EVALUATING THE PERFORMANCE OF EMPLOYMENT SERVICES: EXPERIENCE OF BUILDING A MODEL

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Abstract

The significant resources spent on active labor market policy (ALMP) make it relevant to evaluate its effectiveness. The paper builds a mathematical model that formalizes the activities of state employment centers in a typical Russian region in the implementation of ALMP.

The effectiveness of ALMP implementation is estimated using mathematical models that take into account the reasons for deregistration of unemployed. To do this, the reasons for deregistration are assigned weights that characterize their proximity to some "ideal" result; services are evaluated in terms of costs for their provision.

We also presented the work of the employment service to a sequence of services for unemployed. The management process can be modeled by a series of transitions between internal states of the subject, caused by unobserved characteristics of the unemployed (wishes, requirements, attitudes, ambitions, etc.), presence of budget constraints and the need for more information about unemployed to make the optimal decision.

The resulting model allowed comparing the effectiveness of the employment service for groups of unemployed with different socio-demographic characteristics.

Key words: active labor market policy, assessment of effectiveness, unemployment

JEL Code: J08, J64, J68

Introduction

ALMP is a widespread approach to reducing unemployment worldwide and often involves a standard set of measures. These measures usually include training for the unemployed, subsidized employment, assistance in finding work, including referrals to employers, and free access to the job database (Martin, 2015).

Currently, there are different approaches to evaluating the effectiveness of ALMP.

Thus, the microeconomic approach is concerned with assessing the consequences of individuals' participation in various ALMP programs, which include the probability of getting a job, the duration of unemployment, the amount of wages, etc. Thus, Vooren et al. (2019),

performing a meta-analysis of 57 studies showed that subsidized labor and government employment programs have a negative short-term impact, which gradually becomes positive in the long term. However, job search assistance and training programs do not have negative short-term effects. The effect of a number of active employment policies is also noted in the works of I. Tomic (2014), G.J. Alegre (2017), M. Kantova et al. (2018), N. Ahmad et al. (2019), K. Karasova et al. (2019).

At the same time, it is important to note that experts pay attention to the fact that ALMP programs should take into account not only the priorities of state policy, but also the peculiarities of individual regions. Otherwise, asymmetric effects on regional labor markets will be recorded. For example, S. Altavilla and F.E. Caroleo (2013) have shown the importance of adapting active policy to the peculiarities of regions within the country using the example of Italy. A similar conclusion is held by M. Orton and A. E. Green (2019) and notes the importance of increasing efforts at the local level in relation to the British labor market (active local labor markets approach).

In this paper, the authors propose an approach to evaluating the effectiveness of active employment policies in the Omsk region, one of the Russian regions with a workforce of 1.01 million people. Work with the unemployed, including the implementation of ALMP measures in Russia, is carried out by the state employment service. In 2019, 67.7 thousand people applied to its divisions in order to find a suitable job, and 30.2 thousand people were recognized as unemployed (Situation on the registered labor market of the Omsk region in January-December 2019, 2019).

The ALMP implemented in Russia has a certain decentralization, which is reflected in the existence of regional programs along with federal measures. In addition, federal programs have certain regional specifics (the list and scope of specific activities).

When speaking about the assessment of the Russian region's ALMP, it is important to note three circumstances.

1. In Russia there is traditionally a large gap between the total unemployment rate, which is recorded by statistical agencies in accordance with international standards, and the unemployment rate recorded according to employment centers. So, at the end of 2019 in the Omsk region, the total unemployment exceeded the registered one by more than 5 times. (6.4 % vs. 1.2%).

2. Perception of employment centers by labor market agents as generally ineffective bureaucratic structures. Applying to an employment center in Russia is not the most popular way to find a job.

3. The country had a low level of unemployment benefits. At the end of 2019 the amount of unemployment benefits in the Omsk region varied from 4.9% to 26.1% of the average salary in the region (the authors' calculations).

These circumstances allow us to assert that there is a self-selection of individuals who apply to the services of Russian state employment centers. It is likely that there are more people who are experiencing serious problems with employment among the recipients of these centers. For the analysis, we used microdata from the employment service, which contains information about the socio-demographic characteristics of individuals registered as unemployed (gender, age, education, place of residence), the date of registration and deregistration (if available), the list of services used by the unemployed, the reasons for deregistration (a total of 16.2 thousand completed cases).

