

Do Students Expect Any Returns on Effort Applied to Studying? An Econometric Analysis of Determinants of the Amount of Expected Wage after Graduation

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Abstract. Students' perception of the labor market makes a great deal in students' decisions concerning effort to study, work during university studies, etc. The aim of the research is to define whether students identify significant returns on effort with respect to wage after graduation. Moreover, it seems reasonable to single out other factors that students expect to influence their wage significantly. With the use of the data of Russian students' questionnaire conducted in 2012 within the framework of the Monitor of Economics of Education project the regressions with the use of instrumental variables and stochastic frontier approach are estimated. The results suggest effort is considered as an influential factor in determining wage by Russian students if students' incomplete awareness about labor market is taken into account. Besides, university quality, abilities, wage received by working students, region, specialty, family's income and gender make the difference in the amount of wage expected by students. For additional analysis the 20% and 80% quantile regressions are built. According to the results, persons having the highest wage forecasts base them on the amount of wage offered to working students on the labor market and do not correct them subject to their effort, university quality and abilities. At the same time another group of students, keeping similar basis for expectation formation as a previously analyzed group, expect significant contribution of effort and abilities.

Keywords: expected wage, wage after graduation, returns on effort, quantile regression, stochastic frontier approach

1 Introduction

Expectations are the base of decisions and actions of persons. One of the key decisions during university studies is time allocation between study, work and leisure. One can assume that among the determinants of students' time allocation are their wage expectations, in particular, expectations about factors which

contribute to wage after graduation. For instance, effort dedicated to study, university quality, working experience can be among the factors that are expected to influence wage after graduation. If a person supposes that his/her effort to study influences in a great extent the wage after graduation then he/she will decide to spend more time studying. If a student expects that university quality makes a great deal in his/her positions on the labor market after graduation and determines his/her wage then he/she probably will dedicate less effort to studying relying on university reputation on the labor market. In the case a student thinks working experience is the most valuable asset to an employer and studying in a university is just a social norm or parents' wish then he/she will also spend as less time studying as possible. Thus, having known the relevance of effort to study in determining student's positions on the labor market assumed by students, undertaking appropriate measures, for instance inviting employers to make a talk about vitality of knowledge got in university, can stimulate students to dedicate more time to study. This can be treated as an argument supporting the relevance of the research. Consequently, the aim of the research is to determine the influence of their effort on wage after graduation as expected by students. Moreover, it makes sense to reveal other factors, which students suppose to influence their wage after graduation, and measure the degree of their influence.

The research is based on the data of Russian university students' questionnaire in 2012 conducted within the framework of project Monitor of Economics of Education organized by National Research University Higher School of Economics, the analytical center of Yuriy Levada under control of the Ministry of Education of Russia. The dependent variable is the amount of expected wage of Russian university students. The authors analyze the factors that are traditionally considered in this kind of research among which are gender, year of study, family's disposal income, specialty, region. The list of regressors is supplemented by the proxies for effort, university quality, abilities and the amount of wage received by working students. Regression approach is applied to the conditional expectation of the dependent variable and 20% and 80% quantiles of the distribution. The said approach includes estimation with the use of instrumental variables and stochastic frontier method which is used to control for students' inefficiency in estimates and limited knowledge about labor market.

The results suggest the existence of the difference of expectation formation between two groups of students with the lowest and the highest wage expectations. The latter build their expectations on the amount of wage they are offered working during studies. They do not associate the variability of the sum of wage after graduation with the amount of effort applied to studying and university quality. Abilities are not a significant factor as well. They are the students already having a well-paid job to the time they enter university. They usually do not apply much effort. Persons with the lowest wage expectations also take into account the wage offered to working students but still they assume effort makes the difference in formation of wage after graduation. So do abilities. University

quality is also not admitted as significant in explanation of variation in values of expected wage of this group of students.

The results of the regression for all students of the sample propose effort, university quality, abilities and wage of working students are significant if we take into account “individual inefficiency”. In terms of the above stated aim of the research, it means that students realize vitality of their effort for their positions on the labor market. Thus, it is worth to coordinate university policy so that it drives students’ decisions to work harder which, in turn, will result in benefits for both students and university.

