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ARE ENTREPRENEURSHIP AND HUMAN CAPITAL THE DRIVERS OF REGIONAL GROWTH? EVIDENCE FROM NUTS 3 SUB-REGIONS IN SERBIA

Dejan Molnar^{1*}, Sonja Josipović² and Bojan Baškot³

¹University of Belgrade, Faculty of Economics and Business, Belgrade, the Republic of Serbia

²University of Belgrade, Faculty of Technology and Metallurgy, Belgrade, the Republic of Serbia

³University of Banja Luka, Faculty of Economics, Republic of Srpska, Bosnia and Herzegovina

The paper presents different concepts of regional economic growth, according to which the educational structure of the working age population and entrepreneurial activity significantly contribute to the improvement of economic performance. It also analyzes the role of the entrepreneurial activity and the quality of human capital in regional economic growth in Serbia in the period from 2011 to 2020 using a sample of 25 NUTS 3 level sub-regions. The results of the evaluation of the three selected panel models indicate that entrepreneurial activities play a vital role in the growth of gross added value at the level of the sub-region. Given the fact that the main theoretical and numerous empirical findings suggest that bearers of regional development should be entrepreneurs who possess the appropriate knowledge, abilities, creativity and skills, the recommendation for the creators of public policies is to continuously work on improving the business climate and building a stimulating entrepreneurial environment. Such an environment can encourage highly educated individuals to become the key bearers of entrepreneurial activities.

Keywords: regional growth, entrepreneurship, human capital, education, NUTS 3

JEL Classification: I25, O110, R580

INTRODUCTION

According to the endogenous theory of growth, developed regions and cities represent geographical areas characterized by a more educated and creative workforce and the development of numerous

innovations. The following factors have the most significant role in their economic development: allocations for research and development necessary for the creation of commercially successful inventions, human capital required for the formation of the so-called "clusters" consisting of highly educated employed individuals, and entrepreneurial capital related to the construction of an environment that encourages the entrepreneurial activity and is

* Correspondence to: D. Molnar, University of Belgrade, Faculty of Economics and Business, Kamenička 6, 11000 Belgrade, the Republic of Serbia; e-mail: dejan.molnar@ekof.bg.ac.rs

significant for the successful implementation of new ideas through the initiation of innovative business ventures. Endogenous growth models recognize the significant role of entrepreneurship as an important factor for the successful commercialization of knowledge by improving the success of the existing businesses and launching new entrepreneurial initiatives. Innovations and new technologies can have a double impact on economic growth, a direct impact on the growth of the gross domestic product and an indirect impact on improving economic performance through entrepreneurial capital. In order for developed inventions to be successfully marketed and accepted on the market, there is a need for the entrepreneurs who can ensure the necessary commercialization of the accumulated knowledge capital, i.e. investment in research and development and the availability of human capital.

Since the beginning of the 21st century, various models of economic growth have been presented. They emphasize that highly educated individuals and entrepreneurs can significantly impact the economic growth (the growth rate of gross added value) of the region (area). The paper examines the impact of the entrepreneurial activity and highly educated individuals on regional economic growth in the Republic of Serbia (RS) during the period from 2011 to 2020. Based on the results obtained in terms of the achieved contribution of the entrepreneurial activity and human capital to economic growth, as well as the achieved level of the development of sub-regions in RS, the research aims at indicating the measures, instruments and policies that correspond to the real needs of the NUTS 3 sub-regions in RS. The study is based on the following hypothesis:

- H1: The growth rate of the entrepreneurial activity and the growth rate of human capital have a positive and significant effect on regional economic growth, quantified by the gross value added growth rate.

The initial hypothesis was tested using econometric models and panel methods on a sample of 25 NUTS 3 level sub-regions in RS during the period from 2011 to 2020.

Beside the Introduction and the Conclusion, the paper consists of the three other parts. In the first part, relevant empirical research in the field of regional economic growth is presented, which indicates that the growth is largely determined by the joint influence of highly educated individuals and entrepreneurs. In the second part, the applied methodology for testing the starting hypothesis is explained and the research findings are presented. In the third part of the paper, the recommendations for the implementation of the regional policy are provided.

LITERATURE REVIEW

The structure of the industry, the educational structure of the population, the level of income per inhabitant, population density, the development of the transport infrastructure, and the provision of adequate support by local, financial and educational institutions all significantly influence the development of innovation and the development of entrepreneurial activities both at the national and at the regional, as well as at the local levels (at the level of urban areas, rural areas and cities). The countries that invest substantial capital in research and development and which have a significant growth of the entrepreneurial activity also have the highest growth rates of the gross domestic product, employment and wages (Wennekers & Thurik, 1999; Audretsch & Thurik, 2001; Ács, Audretsch, Braunerhjelm & Carlsson, 2005).

