

Students' Wage Expectations. Dynamic Analysis

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Abstract—Factor structure of expected graduate's wage is considered in the paper. The analysis of eight regression estimates for 2007–2009 and 2012–2016 of Russian University students' wage expectations demonstrates consistency of estimates of all coefficients but regional dummy and wage of working students. The dynamics of expected graduates' wage and average nominal wage suggests that the former is much more exposed to influence of economic cycles than the latter.

Index Terms—economics of education, expected wage, wage after graduation

I. INTRODUCTION

Expectations are the baseline category in microeconomic analysis of an economic agent's behavior. They are determined by number of individual as well as macroeconomic parameters. Students' wage expectations, which define their educational choices in many dimensions [1]–[3], are within the scope of the research. The question under consideration is whether determinants structure of value of expected wage of Russian university students changes over time. Understanding the factor structure of students' wage expectations as well as its dynamics enables more thorough perception of motivation of students' decisions and actions, conduction of profound educational policies. Particularly, value of coefficients for the regressor of youth wage on labor market and the regressor of effort can explain the share of working students. Yearly changes in coefficients can also provide insights into changes in structure of labor force. These facts can motivate the relevance of the research. Number of researches scrutinize the issue of the determinants of value of expected wage in different countries [4]–[6]. However, the case of Russia seems to be outstanding because of higher education system specifics, labor market and economic peculiarities, significant regional disparities etc.

Features of Russian education system [7] is one of the reasons of deriving particular attention to expected wages of Russian university students. In particular, coexistence of state-funded and fee-paying studying is an additional source of differences in self-esteem and effort of students applied to studying. Getting correspondence and part-time evening education allows these students to have working experience greater than others have. Disparities among students created artificially in Russian higher education system being supported by other factors which definitely contributes to variation of expected wages. Recent changes in university entrance principal: from entrance exams to the compulsory United State Exam encourage growth of demand on higher education

increasing chances to enter the institution. This caused further transformations of the landscape of the system, educational programs, style of education. Dynamic analysis of expected wages of university students allows to analyze the effect of the process of massification of higher education system on individuals, effort applied to study and future career perception.

The authors derive attention to similarity of the dynamics of starting wage expectations and the value of average wage on labor market, whether the parameter under investigation is exposed to economic crises, how realistic students' expectations concerning wage after graduation are. If we consider individual's expected wage as a key channel transmitting economic changes into higher education system then comparison of expected and nominal wage of university graduates enables to get insight into correctness of individuals' perception of economic situation and labor market conditions.

The paper is organized as follows. Section II gets through the literature on the research question. Section III contains data analysis. In section IV the results of comparison of expected and nominal wages after graduation are presented. Section V focuses on the determinants of the parameter of expected wage after graduation. Section VI provides a conclusion.

II. LITERATURE REVIEW

Expectations are acknowledged to be a vital parameter defining the state of economy, “powerfully affecting events, but rarely revealing itself directly” [8]. They constitute an inherent component of information-based general equilibrium models' argumentation [9]. Students' wage expectations might be the driving force of higher education expansion [10], [11] as far as they are acknowledged to be a factor of demand on higher education.

At the same time a lot of researchers account for macroeconomic characteristics shaping expectations of economic agents. Fuchs [12] claims expectations function is revised from time to time due to new information or learning processes.

A bunch of literature scrutinizes the question of accuracy of students' expectations of their wage after graduation. However, evidences are rather controversial [13], [14].

Series of papers [15]–[17] focus on determinants of actual wage of university graduates. They prove the influence of GPA, abilities, family background, elite university degree (bachelor, master, PhD), specialty, working experience during studies, gender, age on the value of wage.

Literature suggests factors of value of expected wage of university students are similar across countries: year of study, gender, family income, specialty, level of parent’s education, abilities, working experience, effort, university quality influence students’ wage forecasts [18]–[21].

Drawing the line, it can be noticed that factors of expected graduates’ wages are similar to the law of actual graduate’s wage formation revealed in a number of studies. In general, graduate’s wage expectation rule adjusts to changes in economic situation, as it is natural to expectations, causing further changes in state of labor market, education system and economy. The research contributes to the existing literature by robustness check of law of starting wage expectation formation of Russian university students; analysis of determinants structure of quantiles of expected wage; comparison of expected wage dynamics with that of actual graduate’s wage and average labor market wage.