To assess the effectiveness of ALMP, the authors used a mathematical model that takes into account the reasons for deregistration, the participation of the unemployed in ALMP events, and the cost of implementing these measures.

1 Methodology and results of research

1.1 Mathematical model

The effectiveness of ALMR implementation was estimated using a mathematical model that takes into account the reasons for deregistration of the unemployed (for completed periods of unemployment) and the services provided to them by the employment service. The main reasons for deregistration are self-employment, professional training, employment in the direction of the employment center, prolonged absence of a citizen without valid reasons, refusal of employment services, employment for public works, temporary employment, appointment of the pension, employment in a subsidized workplace.

The services provided by the employment center include temporary employment, informing about the state of the labor market, public works, organization of job fairs, professional training, career guidance, psychological support, assistance in self-employment, assistance in relocation to another area, assistance in relocation to work in rural areas, assistance in job search, support for the employment of disabled people, social adaptation and other services.

The employment service performance function has the following form:

$$F = \alpha G - \beta R, \qquad (1)$$

$$G = \frac{\sum_{i=1}^{N} w_i x_i}{\sum_{i=1}^{N} x_i}, \qquad (2)$$

$$R = \frac{\sum_{k=1}^{M} v_k \sum_{i=1}^{X} u_{ik}}{\sum_{k=1}^{M} \sum_{i=1}^{X} u_{ik}}, \qquad (3)$$

$$x_i \geq 0,\ \sum_{i=1}^{N} x_i = X,\ u_{ik} \geq 0,\ \sum_{k=1}^{M} u_{ik} \geq 1,\ u_k \overset{def}{=} \sum_{i=1}^{X} u_{ik},$$

where x_i – number of unemployed with the *i*-th reason for deregistration; N – number of reasons for deregistration; w_i – conditional performance or weight of the *i*-th reason for deregistration; X – total number of unemployed; u_{ik} – number of services of type *k*, provided to the *i*-th unemployed person; v_k – conditional labor intensity (weight) of provision the service of type *k*; M – number of types of services; $\alpha, \beta > 0$ – valid normalization coefficients.

The built function consists of two components.

The first component *G* evaluates the performance of the employment service. To do this, the reasons for de-registration are assigned weights w_i. The value *G* is normalized according to the number of people who applied with the completed period of unemployment (formula 2).

The second component *R* is an assessment of the complexity or effort spent on providing all types of services. To do this, the services are assigned weights v_k. The value *R* s normalized by the total number of provided services (formula 3). The employment service performance function *F* is calculated as the weighted difference between performance and labor intensity (formula 1). The normalization coefficients can be evaluated by experts, and in the simplest case of equality of values of components, both coefficients can be put equal to one. Some parameters are determined statistically from the data provided by the employment service. They are x_i, N, X, u_{ik}, M.

The remaining part of the parameters x_i and v_k cannot be built on the basis of statistical analysis and at the first stage it should be determined by experts. The experts involved are managers and leading specialists of the employment service and the regional Ministry of labor and social development who are engaged in the implementation of ALMP and have at least

