Optimization of Students' Graduation by the University Taking into Account the Needs of the Labor Market

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Abstract: The development of the socio-economic system and the labor market is directly related to the training of young specialists in higher education institutions in accordance with the needs of developing regions. To optimize the functioning of the labor market, it is necessary to compensate for the shortage of highly qualified personnel depending on the areas of training and determine the structural proportions of the optimal number of graduates, based on the share of employed and unemployed in various sectors of the economy. The University meets the needs of regional labor markets with a significant proportion of young highly qualified specialists. To optimize the educational process, it is necessary to analyze and model the impact of educational paths of graduates on the labor market by determining the equilibrium unemployment in the labor market. The proposed approach combines a model for maximizing the expected salary of students with a modification of the search and matching model. At the first level of model construction, we apply an econometric model that allows us to adapt educational paths to the interests of students. At the second level, we describe the behavior of students, choosing an educational path. At the third level, the structure of graduates adapts to the requirements of the labor market. The research perspective is the introduction of feedback mechanisms from graduates of regional Universities using surveys for a comprehensive assessment of the quality of graduate programs of the University with administrative data on the educational paths of graduates.

Keywords: optimal control, dynamic games, labor market, educational paths, professional trajectories, higher education, human capital.

1. INTRODUCTION

The development of the regional labor market economy is due to the training of young specialists in universities in accordance with the needs of the region in renewal and development. This requires compensation of the deficit of highly qualified personnel depending on the areas of training, the definition of the structural proportions of the optimal number of graduates, based on the proportion of employed and unemployed in various fields of economy.

To solve these problems, it is necessary to study the contribution of the University to the success of graduates in the labor market by assessing the degree of influence of the quality of educational programs of higher education on the effectiveness of their employment.

In our approach, we highlight the main key aspects. Among them is the current state and basic criteria for the development of institutional research practices in foreign and Russian universities. We also consider the main directions of research among graduates of foreign and Russian universities and the existing experience, engineering and technology research among the graduates of the University as a core institution in the formation of educational and scientific environment for the development of the region (Keane M.P. & Wolpin K.I., 1997).

The University provides a significant proportion of young highly qualified specialists for the requirements of the regional labor market. In this study, we used data from the Ural Federal University, which allows us to assess the impact of a large educational center on the development of the socio-economic system of the region. The analysis of data on monitoring educational and career paths revealed the following features of employment of University graduates.

According to the average data, master's degree graduates are 14% more likely to find a job within a year after graduation. Their salaries are on average 35% higher than those of bachelors. At the same time, the increase in remuneration levels has a positive dynamics with an increasing gap between bachelors and masters, which characterizes the increase in demand for highly qualified specialists (Kuznetsov A. & Kuznetsova O., 2011; Bachan R., 2014; Beffi M., fougere D. & Morel A., 2012; Karnoy M., Frumin I., Loyalka P. K. & Tilak J. B. G., 2014).

In this regard, it is necessary to apply a specific approach to assessing the educational, professional and career paths of graduates, which can show differences between the career successes of graduates of different educational programs. The data on employment of graduates by profession, on the place of work, educational level and qualification of University's graduates allows conducting the rapid assessment.

Our modeling approach takes into account not only employment indicators, labor productivity and education, but also data on individual characteristics of graduates, their academic performance, collected from the results of human potential graduation (Booij A. S., Leuven E. & Oosterbeek H., 2012; Dearden L., Fitzsimons E., Goodman A. & Kaplan G., 2008; Meghir C. & Rivkin S., 2011).

2. OPTIMIZATION TASK FOR EDUCATIONAL PATHS

The proposed approach combines a model for maximizing the expected salary of students with a modification of the search and matching model. At the first level of model construction, we apply an econometric model that allows us to adapt educational paths to the interests of students. At the second level, we describe the behavior of students, in a sample of more than 10000 students, choosing an educational path. At the third level, the structure of graduates adapts to the requirements of the labor market using a modified model of search and selection of personnel.