III. DATA

The research uses the data of Russian university students’ questionnaire conducted within the project Monitor of Economics of Education [22] by NRU Higher School of Economics together with the analytical center of Yuriy Levada under control of the Ministry of Education of Russia. We use the data for the years 2007–2009, 2012–2016. The data of 2010 and 2011 do not contain information about values of students’ expected wages. The dataset includes more than 800 observations each year excluding master’s students and students of correspondence and part-time evening education.

It can be seen in Table I that average values of wage of working students (w1) as well as average expected wages experience growth as it is peculiar for nominal parameters. Average quantity of time dedicated to self-education (ts) varies from 10 to 14 hours a week for different groups of students. It is clear that samples are homogeneous by gender, year of study, and family income. Moreover, groups of students under consideration are similar in terms of distribution of students between technical, pedagogical, medical, and other specialties. The share of students of Moscow universities also does not change.

In addition, we exploit the data of Monitor of graduates’ employment [23] conducted by the Ministry of Education of Russia for the years 2014–2016 in order to identify accuracy of students’ wage predictions. The latter is enhanced by the comparison of mean values of expected graduates’ wages and average wage on the labor market for the periods 2007–2009, 2012–2016 [24]. These are illustrated with the use of Fig. 1.

IV. COMPARISON OF EXPECTED AND NOMINAL WAGES

Since expected wage constitutes an individual’s perception of labor market and general economic situations, the questions of how realistic wage predictions of students are as well as how sensitive they are with respect to general labor market trends seem to be interesting in the period of global economic integration and subsequent microeconomic changes. The analysis of Fig. 1 suggests students’ wage expectations are

Table I
MEAN VALUES OF VARIABLES UNDER CONSIDERATION

Variable ¹	2007	2008	2009	2012	2013	2014	2015	2016
Number of observations	898	1527	1200	2233	1744	4485	1228	2837
In	9.13	9.39	9.38	9.93	10.06	10.17	10.12	10.29
ts	12.84	13.73	12.19	10.3	10.8	10.37	12.22	14
female	0.589	0.6	0.54	0.57	0.65	0.56	0.62	0.6
year	2.91	2.49	2.33	2.42	2.88	2.32	1.8	2.84
income	4.42	4.63	4.51	5.7	6.96	7	7.03	7.02
techn	0.11	0.12	0.11	0.14	0.125	0.18	0.17	0.196
ped	0.02	0.025	0.026	0.02	0.032	0.027	0.036	0.025
med	0.05	0.066	0.064	0.048	0.04	0.057	0.072	0.079
Moscow	0.24	0.26	0.18	0.25	0.36	0.255	0.23	0.291
w1	4422	10130	9916	14295	15695	17087	19213	19536

¹Variables are described in Table II.

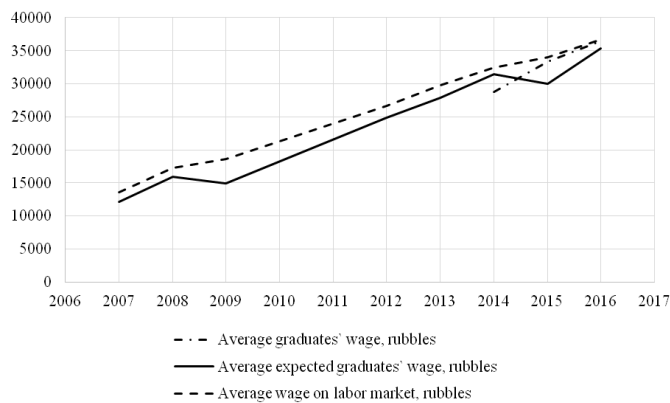


Figure 1. Wage dynamics

highly correlated with the dynamics of average wage on labor market. However, it is evident that students overestimate the influence of economic crises. Indeed, the parameter of average expected wage is characterized by negative growth rate in 2009 and 2015 while average nominal wage’s pace of growth though decreasing still stay positive. At the same time graduates’ wages continued growing steadily during the crisis period 2014–2015. Additionally, it is necessary to notice students’ wage expectations are of no more than 10% difference of actual graduates’ starting wages.

