Please give your answer in figures.)*
_____ rubles/month
–1. No answer

54. Suppose that you quit college today and got a full-time job, what salary do you think you could expect to be paid? *(Please give your answer in figures.)*
_____ rubles/month
–1. No answer

Answers to the first questions were used to calculate the indicator of expected starting salary (w^e). The values vary from 20,000 to 150,000 rubles per month among Moscow first-year college students, the mean being 56,300 rubles per month. Such expectations are unreasonably high: according to the 2014 Monitoring of Russian College Graduate Employment[5], the average starting salary of Moscow graduates was 38,504 rubles per month, with graduates being an average age of 28. The regression analysis will use a logarithm of expected starting salary ($\ln(w^e)$).

Expected (relative) returns to higher education (R^e), the second indicator of salary expectations, were calculated as follows:

$$R^e = \frac{w^e}{w^e_0} - 1,$$

been admitted to colleges with specific characteristics and who developed their expectations depending on college selectivity. What matters to us are not the expectations before admission (as in [Andrushchak, Natkhov 2010], for example) but the expectations after admission, i. e. during the period when first-year college students have already familiarized themselves with characteristics of the selected college, its academic environment, the level of graduates' salaries, etc. This is why we exclude school leavers who did not apply to college (did not seek to obtain higher education) and those who applied but failed (as we need to consider characteristics of specific colleges in formation of expectations). As we can see, sampling bias is justified by the objectives of this study. Besides, while sampling, we did not take into account answers provided by respondents with unrealistic expectations (which is in line with the theoretical framework of research). The upper limit of salary expectations was set to 150,000 rubles per month (inclusive), and relative expected returns to education were under 4.

5 http://graduate.edu.ru/registry#/?year=2014&slice=6&board=1.

Table 2. **Distribution among major domains of learning**

| Major	Number of observations	Proportion (%)
Mathematical and Natural Sciences	95	9.0
Engineering and Technology	247	23.5
Healthcare and Medicine	64	6.1
Social Sciences	219	20.9
Education and Pedagogy	50	4.8
Humanities	56	5.3
Arts and Culture	19	1.8
Economics and Management	299	28.5
No answer	1	0.1
Total	1,050	100.0

where w_0^e is the salary the student would expect to be paid if he/she quit college today and got a full-time job, i. e. salary expectations in the case of renouncing higher education.

The coefficient of expected returns to higher education shows the excess of income (in relative terms) that will be provided by college education. We excluded some answers with negative returns to higher education from the analysis as being inconsistent with rational choice logic. As a result, this variable takes on values from 0 to 3.71, the mean being 1.17. That is to say, students expect to be paid on average 117% higher (i. e. more than twice as much) after graduation than they would be paid if they quit college. The major difference between absolute returns to education (w^e) and relative returns to education (R^e) is that the relative returns indicator depends much less on time-fixed individual differences (first of all in competencies) and on the variables that affect the numerator and denominator variables (w^e and w_0^e, respectively) unidirectionally (e. g. family characteristics).

The sample includes students in different majors. Table 2 presents the distribution of first-year students among major domains of learning (originally based on the relative list provided by the Ministry of Education and Science, but the Economics and Management category was later separated from the Social Sciences category).

The most popular domains of learning turned out to be Economics and Management; Engineering and Technology; and Social Sciences. Salaries differ for graduates of different departments and majors (e. g. engineers can be paid higher than teachers), so it would be logical to assume that expectations of students in different majors regarding salaries and returns to education will differ too. Figure 1 shows the mean values of the relevant parameters depending on the major selected.