Having revised the factors influencing students’ wage forecasts we have realized that the parameter is prone to labor market shocks connected with changes in an average level of wage and that offered by employers to students; fiscal shocks expressed in variations in transfers and tax rates; personal shocks that cover all possible changes in life of a student, his/her preferences, perception of labor market, etc.

Section 2 gets through the literature on the research question. Section 3 reveals methodological and data aspects. In section 4 the results are presented and discussed. Section 5 discusses the influence of different kinds of shocks on students’ wage expectations. Section 6 provides a conclusion.

2 Literature Review

The pool of research conducted on the data of different countries (USA, Denmark, Czech, Britain, Cyprus, Switzerland, etc.) found the similar set of variables determining the expected wage after graduation and revealed similar patterns of influence of the factors on the dependent variable. The findings can be summarized as follows.

Firstly, scholars point out that wage expectations play a great role in decision-making concerning specialization of studying and choosing the amount of effort to study [6, 8, 9, 18, 19].

Secondly, younger students have higher expectations about wage after graduation than elder ones. This is explained either by the rate of inflation taking into consideration by younger students or by the fact that they do not have enough information about labor market [5–7].

Thirdly, female students have lower expectations about wage after graduation in comparison with male students [4, 6, 7, 10].

Fourthly, high family income increases students’ wage expectations [1, 6, 14] relatively to persons from low-income families who tend to underinvest in their education because of significant financial resources deficiency etc. [11].

Fifthly, specialty, level of parent’s education, abilities and working experience are also among factors influencing students’ expectations about wage [5, 7, 11, 14].

The researchers provide controversial evidences concerning accuracy of students’ wage estimates. [6, 9, 10, 15–17, 19].

It is necessary to mention that despite the fact that the influence of wage expectations on students’ decisions about the amount of effort allocated to study

is accounted by scholars, the contribution of effort to wage assumed by persons is not mentioned or verified. Furthermore, the influence of university quality on students' wage expectations has not received enough attention. Our research is aimed at filling the gaps.

3 Methodology and Data

We are going to consider the following determinants of the amount of expected wage in the research¹ (Table 1):

Table 1. Independent variables under consideration

Factor	Variable (name)	Variable (description)
effort dedicated to study	t_self	the amount of hours dedicated to self-education (hours per a week)
university quality	share_oregion	share of students from other regions studying in the university
gender (control variable)	female	binary variable, = 1 for female students
year of study (control variable)	year_of_study	dummy variable, takes values from 1 to 4
family income (control variable)	yd	dummy variable for family's monthly disposal income (in rubles), yd = 1, if income \in [0, 2000], yd = 2, if income \in (2000, 4000), yd = 3, if income \in (4000, 7000], yd = 4, if income \in (7000, 10000], yd = 5, if income \in (10000, 15000], yd = 6, if income \in (15000, 20000], yd = 7, if income \in (20000, 30000], yd = 8, if income more than 30000 rubles
specialty (control variable)	techn ped med	binary variables, techn = 1 for students of technical specialties ped = 1 for students of pedagogical specialties med = 1 for students of medical specialties
region (control variable)	Moscow	binary variable, = 1 for students of Moscow universities
working experience	w1	wage a person gets working during university studies (in rubles)
abilities	ege_av	the average score of all state exams a student took graduating from school

¹ The descriptive statistics of variables under consideration is presented in Table 3 in Appendix (except dummies)

It is necessary to mention that because of the fact that effort, university quality, working experience and abilities are latent or vague to interpret we use proxy variables mentioned in the table instead of them. As for effort, it might be argued that it is necessary to use the overall studying time which includes time spent on lectures and seminars and time to self-education and preparation of tasks. However, the former depends not only on student's willingness to study but also on time of commuting to studies and other factors. At the same time, one might suppose that the latter clearly demonstrates student's effort to understand a discipline. Evidently, we need to control for abilities here. Certainly, exam results depend not only on person's abilities but also on his/her characteristics, for instance concentration, stress resistance, self-confidence, etc., and teacher's effort. Nevertheless, the existence of positive correlation between exam results and abilities justifies using the chosen proxy. As for university quality, we suppose that demand on university educational service clearly reflects the quality of that service. We consider share of students from other regions arrived to study in a particular university as a parameter revealing demand on university educational services. However, this parameter demonstrates not only quality of university but also quality of region in comparison with native one for an individual. However, positive correlation between university quality and share of students from other regions is an argument in favor of using the aforementioned proxy for university quality. Working experience can be treated 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, etc. We take into consideration the first meaning. In addition to this, we take into account amount of wage a student receives working during studying because probably this value will be, firstly, the base for formation of wage expectations, secondly, it probably will be his/her reserve wage entering labor market after graduation.