Comparing expected and nominal graduates’ wage by specialty with the use of Table IV, it is possible to notice that more often students overestimate value of wage after graduation than underestimate (the latter happens in 1 case out of 3 cases). The value of absolute error, averaged by specialty and year, is approximately 20%. Frequent overestimation and such a great deviation of students’ forecasts from actual graduates’ wages allow to conclude that expansion of higher education system in Russia is higher than it is suggested by globalization, technological development and current economic trends. It is also interesting to notice that students mistake realizing the highest paying jobs for university graduates. They assign the biggest value of expected

Table II
DESCRIPTION OF VARIABLES

Variable name	Description
ln w	logarithm of expected monthly wage after university graduation, logarithm of rubbles
ts	amount of time dedicated to self-education, hours a week
female	binary variable, =1 for female students
year	year of study
income	dummy variable for family's monthly income ¹
techn	binary variable, =1 for students of technical specialty
ped	binary variable, =1 for students of pedagogical specialty
med	binary variable, =1 for students of medical specialty
Moscow	binary variable, =1 for students of Moscow universities
w1	monthly wage if a student is working, rubbles

¹ Description of values of the dummy-variable is presented in Table III.

Table III
DESCRIPTION OF INCOME VARIABLE¹

Value of income dummy-variable	Years of the sample		
	2007–2009	2012	2013–2016
1	income ∈ [0,2000)		
2	income ∈ [2000,4000)	income ∈ [0,5000)	if income ∈ [0,5000)
3	income ∈ [4000,7000)	income ∈ [5000,8000)	income ∈ [5000,8000)
4	income ∈ [7000,10000)	income ∈ [8000,11000)	income ∈ [8000,11000)
5	income ∈ [10000,15000)	income ∈ [11000,16000)	income ∈ [11000,16000)
6	income ∈ [15000,20000)	income ∈ [16000,21000)	income ∈ [16000,21000)
7	income ∈ [20000,30000]	income ∈ [21000,30000)	income ∈ [21000,31000)
8	income more than 30000 rubbles	income ∈ [31000,40000]	
9			income ∈ [31000,41000)
10		income more than 40000 rubbles	
11			income ∈ [41000,51000)
12			income ∈ [51000,60000]
13			income more than 60000 rubbles

¹Levels of the variable are appointed to different income levels for different years which is a matter of the database construction. As far as the methodology implies estimating different regression equations for different years of the sample, this peculiarity of income variable leads to impossibility of comparing the estimates of the coefficients in different regressions.

wage to graduates of technical specialties or mathematics ones whereas graduates of physical education specialties turn to be the most paid. Speaking about labor market in general rather than about its niche for graduates, it can be noticed that sportsmen get high wage, however, financiers and programmers are mentioned having the highest wages among other employees by Russian statistical agency ROSSTAT and Russian recruitment company Headhunter.

V. DETERMINANTS ANALYSIS OF STUDENT'S EXPECTED WAGE AFTER UNIVERSITY GRADUATION

Wage expectations are formed on an individual basis. Thus, macroeconomic conditions influence them indirectly. Having analyzed determinants of expected wage, it is possible to reveal the ways of how the influence realizes.

The following regression specification is under

consideration

$$\ln w_i = \beta_0 + \beta_1 * ts_i + \beta_2 * ts_i^2 + \beta_3 * female_i + \beta_4 * year_i + \beta_5 * income_i + \beta_6 * techn_i + \beta_7 * ped_i + \beta_8 * med_i + \beta_9 * Moscow_i + \beta_{10} * w1_i + \epsilon_i \quad (1)$$

Description of variables is presented in Table II. OLS estimates of the coefficients of regression 1 are in Table V¹.

