

Returns to Education in the Russian Federation: Towards Evidence Based Decision Making with Social and Private Returns to Education

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Data and Code

Thanks are due to the Ministry of Education and the Ministry of Finance for making the data available regarding graduate earnings and college and university income and expenditures. The code used for this paper is made freely available for all researchers at <https://bitbucket.org/zagamog/edreru/src/master/>

This paper presents a preliminary analysis of a dataset distributed by the Ministry of Education of the Russian Federation that provides information on graduate salaries. The data is merged with information on income and fee revenue of colleges and universities to provide estimates of costs and benefits at an institutional level and private and social returns to education at a regional level. As the length of the data series on graduate earnings will grow over time, the estimates presented in this paper can be updated to provide sharper estimates of the costs and benefits of attending a particular institution.

KEYWORDS

Returns to Education, Higher Education, Cost-Benefit Analysis

JEL Codes: I23, I26

1 | DESCRIPTION OF DATA

The Ministry of Education provides information regarding the salaries obtained by graduates and other related information at the website "http://graduate.edu.ru". A key purpose of this website is to provide accurate information to prospective university students and their families about the prospects of graduates from each of the universities or colleges. The Ministry of Finance collects information from all education establishments and others providing public service as a

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means to foster citizen engagement and accountability. This information includes details about revenue and income streams. This paper presents analysis from the merger of these two databases. The content of the data is presented in this section. Subsequent sections provide analysis and interpretation.

1.1 | Graduate.edu portal

Graduate.edu allows the registered users to download all desirable information about the earnings of college or university graduates in .xlsx format. By using that service we obtained data about the number of graduates in 2013 in each university and college and their corresponding salaries in 2014, 2015 and 2016. Our final set of data consists of 1909 colleges, 423 universities, and 2975 pairs of university-study areas with information about the graduates earning in them. We filtered out universities and colleges with less than 100 and 50 graduates in 2013, respectively. Salaries in 2014 and 2015 were adjusted to the prices of 2016.

	Mean	Std	Quantile.25.	Quantile.50.	Quantile.75.
College Graduates Avg. Earnings 2014	22,408	6,718	18,214	20,843	24,745
College Graduates Avg. Earnings 2015	21,036	6,243	17,172	19,611	23,375
College Graduates Avg. Earnings 2016	21,586	6,637	17,359	20,001	23,944
University Graduates Avg. Earnings 2014	34,910	15,282	24,811	30,481	40,376
University Graduates Avg. Earnings 2015	35,789	16,927	25,381	30,710	41,603
University Graduates Avg. Earnings 2016	36,937	18,353	25,410	31,692	42,500