For the purpose of our research we use the data of students' questionnaire conducted in the framework of the 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 in 2012. It is necessary to point out that the sample includes only bachelor students whose study is financed by the government. This is the limitation of the research. The final sample includes 553 observations.

The dependent variable is logarithm of expected wage after graduation (\ln_w2).

4 Results

Having conducted the regression analysis with the use of two-step least squares method, we chose the following regression specification (1) basing on econometric criteria and theoretical assumptions. The results are presented in Table 2

(Column “IV”).

$$\begin{aligned} \ln_w2_i = & \beta_0 + \beta_1 t_self_i + \beta_2 t_self_i^2 + \beta_3 share_oregion_i + \\ & + \beta_4 female_i + \beta_5 year_of_study_i + \beta_6 yd_i + \beta_7 techn_i + \\ & + \beta_8 ped_i + \beta_9 med_i + \beta_{10} Moscow_i + \beta_{11} w1_i + \beta_{12} ege_av_i + \varepsilon_i \quad (1) \end{aligned}$$

Table 2. The results of regression analysis of logarithm of expected wage with the use of different methods

ln_w2	IV	Quantile regression, 20%	Quantile regression, 80%	Stochastic frontier approach
t_self	0.00004	-0.029***	0.003	-0.017***
(t_self) ²	0.0001	0.0007***	-0.00006	0.0004***
share_oregion	0.003*	0.002	0.002	0.02**
female	-0.118**	-0.159***	-0.168***	-0.147***
year_of_study	-0.068***	-0.109***	-0.118***	-0.094***
yd	0.056***	0.055***	0.022**	0.047***
techn	0.084	0.128*	0.133**	0.109**
ped	-0.163	-0.212	-0.304***	-0.305***
med	-0.112	-0.136	0.005	-0.048
Moscow	0.432***	0.474***	0.457***	0.479***
w1 · 10 ⁻⁵	0.826***	0.717**	1.400***	0.637***
ege_av	0.008***	0.008***	0.002	0.005***
Const	8.961***	8.976***	10.111***	9.279***
R-squared	0.380	0.220	0.215	-
sigma_v ²	-	-	-	0.426
sigma_u ³⁴	-	-	-	0.228

Firstly, it is necessary to point out the presence of endogeneity in the model with endogenous variables of time dedicated to self-education and the square of that variable. The reason is that not only effort expressed by the endogenous variables has a presupposed influence on wage but wage expectations do affect effort stimulating or de-stimulating a student. An instrumental variable is amount of time allocated to writing course papers, a bachelor project, etc. The instrument is correlated with amount of time for self-education as far as they characterize a student as more or less diligent. However, the amount of time for writing course papers, etc. is hardly connected with expected wage.

The results correctly reflect labor market trends in Russia. In particular, according to the estimates, wage expectations of Moscow universities students

² sigma_v denotes the estimate of standard deviation of the stochastic component ν_i

³ sigma_u denotes the estimate of standard deviation of the stochastic component u_i

⁴ LR test of sigma_u = 0: Prob ≥ chibar2 = 0.008

are approximately 40% higher than that of students of other universities. In addition to this, despite the influence of specialty on value of expected wage is insignificant, the signs of coefficients are correct. In particular, technical specialty increases while pedagogical and medical specialties decrease the level of expected wage in average in comparison with graduates of other specialties.