One of the research prospects is the development of interaction with University graduates through feedback mechanisms. We use online surveys to assess the effectiveness of educational programs of the University with additional use of panel data on educational paths of graduates (Koksharov, V. A., Agarkov, G. A., 2015; Lutz W., Crespo Cuaresma, J., Sanderson, W., 2008; Krasovskii A. A., Tarasyev a.m., 2008; Jerrim J. (2015)).

At the stage of constructing an econometric model for evaluating the effectiveness and optimization of higher education, we analyzed a set of data describing the educational paths of students whose economic behavior is described by the utility maximization function. To implement this approach, it is necessary to systematize students ' data by their main personal characteristics. Therefore, the work uses the student's assessment of the unified state exam (use), submitted to the admission committee of the University.

To summarize the problem, consider the main packages of the exam passed corresponding to the requirements for admission to the desired specialty with an affinity for individual institutions. If the exam on the subject is not passed, then $e_{gi}=0$; $g=1,\ldots,h$; $i=1,\ldots,n$. Here e_{gi} is the parameter, representing scores for a single exam in a set of exams taken by applicants; $i=1,\ldots,n$ is the ordinal designation of the exam on the subject passed by the applicant; $g=1,\ldots,h$ is the number of applicants wishing to enter the University. If the exam on the discipline is passed, then $e_{gi}=N_{gi}$; $g=1,\ldots,h$; $i=1,\ldots,n$. Here N_{gi} is the numerical value of the points received by the applicant g for the exam in the subject i.

As a result, we get a matrix $E_{h\times n}=(e_{gi})_{h\times n}$ reflecting the list of applicants with passed entrance exams, where the rows represent the applicants, and in the columns information about the exams with the indication of the points received.

Table 1. Exam scores

	Exam 1	…	Exam n
Name 1	48	…	51
…	…	…	…
Name h	40	…	48

We will conduct a twist of the obtained data to determine the possible packages of exams for applicants. We establish a matrix $Z_{n\times m}=(z_{is})_{n\times m}$, $i=1,\ldots,n$, $s=1,\ldots,m$, reflecting information about packages of examinations on columns and about the general list of examinations on lines. Here $s=1,\ldots,m$ denotes the ordinal designation of the examination package required for training in the chosen specialty; m presents the number of exams.

Table 2. Packages of Exams

	Package 1	…	Package m
Exam 1	1	…	0
…	…	…	…
Exam n	0	…	1

For data on exam packages, we will create a new matrix $F_{h\times m}=(f_{gs})_{h\times m}$, in which the columns will contain data on scores for exam packages, and the rows - data on applicants:

$$F_{h\times m} = (f_{gs})_{h\times m} = \begin{cases} 0, & if\ e_{gi}=0, z_{is}=0 \\ E_{h\times n} \times Z_{n\times m}, & if\ e_{gi}>0, z_{is}>0 \end{cases} \quad (1)$$

As a result, the matrix $F_{h\times m}$ takes the following form:

Table 3. Exam packages for applicants

	Package 1	…	Package m
Name 1	125	…	0
…	…	…	…
Name h	0	…	118

We describe the mechanism of the device by entrants on specialties available to it taking into account possibility of budgetary support. It is necessary to check the compliance of the sets of exams passed by the entrant with the set of exams required for enrolling him in the chosen specialty. To do this, let's make a matrix $Q_{m\times l}=(q_{sk})_{m\times l}$, $i=1,\ldots,m$, $k=1,\ldots,l$ reflecting the necessary sets of exams s for admission to each specialty k. Here $k=1,\ldots,l$ reflects the specialty available to an applicant who has passed a certain set of exams; l - number of specialties in the University. To correlate the exams passed by applicants with the packages of exams taken at the University, consider the combinations in the rows of the matrix $Q_{m\times l}$.

