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THE RELATIONSHIP BETWEEN THE VOLUME OF OUTPUT AND THE LEVEL OF UNEMPLOYMENT IN THE RURAL AREAS OF THE REGION

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Abstract

The problem of unemployment for rural residents of municipalities in the region has become very relevant in recent years, as well as for all residents of Russia. In the current conditions, there was a massive reduction in jobs and depreciation of the labor force. Extremely low wages at vacant jobs, does not even ensure the simple reproduction of an employee The empirical method of grouping Sturges is used to determine 6 groups of districts depending on the level of unemployment. A methodical approach to planning the unemployment rate based on the interpretation of Okun's law is proposed. The paper estimated the empirical sensitivity coefficient and adjustment of the potential size of agricultural production per capita of the working population for all categories of farms (agricultural enterprises, peasant farms, personal subsidiary plots). Also, it aims to identify the dependence of changes in economic indicators based on the increase of employment level. It shows the possibility of reducing the unemployment rate o from 0.77 to 4.30 points with an increase in production by 7%; (taking into account the estimated sensitivity factor of 1.12).

Key words**:** *agricultural products, employment, potential, unemployment, working-age population*

INTRODUCTION

The reasons for the unemployment of a rural settlement are, first of all, the reduction of enterprises associated with the production and processing of agricultural products. Partial or complete cessation of the work of many agricultural industries, slowdown in the creation of new ones, modernization and reconstruction of existing ones.

Increasing the level of employment of the population must be included in the list of priority tasks for solving social problems in rural areas. The costs of unemployment are insufficient output. As a result of the underutilization of the total labor force, the revenue side of municipal budgets is reduced, tax revenues are reduced, and revenue from the implementation of various types of activities is reduced; which leads to a decrease in the standard of living, loss of personal income of persons who have become unemployed. Researchers like [10] noted the importance of increasing the productivity of agricultural production. Its reduction has a profound impact on the cost of production, gross value added and labor costs. Which in the future can lead to a reduction in employment. Also, [3] justified the need to form consulting services and specialized recruitment agencies in order to develop the rural labor market and reduce unemployment.

The prerequisite for considering this issue was that it is the opacity of the labor market, the lack of information about the hidden processes taking place on it, that leads to its disorganization – an oversaturation or unclaimed specialists and a shortage of required workers. These factors, in turn, further contribute to the growth of informal phenomena in the labor market – informal employment and informal unemployment. There is a social vulnerability of the able-bodied population, an increase in the number

of unemployed, going into the "shadow" of enterprises, which is a barrier to development and reduction of the tax base. The solution to the current problem of unregistered officially unemployed is within the competence of regulatory institutions and labor market participants [5]. Also, a special place in the regulation of the labor market and the identification of labor potential is occupied by the labor exchange, as an intermediary between employees and employers in transactions for the sale of labor and, thereby, being a regulator of unemployment [1, 4].

MATERIALS AND METHODS

To analyze the current level of unemployment, the grouping feature determined the "number of unemployed people" divided by the Sturges rule of thumb into 6 conditional groups on average over a period of 7 years, and the calculated interval step is 176 [12]. The application of this method gives good results if the population consists of a large number of units, in our case it is 38 districts of the region. Second method: Okun's law represented by an empirically established ratio, according to which, for every two to three percent increase (or decrease) in real output compared with the natural level, there is a decrease (or increase) in the unemployment rate by one percentage point relative to the natural value [9].

RESULTS AND DISCUSSIONS

The analysis of unemployment in rural areas of the Saratov region in the context of sustainable development of rural areas contains statistical materials grouped by municipalities of the region, and includes the dynamics of indicators in the field of employment and general unemployment; registered unemployment; in the registered labor market.

Table 1. Estimated unemployment rate in rural areas of the Saratov region on average for 2013–2020, people