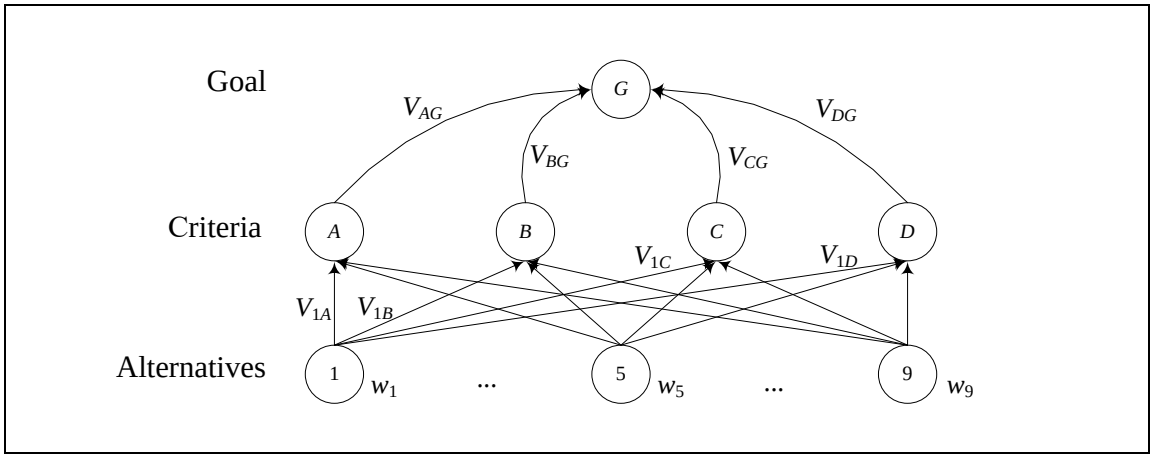
three years of experience in this field. In the future, it is planned to use information from unemployed citizens about the effectiveness of their employment. Expert cost estimates can also be replaced with reporting data.

1.2 Construction of a hierarchy

To determine the w_i and v_k weight coefficients, we used the analytic Hierarchy Process (AHP) hierarchy analysis method, which is well known from the decision support theory (Saaty, 1980; Zavadskas & Turskis, 2011; Omkarprasad & Sushil, 2006; Xu & Xu, 2020). AHP is used in cases of decision-making based on poorly structured data, in situations of uncertainty, when we get different results depending on the applied criteria.

Using AHP starts with structuring the task as a hierarchy. To calculate w_i, there is constructed a three-level hierarchy: goal, criteria, and alternatives (figure 1).

Fig. 1: Hierarchy for statistically significant reasons for deregistration



Source: authors

The level of alternatives is the statistically significant reasons for deregistration. The top of the hierarchy (goal) is the expected result of the method – ranking the reasons for deregistration by the degree of influence on the performance (*G*) of the employment service. After consulting with experts and specialists of the employment service, the criteria that affect the implementation of the goal were selected (table 1).

To assess the complexity of delivering services (*R*) there was constructed a two-level hierarchy. Level of alternatives is the types of services provided by the employment service. The top of the hierarchy (target) is ranking of services according to the complexity of their provision by the employment service. There is no criteria level in this hierarchy.

Tab. 1: Criteria for evaluating the performance of the employment service

Letter designations	*Criteria for G*
A	Earnings of an unemployed person after employment
B	Socio-professional status of the unemployed after employment (relative to the existing qualifications)
C	Absence of further cases of job loss
D	Satisfaction with the work of the employment service

Source: authors

1.3 Pair comparisons

The next step is to construct matrices of paired comparisons. The dimension of the matrix of paired comparisons of criteria with respect to their impact on performance (*G*) is determined by the number of criteria and is equal to 4. Each pair of criteria is compared on an inverse nine-point scale:

$$1/9,\ 1/8,\ \ldots,\ 1/2,\ 1,\ 2,\ 3,\ \ldots,\ 9,$$

where 1 - means equal influence, and 9 - means overwhelming advantage. The full scale of ratings and their semantic equivalents can be found in (Saaty, 1980).

Reasons for deregistration are compared with each other for each criterion. The results are presented as matrices of dimension 9×9, similar to the matrix of the criteria level. The matrix of paired comparisons for services relative to their labor intensity (*R*) has a dimension of 14×14.

The measure of expert judgments consistency in the matrix of paired comparisons is determined by the consistency index $\delta = \frac{|\lambda - n|}{n-1}$, where λ – maximum eigenvalue of the matrix, n – dimension of the matrix. Based on the consistency index there is calculated relative consistency (RC): $RC = \delta / \delta_n$, where δ_n – random consistency index that depends on the dimension of the matrix. For all matrices of paired comparisons, the RC value does not exceed 0.2, which is an acceptable consistency value (Saaty, 1980; Xu & Xu, 2020).