Figure 1. **Mean values of expected starting salaries and expected returns to higher education depending on college major**
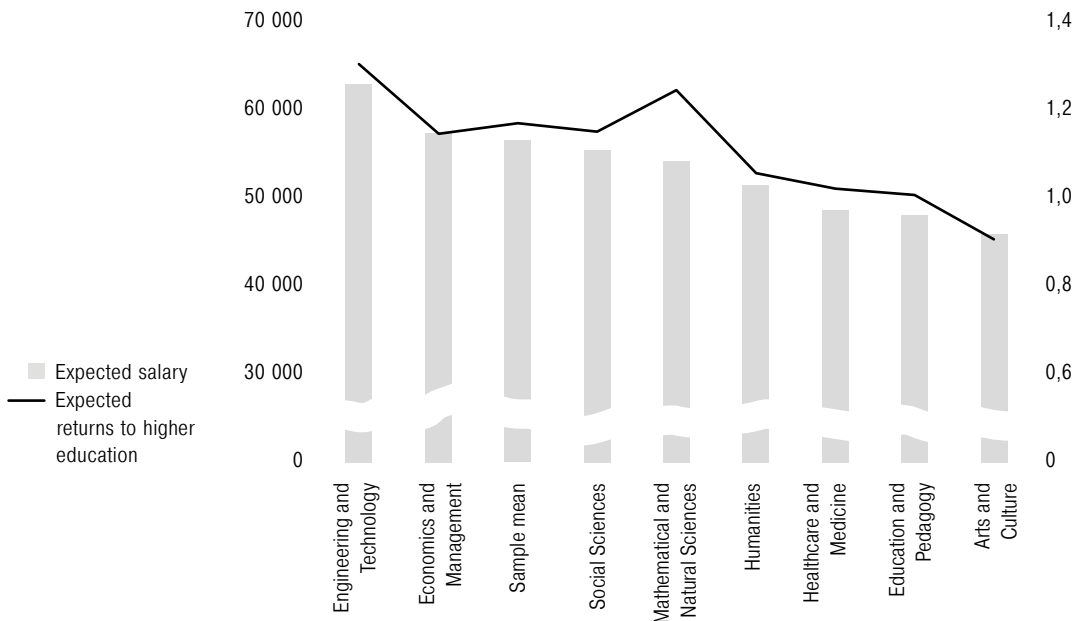
Analysis of means with a breakdown by majors shows that the highest salary expectations are typical of students in Engineering and Technology and Economics and Management, while students in Education and Pedagogy and Arts and Culture demonstrate the lowest salary expectations. Expected returns to education are the highest for students in engineering, mathematical and natural sciences (economists, while expecting to be paid well, believe that relative returns to economics education are not that high) and the lowest, again, for those in Pedagogy and Arts and Culture.

On the whole, there is a positive correlation between salary expectations and expected returns to higher education, with the exception of the Mathematical and Natural Sciences domain. The observation can be interpreted as follows. Students in this domain of learning expect their starting salaries to be near average. Nevertheless, they predict the relative value of higher education to be pretty high, believing that they can earn much less without college education. On the one hand, such a relationship between expectations can indicate an underestimation of returns to secondary education; on the other hand, students in mathematical and natural sciences have better competencies in mathematics, physics and chemistry (which manifest themselves in high school already) and realize that higher education is indispensable in ensuring their effective application.

The following variables were selected as potentially correlating with salary expectations and expected returns to higher education, based on the previous research findings and the hypotheses offered herein (Table 1).

Student *gender*. The proportions of boys and girls in the sample are 43% and 57%, respectively.

The selected *academic performance* indicators include *USE score in Russian* (mean: 77 points) and *USE score in mathematics* (mean: 58 points) as compulsory tests taken by all high school graduates. Besides, *college selectivity* (average USE score among admitted students) is an indirect indicator of student abilities. The mean selectivity value is 74 points. Correlation analysis (see Table 4) proves that USE scores in Russian and mathematics and college selectivity are quite correlated with one another, so only one of these indicators will be used in each specification during the regression analysis to avoid the problem of multicollinearity.

