

IMPACT OF LOCAL FACTORS FOR CHANGES ON LABOR AND FARM NUMBER IN BULGARIA

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Abstract

The purpose of this study is to analyze the impact of local factors for changes in labor force and farm number in Bulgaria based on the last two censuses conducted in the years 2010 and 2020. The local factors are considered those conditions and prepositions apart from the national and regional causes driving the development and tendencies in the farm structure. The local level in this study is municipality territory, which is adopted as an unit for defining rural and not-rural areas. The evolution of labor worked in Bulgarian agriculture and the number of farms is steadily declining between both censuses, which is a general finding, where is interesting to identify the local differences and particularities.

For the sake to analyze the local specifics, the Territorial Shift Share Analysis (TSSA) is applied. The TSSA is an analytical tool built on the basis of Shift Share Analysis (SSA), designed to determine the contribution of local determinants to the changes in the number of agricultural farms and labor force having in mind and estimating the changes driven by national and regional causes.

The results show that about 72% of the observed changes ascertained as a decrease in farms in the country can be prescribed to macroeconomic, national influencing causes, about 19% has more regional roots and only about 9% of the decrease in the number of farms can be connected to local characteristics and factors. In the case of the labor force, the structure of the factor influence is similar, as around 69% of the total change in the labor force can be pertained to macroeconomic reasons, 21% can be traced to regional conditions and 10% to local circumstances. This structure is very similar and shows that local factors also contribute to the reduction in the number of farms and the labor force in the Bulgarian agriculture, which means that there is almost no local initiative for complement support of this production. The regional factors also have a certain impact, even though more limited than the macroeconomic and national environment, as it is deemed that as much as the regions differ from each other, the greater is the weight and impact of the regional level to the estimated changes.

Keywords: agriculture, changes, labor, farms, Bulgaria

JEL: J01; Q1; R11

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Introduction

Due to interregional and intraregional imbalances, issues related to regional policies are constantly on the agenda among stakeholders and politicians. The reason for this is that regional disparities are increasingly deepening and growing, which provokes researchers to focus research on the adequacy of applied strategies (Gezici, F. and Hewings, G., 2004; Monastiriotis, V., 2008; Totev, S., 2011; Timiryanova, V. et al., 2021). After the integration of Bulgaria into the EU in 2007 and the accompanying socio-economic challenges, approaches to regional politics have changed. A number of measures and support schemes were included in order to harmonize regional interventions with those of the EU. However, there are still regional differences (Doitchinova and Stoyanova, 2020). that often contrast with the overall 'picture'. The activities and performance in agriculture is very important to the state of rural areas because agriculture is still crucial sector for those areas. It is assumed that capacity of rural communities depends on their responses to external changes by adapting the functions and structure of their internal components (Doichinova and Wrzochalska, 2022).

The purpose of this study is to analyze the impact of local factors for changes in labor force and farm number in Bulgaria based on the last two censuses conducted in the years 2010 and 2020. The local factors are considered those conditions and prepositions apart from the national and regional causes driving the development and tendencies in the farm structure. The local level in this study is municipality territory, which is adopted as an unit for defining rural and not-rural areas. The evolution of labor worked in Bulgarian agriculture and the number of farms is steadily declining between both censuses, which is a general finding, where is interesting to identify the local differences and particularities.

Methodology

In the study is adopted a method for investigating the territorial local impact on the changes in number of farms and amount of the working force in agriculture on municipal level. The selected method is designed to demarcate the national and regional influence on the evolution of those indicators and to estimate the isolated local impact. For the sake to fulfill such study is adopted the Territorial Share Shift Analysis (TSSA), which is similar and modified model of the popular Shift Share Analysis (SSA). The adopted model is proposed by Ivanov (2020, 2022), applied also by Todorov (2021) and Mikova (2022) and is working by the similar principle