Furthermore, tendencies mentioned in other research works are supported by our results. The coefficient reflecting the influence of years of study on wage has a negative sign. The fact means that students of earlier years of studies expect to receive higher wage after graduation than elder students. Gender has negative wage contribution for female students as have been already noticed by researchers. The influence of family's disposal income on the amount of expected wage is also in correspondence with findings of other researchers.

The influence of share of students from other regions and average exam score on the value of expected wage match with the theoretical rationale. In particular, according to the estimates, higher university quality and higher abilities result in increase in the amount of expected wage. Although the coefficient of the variable of time dedicated to self-education turned to be insignificant, we leave it in the regression as far as it is in the focus of study. Moreover, we assume the effect of the proxy variable for effort on wage to be nonlinear.

For the purpose of the research the regressions for 20% and 80% quantiles of the dependent variable are considered (Fig. 1). The aim is to check whether the influence of effort on expected wage differs for the abovementioned groups of individuals with high and low values of expected wage. The results are in Table 2 (Columns "Quantile regression, 20%", "Quantile regression, 80%").

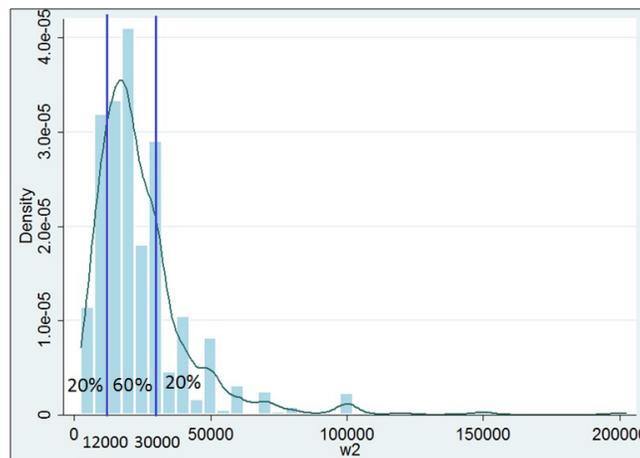


Fig. 1. Histogram for values of wage expected after graduation by university students (with the use of kernel of standard normal distribution)

In general, the estimates of the coefficients are rather similar in the regressions. However, there are some differences in the influence of time to self-education, average exam score, wage for working students and medical specialty on the dependent variables in regressions for 20% and 80% quantiles. The coefficient of the variable w_1 in the regression for the group of students expecting the highest wages after graduation is greater than in the regression for students from another group. In addition to this, students constituting 80% quantile of the dependent variable do not assume any significant influence of effort to study, university quality and their abilities on their wage. If it turns to individuals with the lowest wage expectations, this group of students is characterized by significant influence of effort and innate abilities on the amount of wage.

To sum up, students do differ in the way they form their expectations and the weights they associate with factors of the amount of expected wage. Speaking about students expecting high wages after graduation, they evidently base their forecasts on the wage they get working in university. Students from the cohort with the lowest expectations also pay attention to the amount of wage they receive working during university studies in formation of their wage predictions. Nevertheless, they expect positive returns on effort and abilities with respect to wage after graduation. In order to find explanations for the existing difference in formation of wage forecasts we will analyze the two groups of students in more details. It is necessary to pay attention to the fact that the majority of individuals belonging to the group with the least wage predictions are not students of Moscow universities. In addition to this, there are much more students of technical specialties (18%) among the students with the highest 20% of wages than in the group of students with the lowest 20% of wages (10% of students are getting technical specialty). At the same time, the former group includes significantly less amount of students of pedagogical specialty (0.84%) than the latter group (4.4%). Moreover, it is interesting to notice that the average amount of time dedicated to self-education by this group of students (11.19 hours in a week) is higher than the average amount of time to self-education of students with the highest wage expectations who in fact attribute no significance to the influence of effort on wage (10.12 hours a week). Finally, the average wage of working students in the group of individuals with the highest 20% of expected wages is approximately equal to 21,000 rubles that is almost two times greater than the average wage of the last 80% of students which is around 12,000 rubles. Thus, we can conclude that students forming the group with the lowest wage expectations are persons who are studying not in Moscow, who are getting pedagogical specialties; they mainly do not receive high wage working during studies and pay quite a lot of attention to study. The group of students expecting to get the highest wages after graduation includes students of technical specialties and students who already have a well-paid job and do not apply too much effort to study. The effect mentioned in the last sentence has been already noticed by the statisticians of the Ministry of Education of Russia and is also described in the publication of the media source "Komsomolskaya Pravda" [13]. They call the reader's attention to the fact that students of universities demonstrating low

quality of education and having low ranks according to the official university rankings get the highest wages after graduation. The author of the publication comments that this kind of universities are highly attractive to individuals who already have a substantial working experience but they need a university diploma for further career promotion. They usually work full-time and do not have an opportunity and willingness to study hard.