Table 4. Possible educational paths for applicants

Fields of study	1. Economics and Management	2. Public Administration and Entrepreneurship		16. Radio electronics and Information Technologies
Mathematics, Physics, Russian Language				*
Mathematics, Informatics, Russian Language	*			*
…	…	…	…	…
Mathematics, Foreign Language, Russian Language		*		

To obtain the information on the amount of students, who can graduate to chosen specialities, taking into account the types of passed exams, we multiply the matrices $F_{h \times m}$ and $Q_{m \times l}$:

$$C_{h \times l} = F_{h \times m} \times Q_{m \times l}, g = 1,...,h; \ s = 1,...,m; \ k = 1,...,l . \quad (2)$$

It is necessary to describe the availability of budget support for the students. Here ob_k reflects the passing score for public education in the chosen specialty; ov_k is the passing score for paid education in the chosen specialty; c_k stands for a fixed amount of tuition fees for specialty k; cv_k stands for the calculation of tuition fees for specialty k, taking into account the presence or absence of budget support. According to the logical structure $ob_k > ov_k$.

At the second level of the model, by describing the behavior of agents when choosing an educational path, we analyze the tuition costs for the students. We take into account the following limitations and determine the potential of higher education budget resources:

$$c_{gk} > \alpha \cdot ob_k \Rightarrow cv_k = 0$$
$$\beta \cdot ov_k < c_{gk} < \alpha \cdot ob_k \Rightarrow cv_k = c_k \quad . \quad (3)$$

When $cv_k = 0$ we face the full budget support for the applicant, when $cv_k = c_k$ the paid tuition is available. If $c_{gk} < \beta \cdot ov_k$, what do we consider the applicant as not enrolled in the University.

The parameter c_k denotes the tuition costs Tc for the specialty k, taking into account the total cost of the entire period of study T period of study for bachelor's and master's degrees:

$$c_k = \sum_{t=0}^{T} Tc(t) . \quad (4)$$

The parameter w_k describes the level of student's expected incomes during the first year of employment $t=1,...,N$ in the chosen specialty after graduation. The described approach allows us to describe the economic behavior of students and graduates, taking into account the amount of payment for education at the University and the expected level of wages for the first year of employment:

$$w_k = \sum_{t=0}^{N} S_k(t) . \quad (5)$$

In order to evaluate the effectiveness of the selected educational trajectories in relation to economic feasibility, the data is processed using software implemented based on an algorithm for searching educational trajectories. At the same time, the search for an educational trajectory is performed, which reflects the optimal proportion between the education fee and the expected income after graduation. Under these conditions it is necessary to maximize the gap y_k between the expected salary level of the student after graduation w_k and the cost of the tuition cv_k for each year t:

$$y_k(t) = w_k(t) - cv_k(t) \xrightarrow{k} \max , \quad (6)$$

where $w_k(t)$ is the expected income of the student after the graduation for specialty k; the parameter $cv_k(t)$ denotes the student's educational expenses calculated for the time $t=0,...,T$, during the period T of education for specialty k.

The developed algorithm for finding the optimal educational path was tested on panel data. During calibration and testing, data on students ' use scores, information about entrance points for contract and budget-supported training, data on tuition fees and expected income for the chosen specialty after graduation were taken into account. Subsequently, the optimal paths were correlated with the actual choice of applicants. Table 5 reports the obtained results.

As seen from the table 5, the choices applicants made are in conformity with the general economic incentives. According to the analysis, 66% of applicants chose the optimal educational pathways, taking into account the ratio of training costs and the return on education, expressed in terms of the level of remuneration. The most popular in the labor market are graduates of the University, whose educational trajectories have allowed them to find employment in areas of the economy with dynamic development prospects. Among them are specialists in civil engineering, electronics, IT technologies, mathematics and computer science. The availability of budget places has a significant impact on the assessment of the prospects for further education of students and on the choice of educational trajectories, which allows us to judge the demand for educational programs.