of the SSA. It assumes the impact of national and regional factors on the local and municipal level can be presented in a linear function and the leftover from their linear estimated outcomes and the real new values regarding the farm number and labor force scale is prescribed to the territorial driving change itself. In contrast to classical SSA, which is envisaged to estimate the share shift on the industrial regional level, the TSSA is applied on territorial level insofar, there are three separate stages – municipal, regional (NUTS 3) and national. The last two are prior calculated and the remaining to the actual value is conjectured to be local, municipal print on the observed change. The SSA analysis itself is based on the methodology for estimating „local shifts“ in economic industries (Herzog and Olsen, 1977), and the algorithm is evolved and used for the first time as an analytical tool in the early 1960s by Ashby (1970), Dunn (1960). The basic elements of the calculation algorithm of Shift Share Analysis (SSA) are the sectoral shifts in the observed regional shares (SS), the national shifts (NS), the intermediate shifts (IS) and, as a result, the internal, net shift on the concrete territorial unit (RS) is derived (Herzog and Olsen, 1977). The classic computation is as follows:

$$SS = NS + IM + RS \quad (1)$$

The equation (1) is also used in the territorial analysis TSSA for estimating the municipal changes in farm number and labor where the assumption is that the local changes are driven by firstly the general national trends in agriculture, reflect the regional impact and have local specifics explicated by territorial shifts. In the TSSA model, the estimation of the equation components are in linear and relative dispersion mode as follows:

$$NS_K = LIV_{t-1} * \frac{NIV_t}{NIV_{t-1}} \quad (2)$$

$$RS = LIV_{t-1} - NS_K - LIV_{t-1} * \frac{(RIV_t - RIV_{t-1})}{(RIV_t + RIV_{t-1})} \quad (3)$$

$$TSS = LIV_t - \frac{NS_K}{2} - \frac{(LIV_{t-1} * \frac{(RIV_t - RIV_{t-1})}{(RIV_t + RIV_{t-1})})}{2} \quad (4)$$

The indicators composed of the above formulas are local values for the number of farms and number of labor force in Bulgarian agriculture in the time of Census 2010 (LIV_{t-1}) and Census 2020 (LIV_t). The NS and RS are national and regional shifts, whereas the NIV and RIV are national and regional values of farms and labor in the both periods. The TSS is the territorial share shift, which is searched variable resulted afterward on estimated NS and RS.

Having in mind the TSS values are natural values varying hugely among all municipalities, it is chosen to carry out normalized assessment of the absolute changes of indicators using the Relative Comparative Assessment tool (RSA) introduced by Ivanov (2022). It represents an assessment ranged in scale from 0 to 1 based on the averages in the TSS and the coefficient of variation (CV). The equation is drafted as:

$$TSSA_k = \frac{TSS_k}{AVR_{TSS} + AVR_{TSS} * CV} * (0,5 + 0,5 * CV^2) \quad (5)$$

The $TSSA_k$ is the appraisal of the natural number of TSS for each municipality (k) on the indicators farm number and labor, which is collated with the average level of all TSS. In order to apply properly the methodology since the TSS values have in many cases irrational negative numbers, the preliminary treatment is carried out to transform all municipal TSS values with positive values.

From the research point of view, it is interesting along with the assessment of TSS to cluster the municipalities depended on the changes determined by TSS values. The clustering approach is elaborated by Ivanov (2023) and embodies in the algorithm the coefficient of variation in TSS and the number of municipalities and the observation cases, which is principal approach to make such grouping. The applied equation for clustering, primarily oriented to calculate number of clusters is:

$$CN = \log_{1+TSSDL} TSSN * ACF \quad (6)$$

$$ACF = \sqrt{\frac{\frac{CV_{TSS}}{\sqrt{CV_{TSS}}}}{\frac{\sqrt{TSSN}}{TSSDL}}} \quad (7)$$

The idea behind the cluster number calculation (CN) is that it is function of the observations of TSS (TSSN) and the coefficient of variation in TSS absolute values, where as high is the TSSN so high is supposed to be CN, whereas the ACF (Adjusted Cluster Factor) modified it by coefficient of variation, which may propel up the cluster number, when the CV is up and reduce the cluster number regardless the TSS number, when it is minimal.