One can think of fallacies of particular individuals which can be expressed in incorrect knowledge about “law” of wage formation on labor market, wrong assumptions about value of particular skills and knowledge of an individual to an employer, errors in estimates of time allocated to self-education etc. These are named as “individual inefficiency” [2, 3, 12] and can be taken into account with the use of stochastic frontier regression. The idea of the approach is in considering noise as consisting of two components: one is a traditional stochastic component that is assumed to be normally distributed ν_i , another reflects individual inefficiency u_i and usually is assumed to be distributed either according to truncated normal or exponential distribution functions. The classical formulation of regression specification is expressed by equation

$$y_i = \alpha + X_i' \beta + \nu_i - u_i, \quad (2)$$

where $i = 1, \dots, n$, $\nu_i \sim \text{iid } N(0, \sigma_\nu^2)$ ⁵, $u_i \sim \text{iid } N_+(0, \sigma_u^2)$ ⁶ or $u_i \sim \text{iid exponential}$. The fact is that the idea of stochastic frontier was firstly presented for application to estimation of a production function. It was assumed that firms demonstrate inefficiency for some reasons and are not able to reach the maximum of their production opportunities. Thus, an inefficiency component has a negative sign because of the assumption that it always results in decrease of firm’s production. However, things differ in our case. Student’s inefficiency can lead either to increase of the value of expected wage or decrease in comparison with the level of “justified expected wage”. Consequently, we need to introduce changes in the regression specification according to equation

$$y_i = \alpha + X_i' \beta + \nu_i + u_i \quad (3)$$

where $i = 1, \dots, n$, $\nu_i \sim \text{iid } N(0, \sigma_\nu^2)$, $u_i \sim \text{iid } N_+(0, \sigma_u^2)$ or $u_i \sim \text{iid exponential}$. The estimation results are presented in Table 2 (Column “Stochastic frontier approach”). We considered an inefficiency term to be distributed exponentially.

According to the results, all variables do significantly influence the dependent variable except the dummy variable for medical specialty. However, taking into consideration specific features of the Russian labor market we will leave this variable in the regression. It is easy to notice that an average student pays attention to his/her current wage, corrects his/her expectations subject to time dedicated to self-education and university quality. Abilities also matter in formation of wage predictions. Influence of other variables on value of expected

⁵ $N(0, \sigma_\nu^2)$ denotes normal distribution with mean value equal to 0 and dispersion equal to σ_ν^2

⁶ $N_+(0, \sigma_u^2)$ stays for zero-truncated normal distribution with mean value equal to 0 and dispersion equal to σ_u^2

wage after graduation is in agreement with the stylized facts, perception of their interrelation and findings of other researchers.

It is necessary to mention that the stochastic frontier approach has been developed for production function modelling based on the idea of uniformity of technological process. Using this approach in the research we propose that students form their expectation in the same manner, or in other words, having the same “rule” in their head. This is evidently the limitation of our research.

5 Discussion

It seems interesting to think of factors that may change student’s expectations, or in other words, kinds of shocks that can affect value of expected wage after graduation. Turning to the list of independent variables that are considered in the regression analysis we can divide them into several groups.

Firstly, it is possible to single out fixed factors, which do not change, and conditionally fixed factors, which value can be assumed permanent under somewhat conditions. The former group includes gender and abilities. Specialty, region and university quality can be attributed to the latter group. The structure of data and the scope of the research allow to think that students do not change their specialty or university if they have chosen it once. We also do not consider the case of students’ expulsion. Moreover, university quality is suggested to be constant in short run and change in long run gradually as a result of substantial changes in university policy if they take place.

