THE INFLUENCE OF THE SEASONAL FACTOR ON THE EMPLOYMENT AND REMUNERATIONS IN THE AGRICULTURAL SECTOR IN BULGARIA

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Abstract

The present study aims at assessing the impact of the factor of seasonality on employment and remunerations in agriculture in Bulgaria. Statistical models have been used to investigate the dynamics and seasonal fluctuations of employment and remunerations in the agricultural sector. The conclusion drawn is that the seasonal factor influences the dynamics of employment more strongly than the dynamics of remunerations.

Key words: *employment, remunerations, seasonal factor, Bulgaria, agricultural sector*

INTRODUCTION

The problems that concern the rate and dynamics of employment and remunerations as well as well as the range of factors, including the seasonal one, which affect them, are both theoretically and practically extremely important. The diversity of factors with their changes logically leads to a dynamic in a variety of processes and activities, which necessitates timely and thorough analysis [1]. The rate and dynamics of employment and the remunerations are affected by a great number of factors among which seasonal factor stands out. The seasonal factor has a particularly marked influence on employment and remunerations in the agricultural sector, tourism, trade, etc. The assessment of the exact quantitative effect of the influence of the seasonal factor on the employment and remunerations could help develop and implement a variety of measures to encourage employment and the remuneration policy in the different economic sectors in Bulgaria.

MATERIALS AND METHODS

The main purpose of the present study is to assess the influence of the seasonal factor on the number of persons employed and the average monthly gross wages in the economic activity "Agriculture, forestry and fishing" in Bulgaria. The objective study and analysis are necessary so that measures can be taken in order to increase the positive influence and minimize the negative impact [2].

The main tasks the present paper will approach are as follows:
-To examine the dynamics of the employed and the average wage in the agricultural sector in Bulgaria;
-To investigate the seasonal fluctuations in the employment and remunerations;
-To identify the main trends related to the dynamics of employment and remunerations and the changes expected in the short term;
-To present the main conclusions drawn and the results obtained in investigating the development of the economic indicators over of time.

Modern market economy, and more specifically the labour market, can be seen as a system which is complex and self-regulating, functioning under the impact of two counterbalancing forces - demand and supply [3]. From this perspective, the equilibrium of the labour market when the supply of labour force equals the demand for it, determines the number of the employed and the average wage. The dynamics of employment and remunerations in agriculture are determined by dynamics and the seasonal

nature of production in the sector. Additional impact is the fragmentation of the land as a result of the conducted Agrarian reform and aggravated demographic structure in the Bulgarian village [5]. When production decreases, part of the persons employed may get laid-off and in this way employment falls. The other possibility is related to a decrease in the remunerations of the persons employed during the lean season. In this paper we are going to investigate which of the two effects predominates in the agricultural sector in Bulgaria. The elements of the remunerations can be basically divided into two kinds – remunerations of permanent nature and impermanent (variable) remunerations. The permanent remunerations include the basic remuneration for the pay reference period and additional remunerations paid permanently together with the basic one and depending only on the period of time worked. (For example, an additional remuneration for acquired seniority and professional experience, an additional monthly remuneration for the educational and academic degree of "doctor" "doctor of science", related to the work performance of the worker or employee, etc.) From the point of view of the workers permanent remunerations provide a sense of security and an opportunity for long-term planning of the household budgets, but from the point of view of the employers these remunerations are a permanent expense which does not depend on the results achieved, and this could present a certain risk to the competitiveness and financial state of the organization under unfavourable circumstances [6]. The variable remunerations (remunerations of impermanent nature) are the remunerations which are not paid to the workers and employees regularly and their size is not fixed. Some of these remunerations are related to the specific nature and features of the work done, and in this case they are usually regulated by law or regulations, another legal act, or in a collective labour agreement (for example, the pay for night work, overtime, work on public holidays, in cases of internal substitution or secondary employment, etc.) Another part of the variable remunerations are linked to the

results, achievements and the performance of workers and employees – for example, bonus schemes, based on pre-determined indicators, on overall performance assessment, one-time bonuses, etc. [6] The dynamics of the remuneration in the course of time depends on the variable remunerations in the first place.

The present study is interested in the following questions: Does the seasonal factor affect the dynamics of the employment and remunerations, and if it does, to what extent? What are the main trends related to the dynamics of employment and remunerations in the agricultural sector in Bulgaria and the changes expected in the short term?

With a view to achieving better targeting, the present study has the following limitations: The period for which information is presented is 2008I- 2018VI;

-The data used show the figures of the end-of-the-month employment in the economic activity "Agriculture, forestry and fishing"in Bulgaria and the gross average monthly wage in the sector;

-Official and publicly available information is used in the study.

The main methods that have been implemented are: factor analysis, comparative method, the expert judgment method, visual fit approach.