Results

Influence of local factors on changes in the number of farms in Bulgaria

This part analyzes the influence of factors on changes in the number of farms in Bulgaria based on the last two censuses conducted in 2010-2020 (Fig. 1). Based on the obtained results, five farms have a coefficient of 0-0.2, which gives an indication of their decrease for the period. Unfavorable internal (local) factors in the respective municipalities definitely played a key role. These are farms located in cities such as

Velingrad, Dobrich, Kirkovo, Plovdiv, and Sandanski. The results reveal that at the municipal level, in addition to rural areas, there are also non-rural areas, which is especially surprising for cities with well-developed economies such as Plovdiv and Dobrich. More than half of agricultural holdings (135 units) fall into a group with a coefficient of 0,21-0,45, which means that for them predominantly external factors have contributed to the decrease in their number in the respective municipalities. In this case, national and regional reasons were driving the development and trends in the structure of agricultural holdings. There are 115 farms in the middle range (0,46-0,55), which is comparable to the national average. The respective municipalities have similar results and situations as the average for the country and for all regions.

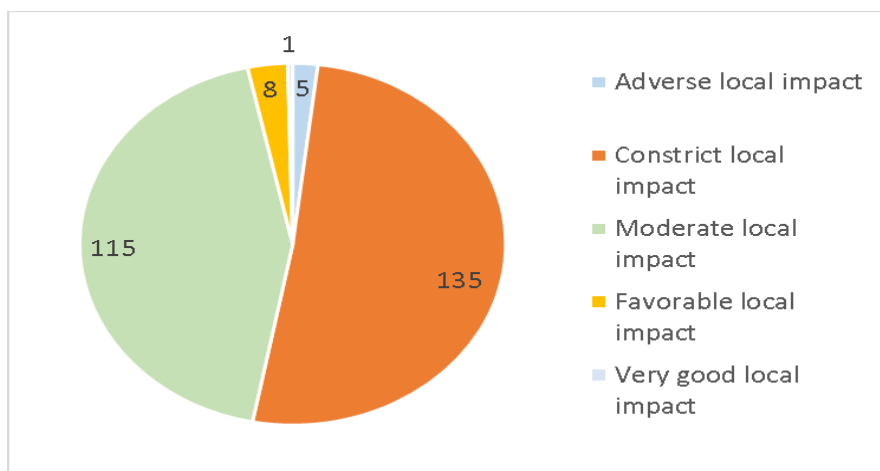


Figure 1. Share of changes in the number of farms in Bulgaria according to the influence of local impact

Source: authors on MAF Agrostistics Census data

There are 8 municipalities with a coefficient of 0.56-0.80, and the increase in their number is mainly due to the influence of external factors. In this group, domestic factors are assumed to have contributed to the trend toward an increase in the number of farms. These are the municipalities of Belitsa, Kyustendil, Nedelino, Pomorie, Petrich, Sarnitsa, Tervel, and Yakoruda, mostly located in border areas. These areas are represented by mostly small and medium-sized farms, in mountainous areas, with a predominant livestock specialization and, less often, mixed crop-livestock farming. Only one region (Dobrich-village Municipality) falls into the last group (0,81-1), where it can definitely be assumed that the synergistic effect of internal and external factors played a dominant role in increasing the number of farms there. It is important to consider the results obtained for the absolute values of

TSSitself. In this case, clusters were defined and formed. In order to visualize the change in the number of farms, a model was made, establishing that 12 clusters can be distinguished based on the obtained figures. They show the number of municipalities that fall into each cluster. Cluster 7 unites the largest number of municipalities (158) with an increase in the number of farms in absolute size in the range from -147 to +82. About ¼ of the municipalities (Cluster 6) represent a decrease in holdings in the range of -147 to -376 units. for the period 2010-2020 (fig. 2). The remaining clusters group a smaller number of municipalities with a proportional decrease or increase in farms.