It should be noted that the indicator of employment of young professionals within a year after graduation is a formal assessment of the quality of higher education provided by higher education institutions. As a result, it does not reflect the problems related to the content of higher education, the conflicting views of employers and employees, the teaching staff of universities on the competitiveness of graduates in the labor market. There is a lack of professional self-determination of students, which leads to the fact that only a quarter of graduates are employed in their main specialty and about half of graduates are employed in the labor market, indirectly related to their main specialty, this is due to the high level of competition in the most popular professions.

Table 5. Share of applicants with optimal choice

Fields of study	Percent of students with optimal choice, %	Factors determining alternative optimal educational paths, %		
		Relatively low tuition fee	Possibility of government paid places	Higher expected income after the graduation
1. Economics and Management	71.46	85.66	0.74	13.60
2. Public Administration and Entrepreneurship	73.40		5.41	94.59
3. Humanities and Arts	53.03		100.00	
4. Natural Sciences	53.89		39.06	60.94
5. Mathematics and Computer Sciences	76.92		100.00	
6. Material Sciences and Metallurgy	36.76	5.41		94.59
7. Mechanics and Machine Building	52.76		9.35	90.65
8. Radio electronics and Information Technologies	78.42	23.81	4.76	71.43
9. Social and Political Sciences	58.63	20.39	25.24	54.37
10. Civil Engineering	91.97	87.10	12.90	
11. Power Engineering	75.53	24.27	7.77	67.96
12. Physics and Technology	71.95			100.00
13. Physical Education and Sport	72.00			100.00
14. Fundamental Education	73.33		21.88	78.13
15. Chemical Technology	83.96			100.00
16. Military Technical Education and Security	71.59			100.00

When the value $y_k(t)$ is calculated and maximized, we save the information on the student into the dataset x_{rk}. As a result of application of the developed model the matrix is received:

$$H_k = (x_{rk})_{X \times K}, \ r = 1,...,X, \ k = 1,...,K, \quad (7)$$

which describes the number of students $r=1,...,X$, educated in their chosen specialty $k=1,...,K$.

At the final stage, we estimate the value of specialists for each speciality k, who graduate the university:

$$Y_k = \sum_{r=1}^{X} (x_{rk})_{X \times K}, \ r = 1,...,X, \ k = 1,...,K. \quad (8)$$

3. MODELING THE VOLUME AND STRUCTURE OF UNIVERSITY OUTPUT

At the third level, the structure of graduates adapts to the requirements of the labor market. For this purpose, we consider a modified model of search and matching, which allows us to assess the additional contribution of the University to the labor market with qualified personnel distributed by specialty. To optimize the educational process, it is necessary to analyze and model the impact of educational trajectories of graduates on the labor market by determining the equilibrium unemployment in the market. In the classical formulation of the search and matching model, it is assumed that the number of working population $L(t)$ is a fixed value (Diamond 1982, Pissarides 2000). An alternative formulation of this task involves setting the current symmetrical dynamics of the processes of entry and exit of workers to the labor market, related to the life cycles of the population. To optimize the model design, let's consider the main control parameters broken down by specialty. At any time, a person may be employed by $E_k(t)$ or unemployed $U_k(t)$. For the same time period a job in a firm may be occupied by $F_k(t)$ or vacant $V_k(t)$. At this stage, we add University graduates $R_k(t)$. Thus the number of unemployed people in the labor market at time t is described by the following expression:

$$R(t) = \sum_k R_k(t) = U(t) + Y(t) = \sum_k U_k(t) + \sum_k Y_k(t). \quad (9)$$

In a state of equilibrium in the labor market, it is assumed that workers will be replaced in the process of bargaining for wages. Due to the fact that the number of employed jobs $F(t)$ corresponds to the number of employed population $E(t)$, the ratio between workers and firms can be written as follows:

$$K(t) - V(t) = F(t) = E(t) = L(t) - R(t), \quad (10)$$

where $L(t) = \sum_k L_k(t)$ - number of working population (labor force) per unit of time t;