RESULTS AND DISCUSSIONS

The study goes on to examine the dynamics of employment in Bulgarian agriculture, using monthly data for the Bulgarian economy for the period 2008I- 2018VI, data from the National Statistical Institute (NSI) [4].
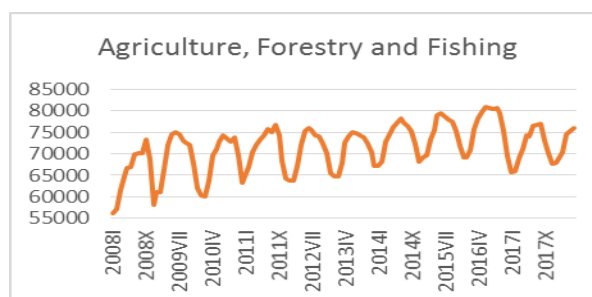

Fig. 1. Dynamics of employment in the agricultural sector in Bulgaria for the period 2008I- 2018VI. Source: National Statistical Institute.
* 2017-2018 – preliminary data.

It is obvious from Figure 3 that the influence of the seasonal factor on employment is huge. At the beginning of the period that has been studied the number of the employed reached its lowest value (2008I – 56,110 people), and in 2016VI it was at its highest – 80,789 people employed.

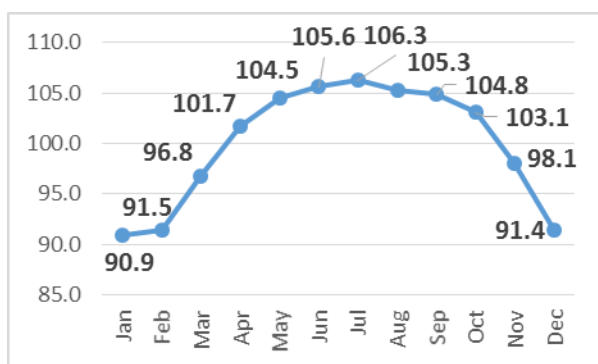Figure 2 shows the results of the seasonal decomposition of employment.

Fig. 2. Seasonal decomposition of employment in Bulgarian agriculture.
Source: National Statistical Institute, own calculation.

As figure 2 shows, the highest value of the seasonal indices was reached in July (106.3%), and the lowest – in January (90.9%). The deviation about the mean during each one of quarters is 15.4 percentage points (pp).

The most appropriate model for modelling the trend has been estimated for the adjusted time series (i.e. the time series with seasonal or random fluctuations removed). The different models have been compared as per the value of the coefficient of determination (explanatory part).

Table 1. Statistical evaluation of the different models describing employment variation in the sector of agriculture in Bulgaria.

Model Summary and Parameter Estimates

Dependent Variable:Trend-cycle for E from SEASON, MOD_1, MUL CEN 12

Equation	Model Summary					Parameter Estimates			
	R Square	F	df1	df2	Sig.	Constant	b1	b2	b3
Linear	,627	208,623	1	124	,000	67059,438	68,890		
Logarithmic	,737	348,102	1	124	,000	60202,244	2907,680		
Inverse	,354	67,857	1	124	,000	72200,316	-17824,234		
Quadratic	,743	177,996	2	123	,000	64591,800	184,560	-,911	
Cubic	,748	120,873	3	122	,000	65215,418	126,775	,222	-,006
Compound	,626	207,244	1	124	,000	67067,982	1,001		
Power	,754	379,850	1	124	,000	60729,949	,042		
S	,376	74,827	1	124	,000	11,187	-,261		
Growth	,626	207,244	1	124	,000	11,113	,001		
Exponential	,626	207,244	1	124	,000	67067,982	,001		
Logistic	,626	207,244	1	124	,000	1,491E-5	,999		

Source: Own calculation.

The obtained results show that the cubic and the quadratic models have the greatest values for the coefficient of determination (0.748 and 0.743 respectively). This coefficient is 0.627 for the linear model. The total variation which is explained by these models is significant as the F-statistic shows (the values of the significance levels are Sig. =0.00<0.05). The model chosen as the most adequate one is the cubic model (Fig. 2) because the difference between the values of the coefficient of determination for the cubic and linear models is equal to 0.121, i.e. bigger than 0.1. The following equation describes the cubic model:

$$E=65215.418+126.775t+0.222t^2-0.006t^3+\varepsilon,$$

where E is the number of the persons employed, $t=1,2,3,…,126$ (the number of months, ε- the error term (Fig. 3).
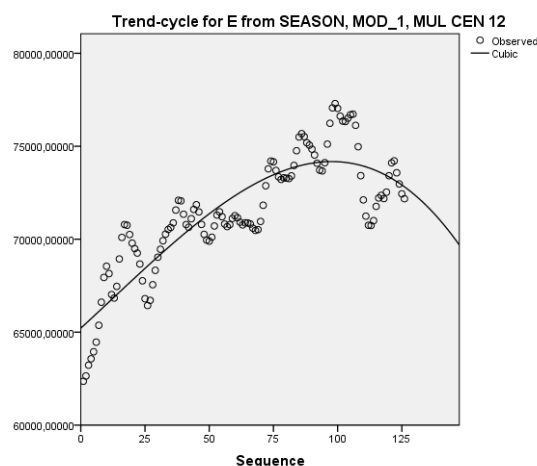

Fig.3. Dynamics of employment in the agricultural sector in Bulgaria with removed seasonal and random fluctuations (cubic regression model).
Source: Own calculation.