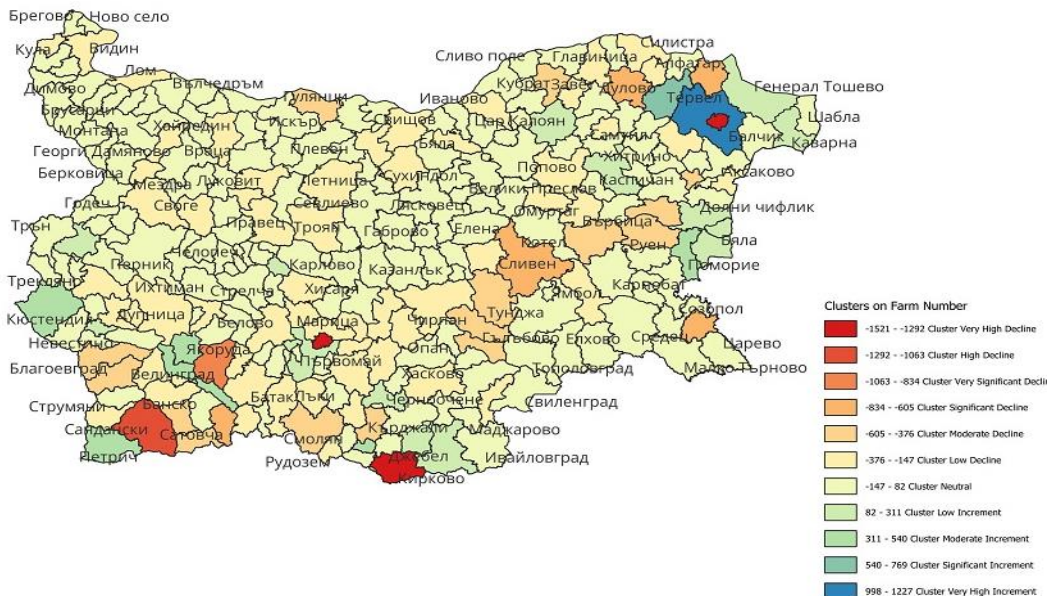


Figure 2. Clusters based on changes in the number of agricultural holdings in Bulgaria according to the influence of local factors

Source: authors on MAF Agrostistics Census data

Influence of local factors on changes in labor input in Bulgarian farms

The development of labor input in farms in the country shows a decrease by 224,635 AWU in 2020 compared to 2010. Negative trend covers the majority of municipalities, and the reasons for this can be sought both in the complex specificity of the local factors determining the development and importance of agriculture within the local economic development, and in the impact of external determinants for the area.

The distribution of the number of municipalities according to the impact of local factors on changes in labor input in farms is shown on figure 3. Adjusted RS values determine an unfavorable local impact only in two municipalities – Kirkovo (0,00) and Satovcha (0,18). The reduction of AWU used on farms in both regions was

occurred at a faster rate, than the established decline at the district level, and compared to the national average decrease reported. Low values of the indicator testify to the need for more targeted policies and mechanisms to create local conditions favorable to the development of agricultural production. The number of municipalities with constrict local impact on changes in labor input in farms is the largest – 130, having adjusted RS values in the range between 0.21-0.45. In this case, the changes can be explained primarily by the impact of factors occurring at the regional or national level. Anastasova-Chopeva (2019) indicated as the main reasons for the reduction of the labor as a whole in the agriculture of Bulgaria the unfavorable demographic base for the formation of the necessary labor force in terms of quantity and quality; a low degree of attractiveness of the quality of life in the villages; lower than the average labor productivity for the EU-27, which affects the competitiveness of Bulgarian agricultural products; lower profitability in agriculture compared to other sectors of the economy; limited financial resources and difficult access to them; insufficient qualification of personnel and a weak innovation culture. In a study of Harizanova-Metodieva and Harizanova-Bartos is reported „there is a negative correlation between the number of employed persons and subsidies in agricultural sector, which probably means that the subsidies to some extent serve to compensate for the decrease in the number of persons employed in agriculture“. It can be added that the subsidy increase leads to more investment opportunities, which reduces the demand of labor force.