Table 3 specifies the mean USE scores in Russian and mathematics as well as levels of college selectivity for different majors. The findings appear to be paradoxical in one of the subgroups: although students in Engineering and Technology have the highest salary expectations and expect the highest returns to higher education, they demonstrate the lowest USE performance in Russian and attend the least selective colleges. The paradox can be explained by the following: although the USE in Russian is mandatory for all school leavers and college applicants, admission to engineering and technology colleges is normally based on performance in major subjects (e. g. USE scores in mathematics are generally higher than average in such colleges). At the same time, low selectivity of colleges offering education programs in Engineering and Technology has to do with the low demand for engineering majors in a number of colleges: in some cases, the number of applicants is lower than that of government-funded places available. More than that, the competition is often higher in economic and legal departments (minors) of engineering colleges. However, recent years have seen a growing interest in engineering majors as a response to the state's demand [Kovalenko 2016].

Students in humanities perform best in Russian, while the highest USE scores in mathematics are observed among students in mathematical and natural sciences, which appears to be logical. The highest college selectivity is found in the group of medical students, which has to do with the limited offer of places in these colleges.

Family characteristics are represented by *parental education: mother's education* (mothers with higher education account for 69%), *father's education* (63%), and *maximum level of parental education* (77%). The latter is understood as the highest of the education levels of both parents. This variable takes on the value 1 in caseswhere at least one of the parents has higher education and 0 otherwise. As these indicators are also strongly correlated (Table 4), only one

Table 3. **Mean values of the key parameters depending on the major**

Collegemajor	Expected salary	Expected returns to higher education	USE score in Russian	USE score in mathematics	College selectivity
Mathematical and natural sciences	54,084.21	1.2406	80.01	65.33	75.26
Engineering and Technology	62,732.79	1.3004	74.95	62.84	70.88
Healthcare and Medicine	48,515.63	1.0186	78.19	57.78	76.95
Social Sciences	55,242.01	1.1475	77.57	50.33	75.54
Education and Pedagogy	47,900.00	1.0037	76.14	51.68	71.84
Humanities	51,303.39	1.0526	80.75	51.58	73.88
Arts and Culture	45,789.47	0.9039	77.95	53.83	76.67
Economics and Management	57,288.85	1.1427	76.78	56.72	74.13
No answer	50,000.00	1.5000	64.00		
Sample mean	56,336.53	1.1667	77.08	58.03	73.86

of them will be used in the regression analysis. In addition, we use such family characteristics as family composition (students from single-parent families account for 9%), number of books at home (mean: 254), and family income (coded as a continuous measure from 1 to 6, the mean being 4) as variables potentially correlating with salary expectations and expected returns to higher education.

School characteristics are represented by the *type of school*: secondary general education school (65%) or school of another type (cadet boarding school, gymnasium (grammar school), boarding school, education center, lyceum, or cadet school).

Learning process characteristics include: state or private college, full- or part-time studies, and government- or tuition-funded place. Nine percent of the respondents attend private colleges; the overwhelming majority is full-time students (95%); and half of the respondents pay tuition fees.

In addition, students were asked questions on combining work and study. According to the data obtained, 13% of students had a job, the average income in the sample being 4,815 rubles per month. The indicators of working status and personal income are strongly correlated, so only one of them will be used in the regression models.

3. Correlation analysis

Analysis of paired correlations among the variables establishes that dependent variables—logarithm of expected salary and expected returns to education—are correlated strongly with one another (correlation coefficient being 0.59 and statistically significant). Logarithm of expected salary correlates positively with USE scores in mathematics,

the level of the father's education, family income, college selectivity, and full-time studies. Besides, salary expectations are higher among boys than among girls. Logarithm of expected salary correlates negatively with attending a private college.

Expected returns to higher education correlate positively with the mother's education, the maximum level of parental education, college selectivity, and full-time education, while showing negative correlations with attending a private college and combining work and study. Boys tend to expect better returns to higher education than girls.

Some groups of independent variables also reveal strong correlations; these include the indicators of parental education, academic performance (level of competencies), working status, and personal income. Correlations are either weak or statistically insignificant for the rest of the variables. Based on the analysis of paired correlations, we can draw a general conclusion that logarithm of expected salary and expected returns to education correlate positively with the level of parental education and negatively with attending a private college. Gender-based correlation is significant, too. In addition, an important role belongs to the positive correlation between family income and salary expectations.