Empirical research in the field of regional economic development has contributed to the definition of the new models of economic growth that recognize the important and complementary role of highly educated individuals and entrepreneurs for economic growth (Wennekers & Thurik, 1999; Audretsch & Thurik, 2001; Marlet & van Woerkens, 2004; Skuras, Meccheri, Moreira, Rosell & Stathopoulou, 2005; McGranahan, Wojan & Lambert, 2011; Alehegn, Sacchetti & Tortia, 2013; Josipović & Molnar, 2018; Rikalović, Josipović & Molnar, 2020a; Drobnjaković, Stojanović & Josipović, 2022). In the developed economies, the regions characterized by a large participation of employees with higher education achieve the highest

entrepreneurial economic growth. An increase in the participation of entrepreneurs in the total number of companies can be made through the engagement of highly educated individuals who, according to the prior research conducted by (Mathur, 1999; Marlet & van Woerkens, 2004), have the ability to recognize market opportunities and are more inclined to start an independent entrepreneurial venture. In Germany, the largest volume of entrepreneurial capital (quantified by the number of newly founded companies per 1000 inhabitants) is found in the regions characterized by a high volume of human capital, a low unemployment rate, population growth and high population density (Audretsch & Fritsch, 1994; Audretsch & Fritsch, 2002; Audretsch & Keilback, 2005; Alehegn *et al*, 2013).

The term “entrepreneurial human capital” has been formulated and defined in the pertinent literature; it refers to the knowledge and skills (competencies) possessed by entrepreneurs (Skuras *et al*, 2005; Radosavljević, Josipović, Kokeza & Urošević, 2022). A high volume of entrepreneurial human capital can ensure the use of specific advantages of the environment of the region (area) to achieve a high rate of economic growth. During the last four decades, the highest growth rate of entrepreneurial initiatives and employment growth in developed economies has been possible to find in the areas recognized as the areas of significant outdoor amenities. The highly educated individuals who live and work in these areas are creditable for the successful transformation of the local economy, employment growth, the improvement of the living standards and the development of entrepreneurship (Josipović & Molnar, 2018). They inhabit these areas in the desire to ensure a better quality of life for themselves and their families and are the most important bearers of entrepreneurial initiatives. Human capital and entrepreneurial activities should have a complementary role in rural (regional) development and special attention should be paid to improving their synergy. Knowledge, creativity, talent and innovation are more closely linked to the local economy, which is characterized by a high prevalence of entrepreneurial activities. Conversely, entrepreneurial activities can contribute to the improvement of rural (regional) economic

performance if their holders are highly educated, creative and talented individuals.

The study by S. Fölster (2000) recognized entrepreneurship as an important instrument for increasing total employment. Using the example of 24 areas in Germany, this study confirmed that an increase in the share of the self-employed in the total labor force by 1% increased the employment rate by 0.5%. In order to improve the existing businesses and increase the number of entrepreneurs, in addition to the appropriate business climate (the level of taxes and contributions, administrative benefits), it is necessary to provide an environment that promotes and encourages creativity, diversity and the development of innovation and entrepreneurial culture.

In the developing countries, such as RS, highly educated individuals and entrepreneurs can be the key drivers in future economic development. S. Josipović and D. Molnar (2018), S. Josipović (2018) and G. Rikalović *et al* (2020a) analyzed the connection between the concept of human capital and entrepreneurship in RS at the NUTS 3 level of the hierarchical classification of territorial entities during the period from 2008 to 2013. The basis of the developed model of entrepreneurial economic growth is the hypothesis that the educational structure of the population and entrepreneurs contributes to improved economic performance. The model is based on the assumption that entrepreneurial economic growth can be explained by the following factors: the share of the number of employees with higher education in the total number of employees (a traditional measure of quantifying human capital for the purposes of empirical research), the share of the number of entrepreneurs in the total number of companies, the share of the number of employees in the primary sector, the share of the number of employees in the secondary sector, the share of the number of employees in the tertiary sector, the share of the number of employees in the quaternary sector, the share of residents aged 15 to 64 in the total number of residents (an indicator of the working population) and the share of residents up to 14 years of age in the total population (an indicator of the young population).

According to the results of the evaluated pooled panel model with constant regression parameters, the employees who have a college degree, the individuals who start and run their own business, employment in the primary, secondary and tertiary sectors and the young population have a significant and positive impact on entrepreneurial economic growth. Additionally, the studies indicate that, although there is a positive individual impact of human capital and entrepreneurs on the entrepreneurial economic growth at the NUTS 3 level, the two key prerequisites for establishing an appropriate model of economic growth were not satisfied. These refer to the presence in a certain geographical area and a significant part of the employed population that is equipped with human capital and a significant number of employees who are bearers of entrepreneurial activities (Radosavljević *et al*, 2022).

SOURCES OF REGIONAL GROWTH IN SERBIA FROM 2011 TO 2020

Data and the applied methodology

In order to test the importance of human capital and entrepreneurship in the regional economic development of RS (the NUTS 3 level of the hierarchical classification of territorial entities, 25 areas) during the period from 2011 to 2020, the following three types of panel models were evaluated: the model with constant regression parameters with artificial variables related to the years of observation (the pooled model), the fixed individual effects model (the FE model) and the random individual effects model (the RE model). The models are based on the assumption that economic growth (quantified by the gross value added (GVA) growth rate) is significantly influenced by the improvement of the educational structure of the population (the growth rate of human capital, i.e. the share of the highly educated in the total number of employees) and the increase in the entrepreneurial activity (the growth rate of the number of entrepreneurs in the total number of employees).