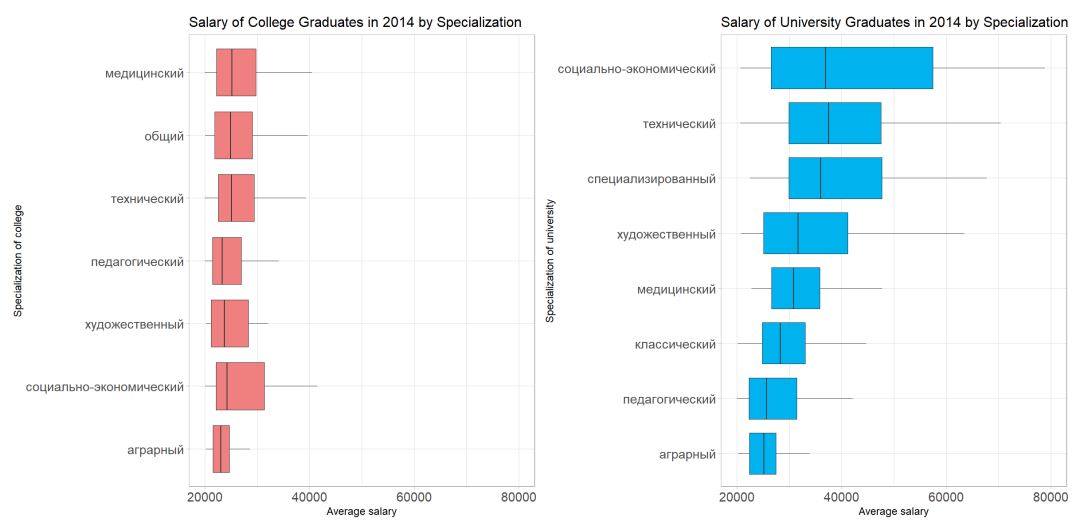


Рис. 1.1 Earnings in 2014 by Specialization

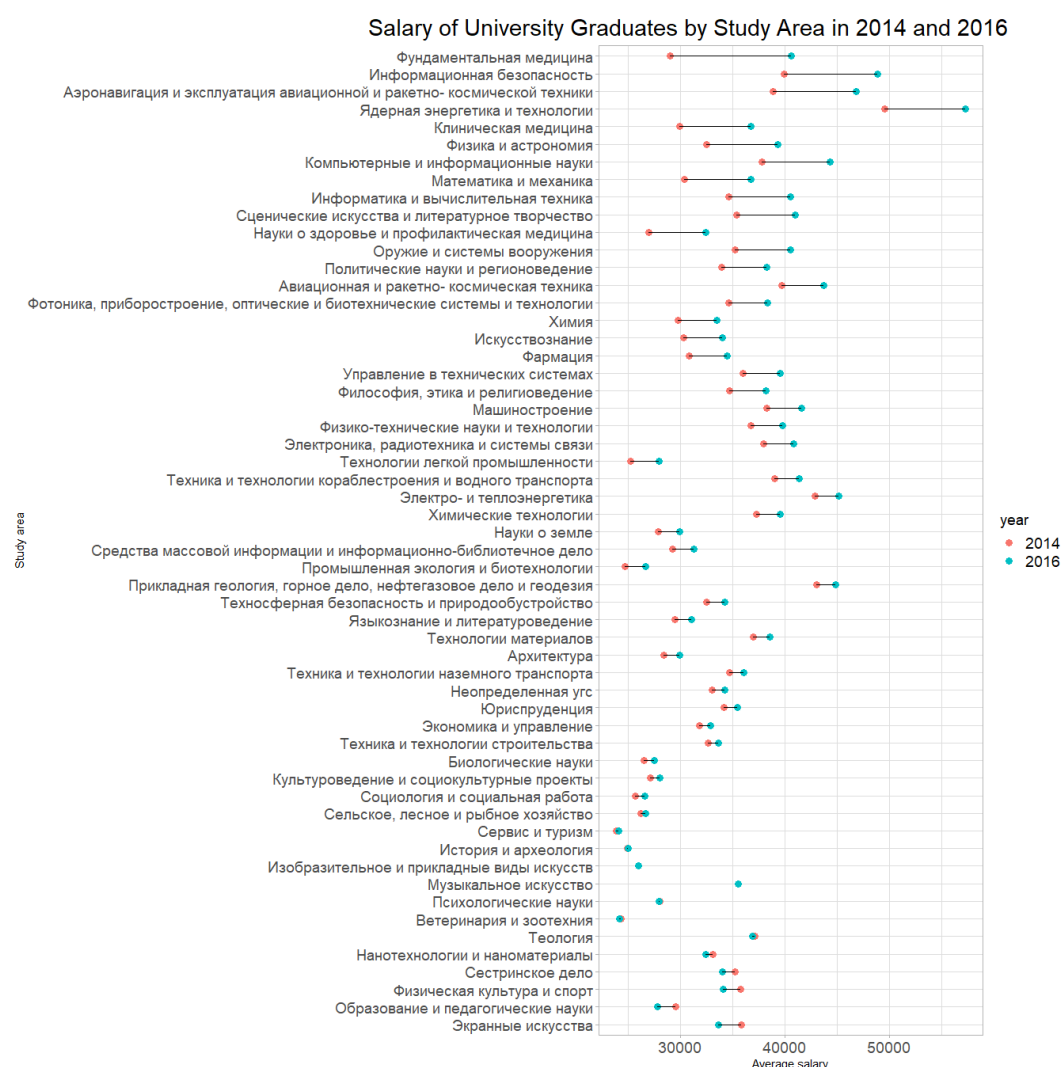


Рис. 1.2 Earnings Growth 2014-16 by Specialization

1.2 | Bus.gov portal

We obtained financial data about the colleges and universities from the open data section on the <https://bus.gov.ru>. It contains information about the total cash receipts of an organization for a given year and provides data on the income subcategories, such as cash receipts from paid services, target subsidy, budget investments, state (municipal) tasks. In our research, we approximated fee payments through the information about cash receipts from the paid services and used it together with the number of graduates for the calculation of the private education cost. To estimate the social cost of education we used total cash receipts in an organization.

Таблица 1.1 Data regarding Tertiary Education Institutes

	Mean	Std	Quantile.25.	Quantile.50.	Quantile.75.
Number of College Graduates in 2013	176	133	91	140	224
Total Cash Receipts in Colleges, mean 2012-2017	88,499,123	200,088,664	42,204,580	60,579,178	94,179,183
Cash Receipts from the Paid Services in Colleges, mean 2012-2017	12,004,525	24,174,679	3,338,267	6,714,013	13,290,758
Cash Receipts from the Target Subsidy in Colleges, mean 2012-2017	10,928,189	68,501,580	2,628,308	5,600,336	10,975,815
Cash Receipts from the Budget Investments in Colleges, mean 2012-2017	391,006	3,281,730	0	0	0
Cash Receipts from the State (Municipal) Tasks in Colleges, mean 2012-2017	62,185,103	78,598,657	31,545,198	45,165,347	68,748,188
Social Cost for Colleges	209,009	376,700	107,376	149,017	224,786
Private Cost for Colleges	22,515	26,853	8,606	16,156	28,189
Number of University Graduates in 2013	1,653	1,540	633	1,230	2,069
Total Cash Receipts in Universities, mean 2012-2017	1,584,286,956	2,428,205,237	483,322,825	852,711,495	1,554,176,934