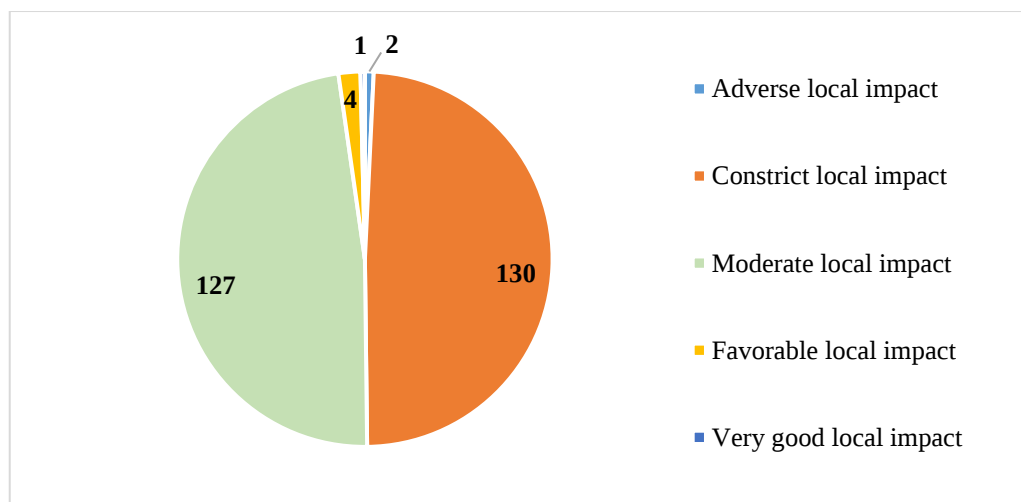


Figure 3. Share of changes in the labor input in farms in Bulgaria according to the influence of local factors

Source: authors on MAF Agrostistics Census data

There are 127 municipalities in the middle scale of the range with estimates of adjusted RS between 0,46 and 0,55, for which the change in labor input in farms is close to the national average. In this case, the influence of local factors is moderate. The number of municipalities that fall into the scale with limits 0.56-0.80 is four – Karnobat, Pomorie, Ruen and Yakoruda. In this case, the influence of external factors is reinforced by the favorable impact of the factors of the internal environment – local and regional policies, economic and market conditions, labor supply, social and cultural environment, etc. All this has an effect in the direction of increasing the labor input in farms between 2010 and 2020. Three of the municipalities – Karnobat, Pomorie and Ruen are bordering, located in the same region of the Burgas district, which shows that mainly the synthesis between local and regional resources and conditions is decisive for the positive dynamics in terms of the labor input in agriculture. The agricultural sector occupies an important place in the economy of the three municipalities, with more developed crop production (mainly cereal production, viticulture, fruit growing and, to a lesser extent, vegetable production) compared to livestock production. The obtained results come close to the data reported by Doitchinova et al. (2022), according to which expert assessments of the role of agriculture in creating new jobs in rural areas are highest in the Southeast region (3.92), which also includes the Burgas district (3.17). According to the same study, the potential for providing jobs in agriculture in the Blagoevgrad district, where the municipality of Yakoruda is located, has an expert assessment of 4.00. The only municipality with assessment TSS in the highest part of the evaluation scale between 0,81-1 is located in the Blagoevgrad region – the municipality of Petrich (0.90). In this case, the impact of regional and national factors is combined with a very good influence of local factors.

