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Boban Stojanović, Snežana Radukić, Milan Kostić and Zorana Kostić
HOW DOES MARKET SHARE AFFECT THE INCREASE IN THE VALUE OF INVESTMENT UNIT OF VOLUNTARY PENSION FUNDS?
457

Snežana Miletić and Savka Vučković Milutinović
AN ANALYSIS OF ACCRUAL-BASED EARNINGS MANAGEMENT IN LARGE SERBIAN COMPANIES
469

Vladimir Mihajlović
THE NEXUS BETWEEN UNEMPLOYMENT AND ECONOMIC GROWTH IN SERBIA: DOES OKUN'S LAW HOLD?
484

Mihajlo Babin, Goran Radosavljević and Ivan Đokić
LEGAL UNCERTAINTY AS THE IMPEDIMENT TO ECONOMIC GROWTH OF SERBIA
500

Nataša Stanojević
EXPORT POTENTIAL OF SERBIA'S DEFENSE INDUSTRY
510

Igor Kovačević, Aleksandra Anić, Maja Ribić and Aleksandra Đorđević Zorić
ECONOMIC IMPACT OF THE CREATIVE INDUSTRY AND THE EXAMPLE OF SERBIA
522

Gordana Radović
COMPARATIVE OVERVIEW OF THE STATE OF AGRICULTURAL INSURANCE IN SERBIA AND CROATIA
532

Jelena Lukić, Jamila Jaganjac and Snežana Lazarević
THE SUCCESSFULNESS OF CRISIS MANAGEMENT TEAMS' RESPONSE TO THE CRISIS CAUSED BY THE COVID-19 PANDEMIC
545

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This edition of *Ekonomika preduzeća* opens with an interesting paper in the *Finance* section written by *B. Stojanović, S. Radukić, M. Kostić* and *Z. Kostić*. The authors evaluate the static and dynamic relationship between a pension fund's market share and value of the investment unit. The research was designed to monitor changes in the size of market share and changes of their investment units in the period from 2008 to 2017 in Serbia. The main findings suggest that the size of market share of an individual voluntary pension fund has no influence on growth of the investment unit value. Contrary to the static approach, the dynamic approach argues that changes of market share determine the performance of voluntary pension funds. The obtained results point out that performance of an individual pension fund does not depend on its size, but rather on its ability to spread in the market and increase its market share. This paper offers a systematic review of relevant empirical literature on internal and external determinants of pension funds' performance.

The first paper in the *Accounting and Auditing* section, authored by *S. Miletić* and *S. Vučković Milutinović* analyzes the systematic differences in earnings management across 215 large companies operating in the real sector in Serbia in the period from 2009 to 2017. The authors constructed an aggregate measure which covers several aspects of accrual-based earnings management. The results indicate that the accrual-based earnings management, which is immanent in economies with underdeveloped capital markets, weak investor protection and frequent changes in the regulatory framework coupled with inefficient judiciary, is widespread among large Serbian companies. Having found significant differences in the levels of earnings management across companies, the authors examined the mean values of the aggregate earnings management measure for numerous categorical variables in order to identify whether individual company characteristics are related to incentives for aggressive exploitation of accounting discretion.

In the *Economic Growth and Development* section, *V. Mihajlović* investigates the relationship between real GDP growth and the unemployment rate in Serbia. The analysis is motivated by the fact that the unemployment rate in Serbia has decreased significantly over the last decade (especially after 2014) despite the relatively modest rates of economic growth. These tendencies indicate the possibility of a nonlinear (asymmetric) relationship between these variables, which has important implications for designing a more efficient economic and employment policy. Application of both linear and nonlinear Autoregressive Distributed Lags models to quarterly data in the 2008-2019 period reveals that the relationship between economic growth and the unemployment rate is negative, as suggested by Okun's law, but also that there is a profound asymmetry in this

relationship. The second paper in this section, written by *M. Babin, G. Radosavljević* and *I. Đokić,* investigates the scope of criminal policy in the prevention of tax indiscipline. The analysis of the shortcomings of the existing legal solutions is accompanied with the assessment of prevailing case law and tax evasion criminalization in selected European countries. The holistic research approach enabled the development of a specific proposal for the enhancement of the legal framework and, consequently, an increase of legal certainty with positive effects on the economic growth of Serbia in the mid and long term.