The pooled regression model was the starting point of the research:

$$y = x_i\beta + \varepsilon_i, \quad (1)$$

where the classical OLS model for panel data was used. Heteroscedasticity in the residual distribution, as well as the residual autocorrelation, were accounted for.

Then the following model specification was applied:

$$y_{it} = x_{it}\beta + \alpha_i + v_{it}, \quad (2)$$

where, compared to the OLS model, the error term is defined as $u_{it} = \alpha_i + v_{it}$. This model can be presented in a matrix form as:

$$y = X\beta + D\alpha + v, \quad (3)$$

where:

$$y_i = \begin{bmatrix} y_1 \\ \vdots \\ y_N \end{bmatrix}_{NT \times 1}, \quad X = \begin{bmatrix} X_1 \\ \vdots \\ X_N \end{bmatrix}_{NT \times k}, \quad \beta = \begin{bmatrix} \beta_1 \\ \vdots \\ \beta_k \end{bmatrix}_{k \times 1},$$

$$D = \begin{bmatrix} 1_T & 0_T & \cdots & 0_T \\ \vdots & \vdots & \ddots & \vdots \\ 0_T & \cdots & 1_T & 0_T \\ 0_T & \cdots & \cdots & 1_T \end{bmatrix}_{NT \times N}, \quad \alpha = \begin{bmatrix} \alpha_1 \\ \vdots \\ \alpha_N \end{bmatrix}_{N \times 1}, \quad v_i = \begin{bmatrix} v_1 \\ \vdots \\ v_N \end{bmatrix}_{NT \times 1}.$$

It is assumed that there is no serial correlation and no homoscedasticity, nor is there any correlation between and the regressors, either. Hence, it can be written in the following manner:

$$V(\alpha_i | X) = \sigma_\alpha^2 \quad (4)$$

$$V(v_{it} | X) = \sigma_v^2 \quad (5)$$

$$E(\alpha_i v_{it} | X) = E(\alpha_i v_{is} | X) = 0 \quad (6)$$

Usually, the OLS estimation is not applicable for panel data because of the error term structure, or to be precise:

$$E(u_{it}u_{is}|X) = E[(\alpha_i + v_{it})(\alpha_i + v_{is})|X] = E[\alpha_i^2 + v_{it}v_{is} + \alpha_i v_{is} + \alpha_i v_{it}|X] = \sigma_\alpha^2 \quad (7)$$

In such a situation, our OLS estimator is inconsistent and biased, or to be precise, it can be written as:

$$\text{plim} \hat{\beta}^{OLS} = \beta + \frac{\text{cov}(x_{it}, \alpha_i)}{\sigma_x^2} \quad (8)$$

The next step usually assumes the application of a fixed effect (FE) estimator, or a random effect estimator (RE). Nevertheless, there are certain situations when pooled regression is actually a better option. Such a situation can be identified by the Breusch-Pagan Lagrange multiplier test, where the null hypothesis is that the variance of the unobserved fixed effects is zero (Breusch & Pagan, 1980). This might result in a situation in which pooled regression is actually a better solution.

Discussion of the obtained results

Table 1 presents the descriptive statistics of the variables from the panel model, while Table 2 shows the results of the estimated three selected panel models. Table 2 contains the pooled regression model (with a dummy variable for each year), FE and RE model results. The Breusch-Pagan Lagrange multiplier test was applied after the Hausman test, where the test statistic 0.8451 implied that the RE was a better option. On the other hand, the modified Wald test for groupwise heteroscedasticity in the fixed effect regression model indicated the following:

- robust (Huber-White-sandwich) standard errors need to be used;
- the Sargan-Hansen test (the test of overidentifying restrictions) needs to be used so as to decide between the RE and the FE.

In the pooled regression model, R-squared is 0.32. As expected, there are some other factors that do affect growth at the regional level in RS, apart from our variable of interest (the entrepreneurship growth rate) and our control variables (the human capital growth rate and year dummies). Also, this setting imposes the following question: Is there an effect of our human capital on the regional level (measured by the proportion of the highly educated in the labor force), our entrepreneurship growth rate at the regional level, and *vice versa*? Furthermore, what is the effect

Table 1 The descriptive statistics of the variables from the panel model

| Variable | Mean | Median | Maximum | Std. dev. |
|---|-------|--------|---------|-----------|
| GVA growth rate | 3.22 | -14.55 | 18.35 | 5.51 |
| Growth rate of human capital | 1.44 | -45.93 | 48.05 | 15.09 |
| Growth rate of the entrepreneurial activity | -0.59 | -28.33 | 23.41 | 5.32 |

Source: Authors

of the growth rate on the regional entrepreneurship growth rate and the regional human capital growth rate?

To answer these questions, there is the need to move on to the models that actually exploit the potential endogeneity issue. The Vector Autoregression Model (the VAR model) was opted for our panel dataset, since it has become one of the basic instruments for analyzing the transmission of shocks through one or more national economies in the last few decades.