4. Regression analysis

Two basic econometric models are evaluated. In the first one, logarithm of expected salary is the dependent variable regressed on student characteristics (gender, academic performance) as well as characteristics of family, learning process and job (an analogue of a Mincer equation). In the second specification, expected returns to higher education are the dependent variable regressed on the abovementioned characteristics. Due to strong paired correlations among a number of variables describing academic performance, parental education and learning process characteristics, only one variable in each group is used in the models. Table 4 presents the regression analysis results for the first specification (using the logarithm of expected salary).

Models 1–12 were evaluated by applying the method of ordinary least squares (OLS) to the whole sample. The results demonstrate that salary expectations of boys are higher than those of girls. Academic performance (based on USE scores in Russian/mathematics or expressed in college selectivity) also correlates positively with salary expectations. Father's education is a significant factor in expectations formation. The level of father's education was included in relevant models both as an individual independent variable and as an intersection of the father's education and single-parent variables. The sample includes a tangible proportion of students who were raised by single mothers. Using the father's education variable in the regression analysis would reduce the number of observations. To avoid this, we introduce an integral variable, which is a combination of the level of father's education and family composition. This variable takes on

the value 1 in the case of a two-parent family and 0 in all other cases (a single-parent family or a two-parent family with a low level of father's education). As can be seen from Table 4, using an alternative specification model yields similar results.

Students from higher-income families tend to expect higher starting salaries. Students attending private colleges expect to be paid lower than those who attend state colleges. Students with working experience show higher salary expectations than non-working students.

A number of specifications were controlled for college major. The Social Sciences domain of learning was chosen as a base, as average salary expectations in this domain are the closest to the sample mean. Analysis shows that students in engineering and economic majors most often expect to be paid higher than students in Social Sciences, whereas students in Arts and Culture develop lower income expectations. The differences for other majors were found to be insignificant.

The results of models 1–12 are quite logical and consistent with previous research findings. However, the estimators obtained by the OLS method may be biased due to endogeneity problem: for instance, USE scores are not independent values as such but represent a function of various characteristics, similar to a production function in education [Prakhov 2016]. This is why we suggest using an alternative method to estimate regression of expected salary, namely a two-stage least squares regression analysis (2SLS), which implies constructing a regression model of USE score in the relevant subject at the first stage.

We believe that the USE score in Russian correlates positively with the mother's education and the number of books at home, i. e. the social and cultural capital indicators. In addition, boys perform worse in Russian than girls, while scoring on average two points higher in mathematics. Besides, there is a positive correlation between the mother's education and the number of books at home.

The final results of applying 2SLS to the whole sample are presented in models 13–20 (Table A1 in Appendix). The USE score in Russian has a negative sign in this specification because the resulting model uses instrumentsfor USE scores and does not directly control for gender of respondents (girls score better in Russian, as was demonstrated at the first stage). The USE score in mathematics is significant, but the coefficient is approaching zero, which can also be explained by leaving out student gender at the second stage. The level of father's education has significant effects on the expected salary in all the models. Models 13–20 reveal a positive influence of family income on the formation of salary expectations. Students at private colleges demonstrate less ambitious income expectations than those attending state colleges in the models using the USE score in Russian.

Therefore, summing up the findings, we can conclude that salary expectations of college students correlate positively with academic performance (USE scores or college selectivity), parental educa-

Table 4. **Regression analysis results. Dependent variable: logarithm of expected salary** (method of least squares)