$E(t) = \sum_k E_k(t)$ - number of employed population (employed) per unit of time t;

$U(t) = \sum_k U_k(t)$ - number of unemployed population per unit of time t;

$Y(t) = \sum_k Y_k(t)$ - number of students released by the University per unit of time t;

$K(t) = \sum_k K_k(t)$ - number of jobs per unit of time t;

$F(t) = \sum_k F_k(t)$ - number of occupied jobs per unit of time t;

$V(t) = \sum_k V_k(t)$ - number of vacant jobs per unit of time t.

When considering the labor market taking into account various specialties we get the following expression:

$$\sum_k K(t) - \sum_k V(t) = \sum_k F(t) = \sum_k E(t) = \sum_k L(t) - \sum_k R(t). \quad (11)$$

Using the search and matching function, we describe the relationship between the flow of filled jobs (filling vacancies), the number of vacancies $V_k(t)$, and the number of unemployed $R_k(t)$ in working age. To do this, we use the matching function defined as a Cobb-Douglas power function:

$$m(t) = f(R(t), V(t)) = \alpha \cdot R(t)^\delta \cdot V(t)^\mu, 0 \le \delta \le 1, 0 \le \mu \le 1, \quad (12)$$

where α is a parameter of the effectiveness of the search and matching technology;

δ – coefficient of elasticity for the unemployed;

μ – coefficient of elasticity for vacancies;

$m(t)$ – the flow of filled jobs per unit of time t.

When considering the model dynamics, taking into account the specifics of the specialties represented in the labor

market, we obtain the following expression for each specialty from expression (12):

$$m_k(t) = \alpha_k \cdot R_k(t)^{\delta_k} \cdot V_k(t)^{\mu_k}, 0 \le \delta_k \le 1, \ 0 \le \mu_k \le 1. \ (13)$$

The rate of elimination of vacant jobs, which determines the rate at which the unemployed find work per unit of time, is characterized by the ratio of the flow of filled vacancies to the number of vacant jobs for a particular specialty as follows:

$$q_k(t) = \frac{m_k(t)}{V_k(t)} = \frac{\alpha_k \cdot R_k(t)^{\delta_k} \cdot V_k(t)^{\mu_k}}{V_k(t)} = \alpha_k \cdot R_k(t)^{\delta_k} \cdot V_k(t)^{(\mu_k - 1)}. \ (14)$$

The rate of reduction in the number of unemployed in the system due to employment depends on the flow of filled vacancies and the number of unemployed. This parameter is expressed for a particular specialty:

$$a_k(t) = \frac{m_k(t)}{R_k(t)} = \frac{\alpha_k \cdot R_k(t)^{\delta_k} \cdot V_k(t)^{\mu_k}}{R_k(t)} = \alpha_k \cdot R_k(t)^{(\delta_k - 1)} \cdot V_k(t)^{\mu_k}. \ (15)$$

A perfect capital market is assumed, so the interest rate r is taken constant and determined exogenously. In this case, the workplace is eliminated at an exogenously set rate of b_k per unit of time. An employee who is employed produces exogenously specified products in the volume y per unit of time and receives a salary w_k, which is determined endogenously. The flow of workers who are released from employment at the current workplace is designated as $b_k E_k(t)$. Then the net increase/decrease in the number of employed workers is set depending on the flow of filled vacancies per unit of time t and the flow of eliminated jobs over the same period:

$$\dot{E} = f(R_k, V_k) - b_k E_k = \alpha_k \cdot R_k^{\delta_k} \cdot V_k^{\mu_k} - b_k E_k. \ (16)$$