Categories	Unemployed	Unemployed, voluntarily laid off	Unemployed laid off due to liquidation of enterprises	Unemployed, long-term idle
1 group				
Average for the period	12.3	54	16	23
Ratio of 2020 to 2013, %	73.7	98/2	33.8	115.0
Ratio of 2020 to 2018, %	89.9	107.7	63.3	105.7
2 group				
Average for the period	303	110	37	53
Ratio of 2020 to 2013, %	65.2	87.4	22.9	66.6
Ratio of 2020 to 2018, %	83.1	106.7	37.5	101.2
3 group				
Average for the period	513	208	57	137
Ratio of 2020 to 2013, %	77.5	90.6	7.4	176.7
Ratio of 2020 to 2018, %	75.7	79.9	21.3	69.0
4 group				
Average for the period	677	324	96	129
Ratio of 2020 to 2013, %	65.2	71.9	44.9	33.7
Ratio of 2020 to 2018, %	92.2	102.3	66.6	101.1
5 group				
Average for the period	813	376	177	88
Ratio of 2020 to 2013, %	68.5	95.2	27.4	55.6
Ratio of 2020 to 2018, %	75.3	81.1	66.2	81.6
6 group				
Average for the period	1116	627	161	99
Ratio of 2020 to 2013, %	70.1	76.3	98.2	60.9
Ratio of 2020 to 2018, %	71.3	72.0	101.4	69.2

Source: Calculated by the authors according to the data of the Ministry of Labor and Social Protection. social.saratov.gov.ru, Accessed on 24.07.2021 [7].

The calculation based on the Sturges rule pointed out that the most numerous is the first group including of 27 districts with an average unemployment rate of 123 people (Table 1).

The level of official unemployment by groups of districts of the Saratov region for 2013–2020 averaged in the range of 0.64–2.19%. Such low values do not reflect the real picture of employment in rural areas. Most of the unemployed in rural areas are not officially registered due to the remoteness of settlements from regional centers and the inability to regularly report to the employment service.

To combat unemployment, it is necessary to develop and adopt state programs to ensure employment, the implementation of which requires significant budgetary funds. Therefore, as an important element, the social paradigm of sustainable development of rural areas of the region, the task was set to explore the internal potential of agricultural producers to eliminate unemployment [2, 6, 11]. Let's reveal the influence of internal production reserves on the change in the unemployment rate, based on Okun's law (Table 2).

Let us determine the potential size of agricultural production at the natural rate of unemployment. If the level of natural unemployment in the Saratov region, according to the Ministry of Economic Development of Russia, in 2013 is 5.2%; in 2014 – 4.6%; in 2015 – 4.7%; in 2016 – 5.1%, in 2017–2018 – 4.8–5.0%, for 2019–2020 – 4.3% [8].

Table 2. Rural unemployment forecast for the region (based on the Okun's model)

Purpose: to identify the actual unemployment rate (in the context of the regions of the subject of the Russian Federation) and calculate the forecast level in the long term	
Input data: the volume of the potential size of agricultural products in selling prices	
Calculation formula for the size of the calculated (potential) products): $Y^{\circ} = \frac{Y}{1 - \beta np * (U - U^{\circ})}$ where: Y– actual size of agricultural production, thousand roubles; Y^0 – estimated (potential) size of agricultural products, thousand roubles; U – actual unemployment rate, %; U^0 – natural rate of unemployment,%; β – Okun's ratio.	
Basic pattern: Annual growth rate products by 2–3% leads to a decrease in unemployment by 0.4%.	Calculation formula (according to the unemployment rate): $U = -0{,}4 \times \left(\frac{Pri1}{Pri0} \times 100\right) - 2{,}5\%$ where: U – unemployment rate, %; Pri1 – products of the current period, rubles.
Achieving output growth: investment through growth in the size of agricultural products as a result of the reduction in unemployment, Po.p. = Nt/r – 2*(Ui – ((Ui – 1)) where, Po.p. – volume growth agricultural products, taking into account the unemployment rate according to Okun, Tr.b. = (β) r*(Tr.p. – Nt/r), where Tr.b. – Okun's unemployment rate Tr.p. – actual growth rate of agricultural production, Nt/r – standard growth rate of agricultural production, %.	Calculation result: increase in agricultural output 2.5 % reduces unemployment by 0.4%. Estimated Okun's ratio – 1.12 - formed with a planned increase in production by 7%.
Output: rate of unemployment reduction (by 2030) at the planned rate of production growth in the 1st, 2nd, 4th and 5th groups of the studied districts of the region will be 0.77%, 0.59%, 0.18%, 4.3%, respectively. Under these conditions, the growth in production for the same groups amounted to: 6.99%, 6.97%, 6.98%, 6.94% for the future.	

Source: compiled by author.

According to the estimates of regional statistical bodies, the values in Table 3.