Independent variable	1 OLS	2 OLS	3 OLS	4 OLS	5 OLS	6 OLS	7 OLS	8 OLS	9 OLS	10 OLS	11 OLS	12 OLS
Gender	0.092*** (0.030)	0.051 (0.032)	0.128*** (0.027)	0.088*** (0.028)	0.092*** (0.031)	0.071** (0.033)	0.129*** (0.027)	0.108*** (0.030)	0.102*** (0.030)	0.062** (0.031)	0.138*** (0.027)	0.097*** (0.028)
USE score in Russian	0.002* (0.001)	0.002* (0.001)	0.002** (0.001)	0.002** (0.001)								
USE score in mathematics					0.002** (0.001)	0.002* (0.001)	0.003*** (0.001)	0.002*** (0.001)				
College selectivity									0.004** (0.002)	0.005*** (0.002)	0.005*** (0.001)	0.006*** (0.002)
Father's education	0.064** (0.029)	0.068** (0.029)			0.076** (0.032)	0.085*** (0.032)			0.059** (0.030)	0.061** (0.030)		
Father's education x Two-parent family			0.063** (0.026)	0.072*** (0.026)			0.068** (0.028)	0.079*** (0.028)			0.056** (0.026)	0.063** (0.026)
Family income	0.034** (0.015)	0.029** (0.015)	0.024* (0.013)	0.020 (0.013)	0.041** (0.016)	0.035** (0.016)	0.023* (0.014)	0.017 (0.014)	0.032** (0.015)	0.026* (0.015)	0.020 (0.013)	0.015 (0.013)
Private college	−0.139** (0.055)	−0.137** (0.055)	−0.126*** (0.046)	−0.128*** (0.047)	−0.168** (0.068)	−0.182*** (0.068)	−0.147*** (0.056)	−0.161*** (0.056)	−0.119* (0.061)	−0.102* (0.063)	−0.095* (0.053)	−0.079 (0.054)
Work	0.083* (0.043)	0.090** (0.042)	0.065* (0.037)	0.075** (0.037)	0.089* (0.045)	0.101** (0.045)	0.070* (0.040)	0.081** (0.040)	0.087** (0.043)	0.095** (0.043)	0.063* (0.038)	0.076** (0.038)
Mathematical and Natural Sciences		−0.058 (0.054)		−0.059 (0.050)		−0.046 (0.058)		−0.071 (0.054)		−0.060 (0.055)		−0.054 (0.051)
Engineering and Technology		0.095** (0.042)		0.098*** (0.038)		0.084* (0.048)		0.064 (0.043)		0.098** (0.044)		0.106*** (0.039)
Healthcare and Medicine		−0.070 (0.062)		−0.081 (0.057)		−0.018 (0.090)		−0.073 (0.079)		−0.084 (0.062)		−0.093 (0.057)
Education and Pedagogy		−0.096 (0.071)		−0.087 (0.063)		−0.058 (0.081)		−0.071 (0.074)		−0.086 (0.071)		−0.075 (0.063)
Humanities		−0.058 (0.066)		−0.057 (0.062)		−0.050 (0.086)		−0.049 (0.081)		−0.063 (0.067)		−0.069 (0.063)
Arts and Culture		−0.275*** (0.100)		−0.249** (0.097)		−0.122 (0.122)		−0.116 (0.118)		−0.287*** (0.100)		−0.262*** (0.097)
Economics and Management		0.072* (0.039)		0.032 (0.035)		0.095** (0.043)		0.042 (0.039)		0.066* (0.040)		0.035 (0.035)
Constant	10.466*** (0.119)	10.493*** (0.122)	10.492*** (0.104)	10.514*** (0.106)	10.497*** (0.087)	10.511*** (0.091)	10.528*** (0.075)	10.556*** (0.079)	10.337*** (0.134)	10.306*** (0.141)	10.329*** (0.120)	10.281*** (0.126)
R2	0.044	0.078	0.051	0.077	0.067	0.091	0.077	0.077	0.055	0.091	0.063	0.092
Number of observations	766	766	919	919	735	735	881	881	784	784	1,001	1,001

Standard error is specified in brackets. Significance level: *** 1%; ** 5%; * 10%.

tion, family income, and working status (or personal income) but show a negative correlation with attending a private college. Besides, boys tend to be more optimistic in their salary expectations than girls.