Cash Receipts from the Paid Services in Universities, mean 2012-2017	635,645,477	1,093,170,696	131,150,223	296,913,560	687,080,404
Cash Receipts from the Target Subsidy in Universities, mean 2012-2017	219,245,816	307,653,669	71,807,802	128,997,272	220,246,527
Cash Receipts from the Budget Investments in Universities, mean 2012-2017	38,817,643	136,401,305	0	0	2,823,465
Cash Receipts from the State (Municipal) Tasks in Universities, mean 2012-2017	658,658,760	1,066,074,166	242,686,337	361,106,787	651,264,621
Social Cost for Universities	272,584	282,826	107,101	176,603	308,564
Private Cost for Universities	102,267	131,717	34,454	58,741	113,401

2 | REGIONAL ESTIMATES OF SOCIAL AND PRIVATE RETURNS

In the first part of our research, we focus on calculating the social and private regional internal rate of return by using the following methodology. We utilize the average wage in each age from 2014 to 2018 Rosstat Survey to calculate the potential earnings profiles and then add the mean social and private cost estimates for the regions to the beginning of that profile. We also adjust for the foregone earnings of graduates by adding to the educational cost the potential wage that graduates missed due to the enrollment in the university or college, we took average wage in the region as the approximation of such earnings.

Below you can see an estimate of social and private IRR of university graduates by regions of Russia. Both types of returns have high dispersion across the country: from around 40% IRR in Magadanskaya and Ulyanovskaya oblast to the less than 15% in Kurganskaya and Kurskaya oblast. It is interesting to notice that although Moscovskaya oblast has substantially high social and private returns, the Moscow lacking behind in that ranking with only 20% of IRR. That may happen due to the circular migration from Moscovskaya Oblast to Moscow - people in Moscovskaya Oblast can get access to the cheaper education inside their region and still be able to work in the nearby capital.