The volume of the potential size of agricultural products can be calculated by the formula:

$$Y^{\circ} = \frac{Y}{1 - \beta np * (U - U^{\circ})}$$

.....(1)where:

Y – actual size of agricultural production, thousand roubles;

Y^0 – potential size of agricultural production, thousand roubles;

U – actual unemployment rate, %;

U^0 – natural rate of unemployment, %;

β – Okun's coefficient.

Hence, the calculated potential size of agricultural production (Y^{o}) is equal to:

1 group:

$$Y^{\circ}_{2013} = \frac{59{,}358{,}224}{1 - 2.5 * (1.24 - 5.2)} = 5{,}445{,}708.62$$

$$Y^{\circ}_{2014} = \frac{62{,}988{,}654}{1 - 2.5 * (1.08 - 4.6)} = 6{,}427{,}413.57$$

$$Y^{\circ}_{2015} = \frac{87{,}970{,}127}{1 - 2.5 * (1.02 - 4.3)} = 9{,}561{,}970.33$$

$$Y^{\circ}_{2016} = \frac{95{,}258{,}550}{1 - 2.5 * (1.13 - 5.1)} = 8{,}719{,}318.08$$

$$Y^{\circ}_{2017} = \frac{82{,}539{,}591}{1 - 2.5 * (1.16 - 4.8)} = 8{,}172{,}236.73$$

$$Y^{\circ}_{2018} = \frac{77{,}735{,}640}{1 - 2.5 * (1.10 - 5.0)} = 7{,}231{,}222.33$$

$$Y^{\circ}_{2019} = \frac{87{,}970{,}127}{1 - 2.5 * (1.02 - 4.3)} = 9{,}561{,}970.33$$

Table 3. Dynamics of the actual level of unemployment of the population by groups of districts of the Saratov region, % for 2013–2020

District groups	2013	2014	2015	2016	2017	2018	2019 – 2020	Mean
1	1.24	1.08	1.06	1.13	1.16	1.10	1.02	1.11
2	1.33	1.02	1.05	1.25	1.18	1.13	0.98	1.14
3	2.00	1.80	2.30	2.50	2.40	2.40	1.90	2.19
4	1.40	1.20	1.3	1.40	1.15	11.00	1,05	1.23
5	0.60	0.60	0.50	1.00	0.70	0.60	0.50	0.64
6	0.70	0.60	0.60	0.80	0.70	0.60	0.50	0.64

Source: Calculated by the authors according to the data of the Territorial Office of the Federal State Statistics Service for the Saratov Region. https://srtv.gks.ru, Accessed on 06/27/2021 [13].

The potential size of agricultural production in all categories of farms of 2–6 groups of districts was determined in a similar way (Table 4). The potential size of agricultural output is determined with the full use of labor resources and production assets, taking into account the restrictions imposed by the characteristics of the regional market.

Table 4. The volume of estimated (potential) agricultural production (in actual prices) in farms of all categories, thousand rubles. for 2013–2020

	2013	2014	2015	2016	2017	2018	2019	2020	Mean
1	5,445,708.62	6,427,413.57	7,484,887.03	8,719,318.08	8,172,236.73	7,231,222.33	9,561,970.33	12,469,880.65	7,564,766.26
2	1,710,676.44	2,076,403.52	2,560,882.57	2,602,539.76	2,493,417.41	2,246,982.86	2,928,690.65	4,159,169.14	2,375,578.03
3	255,376.22	336,897.75	496,913.57	482,238.40	358,107.57	390,653.87	429,376.57	701,118.29	389,768.24
4	646,319.33	873,288.32	1,050,473.89	1,103,191.41	1,005,236.15	924,460.09	1,083,013.48	709,089.86	955,282.72
5	646,319.34	354,564.82	370,822.26	519,136.44	445,429.51	364,118.75	550,548.57	611,274.48	408,577.98
6	700,277.55	905,935.91	992,177.51	925,451.15	731,536.18	744,590.17	93,008.67	1,014,720.00	735,854.65

Source: Calculated by the author.