It seems evident that wage forecast depends on gender, specialty, region. According to labor market trends demonstrated by the ROSSTAT statistics, the highest wages are got by employees of technical professions. Employees having pedagogical and medical specialties were among the least paid several years ago. We include these dummy variables into regression equation because values of expected wage in the earlier years are probably influenced

¹Interpretations of coefficients of the model is made under the assumption of rational expectations of Russian university students about wage after graduation

Table IV
AVERAGE EXPECTED WAGE AND AVERAGE NOMINAL WAGE AFTER GRADUATION ACCORDING TO SPECIALTIES BY YEAR

	Average expected wage (rubbles)			Average wage after graduation (rubbles)			Relative value of error		
	2014	2015	2016	2014	2015	2016	2014	2015	2016
Physical education	21461	21800	38750	33041	37663	40143	0.54	0.77	0.04
Technical sciences (building, connection, production technologies etc.)	35860	35300	43127	29302	34691	38648	0.18	0.02	0.1
Mathematics, programming, computer sciences	31344	38975	42006	28474	34326	40785	0.09	0.12	0.03
Social sciences (economics, law, management, sociology, psychology etc.) except pedagogy	33542	29618	32615	27774	32134	34777	0.17	0.09	0.07
Medicine	32925	35125	31325	24105	31100	35355	0.27	0.12	0.13
Pedagogy	27157	20034	24983	23934	26773	28133	0.12	0.34	0.13
Liberal arts (philosophy, phyology, Russian language, literature, history etc.)	30981	32361	29849	23525	27432	30103	0.24	0.15	0.009
Natural sciences (physics, chemistry, biology, geography, ecology etc.)	34271	22046	35457	23211	27907	31013	0.32	0.27	0.13
Cultural studies, arts (music, painting, theatre etc.), design, architecture	26351	22744	35613	22267	25220	27554	0.16	0.11	0.23
Agronomy, agriculture, forestry	31936	28127	26316	20492	24190	26112	0.36	0.14	0.008
Service, advertising, travelling	28864	33875	38400	20170	23203	24762	0.3	0.32	0.36

Table V
OLS ESTIMATES

	2016	2015	2014	2013	2012	2009	2008	2007
ts	-0.00017	0.015*	0.0014	-0.004	-0.01***	0.003	-0.005 *	-0.0057
ts ²	-0.000077	-0.0004	-0.00005	0.00009	-0.0002***	-0.000009	0.00006	0.0000053
female	-0.124***	-0.129 ***	-0.2***	-0.147***	-0.135***	-0.082	-0.095	-0.014***
year	-0.006	-0.049***	-0.0008	-0.033***	-0.079***	-0.036	-0.069**	-0.048***
income	0.03***	0.014**	0.026***	0.035***	0.063***	0.047***	0.035*	0.14***
techn	0.18***	0.262***	0.088***	0.178***	0.209***	0.106	0.231***	0.314***
ped	-0.13	-0.136	-0.03	-0.432***	-0.14	-0.39***	-0.48**	-0.406***
med	0.08	0.077	0.063	-0.079	0.136**	-0.28**	-0.007	0.012
Moscow	0.28***	0.442***	0.497***	0.54***	0.551***	0.737***	0.65***	0.72***
w1 * 10 ⁻⁵	0.209***	0.362***	0.594***	0.42***	0.562***	1.43***	1.38***	0.576***
const	10***	9.87***	9.89***	9.77***	9.65***	8.98***	9.24***	8.554***
R-squared	0.18	0.26	0.29	0.36	0.34	0.38	0.31	0.36
VIF	2.38	2.93	2.05	2.13	2.03	1.85	2.26	1.79

* significant on 15% level of significance,
 ** significant on 10% level of significance,
 *** significant on 5% level of significance

by this labor market trend. Russian regional structure is rather diverse according to many parameters so that each of the regions has its specifics, however, we account only for Moscow region dummy variable. Following the results of

other researches of expected wage determinants, we include the regressors of year of study, dummy variable for family's income as a proxy for family conditions, wage of working students as characteristic of their working experience. Year