Secondly, it is possible to account for variable factors of expected wage formation.

It goes without saying that along with growth of a person and increase in the number of studying years, insights about labor market advance and become more realistic.

Wage offered to working students on labor market is often regarded as a benchmark for formation of wage forecasts. That is why revision of value of students’ labor implemented by employers will lead to reassessment of wage after graduation.

Family’s disposal income amounts to parent’s wages considering transfers and taxes. Consequently, changes in this parameter may be attributed either to labor market or fiscal shocks that can be the result of changes in the economy in a whole or in the state of a particular region. These alterations will supply variations in expectations concerning wage after graduation.

An individual can apply more or less effort to study that is measured by the amount of time dedicated to self-education in our research. This parameter can undergo substantial and sudden shifts during the period of study driven by rearrangement of person’s preferences. Keeping assumed contribution of effort to wage constant, changes in amount of time devoted to self-education can initiate shifts in anticipated amount of wage that will be offered to a student after graduation. At the same time it is necessary to keep in mind that wage beliefs themselves play a significant role in decision about amount of effort. This means

that if wage expectations are revised by a student due to changes on labor market or in economy in general then a person is to correct the expected contribution of effort and knowledge to wage after graduation and finally to redefine the time allocation between self-education, lectures and seminars attendance, work and leisure.

All in all, the amount of expected wage after graduation is susceptible to the influence of several kinds of shocks. They are the following:

- labor market shocks expressed in changes of wage offered to students and overall level of wage as well as changes in value of graduates' knowledge to employers foster adjustments in the level of expected wage after graduation;
- fiscal shocks, in particular, changes in transfers and tax rates may also lead to revision of expectations of all economic agents in general and reevaluation of expected wage by students too;
- individual shocks associated with alterations in personal life of an individual, in his/her point of view, preferences may result in changes in the amount of effort to study or redefining of the role of factors in the law of the expected wage formation and reassessment of level of expected wage after graduation as a consequence.

Additionally, it seems reasonable to point out that any changes in the principles of building wage forecasts, in perception of labor market, will cause not only changes in expected wage itself but also in the amount of effort taken because of their interdependence.

6 Conclusion

Formation of wage expectations of Russian university students is scrutinized in the paper. Apart from the traditional for this kind of research factors of expected wage, the authors analyze the influence of effort, university quality, abilities and working experience on value of the dependent variable. Two different ways of expectation formation can be detected for 20% of individuals with the highest and 20% with the lowest wage expectations. The latter are not studying in Moscow in majority. Effort is recognized as decisive by individuals from the second group. They also take into consideration the wage they get working during university studies; abilities do also influence the value of expected wage of this group of students. The primary role in formation of the highest wage expectations is played by the wage offered to working students. Effort and abilities do not influence the expected wage of this group of students. Thus, the evidence is provided for the fact that the highest wage expectations in Russia have students who are having a well-paid job, apply mostly to low quality universities and devote as less effort to study as possible to get a diploma.

If we consider all the students together estimating the regression for the conditional expectation of the dependent variable then it appears that time allocated to self-education characterizing student's effort has a distinct influence

on the amount of expected wage in the case we account for inefficiency of students connected with their limited awareness about labor market.

Returning to the research question, we may conclude that an average student expects his/her effort positively affects the amount of wage he will be offered after graduation. So do the students outside the Moscow region having the lowest wage expectations. Thus, it makes sense for university to take actions towards rising students' effort and stimulate them to allocate more time to study. In general, it will result in improvement of quality of university graduates and will have positive impact on university reputation.

Additional analysis suggests the existence of several kinds of shocks that may affect the amount of expected wage after graduation, in particular, labor market, fiscal and individual shocks.

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Appendix

Table 3. Descriptive statistics of variables used in the regression analysis

Variable	w2	ln_w2	t_self	share_oregion	yd	w1	ege_av
Mean value	24857.01	9.882	10.06	19.25	5.557	12715.3	68.00
Minimum	2500	8.294	1	0	2	200	32
Maximum	200000	11.918	56	68	10	200000	100