The VAR model can be viewed as a dynamic system of equations. Its implementation essentially means that several time series are observed simultaneously. Generally speaking, this approach is suitable for “what if” analysis (Ullah, Wan & Chaturvedi, 2002). The VAR model was originally presented by C. Sims as a framework for defining a monetary policy (Sims, 1980). C. Sims suggested that VAR models were better for forecasting equations based on structural equations. The VAR model essentially consists of “seemingly unrelated regressions” (Greene, 2002). In its first step, the procedure for applying the VAR methodology in general implies the defining of the optimal length of delay (the time lag). The decision on the optimal length of the delay is defined in accordance with the LR test, which implies the application of the Akaike Information Criteria and the Final Prediction Error (FPE).

Table 2 The results of the estimated panel models

| Variables | POOLED model | | FE model | | RE model | |
|---|--------------|-----------|-------------|-----------|--------------|-----------|
| | Coefficient | p - value | Coefficient | p - value | Coefficient | p - value |
| Constant | 0.888 | 0.336 | 2.235 | 0.503 | 2.713 | 0.000 |
| Growth rate of human capital | 0.025 | 0.282 | 5.533 | 0.743 | 3.074 | 0.384 |
| Growth rate of the entrepreneurial activity | 0.082 | 0.015 | 0.228 | 0.002 | 0.214 | 0.000 |
| 2012 | 6.762 | 0.000 | | | | |
| 2013 | 4.528 | 0.006 | | | | |
| 2014 | -1.333 | 0.242 | | | | |
| 2015** | | | | | | |
| 2016 | 1.148 | 0.352 | | | | |
| 2017 | 6.999 | 0.000 | | | | |
| 2018 | 2.549 | 0.078 | | | | |
| 2019 | 1.570 | 0.374 | | | | |
| 2020 | -1.212 | 0.497 | | | | |
| F statistic | 92.68 (0.00) | | 6.15 (0.01) | | 16.59 (0.00) | |
| R ² (R ₂ adj.) | 0.32 (0.29) | | | | | |

*Hausman Prob>chi2 = 0.8451; the modified Wald test for groupwise heteroscedasticity in the fixed effect regression model Prob>chi2 = 0.0000.

** Omitted to avoid the dummy trap.

Source: Authors

The observed model can be represented by the following system of linear equations:

$$Y_{it} = Y_{it-1}A_1 + Y_{it-2}A_2 + \dots + Y_{it-p+1}A_{p-1} + Y_{it-p}A_p + u_i + e_{it} \quad (9)$$

where $i \in \{1, 2, \dots, N\}$, $t \in \{1, 2, \dots, T\}$.

Y_{it} is the vector of the dependent variable dimensions ($1 \times k$); u_i and e_{it} are the vectors of the dimensions ($1 \times k$) that refer to the panel fixed effects, i.e. to idiosyncratic errors; $A_1, A_2, \dots, A_{p-1}, A_p$ are the parameters that should be estimated.

The system of equations is solvable based on the restrictions that follow as a result of the Cholesky decomposition, where there are three variables: economic growth (quantified by the GVA growth rate), the growth rate of human capital and the growth rate of the entrepreneurial activity.

As for the shocks, the following characteristics are assumed:

$$E[e_{it}] = 0, E[e'_{it}e_{it}] = \Sigma \text{ and}$$

$$E[e'_{it}e_{is}] = 0 \text{ for } t > s. \quad (10)$$

The parameter estimation method used is the generalized method of moments (GMM) (Abrigo & Love, 2015). The results are presented through a graphical representation of the impulse-response function. Figure 1 shows the above function in a dynamic frame of three years (a 67% confidence interval).

The findings presented in Figure 1 can be summarized as follows:

- The share of entrepreneurs, as a variable, needs approximately two years to materialize a slight positive impact on regional growth.
- The share of entrepreneurs has a positive impact on human capital (measured as the share of the highly educated in the labor force) within a year or two.

- Regional growth has a positive impact on the share of entrepreneurs. This has a low-intensity impact, but considering data limitations (the short time series and the high frequency of the time series), this finding should be noted.
- Growth has an immediate positive impact (the indications are weakly visible) on the share of entrepreneurs, while it also has a positive impact on the share of the highly educated, but it takes a certain time for this to show, at least a year.

Although unexpected to a certain extent, these results indicate the presence of a problem when regional development in RS is concerned. The first impression is that education should encourage people to start their own business, which means that it is expected that, in those (sub)regions where there is a higher quality/educated workforce, the level of the entrepreneurial activity will be more intensive, i.e. economic growth will be stronger. The impact of education on the level of entrepreneurship, which is not statistically significant, can also be explained if the

motives for starting a business are taken into account. If the educational capital of a society increases, the level of the so-called “necessity entrepreneurship” may decline, because educated people have the qualifications to find a job that can bring them a good income. They earn well and are not forced to start a business; instead, they prefer to be employed in “safer” workplaces, such as foreign companies that operate in the region, or the companies in the public sector where earnings are more secure, and so forth.

In addition to analyzing the employees’ education level, it is also necessary for the jobs performed by the employees holding a college degree to be analyzed. This is important in order to see whether highly educated individuals use their knowledge, abilities and skills adequately. Given the fact that entrepreneurial activities play a vital role in the GVA growth at the sub-regional level, creating a stimulating entrepreneurial environment can encourage highly educated individuals to become key bearers of entrepreneurial activities.