1.4 Calculation of weight coefficients and efficiency function

Each arc (*i, j*) of the hierarchy is assigned a weight V_{ij} (Fig. 1), determined by the i-th coordinate of the eigen vector corresponding to the maximum eigenvalue of the matrix of paired comparisons for the j-th criterion or for the goal (Saaty, 1980). For example, V_{1D} is the weight of the arc (1, *D*) connecting the first reason for deregistration with criterion *D* (figure 1). V_{1D} is

calculated as the first coordinate of the eigenvector corresponding to the maximum eigenvalue of the matrix of paired comparisons according to criterion D .

Finally the weights of the reasons for deregistering w_i are calculated using the following formula:

$$w_i = V_{iA} \cdot V_{AG} + V_{iB} \cdot V_{BG} + V_{iC} \cdot V_{CG} + V_{iD} \cdot V_{DG} .$$

The formula for calculating service weights is as follows:

$$v_k = V_{1R} + V_{2R} + ... + V_{14R} .$$

The results of processing data provided by the employment service for 2019 are presented in tables 2-4.

Tab. 2: Evaluating the performance of ALMP (2019)

i	1	2	3	4	5	6	7	8	9
w_i	0.091	0.173	0.173	0.029	0.030	0.049	0.053	0.165	0.083
x_i	4571	3520	3022	2545	936	573	370	284	126

Source: authors

Tab. 3: ALMP labor intensity assessment (2019)

k	1	2	3	4	5	6	7	8	9	10	11	12	13	14
v_k	0.026	0.064	0.024	0.037	0.060	0.097	0.049	0.056	0.149	0.100	0.100	0.028	0.132	0.079
u_k	501	20984	38079	1064	204	3632	16094	2759	793	29	0	109125	11	2638

Source: authors

Tab. 4: Evaluation of the ALMP performance function (2019)

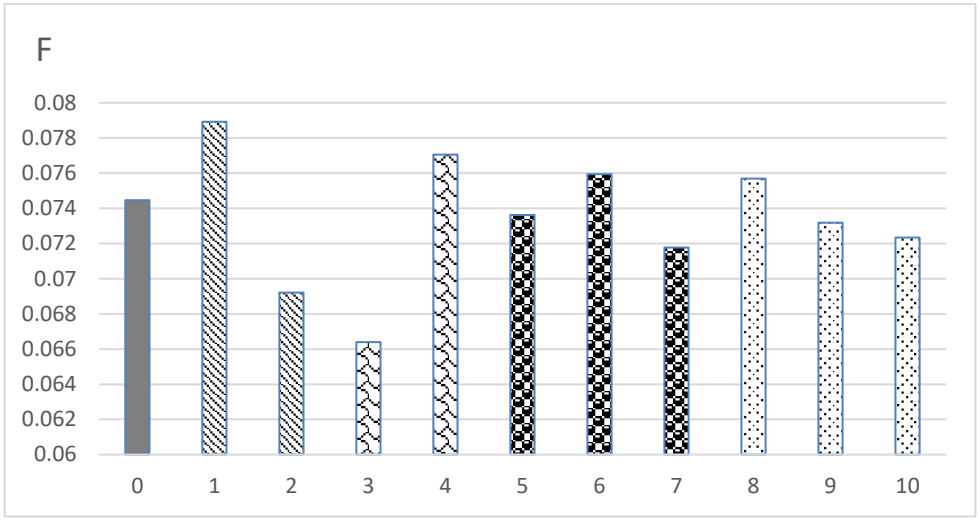
G	R	α	β	F
0.110031	0.035569	1	1	0.074462

Source: authors

The values of the resulting function F are not informative themselves, since they are relative values. But we get a tool that allows us to observe the dynamics of performance by social groups or time intervals, thereby tracking improvements or deterioration in the work of the employment service. For example, according to 2019 data, samples were made for four groups: gender, place of residence, age, and education. Each sample was divided into categories

and the employment service performance function *F* was calculated for each category. The calculation results are shown in figure 2.

Fig. 2: Values of the efficiency function F by category



Categories: 0-the entire sample; 1-men; 2-women; 3 - living in the city; 4 –living in the village; 5 – age up to 30 years inclusive; 6 – age from 30 to 50 years inclusive; 7 – age over 50 years; 8 – secondary education; 9 – secondary professional education; 10 - higher education.