In the *International Economics* section, *N. Stanojević* empirically tests an augmented gravity model of international trade in order to investigate the impact of various factors on the volume and direction of the export of the Serbian defense industry. The results show that military expenditure, military import and a dummy variable referring to historical ties in military trade have positive effects, while, on the other hand, the population, distance and degree of industrial development of partner countries have negative effects on Serbia's military export. The result is reflected in three empirical models, each with a high coefficient of determination, but with different statistical significance of the variables.

In the *Economics of Organizations and Industries* section, a young team of authors, *I. Kovačević, A. Anić, M. Ribić* and *A. Đorđević Zorić*, tries to bring additional value to understanding the economic impact of creative industry and to show that this sector in Serbia has demonstrated clear growth in the analyzed period, with the average increment rate of the number of entities being at the level of 62% for narrow, and at 7.8% for the broader approach. In the observed period, GVA of the private sector in the creative industry has increased by 64.9% by narrow definition, with an average annual growth of 18.1%. The share of GVA in GDP of the creative industry by broad definition is higher than that of some traditional industries. In the second paper in this section, *G. Radović* analyzes the development of agricultural insurance from 2006 to 2018, focusing on family agricultural farms that can be observed as microenterprises important for the growth of the insurance industry in the observed countries. Based on the conducted research, the author concludes that both in Serbia and Croatia, agricultural insurance of family agricultural farms is underdeveloped and that there are significant opportunities for growth of the insurance industry in this market segment.

The last paper in this edition is included in the *Management* section. A trio of authors, *J. Lukić, J. Jaganjac* and *S. Lazarević*, explores the successfulness of crisis management teams' response to the crisis caused by the COVID-19 pandemic. This paper indicates that even those organizations that do not have permanent crisis management teams can adequately respond to crisis if they timely decide to form a crisis management team and respond to the imposed challenges. Results of the research conducted during April and May 2020, which included 108 members of crisis management teams, showed that the teams responded to the pandemic in an adequate manner.

Prof. Dragan Đuričin, Editor in Chief

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Boban Stojanović
University of Niš
Faculty of Economics
Department for General Economic Theory

Snežana Radukić
University of Niš
Faculty of Economics
Department for General Economic Theory

Milan Kostić
University of Kragujevac
Faculty of Economics
Department for General Economics and Economic Development

Zorana Kostić
University of Niš
Faculty of Sciences and Mathematics
Department for Geography

HOW DOES MARKET SHARE AFFECT THE INCREASE IN THE VALUE OF INVESTMENT UNIT OF VOLUNTARY PENSION FUNDS?*

Kako tržišno učešće utiče na povećanje vrednosti investicione jedinice dobrovoljnih penzijskih fondova?

Abstract

The importance of this research stems from highly concentrated markets of voluntary pension funds, on the one hand, and intensive competition pressure among market participants, on the other. The main purpose of this paper is to evaluate the static and dynamic relationship between a pension fund's market share and value of its investment unit. The research was designed to monitor the changes in the size of market share and investment units in the period from 2008 to 2017 in the funds in the Republic of Serbia. The main findings suggest that the size of market share of individual voluntary pension funds has no influence on the growth of investment unit value. Contrary to the static approach, the dynamic approach argues that the changes of market share affect the performance of voluntary pension funds. The obtained results indicate that the performances of individual pension funds do not depend on their size, but rather on their ability to occupy a larger portion of the market and increase their market share. This paper provides a systematic review of the relevant empirical literature on internal and external determinants of a pension fund's performance. It represents a significant contribution to the understanding of market factors, such as market share and value of investment units.