Based on the absolute TSS values, 12 clusters were distinguished, indicated in Fig. 4. Cluster 7 covers the largest number of municipalities – 134. The limits of regional change for this cluster range from -104 to +279, which means that the differences in the rates of change of labor input in farms at the local level are close to those of the district and the national average. The municipalities covered by clusters 1 to 6 have a more significant decrease than the national and regional average rates. The majority of municipalities are grouped in cluster 6 with values between – 487 to -104, reflecting the rate of decline of the labor input in farms. The rate of regional change in 29 municipalities covered by cluster 8, which combines the absolute values of the change between +279 to +662, can be defined as a low increment. The remaining four clusters group 8 municipalities with more pronounced advantages at the local level, which determine rates of relative growth between +662 to +2194.

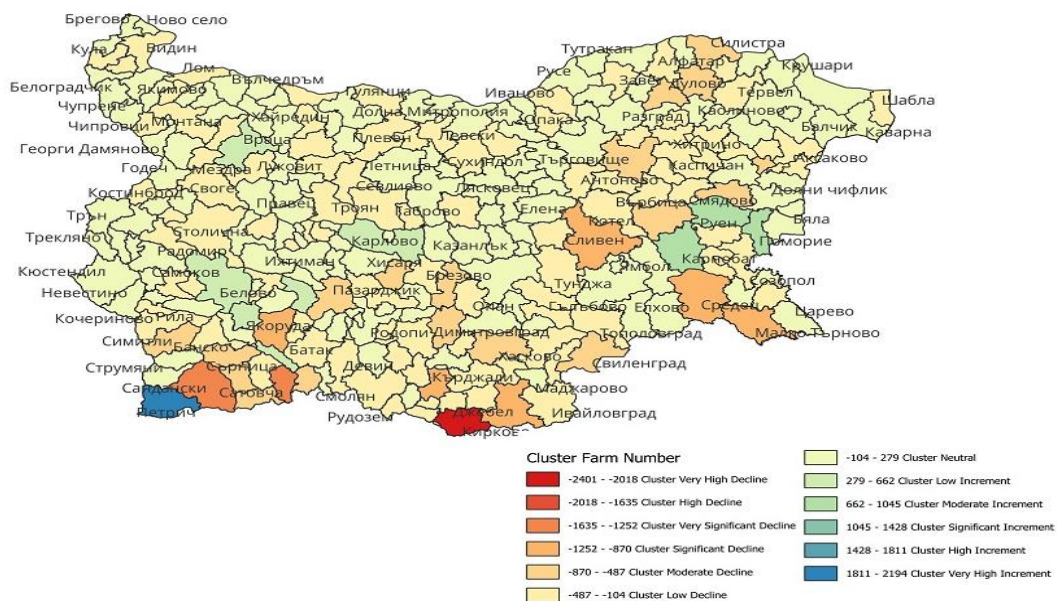


Figure 4. Territorial location of municipalities, distributed in clusters according to the impact of local factors on the change of labor in farms

Source: authors on MAF Agrostatistics Census data

Conclusion

The present analysis shows that the identified significant fall in the number of farms in Bulgaria leads to a tangible decrease in the number of Annual working units in agriculture, which in most cases is due not only to adverse national and regional causes, but also to local circumstances. The number of farms is reducing in the period between the two Censuses of 2010 and 2020, mostly at the cost of small and self-subsistent households, which is rather explained not by local and regional factors, but to macroeconomic and sectoral ones. The agricultural production in tiny and small farms can hardly provide sufficient income for those employed in it compared to other economic alternatives, which is the primary reason for the shrink in the observed indicators. In addition to that, the unattractiveness of agricultural production, especially for family farms, where the family workforce is engaged with a very high intensity, also leads to a leave of working force, which means difficult to involve new comers and to retain those already in the sector.

An additional finding can be drawn from the analysis, that about 72% of the decrease in farms in the country is imputed to macroeconomic, nationally tied causes, about 19% has more regional roots and only about 9% of the decrease in the number of farms can be attributed to local characteristics and factors. In the case of the labor force, the structure of the factor influence is similar, as around 69% of the total change in the labor force can be prescribed to macroeconomic reasons, 21% can be

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