PLOT Social and Private Returns by region, Higher education

The next graph demonstrates the social and private IRR of colleges. As you may notice the regional variation is still present, but not to the same extent as in universities - returns are lying between 20-30% in most of the regions.

PLOT Social and Private Returns by region, Vocational education

The average levels of social returns of college and university graduates in a region are highly correlated - regions with a high level of university returns tend to have higher rates of college returns. Nonetheless, there are some exceptions: for example, Respublika Tatarstan has above average social returns of college graduates, but lacking behind in university returns. The situation in Sahalinskaya Oblast is directly the opposite - the region is characterized by one of the highest levels of social university returns, but the college returns are a lot lower than in most of the other regions. You can see a distribution of returns by two levels of education in the scatterplot below.

PLOT Social Returns by regions

3 | INSTITUTIONAL RETURNS FOR COLLEGES AND UNIVERSITIES

Data provided by graduate.edu allow us to calculate IRR directly for each educational organization. As in the previous part we use social and private cost as the cost part of the IRR specification, but now we utilize graduate salaries in 2014, 2015, and 2016 as the benefits obtained by the graduates. Resulting IRR estimations have a negative sign for most of the organizations since we have access only to the 3 years of observations after graduation. Although obtained results represent only short-run returns they still can be used to compare universities or colleges within each other.

Below, you can the tables with Top-10 and Bottom-10 universities and colleges ranked according to the level of social IRR.

The provided data allow us to map the educational organizations according to their precise coordinates. We can observe a few examples of such plotting for Moscow universities and Saint Petersburg colleges with an indication of the level of social returns for each organization.

PLOT Map Social IRR of universities in Moscow

PLOT Map Social IRR of colleges in Saint Petersburg

Another aspect that can influence the rate of returns substantially is the education area of the organization. Technical specialization has the highest social internal return rate for both college and university and art specializations

	social returns	private returns	name
1	-0.01	0.01	Тюменский индустриальный университет
2	-0.01	0.06	Самарский государственный технический университет
3	-0.01	0.06	Иркутский государственный университет путей сообщения
4	-0.02	-0.01	Бурятская государственная сельскохозяйственная академия имени В. Р. Филиппова
5	-0.02	0	Самарский государственный экономический университет
6	-0.03	-0.01	Санкт-Петербургский государственный экономический университет
7	-0.03	-0.01	Российский государственный университет туризма и сервиса
8	-0.03	0.01	Сибирский государственный индустриальный университет
9	-0.04	0.02	Иркутский национальный исследовательский технический университет
10	-0.04	0.03	Уральский государственный горный университет
11
12	-0.32	-0.26	Московский государственный академический художественный институт имени В. И. Сурикова
13	-0.33	-0.2	Брянский государственный аграрный университет
14	-0.33	-0.27	Астраханский государственный архитектурно-строительный университет
15	-0.34	-0.21	Северо-Западный государственный медицинский университет имени И. И. Мечникова
16	-0.35	-0.24	Российский национальный исследовательский медицинский университет имени Н. П. Барешникова
17	-0.35	-0.17	Уральский государственный аграрный университет
18	-0.36	-0.24	Национальный исследовательский технологический университет «МИСиС»
19	-0.36	-0.21	Саратовская государственная консерватория имени Л. В. Собинова
20	-0.36	-0.23	Московская государственная художественно-промышленная академия им. С. Г. Серова
21	-0.4	-0.26	Первый Санкт-Петербургский государственный медицинский университет имени П. П. Эрбмана

are amongst less returnable once for both educational levels. Medical universities in Russia, in opposite to their American counterparts, are also having one of the lowest internal return rates.

PLOT Boxplots with social returns by specializations

We estimate the factors which are explaining the difference in returns between organization by conducting 4 separate linear regression models with 1) Social IRR in colleges, 2) Private IRR in colleges, 3) Social IRR in universities, and 4) Private IRR in universities as dependent variables. We are going to use 1) the specialization of organization, 2) the number of graduates, 3) the number of staff, 4) the average wage in the organization, 5) the proportion of income obtained from paid services and 6) the average wage in the region as the main predictors for these models.