Keywords: *voluntary pension fund, market share, investment units.*

Sažetak

Važnost ovog istraživanja proizlazi iz visoke koncentracije tržišta dobrovoljnih penzijskih fondova, s jedne strane, i intenzivnog pritiska konkurencije među učesnicima na tržištu, s druge strane. Glavna svrha ovog rada je procena statičkog i dinamičkog odnosa između tržišnog učešća dobrovoljnih penzijskih fondova i vrednosti njihovih investicionih jedinica. Istraživanje je osmišljeno sa ciljem praćenja promene veličine tržišnog učešća i promene njihovih investicionih jedinica u periodu od 2008. do 2017. godine u Republici Srbiji. Glavni rezultati istraživanja upućuju na to da veličina tržišnog učešća pojedinačnih penzijskih fondova ne utiče na rast vrednosti investicionih jedinica. Suprotno statičkom pristupu, dinamički pristup tvrdi da promene tržišnog učešća utiču na performanse dobrovoljnih penzijskih fondova. Dobijeni rezultati ukazuju na to da performanse pojedinačnih penzijskih fondova ne zavise od njihove veličine, nego od njihove sposobnosti širenja na tržištu i povećanja njihovog tržišnog učešća. Ovaj rad daje sistematičan pregled relevantne empirijske literature o unutrašnjim i spoljnim determinantama funkcionisanja dobrovoljnih penzijskih fondova. Rad predstavlja značajan doprinos razumevanju tržišnih faktora, kao što su tržišno učešće i vrednost investicionih jedinica.

Ključne reči: *dobrovoljni penzijski fond, tržišno učešće, investicione jedinice.*

Introduction

Large potential of a pension fund's performance has been argued on a theoretical basis and demonstrated empirically. In general, the performance of pension funds is conditioned by the influence of a number of factors which can by nature be either internal or external. Internal factors relate to the specific characteristics of individual funds, such as the structure of investment portfolios, financial structure, size, and age of the fund. On the other hand, external factors include characteristics of the macroeconomic environment and, due to their systemic character, affect the performance of the overall pension system to a greater or lesser extent. Considering the fact that the primary function of a pension fund is reflected in providing economic and social protection from risks, it is logical that examination of the factors that determine the performance of funds appears as a key part of a comprehensive economic analysis.

The subject matter of the analysis is comprehensive evaluation of whether the market share really affects the value of investment units of voluntary pension funds in the Republic of Serbia. Faced with intense market competition, voluntary pension funds strive to maintain and improve their market position, as the main source of growth, better performance, and value creation for shareholders. Changes in the market share, as one of the crucial performance determinants of pension funds, become very important in the volatile macroeconomic conditions under which companies in Serbia operate. This paper aims to expand the existing empirical literature on the impact of market share of voluntary pension funds on the increase in the value of their investment units. It seems reasonable to assume that a change in a company's market share will, more or less, be reflected in the company's performance. Therefore, the present research seeks to investigate whether the changes in the size of market share of a pension fund really affected its investment unit value in the period from 2008 to 2017.

This paper is organized as follows. The Introduction is followed by a summary of literature review about the main trends and variables which determine a pension fund's performance. The third part of this paper describes the dataset and relevant methodological basis of the research. The fourth includes the econometric analysis and discussion of the obtained empirical results. Finally, the paper ends with the summary and conclusions.

Literature review

The objective of any pension system is to provide adequate, sustainable, and robust benefits. It should help protect countries against economic shocks and long-term demographic changes [15]. On the one hand, the pension fund industry has witnessed a significant growth in the past few years. This phenomenal growth trend is likely to continue in the coming decades [28]. Nevertheless, over the last twenty years the pension fund industry has undergone significant concentration. Major concern about such concentration is that firms might be able to exercise market power. However, it could result in their positive performance, especially if economies of scale are present in the industry [11, p. 63], [4]. In this context, this paper contributes to current literature by examining market share volatility effects on a pension fund's performance.