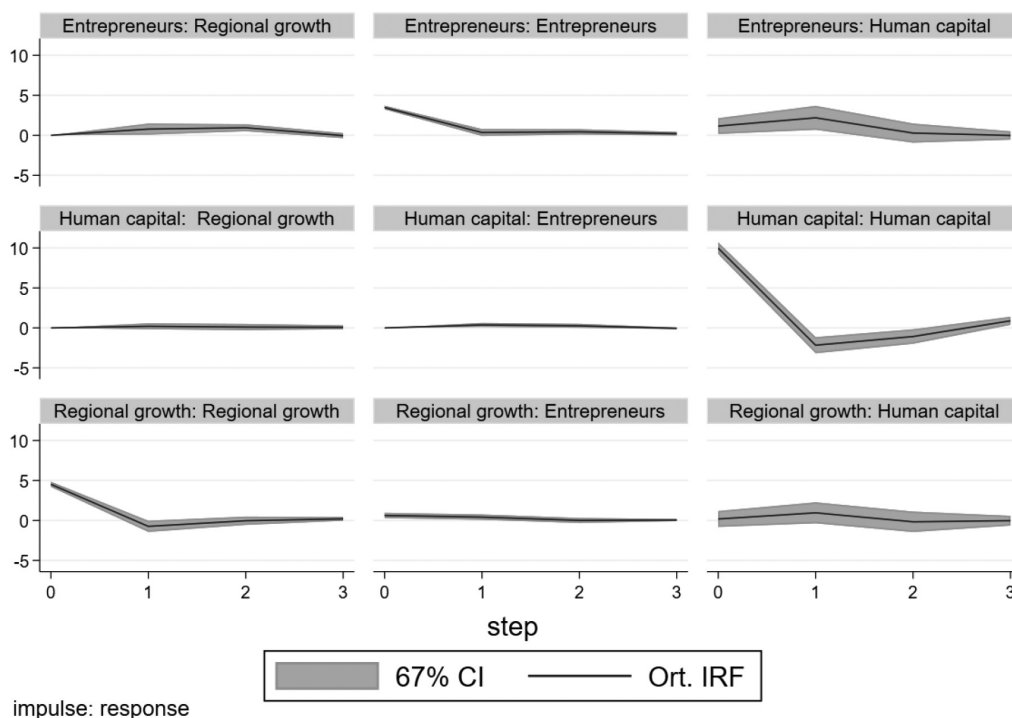


Figure 1 The VAR model results

RECOMMENDATIONS FOR THE REGIONAL POLICY

Since it has been shown above that the entrepreneurial activity contributes to regional growth, the further analysis proceeds with examining the state and potentials in the NUTS 3 sub-regions in RS in terms of the opportunities for improving the business climate and building a stimulating entrepreneurial environment. In order to identify, then implement, adequate measures, policies and support instruments, it is necessary that the basic indicators of regional development should be monitored in compliance with the European approach. Only in this way will the necessary alignment of such measures, policies and instruments with the real needs of the sub-region be ensured, which was often not the case in the past. Table 3 and Table 4 show the basic indicators of development at the level of the NUTS 3 sub-regions in RS.¹

Based on the analysis of the selected demographic indicators (Table 3), a conclusion can be drawn that the Southern Bačka, Northern Bačka, Srem and Raška areas have a more favorable demographic structure. The mentioned areas are characterized by the share of the working age population and population density above and the population ageing index below the national average. The Raška area is the only area characterized by the ageing population index (the ratio of the number of the people in the old population aged 60 and over to the young population between 0 to 14 years of age) below 100. Also, in 2021, this area had the highest share of the young population (between 0 and 14 years of age) in the total number of the inhabitants (17.7%, whereas the national average was 13.61%) and the growth rate of the importance of the young population (27.27%, whereas the national average amounted to 21.20%). From the point of view of the convenience of the environment, which reflects in smaller temperature fluctuations, a different topography, rich water and forest resources, the offer of various recreational activities and the developed traffic infrastructure, the areas are classified into the three groups, namely: high, medium and low convenience of the environment (Josipović, 2018).

Kolubara, Pomoravlje (the Morava River Basin), Bor, Braničevo, Zaječar and Pirot areas have the worst performance in terms of the demographic indicators. Apart from the significantly worse values of the selected demographic indicators compared to the national average in these areas, the share of the young population was significantly below the national average in 2021. The Zaječar and Pirot areas are characterized by the highest average age of the population (48 and 47 years, whereas the national average is 44) and the lowest age dependency ratio (the young population)² (18.50% and 18.93%, respectively). The traffic infrastructure is most developed in the Southern Bačka area, where the share of modern roads is 97.32%. The worst traffic infrastructure is found in the Pčinja area, where the share of modern roadway is only 33.45%. The aforementioned significantly hinders the integration of the Pčinja area at the regional and national levels, as well as access to and the possibility of using the development potential of the rich natural amenities that this area abounds in.

In addition to the demographic indicators and the social well-being indicators, it is necessary to analyze the economic structure and performance indicators (Table 4).