Table 5 contains the results of a regression analysis for expected returns to higher education. They correlate positively with individual USE scores: higher-performing students expect to have better monetary returns to college education. Achieving high academic performance, they invest in their human capital more than others and expect a higher return on investment quite logically. Besides, students attending more selective colleges (where learning is normally more challenging, i. e. associated with higher costs) expect better returns to higher education than students at less selective colleges. This is consistent, for example, with salary-based college rankings: graduates from the most selective colleges usually earn more. Quite naturally, they also expect higher (relative) returns to education.

Parental education is insignificant in these specifications, though it doesnot mean that family has no influence on students' perceptions at all (see below). Family income is only found to be significant in some of the models. The reason for this may be that, while college students from wealthier families expect to be paid higher after graduation (w^e), they also would expect rather high salaries even if they quit college right now (w_0^e), i. e. both the numerator and the denominator expressed in R^e are higher for this category of students. Therefore, the differences in expected returns to education between the rich and the poor may be insignificant. In addition, using the indicator of relative returns to education can neutralize the effects of family.

Students attending private colleges expect lower returns to higher education than those attending state-governed institutions. A possible explanation can be that state colleges mostly offer educational services of better quality.

Working students expect to be paid higher starting salaries in absolute terms but have lower expectations regarding returns to higher education than non-working students. This paradox can be explained as follows. First, working students have more accurate and realistic perceptions of parameter w_0^e as they are already in the labor market. Second, their working experience allows them to hope for higher starting salaries, because they will have a competitive advantage over non-working students. As a result, expectations of returns to higher education turn out to be lower (more realistic) among working college students than their non-working peers.

As for major-based differences in expected relative returns to education, engineering students expect higher returns than students in Social Sciences in a number of models. No other significant differences have been detected, so the models without control for major (23, 27, 31) can be considered as basic.

Table 5. **Regression analysis results. Dependent variable: expected returns to higher education**

Independent variable	21	22	23	24	25	26	27	28	29	30	31	32
Gender	0.047 (0.062)	−0.018 (0.067)	0.109** (0.054)	0.056 (0.059)	0.008 (0.064)	−0.041 (0.070)	0.088 (0.057)	0.057 (0.062)	0.050 (0.061)	−0.020 (0.066)	0.109** (0.054)	0.054 (0.058)
USE score in Russian	0.004* (0.003)	0.004 (0.003)	0.005** (0.002)	0.004* (0.002)								
USE score in mathematics					0.005*** (0.002)	0.004** (0.002)	0.005*** (0.002)	0.005*** (0.002)				
College selectivity									0.006* (0.003)	0.008** (0.003)	0.007** (0.003)	0.008** (0.003)
Father's education	−0.025 (0.061)	−0.024 (0.061)			−0.080 (0.067)	−0.073 (0.068)			−0.023 (0.062)	−0.023 (0.062)		
Father's education x Two-parent family			0.010 (0.053)	0.014 (0.053)			−0.024 (0.058)	−0.022 (0.058)			−0.002 (0.054)	0.000 (0.054)
Family income	0.050* (0.030)	0.049* (0.030)	0.030 (0.026)	0.029 (0.027)	0.062* (0.034)	0.060* (0.034)	0.032 (0.029)	0.027 (0.030)	0.046 (0.031)	0.043 (0.031)	0.026 (0.027)	0.024 (0.027)
Private college	−0.244** (0.113)	−0.220* (0.115)	−0.193** (0.094)	−0.184* (0.096)	−0.270* (0.144)	−0.262* (0.146)	−0.197* (0.116)	−0.204 (0.118)	−0.200 (0.127)	−0.137 (0.131)	−0.137 (0.107)	−0.104 (0.111)
Work	−0.162* (0.088)	−0.155 (0.089)	−0.161** (0.076)	−0.152** (0.077)	−0.131 (0.096)	−0.123 (0.097)	−0.117 (0.083)	−0.114 (0.084)	−0.153* (0.089)	−0.144 (0.089)	−0.160** (0.078)	−0.150* (0.078)
Mathematical and Natural Sciences		0.042 (0.113)		0.022 (0.104)		0.076 (0.123)		0.004 (0.113)		0.056 (0.114)		0.036 (0.105)
Engineering and Technology		0.168* (0.089)		0.091 (0.078)		0.140 (0.101)		0.012 (0.089)		0.201** (0.093)		0.114 (0.082)
Healthcare and Medicine		−0.079 (0.129)		−0.097 (0.117)		−0.125 (0.192)		−0.220 (0.166)		−0.090 (0.130)		−0.114 (0.118)
Education and Pedagogy		−0.079 (0.148)		−0.124 (0.130)		−0.027 (0.172)		−0.151 (0.155)		−0.056 (0.149)		−0.111 (0.131)
Humanities		−0.073 (0.138)		−0.160 (0.127)		−0.102 (0.183)		−0.158 (0.168)		−0.081 (0.140)		−0.146 (0.130)
Arts and Culture		−0.285 (0.209)		−0.261 (0.201)		−0.189 (0.260)		−0.189 (0.246)		−0.297 (0.209)		−0.283 (0.201)
Economics and Management		0.061 (0.081)		−0.013 (0.071)		0.068 (0.091)		−0.040 (0.080)		0.067 (0.083)		−0.009 (0.073)
Constant	0.662*** (0.246)	0.669*** (0.255)	0.678*** (0.212)	0.717*** (0.219)	0.720*** (0.182)	0.735*** (0.193)	0.740*** (0.155)	0.819*** (0.165)	0.552 (0.277)	0.415 (0.295)	0.514** (0.245)	0.463* (0.260)
R2	0.023	0.034	0.022	0.030	0.033	0.040	0.032	0.037	0.023	0.037	0.024	0.033
Number of observations	766	766	919	919	735	735	881	881	784	784	1,001	1,001