Tables with Linear Regression estimates for the Social/Private returns of Higher/Vocational education are depicted below.

	social returns	private returns	name
1	0.07	0.23	Самарский энергетический колледж
2	0.06	0.2	Вилюйский техникум
3	0.05	0.21	Якутский автодорожный техникум
4	0.05	0.14	Новочеркасский геологоразведочный колледж
5	0.05	0.16	Уральский железнодорожный техникум
6	0.04	0.21	Ивановский энергетический колледж
7	0.04	0.23	Якутский коммунально – строительный техникум
8	0.03	0.13	Отраденский нефтяной техникум
9	0.03	0.09	Сахалинский промышленно-экономический техникум
10	0.02	0.08	Новгородский строительный колледж
11
12	-0.36	-0.19	Московский автомобильно-дорожный колледж имени А. А. Николаева
13	-0.36	-0.26	Строительный техникум № 30
14	-0.36	-0.02	Колледж «Красносельский»
15	-0.36	-0.27	Озерский технический колледж
16	-0.36	-0.05	Красноуфимский педагогический колледж
17	-0.36	-0.26	Колледж полиции
18	-0.36	-0.12	Краснодарский педагогический колледж
19	-0.37	-0.14	Мичуринский аграрный техникум
20	-0.37	-0.19	Туапсинский гидрометеорологический техникум
21	-0.37	-0.24	Колледж по подготовке социальных работников Департамента труда и социальн

Таблица 3.1

	(1)	(2)
Constant	−0.067*** (0.007)	0.126*** (0.007)
speciality_typeаграрный	−0.033*** (0.007)	−0.033*** (0.007)
speciality_typeпедагогический	−0.059*** (0.008)	−0.029*** (0.008)
speciality_typeмедицинский	−0.017** (0.008)	−0.020** (0.008)
speciality_typeобщий	−0.010 (0.006)	−0.006 (0.006)
speciality_typeсоциально-экономический	−0.039*** (0.010)	−0.042*** (0.011)
speciality_typeхудожественный	−0.076*** (0.013)	−0.035*** (0.013)
graduates_number	0.0001*** (0.00002)	0.00000 (0.00002)
staff_endYear_2017	−0.00000 (0.00000)	−0.00000 (0.00000)
staff_averageSalary_2017	0.00000 (0.00000)	0.00000*** (0.00000)
paidServices_ratio	0.071*** (0.021)	−0.112*** (0.021)
annual_wage_region	−0.00000*** (0.00000)	−0.00000*** (0.00000)
Observations	990	990
R ²	0.436	0.577
Adjusted R ²	0.430	0.573
Residual Std. Error	0.063	0.065
F Statistic	68.723***	121.450***

Note:

*p<0.1; **p<0.05; ***p<0.01

Таблица 3.2

	(1)	(2)
Constant	−0.136*** (0.014)	−0.021 (0.014)
specialization_typeклассический	0.004 (0.012)	0.018 (0.012)
specialization_typeпедагогический	−0.001 (0.014)	−0.002 (0.013)
specialization_typeмедицинский	−0.025** (0.013)	0.004 (0.012)
specialization_typeспециализированный	0.036* (0.021)	0.064*** (0.021)
specialization_typeсоциально-экономический	0.051*** (0.016)	0.056*** (0.016)
specialization_typeтехнический	0.042*** (0.011)	0.059*** (0.011)
specialization_typeхудожественный	−0.009 (0.015)	0.025* (0.014)
graduates_number	0.00001*** (0.00000)	0.00001** (0.00000)
staff_averageSalary_2017	0.00000*** (0.00000)	0.00000*** (0.00000)
paidServices_ratio	0.055** (0.024)	−0.048** (0.024)
annual_wage_region	−0.00000*** (0.00000)	−0.00000*** (0.00000)
Observations	306	306
R ²	0.485	0.563
Adjusted R ²	0.465	0.546
Residual Std. Error	0.056	0.055
F Statistic	25.129***	34.372***

Note:

* p<0.1; ** p<0.05; *** p<0.01