of study matters in formation of wage forecasts because of several factors. Firstly, students of different age have different working experience. Secondly, one specialization usually offers different job opportunities which may vary in personal qualities required as well as may be paid a bit differently, thus, during studying a person gets more information about his own abilities and makes more reasonable choice of future job being able to forecast his income more precisely. Thirdly, meetings with employers, which are often organized for undergraduate students, also help them to enrich their knowledge about the situation on the labor market so that an individual is able to predict his future labor market experience better. Family conditions can influence an individual's education choices through parents' education, family's standard of living both of which are correlated with family's income. An individual's working experience can be measured in terms of its presence or not, years of working, years of working on specialty, whether work on the last workplace is connected with specialty or not etc. We take into consideration the first meaning. In addition to this, we take into account the amount of wage, a student receives working during studying, because probably this value will be the base for formation of wage expectations as well as it will constitute his reserve wage entering the labor market after graduation. In addition, we argue that student's perception of his own studying effort also matters when he makes wage forecast. The amount of time dedicated to self-education is used as a proxy for student's effort. Use of time spent on lectures and seminars for this purpose seems to be less appropriate because it depends on student's concentration, teacher's effort etc.

The results of regression analysis suggest the following tendencies being true from year to year:

- Female students expect getting in average 14% lower wage than male ones. The influence is statistically significant in most cases.
- A year of study decreases the value of expected wage. Estimate of the coefficient as well as its significance vary along with a sample change.
- The higher family's disposal income, the greater the value of expected wage. The impact is statistically significant in almost all cases.
- Students of technical specialty have higher wage expectations than others. Value of the coefficient also changes but it is mostly significant.
- Wage expectations of Moscow universities' students are higher than of students from universities in regions. The influence turns to be statistically significant in all the regression equations estimated.
- Value of the coefficient of the binary variable Moscow is decreasing gradually from year to year. This means the difference in wage expectations of Moscow universities' students and students from other regions vanishes. One of the possible explanations is that more university graduates hope to be employed in Moscow.
- Expected wage grows with an increase in wages offered

to working students on labor market. The coefficient is significant in most cases.

- The influence of wages offered to working students on expected wages after graduation is significantly stronger for the years 2008–2009 and decreases in value to 2016. One might suppose the reason is in nature of expectations. They lag behind the real economic situation. When the economy faced crisis, economic agents reacted changing the rule of expectation formation basing them on labor market information from working students in less extent. Alternatively, students might realize more of them are working during studies from year to year so that they expect decreasing returns on working experience. Another interpretation may be connected with students' perception of weaker correlation between the dynamics of students' and graduates' wages in later periods.
- The regression analysis establishes no significant influence of effort on value of expected wage.
- The results suggest no influence of pedagogical and medical specialties binaries consistent in sign or significance.

VI. CONCLUSION

The paper focuses on factor structure of students' wage expectations and its variability with changes in sample. The analysis is completed by comparison of dynamics of nominal wage and graduates' wage forecasts. The issue of realistic starting wage estimates is brought to the foreground.

The research exploits the data for the years 2007–2009, 2012–2016 of Russian university students' questionnaire conducted within the project Monitor of Economics of Education by NRU Higher School of Economics together with the analytical center of Yuriy Levada under control of the Ministry of Education of Russia. The data of 2010 and 2011 do not contain information about the values of students' expected wage. The dataset includes more than 800 observations each year excluding master's students and students of correspondence and part-time evening education. Regression analysis of expectation of value of expected wage after graduation with the use of OLS method is conducted.

The results propose signs of coefficients of expected wage determinants are robust to changes from year to year as well as between countries. Thus, the study provides evidence for the findings of other researchers about factor structure of students' expected wages [4], [25], [26]. According to the results, the trend towards decreasing difference in wage expectations of Moscow universities' students and those of other universities is announced. The impact of wage of working students on the parameter under investigation becomes lower over time. An attempt to shed some light on this finding is made. Additionally, the authors try to provide evidence to difference between people having the highest wage forecasts from those having the lowest ones.

The authors provide empirical support to the issue of unbiasedness of students' wage estimations. For this purpose, the database is supplemented by the results of Monitor of

graduates' employment for 2014–2016 conducted by Ministry of Education of Russia. It is found that value of expected wage is of no more than 10% difference with value of average starting wage. However, if wage expectations are analyzed by specialty, it turns to 20% deviation of expected and nominal wage in average.

The issue of variability of expectations in response to general labor market trends is addressed. It is shown that an economic agent forecasts decrease of wage whereas actually the level of wage continues to grow but the rate falls down.

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