The dynamics of the employed population in the model, reflecting the influence of net growth, is described as:

$$E_k(t+1) = E_k(t) + \alpha_k \cdot R_k(t)^{\delta_k} \cdot V_k(t)^{\mu_k} - b_k E_k(t). \ (17)$$

The model assumes that the working population L (t) is at the same level. Then the change in the dynamics of the number of unemployed population is determined as follows:

$$R_k(t+1) = L_k(t+1) - E_k(t+1) =$$
$$= L_k(t) - E_k(t) - \alpha_k \cdot R_k(t)^{\delta_k} \cdot V_k(t)^{\mu_k} + b_k E_k(t) =. \quad (18)$$
$$= R_k(t) - \alpha_k \cdot R_k(t)^{\delta_k} \cdot V_k(t)^{\mu_k} + b_k E_k(t)$$

In an alternative statement of the problem, we add parameters that characterize the processes of entry and exit of employees to the labor market, related to the life cycles of the population. To do this, we will add University graduates and people of pre-retirement age to the dynamics of the employed and unemployed population in the model. Then the dynamics of the employed population in the model is described as follows:

$$E_k(t+1) = E_k(t) + \alpha_k \cdot R_k(t)^{\delta_k} \cdot V_k(t)^{\mu_k} - b_k E_k(t) +$$
$$+ Y(t) \cdot \frac{E(t)}{(E(t) + R(t)) \cdot 12} - P(t) \cdot \frac{E(t)}{(E(t) + R(t)) \cdot 12}. \ (19)$$

The dynamics of the unemployed population in the model is described as follows:

$$R_k(t+1) = R_k(t) - \alpha_k \cdot R_k(t)^{\delta_k} \cdot V_k(t)^{\mu_k} + b_k E_k(t) +$$
$$+ Y(t) \cdot \frac{E(t)}{(E(t) + R(t)) \cdot 12} - P(t) \cdot \frac{E(t)}{(E(t) + R(t)) \cdot 12}. \ (20)$$

To describe the cost of staying in different States, we use the analogy of calculating the cost of an asset and apply a dynamic programming approach. The model assumes that an employee engaged in the labor market produces a volume of output y. Jobs can be created and eliminated freely and free of charge by firms. In this case, the amount set in the dynamics is spent on providing the occupied workplace, reflecting the employee's salary $w_k(t)$ and the cost of maintaining the workplace $c_k(t)$. From the company's point of view, the return on the filled workplace forms the product produced, less the cost of labor and job creation, and less the expected cost of eliminating the workplace. Then the value of the asset for the occupied workplace taking into account the probability of reducing the workplace is written as follows:

$$r \cdot W_{F_k}(t) = y_k(t) - w_k(t) - c_k(t) - b_k \cdot \left(W_{F_k}(t) - W_{V_k}(t)\right), \quad (21)$$
$$y_k(t) = y_k(t_0)$$

where $W_{Fk}(t)$ and $W_{Vk}(t)$ are the value of employed and vacant jobs for the firm, respectively. The firm's wealth also depends on the value of the asset the vacant job and the likelihood of employment:

$$r \cdot W_{V_k}(t) = -c_k(t) + q_k(t) \cdot \left(W_{F_k}(t) - W_{V_k}(t)\right). \quad (22)$$

Consider the expected income stream $W_{Ek}(t)$ of an employee employed in the labor market. This parameter is described depending on the salary $w_k(t)$ and the probability of job reduction as follows:

$$r \cdot W_{E_k}(t) = w_k(t) - b_k \cdot \left(W_{E_k}(t) - W_{U_k}(t)\right). \quad (23)$$

To describe the mechanism of bargaining in the labor market, you must also set the asset value for the state of the unemployed. In the case of simplification of the modeled system, the unemployed person does not receive income (informal employment is not taken into account) and the asset of his state depends on the probability of employment, which is formalized by the following function:

$$r \cdot W_{U_k}(t) = a_k(t) \cdot \left(W_{E_k}(t) - W_{U_k}(t)\right). \quad (24)$$