The scope of transitory changes in pension systems determines the market structure and the pension fund's performance. These changes are covered in literature with a special focus on the time of crisis [14], [8], [25]. In the case of Hungary, "the pension policies were erratic and served short-term electoral demands without offering long-term solutions for structural problems" [1, p. 350]. In this respect, the changes in multi-pillar systems in Central and Eastern Europe, according to the simulations, will have a relatively small impact on the value of future old-age pensions, particularly in countries that decided to make a temporary change in pension contributions. "The net outcome of post-crisis pension system modifications depends on the magnitude of fully-funded contribution reduction, but also on the design of Pay-As-You-Go component and the way individual pension rights are accrued. These results indicate the rise in implicit liability of pension system in Slovakia to be higher than the reduction of the explicit liability caused by the pension system change and the lower rise of implicit liability in Poland and Latvia" [7, p. 110]. Additionally, the latest research studies in this

field have analyzed the behavior of second pillar pension fund participants. The results in Lithuania show that the majority of participants make irrational choices when selecting the pension fund. Moreover, the participants are passive and tend not to change their pension funds during the accumulation period [21].

Some authors point out that pension privatization would not only enable higher pensions for future beneficiaries at the micro level, but would also accelerate economic growth and increase national saving at the macro level [3]. Hence, examining the case of the Swedish pension system, Czech [9] illustrates the fact that privatization of the public sphere brings not only benefits, but also market failures that used to be addressed by traditional welfare states. Actually, the contemporary re-designing of the pension system was aimed at two goals: relief to public finance and expanding pension funding by financial intermediaries. Consequently, Ząbkowicz [30] argues that they are in contradiction to each other, which makes the paradox of reforming pensions.

Some studies investigate scale economies and the optimal scale of pension funds, estimating different cost functions with varying assumptions about the shape of the underlying average cost function. Based on the data provided by the Dutch pension funds over the 1992-2009 period, the authors of one study found that "unused scale economies for both administrative activities are indeed large and concave, that is, huge for small pension funds and decreasing with pension fund size. We observe a clear optimal scale of around 40,000 participants during 1992–2000 (pointing to a U-shaped average cost function), which increases in subsequent years to size above the largest pension fund, pointing to monotonically decreasing average costs" [5, p. 25].

In order to determine whether pension funds are good monitors, it is necessary to identify the influence of the control structure of pension funds over the financial performance and market value of public companies. Using dynamic models of linear and non-linear regressions in an unbalanced panel from 1995 to 2015, it is shown that pension funds in Brazil do not play a good monitoring role, as the control structure of pension funds is negatively related to the financial performance of a company or, in other words, the higher the stake, the worse the performance of the company [27]. Some authors create a new liability benchmark for referencing the asset performance. Measuring the asset performance with respect to the liability benchmark yields the Asset-Liability-Result approach. This approach, that uses the liability benchmark for analyzing the entire pension fund markets' performance and as an operational tool for individual pension funds, shows that the pension funds' recovery from the recent financial crisis took much longer than the value increase of the asset portfolios suggests. Furthermore, this model can be used as a market model to analyze various pension markets around the world [6].

Papík [24] monitors the composition of assets and describes the relation between equity and mixed pension funds' profit and components of assets they own. Accordingly, the obtained results contribute to a better understanding of the importance of certain types of financial assets owned by equity and mixed funds and their impact on pension funds' profit. On the other hand, the relationship between the performance and degree of diversification of a pension fund's portfolios suggests contradictory results [20]. Lee [19] systematized the effects of macroeconomic variables and market factors on profitability and proved empirically that the influence of insurance portfolio concentration on company's performance, although negative, is not significant. As regards the effects of micro and macroeconomic factors on performance, some findings of studies conducted in Jordan show that liquidity, leverage and underwriting risks have a negative and significant effect, whereas the size of the company, market share and GDP statistically have a positive and significant effect on the profitability of the Jordanian insurance industry [2]. Hailegebreal [13] examined macroeconomic and firm-specific determinants of profitability of Ethiopian insurance industry. Knežević et al. [17] measured the efficiency of the insurance companies operating in Serbia using the DEA method. A recent study has shown a statistically significant positive impact of the change in market share on the change of the profit margin of companies [26], [16]. Empirical findings indicate a significant and negative influence of the combined ratio, financial leverage and retention rate on the profitability of non-life insurers,

as measured by the return on assets (ROA), while the influence of the written premium growth rate, return on investment and company size is significant and positive. One should not neglect the fact that it is desirable to achieve a delicate balance between business principles due to, in the short run, excessive requirements for profitability that may threaten the safety of operations [18]. The increase in the premium growth rate will ensure the growth of the company and its market share. In addition, companies set prices according to the prices of competitive companies concerned that they might lose market share [23, p. 518].