The dynamics of the average monthly wages in the agricultural sector and in the country as a whole are presented in Fig. 4, data from the National Statistical Institute (NSI) [6].

Figure 4 shows that the agricultural sector had the lowest average wage (329 BGN or 168 EUR) at the beginning of the period studied – 2008I, and at its end - 2018 VI it had the highest average wage (958 BGN or 490 EUR), i.e. there was a threefold pay rise. The graph clearly shows the seasonal fluctuations of the average remunerations. During the

period studied the average wage in the agricultural sector is always lower than the average wage for the country, with the difference between the two indicators going up.
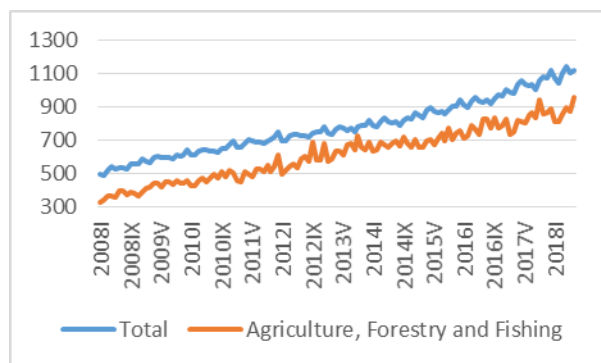

Fig. 4. Average monthly wages of workers in the agricultural sector and for the the whole of the country for the period 2008I- 2018VI.
Source: National Statistical Institute.
* 2017-2018 – preliminary data.

For instance, the difference between the average wages in agriculture and for the country in general was 170 BGN (87 EUR), in 2016 I this difference was 193 BGN (99 EUR), and in 2018I it is 262 BGN (134 EUR). On average, the remunerations in the agricultural sector are 166 BGN lower than the average remuneration for the country.

Figure 5 presents the difference between the average monthly wages for the country in general and the agricultural sector in particular for the period 2008I – 2018 VI.
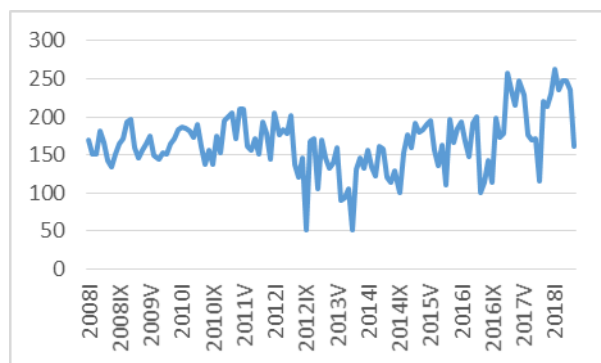

Fig. 5. Difference between the average monthly wages for the country in general and the agricultural sector in particular for the period 2008I – 2018VI (BGN).
Source: National Statistical Institute, own calculation.

Figure 6 shows the results of the seasonal decomposition of the average wage in agriculture.
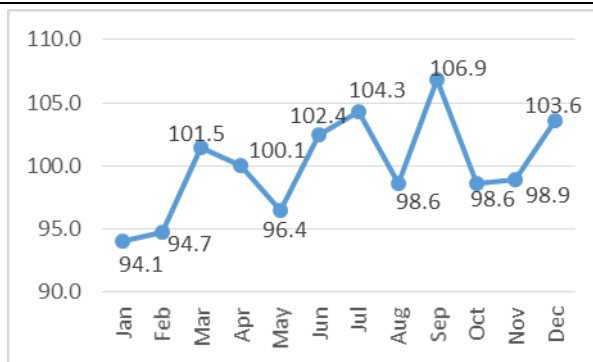
Fig. 6. Seasonal decomposition of average monthly remuneration in Bulgarian agricultural sector.
Source: National Statistical Institute, own calculation.

As can be seen in Figures 2 and 6, the seasonal factor affects the dynamics of employment and the remunerations in the agricultural sector in different ways.
But as Figure 4 shows the highest and the lowest values of the seasonal indices were reached in September (106.9%), July (104.3%), and in January (94.1%) respectively, very much similarly to the results for employment. The deviation about the mean during each one of the months is less compared to the results for employment - 12.8 percentage points.
The most appropriate model for modelling the trend has been estimated for the adjusted time series.