The Southern Bačka and Srem area have the largest share in the creation of gross added value at the level of the national economy (10.2% and 4.30%, respectively). Also, in 2021, these areas achieved the highest gross added value per inhabitant (RSD 857 and 760 thousand, respectively) and had a small number of unemployed persons per 1000 inhabitants compared to the national average (49 and 39, respectively, whereas the national average was 77).

The areas where the largest part of gross added value is created by the secondary and tertiary sectors include the following: Bor (82%), Moravica (74%), Pirot (74%), Srem (72%), Braničevo (71%), Šumadija (69%), Southern Bačka (69%), Zlatibor (68%) and Kolubara areas (68%). Thus, it can be concluded that, in these areas, a significant part of the population earns income outside agriculture as a traditional rural activity. The share of the quaternary sector in the total gross added value of the area ranges from 12.74% in Bor to 34.32% in the Pčinja area.

Table 3 The demographic indicators and the indicators of social well-being at the level of the NUTS 3 sub-regions in Serbia, 2021

| Area | Classification according to the outdoor amenity index* | Population density | Ageing index | Working age population | Higher education employees | Modern roadway |
|---------------------------------|--|--------------------|--------------|------------------------|----------------------------|----------------|
| Western Bačka | low | 66.88 | 169.10 | 64.60 | 18.12 | 91.04 |
| Southern Banat | low | 64.19 | 146.10 | 64.70 | 20.83 | 89.72 |
| Southern Bačka | medium | 153.72 | 120.10 | 65.80 | 33.77 | 97.32 |
| Northern Banat | low | 56.75 | 156.40 | 65.30 | 14.51 | 93.07 |
| Northern Bačka | low | 98.32 | 143.90 | 65.80 | 23.90 | 87.36 |
| Central Banat | low | 52.12 | 148.40 | 64.50 | 21.90 | 94.01 |
| Srem | low | 83.95 | 149.00 | 64.90 | 18.13 | 90.02 |
| Zlatibor | high | 42.21 | 158.20 | 63.40 | 17.48 | 54.00 |
| Kolubara | medium | 64.10 | 168.80 | 64.00 | 10.89 | 82.46 |
| Mačva | medium | 82.80 | 150.90 | 64.70 | 16.05 | 58.80 |
| Moravica | high | 64.35 | 167.10 | 62.70 | 18.76 | 81.48 |
| Pomoravlje (Morava River Basin) | medium | 73.17 | 179.10 | 63.00 | 20.40 | 81.22 |
| Rasina | medium | 80.82 | 180.90 | 62.70 | 25.93 | 70.05 |
| Raška | high | 76.99 | 96.50 | 64.90 | 26.91 | 50.32 |
| Šumadija | medium | 115.55 | 160.80 | 64.00 | 21.12 | 83.85 |
| Bor | high | 30.50 | 196.50 | 62.70 | 26.71 | 68.03 |
| Braničevo | medium | 41.52 | 175.80 | 62.90 | 15.72 | 77.01 |
| Zaječar | medium | 28.21 | 232.80 | 60.00 | 23.07 | 84.00 |
| Jablanica | medium | 69.81 | 151.50 | 65.80 | 17.26 | 58.27 |
| Nišava | medium | 129.80 | 157.70 | 63.80 | 31.18 | 87.12 |
| Pirot | medium | 29.40 | 208.20 | 61.80 | 23.95 | 70.84 |
| Podunavlje (Danube River Basin) | low | 144.32 | 153.40 | 64.40 | 19.50 | 93.37 |
| Pčinja | high | 54.85 | 101.50 | 68.90 | 24.25 | 33.45 |
| Toplica | medium | 36.20 | 154.50 | 62.90 | 26.72 | 58.06 |
| National average | 76.67 | 158.33 | 64.11 | 22.37 | 75.97 | 75.97 |

Notes: * The classification was made according to the results of the research done by S. Josipović (2018) and G. Rikalović & S. Josipović (2018). The indicators are calculated as follows: Population density - people per square kilometers of land area; Ageing index - the ratio of the older population (aged 60+) compared to the pre-productive population (aged 0-14); Working age population - the share of the working age population (aged 15-64) in the total population; Higher education employees - the share of the number of the employees with higher education in the total number of the employees; Modern roadway - the share of modern roads in the total road network.

Source: Authors, based on: G. Rikalović and S. Josipović (2018), Statistical Office of the Republic of Serbia (2022)

Regional development measures and policies should be aimed at ensuring a greater success of entrepreneurial initiatives (e.g. improving the business environment by reducing regulatory and administrative barriers, the possibility of obtaining financial support in the case of starting an independent business venture based on the use of specific local natural, human and cultural resources).