Standard error is specified in brackets. Significance level: *** 1%; ** 5%; * 10%.

5. Conclusions   The study offers empirical estimations of the factors affecting the for-
mation of starting salary expectations of college students. The follow-
ing results have been obtained from a survey of Moscow high school
graduates admitted to college.

Salary expectations of boys are higher than those of girls. Aca-
demic performance determined based on USE scores in Russian and
mathematics also correlates positively with salary expectations in both
absolute and relative terms. Besides, student expectations are pos-
itively affected by college selectivity. It is logical to assume that high
performers and students attending selective colleges (who can nor-
mally boast high USE scores) invest more heavily in their human cap-
ital to achieve their learning goals and thus expect a higher return on
such investment.

The size of expected salary correlates positively with the economic
status of a family, including its social (parental education) and cultural
(number of books at home) capital, with such correlations sometimes
being indirect, i. e. expressed through individual USE performance.
This relationship has been proved by the regression models whose es-
timated coefficients are obtained using the method of least squares
and 2SLS estimators with instrumental variables.

Students attending private colleges demonstrate less ambitious
salary expectations than their peers admitted to state colleges. Like-
wise, they expect lower returns to higher education, which proves in-
directly that private college education typically has a lower value in the
labor market and private college graduates are normally paid lower.

Students combining work and study expect higher starting sala-
ries than their non-working peers. Work experience will be a compet-
itive advantage for such individuals when they enter the labor market.
At the same time, working students develop more realistic expecta-
tions of returns to higher education because they can specify their
current income more accurately.

The values of expected salary and expected returns to higher ed-
ucation differ across majors. Engineering and technology students
show the most ambitious income expectations in both absolute and
relative terms, while the lowest starting salaries are expected by stu-
dents in arts and culture.

Therefore, the theory of human capital has been empirically proved
in the context of how expectations of returns to higher education are
formed, since a positive relationship has been revealed between in-
vestments (both financial and intangible) in higher education and ex-
pected returns to higher education.