Table 2. Statistical estimation of the different models describing the variation of the average monthly remuneration in the agricultural sector in Bulgaria

Model Summary and Parameter Estimates

Dependent Variable:Trend-cycle for Wa from SEASON, MOD_4, MUL CEN 12

	Model Summary					Parameter Estimates			
Equation	R Square	F	df1	df2	Sig.	Constant	b1	b2	b3
Linear	,991	13210,448	1	124	,000	349,867	4,228		
Logarithmic	,781	442,244	1	124	,000	53,863	146,133		
Inverse	,198	30,679	1	124	,000	646,367	-651,806		
Quadratic	,991	6795,327	2	123	,000	356,294	3,927	,002	
Cubic	,991	4670,349	3	122	,000	348,425	4,656	-,012	7,505E-5
Compound	,981	6498,341	1	124	,000	381,513	1,007		
Power	,856	738,602	1	124	,000	221,116	,258		
S	,250	41,372	1	124	,000	6,447	-1,233		
Growth	,981	6498,341	1	124	,000	5,944	,007		
Exponential	,981	6498,341	1	124	,000	381,513	,007		
Logistic	,981	6498,341	1	124	,000	,003	,993		

The linear, quadratic and cubic models are the most adequate models (0.991). All models are statistically significant and the linear model has been chosen as the most adequate one:

$$Wa = 349.867 + 4.228t,$$

where Wa is the average monthly wage in the agricultural sector, $t = 1, 2, 3, \ldots, 126$ (the

number of months), ε-the error term (fig. 7). From the linear regression model obtained it follows that the remunerations in the agricultural sector grow by 4 BGN per month on average.
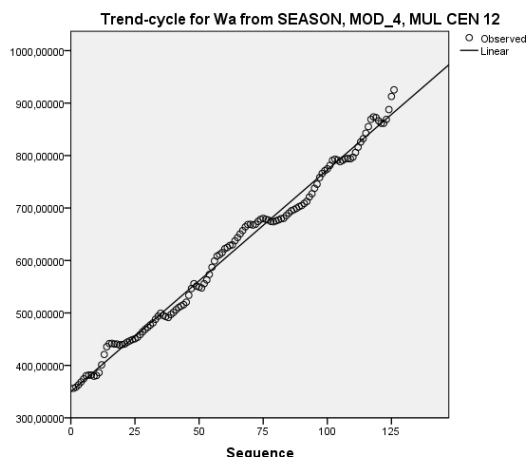

Fig. 7. Dynamics of the average monthly wage in the agricultural sector in Bulgaria with removed seasonal and random fluctuations (linear regression model).
Source: Own calculation.

The models thus obtained can serve as a basis for making a forecast for the number of workers in agriculture in Bulgaria as well as the average monthly remuneration in the sector during a succeeding period. The forecast has a time horizon of 12 months which is approximately 10% of the time series. (Table 4).

Table 4. Values of the average monthly earnings and the number of workers engaged in the agricultural sector in Bulgaria according to the forecast.

Month, year	Number of persons employed	Average monthly remuneration
JUL 2018	77,268	925
AUG 2018	76,450	878
SEP 2018	76,009	957
OCT 2018	74,600	887
NOV 2018	70,873	894
DEC 2018	65,965	940
JAN 2019	65,443	858
FEB 2019	65,759	868
MAR 2019	69,465	934
APR 2019	72,851	926
MAY 2019	74,675	896
JUN 2019	75,332	956

Source: Own calculation.

Therefore, if it is assumed that the patterns found will remain steady during the forecast period, then the average monthly wage in the agricultural sector in Bulgaria will continue to rise and will reach a value of 956 BGN. The number of the persons employed in June 2019 will reach 75,332 people. If the seasonal and random fluctuations are not taken into consideration, the trend is for the number of persons employed to decrease during the forecast period.

CONCLUSIONS

The analysis of the presented data leads to the following conclusions:
The dynamics of employment and remunerations in the agricultural sector in Bulgaria are affected in different ways by the seasonal factor.
There is a more pronounced impact of the seasonal factor on the dynamics of employment than on the dynamics of the average monthly remuneration.
If we assume that the patterns established in the study will remain steady during the forecast period, then the average monthly remuneration in the agricultural sector will continue to increase by 4 BGN per month, but will still be lower than the average monthly remuneration for the country.
The short-term emerging trend is for the number of persons employed in the agricultural sector to go down.
In conclusion, it can be noted that the seasonal factor exerts a huge influence on the dynamics of employment and remunerations in the agricultural sector in Bulgaria. In the short run the positive trend for an increase in the average remuneration and the trend for a decrease in the number of persons employed in the agricultural sector will most likely hold steady.

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