According to G. Rikalović (2004), the role of the regional policy is to help regions create an

entrepreneurial ecosystem that defines the four key elements: policies and development programs should generate a culture of entrepreneurship, education and training for entrepreneurship, business networks that connect entrepreneurs with suppliers and the sources of capital and ensuring access to capital, the infrastructure and institutional support. Improving the educational structure of the population and organizing various training sessions that will provide the knowledge necessary for performing

Table 4 The indicators of the economic structure and performance at the level of the NUTS 3 sub-regions in Serbia, 2021.

| Area | The area's involvement in the creation of GVA | Sector's share in the creation of the region's GVA | | | | Unemployed persons per 1,000 inhabitants |
|---------------------------------|---|--|------------------|-----------------|-------------------|--|
| | | Primary sector | Secondary sector | Tertiary sector | Quaternary sector | |
| Western Bačka | 1.70 | 5.35 | 35.73 | 27.78 | 31.14 | 75 |
| Southern Banat | 4.00 | 4.63 | 35.85 | 27.93 | 31.60 | 65 |
| Southern Bačka | 10.20 | 2.78 | 28.35 | 34.83 | 34.04 | 49 |
| Northern Banat | 1.40 | 4.65 | 43.25 | 23.52 | 28.58 | 51 |
| Northern Bačka | 2.20 | 2.89 | 38.93 | 31.09 | 27.10 | 41 |
| Central Banat | 1.90 | 6.30 | 36.04 | 27.50 | 30.17 | 68 |
| Srem | 4.30 | 2.87 | 44.47 | 30.14 | 22.53 | 39 |
| Zlatibor | 2.90 | 1.88 | 41.92 | 27.60 | 28.60 | 84 |
| Kolubara | 1.70 | 3.84 | 43.37 | 26.24 | 26.55 | 48 |
| Mačva | 2.30 | 1.72 | 41.02 | 28.99 | 28.27 | 86 |
| Moravica | 2.40 | 2.16 | 42.51 | 30.86 | 24.47 | 51 |
| Pomoravlje (Morava River Basin) | 1.90 | 4.28 | 34.49 | 29.40 | 31.83 | 106 |
| Rasina | 2.10 | 1.57 | 42.89 | 26.16 | 29.39 | 85 |
| Raška | 2.40 | 2.03 | 32.37 | 32.00 | 33.59 | 143 |
| Šumadija | 3.10 | 0.93 | 40.56 | 27.94 | 30.57 | 88 |
| Bor | 2.70 | 18.54 | 28.82 | 22.03 | 30.61 | 80 |
| Braničevo | 1.80 | 8.21 | 24.68 | 29.84 | 37.27 | 42 |
| Zaječar | 0.90 | 7.28 | 28.35 | 28.21 | 36.16 | 83 |
| Jablanica | 1.50 | 1.78 | 49.02 | 22.14 | 27.07 | 119 |
| Nišava | 4.00 | 0.71 | 37.73 | 30.52 | 31.04 | 92 |
| Pirot | 0.90 | 1.86 | 44.04 | 21.62 | 32.48 | 112 |
| Podunavlje (Danube River Basin) | 1.60 | 1.61 | 45.05 | 27.15 | 26.20 | 50 |
| Pčinja | 1.30 | 1.94 | 40.49 | 23.11 | 34.47 | 116 |
| Toplica | 0.70 | 1.61 | 51.89 | 17.39 | 29.10 | 125 |
| National average | 4.00 | 3.72 | 37.96 | 27.65 | 30.67 | 77 |

Source: Authors

specific occupations can significantly increase: the productivity of the working age population, the attractiveness of the region for starting new forms of business, the scope of entrepreneurial activities, as well as networking and the exchange of information between different business entities. Due to limited resources, priority should be given to the industries that can provide new jobs and whose development can significantly improve economic performance. In addition, it is necessary to define a development program for the areas of exceptional environmental benefits in RS in order to make the best use of natural resources as a lever for the new regional economic

growth (and development) based on the offer of locally specific, non-marketable products and services. These areas have the potential for the development of organic agricultural production, which can contribute to the improvement of their social, economic and social status (Komazec & Aleksić, 2015). Also, they are particularly attractive for the development of various forms of entrepreneurship, for which it is necessary to ensure the appropriate preconditions defined in the literature as the “four sides of the diamond of entrepreneurship development at the regional level”. According to E. Harpa (2017), these refer to: 1) providing, in addition to natural capital, appropriate

human and financial capital and infrastructure; 2) adopting appropriate strategies and policies, taking particular steps in order to develop specific skills and competencies and preserve local culture and traditions; 3) ensuring the appropriate scope of the market (the number of potential customers); and 4) encouraging the cooperation of various actors at the local level (enterprises, suppliers, financial institutions, distributors).

In this sense, the recommendations for conducting a regional policy first of all refer to the necessity of building an encouraging environment for the development of domestic entrepreneurship (Jakopin, 2020), where people would not decide to start their own business only in a situation in which they have no other options. Bearing this in mind, more efforts should be made in the forthcoming period both at the regional and local levels in terms of building better conditions and a greater predictability of business conditions. This implies a number of financial and non-financial support measures. Efforts should be made in order to reduce pronounced regional inequalities (Molnar, Rikalović & Josipović, 2020b; Rikalović & Molnar, 2021) and improve entrepreneurial demography, i.e. ensure that the largest number of newly opened entrepreneurial shops continue to operate in the long run. As a result, educated people would also decide to take up the entrepreneurial activity, which, in the medium and long run, would have a positive impact on regional economic growth, because the creativity, knowledge and skills that these people have could come to the fore. In this way, opting for other, safer options for themselves, they “lock up” the development resources present in the regions (human capital). Naturally, attracting larger investors should not be completely ignored or abandoned, but it seems that the time is ripe to focus on higher quality investments that have a greater potential to employ highly educated workers. In other words, large international companies in all regions that operate in modern activities in which there is a need for highly educated personnel who can further improve, learn and progress, thus contributing to the development of those companies on the local market are needed more. It is obvious that the current model of attracting foreign investors applied in RS did not

produce the desired/expected results in terms of spillover effects on the local market. In this sense, it is important to stimulate the arrival of the companies that operate in high-tech branches (the quaternary and quintile sectors), not exclusively within the primary or possibly secondary production.