It can be lower than the maximum possible due to the presence of a natural level of unemployment, incomplete use of production resources. In our case, the hidden level of unemployment resulted in a significant excess of the actual value of agricultural production over its potential size. If, according to the Federal State Statistics Service, the unemployment rate of the population aged 15 years and older was 4.8% on average for the period from 2013 to 2020, then according to the reporting data of the Ministry of Labor and Social Protection of the Saratov Region, it was 1.11, 1.14, 2.19, 1.23, 0.64, 0.64%

(average 1.16%) for 6 groups of study areas over the same period, respectively. This study determines the significance of Okun's law in identifying the dependence of changes in effective economic indicators on the unemployment rate for a particular region. Reserves for reduction due to demand stimulation are also calculated. The rate of production growth according to Okun is taken in the range from 2 to 3%. If it stays the same, then the unemployment rate also stays the same. If the output growth rate is higher than 2-3%, then the unemployment rate will decrease, an increase in the output growth rate by each percentage above 2-3% will lead to a decrease in unemployment by 0.4 percentage points and vice versa (Table 5).

This pattern is reflected by the formula:

$$U = -0{,}4 \times \left(\frac{Pri1}{Pri0} \times 100\right) - 2{,}5 \quad \text{.....(2)}$$

where:

U – unemployment rate, %;

Pri1 – production of the current period, rubles;

Pri0 – production of the previous period, rubles.

We have obtained the calculated value of the sensitivity coefficient:

X = (7*(-0.4))/2.5 = -1.12

where:

2.5 – the increase in production according to Okun, %;

7 – planned production growth rate, %;

-0.4 – basic response factor sensitivity Okun, %;

X – calculated response factor according to Okun.

Table 5. The size of the planned unemployment rate. by groups of districts of the Saratov region for the period of 2030

№ groups	Salary, rub.	Actual growth rate of agricultural products, %	Growth in the volume of agricultural products, taking into account the unemployment rate according to Okun, %.	Okun's unemployment rate (scheduled at (β)r), %	Normative growth rate of agricultural products. %	(β) r calculated, % (decrease in unemployment according to Okun)
1	21,133.6	7.69	6.99	-0.77	7	-1.12
2	20,351.68	7.53	6.97	-0.59	7	-1.12
3	20,547.41	6.51	6.90	0.55	7	-1.12
4	23,012.10	70.16	6.98	-0.18	7	-1.12
5	25,453.78	10.84	6.94	-4.30	7	-1.12
6	19,835.95	-13.20	6.99	22.63	7	-1.12

Source: Calculated by the author.

Based on Okun's law define empirical coefficient sensitivity (β)r:

(β)r= (Nt/r*(β)o)/Ppo..... (3)

where:

(β)r – empirical coefficient sensitivity production to the dynamics of cyclical unemployment;

Nt/r – standard growth rate of agricultural production %;

(β)o – β according to Okun, %;

Ppo – production growth rate according to Okun %.

The normative growth rate of agricultural products is established in accordance with the Strategy for the socio-economic development of the Saratov regionby economic growth of gross national productby 7% per capita is determined by the formula:

Po.p. = Nt/r – 2*(Ui – ((Ui – 1)).... (4)

whereat: Po.p. – growth in the volume of agricultural products, taking into account the unemployment rate according to Okun, %;

Ui – unemployment rate of the current period, %; (Ui – 1) – previous period's unemployment rate, %. In turn, the rate of growth or decline in unemployment with the estimated Okun coefficient (-1.12%) is calculated by the formula:

Tr.b. = (β) r*(Tr.p. – Nt/r)..... (5)

where:
Tr.b. – rate of growth of unemployment according to Okun, %;
Tr.p. – growth rate of agricultural products, %.
Okun's coefficient calculated by us (1.12) will allow us to determine the level of unemployment that will develop with the planned increase in production (7%). The 1, 2, 4, 5 studied groups revealed the possibility of reducing the unemployment rate by 0.77%, 0.59%, 0.18%, 4.3% and increase production by 1.93%, 1.48%, 0.45%, 10.75% respectively (at β -0.4) or 0.69%, 0.53%, 0.16%, 3.84% (with (β)r -1.12) annually (6.99%, 6.97%, 6.98%, 6.94% for the future), respectively, by groups [14, 15, 16].

CONCLUSIONS

A combined method of unemployment planning is proposed based on revealing its hidden forms and determining the potential size of agricultural products per capita, taking into account the characteristics of the regional market and the calculated Okun coefficient (equal to 1.12 units) aimed at increasing production by 6.99%, 6.97%, 6.9%, 6.98%, 6.94%, 6.99% for the future, respectively, for 6 selected groups of districts. An increase in the level of employment due to tax incentives for the costs of advanced training will lead to an increase in the level of profitability of enterprises by 0.77% on average in the region.

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