Source: authors

Conclusion

The differences in performance across categories in the same sample estimated by function F are consistent with the observed intuitive performance estimates. Indeed, in a large city (category 3) with large self-employment opportunities, the structure of employment center clients may be skewed towards the least competitive individuals. In addition, it is more difficult for urban residents to find a workplace that corresponds to their ideas about the quality of employment. Rural residents (category 4), due to the more complex situation in the labor markets of small settlements, are less demanding for workplaces and are more likely to accept the job offered.

Similar conclusions can be drawn when analyzing the effectiveness of employment in the context of education. According to the criteria for suitable work, any work, including temporary work, may be suitable for employees who do not have a professional education. As a rule, such jobs are available in a large volume in the database of vacancies in employment centers and do not require significant efforts to employ this group of citizens. When the level of education increases, the number of vacancies in employment centers may not only decrease,

but also additional requirements may be imposed on candidates. The greater effectiveness of men's employment in comparison with women can be explained, among other things,by the presence of gender discrimination in the labor market.

In general, all this indicates the adequacy of the presented mathematical model and the possibility of using it to monitor the effectiveness of the state employment policy. In the future, it is planned to use refined cost estimates and estimates of the impact of active employment policy measures on employment received directly from clients of employment centers in the model, and to determine the effectiveness of individual measures for certain groups of unemployed.

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References

Ahmad, N., Svarer, M. & Naveed, A. (2019). The effect of active labour market programmes and benefit sanctions on reducing unemployment duration. *Journal of labor research,* 40(2), 202-229.

Alegre, G.J. (2017). The efficiency of active labour market policies in the European union: does it make sense increasing the bill? *Acta oeconomica,* 67(3), 333-357.

Altavilla, C. & Caroleo, F.E. (2013). Asymmetric effects of national-based active labour market policies. *Regional studies*, 47(9), 1482-1506.

Kantova, M., Prudka, S., Arltova, M. & Kotynkova, M. (2018). Efficiency of labour market policies changes in the Czech Republic and Sweden in 2006-2015. *Politicka ekonomie*, 66(4), 411-429.

Karasova, K., Balaz, V. & Polackova, Z. (2019). Efficiency of the active labour market policies: Evidence from the Slovak Republic. *Ekonomicky casopis*, 67(1), 11-32.

Martin, J.P. (2015). Activation and active labour market policies in OECD countries: stylised facts and evidence on their effectiveness. *IZA Journal of labor policy*, 4(4), 1-29.

Omkarprasad, S. V. & Sushil, K. Analytic hierarchy process: An overview of applications. *European journal of operational research*, Volume 169, Issue 1, 1-29.

Orton, M. & Green, A. E. (2019). Active labour market policy in the UK: At a (local) crossroads? *Local economy,* 34(1), 3-9.

Saaty, T.L. (1980). The analytic hierarchy process. McGraw-Hill, New York.

Situation on the registered labor market of the Omsk region in January-December 2019. (2019). Retrieved April 15, 2020, from https://omskzan.ru/content/%D0%B0%D0%BD%D0%B0%D0%BB%D0%B8%D0%B7_%D1%80%D1%8B%D0%BD%D0%BA%D0%B0_%D1%82%D1%80%D1%83%D0%B4%D0%B0

Taha, H. A. (2007). Decision analysis and games. In *Operations research: An introduction* (8th ed., pp. 489–530). Prentice Hall.

Tomic, I. (2014). Regional matching (in)efficiency on the Croatian labour market. *Acta oeconomica*, 64(3), 287-312.

Vooren, M., Haelermans, C., Groot, W. & van den Brink, H.M. (2018). The effectiveness of active labor market policies: a meta-analysis. *Journal of economic surveys*, 33(1), 125-149.

Xu, K., & Xu, J. (2019). A Direct Consistency improvement method for the probability-hesitant analytic hierarchy process. IEEE Access, 7, 9445-9458.

Zavadskas, E. K., & Turskis, Z. (2011). Multiple criteria decision making (MCDM) methods in economics: an overview. *Technological and economic development of economy*, 17(2), 397-427.

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