The conclusions we make in this study are consistent with previ-
ous research findings. It is worth emphasizing the importance of the
obtained results for the higher education market and labor market in
Moscow, as the sample was geographically homogeneous. The dif-
ferences in expectations depending on academic performance, fam-
ily and learning process characteristics can affect student strategies

in the labor market. High achievers expect higher starting salaries (return on investment in their own human capital), which is in line with the assumption of the human capital theory. Students attending selective colleges demonstrate higher expectations regarding returns to higher education, while those at private colleges make less ambitious predictions, which proves the important role of higher education quality when assessing returns in the labor market.

Considering that USE scores (and, consequently, the chances for admission to a selective college) are influenced not only by student competencies but also by family characteristics, we can conclude that family is an essential factor affecting admission to college and the development of salary expectations. Students from different families may have unequal opportunities in the higher education market as well as later in the labor market even if they have similar USE scores. Hence, inequality exists even within a single (Moscow) higher education market (i. e. in the absence of costs associated with moving to another city for college), and it can affect accessibility of labor market opportunities in the future.

Our findings confirm the need for elaboration of additional support policies for students from disadvantaged families at both school and college levels. These can include information support (raising awareness of the opportunities offered by the USE), supplementary school-based classes for senior high school students, and financial mechanisms to reduce inequality. Since a strong family influence on salary expectations is preserved even in a unified admission system, the absence of additional inequality reduction policies is fraught with a gap between educational trajectories, which will lead to salary inequalities in the labor market. Ultimately, obtaining higher education will only widen the gap between students from families with different socioeconomic statuses, instead of smoothing it.

As this paper uses the results of a panel study, it appears productive to focus further research efforts on analyzing the extent to which salary expectations of college students are realized and identifying the factors that affect under- and overestimation of returns to higher education.

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Appendix Table A1. **Regression analysis results. Dependent variable: logarithm of expected salary** (method of instrumental variables)

Independent variable	13	14	15	16	17	18	19	20
USE score in Russian	−0.008* (0.004)	−0.003* (0.004)	−0.012*** (0.004)	−0.007** (0.004)				
USE score in mathematics					−0.000** (0.000)	−0.000 (0.000)	−0.000*** (0.000)	−0.000*** (0.000)
Father's education	0.099*** (0.033)	0.083*** (0.032)			0.064* (0.036)	0.062 (0.040)		
Father's education x Two-parent family			0.113*** (0.031)	0.101*** (0.029)			0.077** (0.036)	0.072* (0.040)
Family income	0.000*** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)	0.000** (0.000)
Private college	−0.175*** (0.063)	−0.142** (0.064)	−0.228*** (0.060)	−0.197*** (0.059)	0.006 (0.091)	−0.009 (0.119)	0.047 (0.098)	0.059 (0.152)
Personal income	0.000* (0.000)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Mathematical and Natural Sciences		−0.071 (0.055)		−0.055 (0.054)		−0.253* (0.156)		−0.353* (0.190)
Engineering and Technology		0.092** (0.043)		0.087** (0.041)		−0.102 (0.169)		−0.218 (0.206)
Healthcare and Medicine		−0.078 (0.065)		−0.090 (0.063)		0.064 (0.130)		0.100 (0.144)
Education and Pedagogy		−0.142* (0.073)		−0.137** (0.068)		−0.174* (0.097)		−0.221* (0.120)
Humanities		−0.053 (0.069)		−0.032 (0.066)		0.009 (0.104)		0.079 (0.124)
Arts and Culture		−0.250** (0.100)		−0.230** (0.101)		−0.216 (0.136)		−0.203 (0.158)
Economics and Management		0.071* (0.038)		0.028 (0.037)		−0.160 (0.190)		−0.323 (0.220)
Constant	11.456*** (0.340)	11.050*** (0.340)	11.777*** (0.311)	11.420*** (0.308)	10.922*** (0.056)	11.043*** (0.197)	10.959*** (0.056)	11.174*** (0.229)
Number of observations	766	766	919	919	735	735	881	881

Standard error is specified in brackets. Significance level: *** 1%; ** 5%; * 10%.