CONCLUSION

The results of this research study obtained by the evaluation of the pooled, FE and RE models confirmed the starting hypothesis of the significant and positive effect of the growth rate of the entrepreneurial activity on the GVA growth rate at the level of the NUTS 3 sub-regions in RS during the period from 2011 to 2020. Unlike the entrepreneurial activity, in the case of the growth rate of human capital no statistically significant effect on regional economic growth was found (although the estimated coefficient with this variable had a positive value in all the models). It was confirmed that entrepreneurs contributed to regional growth, which was expected bearing in mind the existing literature and the findings of the previous empirical studies. Based on the VAR model, it was additionally determined that entrepreneurship had a positive impact on regional growth over a period of up to two years. It was also found that entrepreneurship positively affected the share of the highly educated in the labor force within a year or two.

The obtained results indicate the presence of a problem, even a paradox, when speaking about regional development in RS. Namely, although it is expected that education encourages people to start their own business, the findings of this study point to a somewhat different conclusion. If educational capital increases, the level of the “entrepreneurship out of necessity” may decline. For that reason, future research could focus on exploring the sectors and activities in which highly educated individuals work in sub-regions in RS (which are predominantly rural by nature). If they are employed in the state (public) sector or in the privately-owned companies where they do not have the opportunity to engage in modern activities in a creative way, then their contribution is highly questionable. Highly educated individuals seem to be working in those sectors/activities where

it is more difficult to take risks, i.e. they prefer safe jobs with a certain (though not particularly high) salary, and that is often the public sector. According to the findings of this research, it seems that, in the NUTS 3 sample, the assumption that highly educated individuals have the appropriate ability to recognize opportunities on the market is not valid; they are not inclined to start independent entrepreneurial businesses, but rather look for “safer” jobs (primarily in the state sector) that provide them comfort.

Another issue that remains open regards the connection between the level of education and entrepreneurship, i.e. how highly educated individuals can become those who will contribute to regional growth through their own entrepreneurial ventures, which can be one of the directions for future research in this field. On the other hand, wonders may remain whether this particular way of measuring human capital (the share of highly educated people in the total number of employees, which is the way it is measured traditionally) is suitable for RS. Perhaps it would be advisable to take some other variables that would reflect the state of human capital in a better way - such as the share of expenditures for research and development at the enterprise level, investments in additional training and the acquisition of skills and knowledge and so on.

One of the recommendations for the economic policymakers in RS stemming from the results of this research study is that enhancing the conditions that would favor the improvement of the existing businesses and an increase in the number of new entrepreneurs is what should be worked on. This first of all refers to the development of a favorable business environment - an appropriate business climate (the level of taxes and contributions, administrative benefits), as well as the creation of a stimulating environment for creativity, diversity and the development of innovation and entrepreneurial culture. A lot of work needs to be done so as to transform human capital (the potential of highly educated individuals) into entrepreneurial capital (which contributes to economic growth).

ENDNOTE

- 1 The Belgrade area was not treated in this segment of the analysis since it is the only NUTS 3 sub-region that, according to the level of economic development, significantly deviates from the national average. In that sense, it represents an outlier. Furthermore, it is the sub-region that records the largest absolute increase in the number of inhabitants in RS, and hence as such draws human capital from other areas. Therefore, in accordance with this research subject and aim, the focus here is on researching the sub-regions that traditionally have an outflow of the younger-age and more educated population.
- 2 The ratio of the pre-productive population (aged 0-14) to the working age population (ages 16-65).

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Dejan Molnar is an Associate professor at University of Belgrade - Faculty of Economics and Business, where he received his BSc (2004), MSc (2009) and PhD (2013) degree. He is a member of the Committee for Economic Sciences of Serbian Academy of Sciences and Arts (SASA), the Belgrade Association of Economists, the Serbian Scientific Association of Economists. The main fields of his research interest are local economic development, regional economics, energy economics and creative economy.

Sonja Josipović is Assistant Professor in Economics at the University of Belgrade – Faculty of Technology and Metallurgy, Department of Social Sciences. She received her BSc, MSc and Doctoral Degree in Economics from the University of Belgrade – Faculty of Economics and Business, Serbia. She is a member of the Belgrade Association of Economists and the Expert Network for Green Economy of the Foundation for the Advancement of Economics. Her main research areas include environmental economics, rural development, human capital, entrepreneurship and innovations.

Bojan Baškot is an Assistant professor at the Faculty of Economics, University of Banja Luka. He received his PhD in the field of economic sciences and operational research. He worked at the Central Bank of Bosnia and Herzegovina and was a researcher at the Institute for Graduate Studies in Geneva. He was also hired by the International Organization for Migration as an information management analyst.