The amount of salary calculated using the bargaining problem is determined by the parameter $w_k(t)$, which maximizes the weighted net profit of the employee and the company from filling a vacant job as a result of the implementation of the search for the appropriate job. The formation of a job search mechanism occurs due to the fact that the state of employment for the employee and the presence of an employed worker meta for the firm are more preferable than the state of unemployment and the presence of a vacant worker meta, respectively. In the basic case, for a symmetric solution of the model in equilibrium, the parameter β_k is assumed the same for firms and employees. Due to the fact that we are considering a competitive labor

market, the bargaining power of an employee will be different, depending on the sphere of employment, where βk characterizes the employee, and (1-βk) – the firm. The first-order maximization condition is described as follows:

$$(1 - \beta_k)\left(W_{E_k}(t) - W_{U_k}(t)\right) = \beta_k\left(W_{F_k}(t) - W_{V_k}(t)\right). \quad (25)$$

By expressing the corresponding surplus values from the ratio of the employee's assets to the firm's, we get the equation for wages:

$$w_k(t) = \frac{y_k \cdot \beta_k \cdot (r + b_k + a_k(t))}{(1 - \beta_k)(r + b_k + q_k(t)) + \beta_k(r + b_k + a_k(t))} . \quad (26)$$

We use a synthetic indicator that reflects the tension in the labor market. When calculating the model cycle, we get the dynamics that reflect the level of competition for jobs:

$$\theta = \frac{V}{R}$$

$$q_k(\theta) = m_k\left(\frac{R}{V}, 1\right) \cdot \quad (26)$$

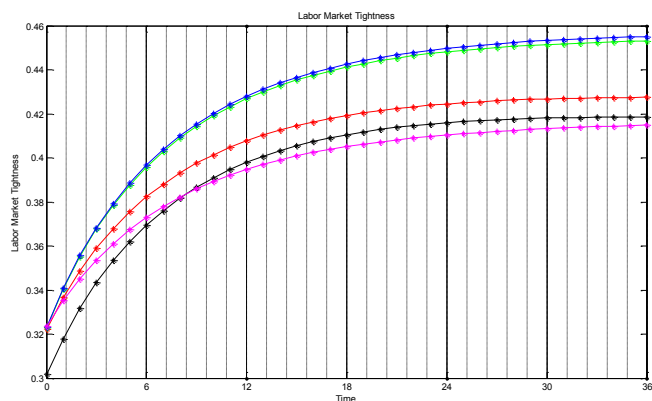$$\theta q_k(\theta) = m_k(1, \theta)$$

Fig. 1. Labor Market Tightness for the most popular specialties

Assuming that there is free entry to the market and new jobs can be created freely, firms will increase their number of q_{ks} as long as it is profitable. Therefore, in equilibrium, the vacancy value must be equal to zero, V_{Vk}=0, from which we get the employment of the E_k.

4. CONCLUSIONS

The presented model of economically optimal educational trajectories has been tested and allows us to draw several conclusions. The study of economic incentives and motivation for individuals' choice is of theoretical and practical significance. Economic incentives have a significant impact on the choice of educational trajectories. Currently, the academic achievements of a University graduate are also not a guarantee of successful employment in the specialty, obtaining higher salaries and positions. The leading factor in improving the quality of training for bachelors and masters is the formation of students' competencies during all years of study related to the ability to work independently in solving problem situations.

As a result of modeling, it is possible to divide the considered educational trajectories into conditional groups, in which the main criterion is the success of the graduate in the labor market, which also reflects the demand for specialists produced by the University in a specific specialty. Thus, the most successful are the specialties related to information technologies: a) computer science and computer engineering; b) management in technical systems; c) computer and information science; d) electronics, radio engineering and communication systems. This phenomenon is explained by the high demand for these specialists and the reduced dynamics of increasing labor market tension in these specialties.

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