Based on the literature that examines the relationship between the market share and performance of companies that operate in a certain market, we have defined the basic research hypothesis of the present paper as follows: There is a statistically significant positive impact of market share size (MS) on the movements in investment unit value (rVIUvpf) in the Serbian pension fund market.

Voluntary pension funds have a special importance for the Serbian pension system because they reduce the pressure on public finance in terms of expenditures and raise the level of life quality of individuals after the end of their working life. At the end of the fourth quarter of 2018, the market of voluntary pension funds in the Republic of Serbia included four companies managing seven voluntary pension funds, one custodian bank and five agent banks. According to the National Bank of Serbia [22, pp. 4], the voluntary pension funds' net assets expanded by 2.7% in 2018. In addition, the changes in the value of net assets reflect net contributions, withdrawals and investment returns. Measured by the Herfindahl-Hirschman Index, market concentration amounted to about 2,780 points, which indicates high concentration in the voluntary pension funds market. According to the size of net assets relative to total net assets of the sector, two funds were classified as large and two as medium. Together, they held 95% of the market share, with the largest fund accounting for around 40%. At the end of the fourth quarter of 2018, 192,295 users were in the accumulation phase (when contributions are made). The number of users is the number of people who are members of voluntary pension funds. This number is lower than the number of membership contracts, as there is a significant number of users with more than one membership contract in one or several voluntary pension fund. Total membership contracts in voluntary pension funds stood at 261,726, and voluntary pension fund users accounted for 9% of the total number of employees [22].

Methodological basis of the research and data sources

In order to increase the transparency of operations of voluntary pension funds and improve the comparability of movements in their investment unit values, the National Bank of Serbia has devised the FONDex index, a unique indicator of movements in the voluntary pension fund system. To illustrate, FONDex may be viewed as an investment unit value of an imaginary fund representing all funds operating in Serbia. The FONDex value is calculated on a daily basis. Its value for the selected date is obtained by multiplying the index value for the previous business day with the weighted average of chain indices of investment unit values for each fund. A fund's net value is taken as a weighting factor; hence the effect of each fund's investment unit value on the formation of FONDex value is proportional to that fund's market share. The first calculation date was 15 November 2006, while the initial FONDex value is 1,000. The following should be noted (the National Bank of Serbia):

a) Previous index values (of investment units) do not guarantee future results. Future values may be higher or lower than the previous ones.
b) A percentage-wise change in the FONDex index (as with any other index), relative to an earlier date, is more significant than its present absolute value. This is particularly important when movements in investment unit values of voluntary pension funds are compared to movements in FONDex values.

The FONDex index can be calculated using the following formula:

$$FONDex(t) = FONDex(t\text{-}1)\frac{\sum_{i=1}^{n}\frac{IJ(i,t)}{IJ(i,t\text{-}1)}NI(i,t)}{\sum_{i=1}^{n}NI(i,t)} \quad (1)$$

$$FONDex(t_0) = 1000 \quad (2)$$

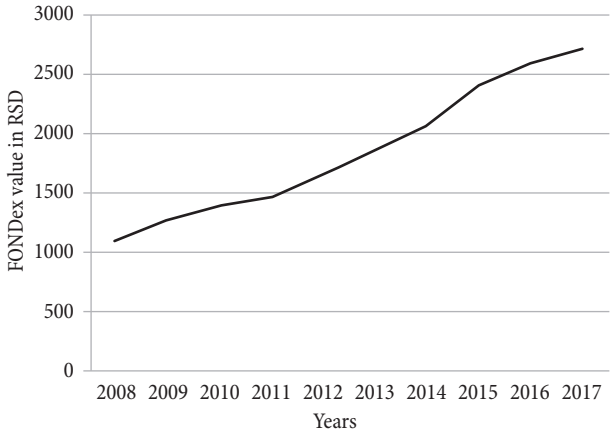
where:

FONDex(t) – FONDex value on selected day t

FONDex(*t-1*) – FONDex value on the business day preceding day *t*
n – number of VPFs operating on day *t*
IJ (*i,t*) – fund's investment unit value *i* on day *t*
IJ (*i,t-1*) – fund's investment unit value *i* on the business day preceding day *t*
NI (*i,t*) – fund's net asset value *i* on day *t*
FONDex (t_0 – FONDex value on the first calculation date (15 November 2006).

Bearing in mind the abovementioned, the investment unit value (VIUvpf) is considered to be the best indicator of a voluntary pension fund's performance and the basis for investors' decision-making when investing. The investment decision does not depend that much on the absolute value of the investment unit, but rather on the rate of its growth (rVIUvpf). The reason for this lies in the fact that the value of these units (at least in Serbia) has a constant tendency of growth; thus, it may happen that a fund that subsequently enters the market has a lower investment unit value. It can then be attractive for investments only if the growth of its investment unit is greater than the growth of other pension funds' investment units. The movement of FONDex as a composite index, which shows the trend of movement in the Serbian voluntary pension fund system, indicates constant growth of voluntary pension funds' investment unit values in Serbia (Figure 1).

Figure 1: Movement in FONDex values between 2008 and 2017 in RSD



Source: Authors' calculations.

Bearing in mind the fact that the FONDex value shows a constant tendency of growth, it can be said that the investment unit value is greater for those funds that have entered the market earlier. We conclude that the absolute value of an investment unit cannot be the measure of a fund's performance and a basis for investing. The increase in investment unit value can be used better for this purpose.

In the analysis of the impact of market share on the increase in the value of investment units of individual voluntary pension funds (rVIUvpf), the authors used a linear panel-data model. The panel regression model involves observing and analyzing the behavior of multiple entities over time. Namely, the analysis repeats the measurements of the same entities over time in order to examine the relationship between the observed phenomena. The regression model used in the study has had the following form [29]:

$$Y_{i,t} = c + \beta_1 X_{i,t} + \alpha_i + u_{i,t} \quad (i = 1,2,...n) \qquad (3)$$

where $Y_{i,t}$ is a dependent variable of entity *i* (in this case pension fund) in month *t*, $X_{i,t}$ is an independent (explanatory) variable of entity *i* in month *t*, β_1 is a coefficient in front of an independent (explanatory) variable that measures the impact of the independent variable on the dependent one, α_i is an unknown intercept for each entity, and $u_{i,t}$ is a residual or statistical error. In this paper, the dependent variable is a change in the investment unit value of a voluntary pension fund (rVIUvpf). Independent (explanatory) variable is the size of a pension fund's market share (MS), determined as the share of pension fund's net assets in the total net assets of all voluntary pension funds in Serbia. In addition to this explanatory variable, there are also two control variables: absolute net asset value (NAV) and absolute value of investment unit (VIUvpf) with a one-month lag. VIUvpf with a one-month lag means that the value of investment unit from the beginning of each month is important for its growth at the end of the month. According to this, the following regression equation was used for the conducted research:

$$\begin{aligned} rVIUvpf_{i,t} &= c + b_1\, MS_{i,t} + b_2\, NAV_{i,t} \\ &+ b_3\, VIUvpf_{i,t-1} + \alpha_i + u_{i,t} \quad (i = 1,2,...n) \end{aligned} \qquad (4)$$

In equation 4, $rVIUvpf_{i,t}$ is the change in the investment unit value of voluntary investment fund *i* in month *t*, which is obtained using the formula $\frac{VIUvpf_{i,t} - VIUvpf_{i,t-1}}{VIUvpf_{i,t-1}}$, where $VIUvpf_{i,t}$ is the investment unit value of pension fund *i* in month *t*. Variable $MS_{i,t}$ is the market share of voluntary

pension fund *i* in month *t*. Variable $NAV_{i,t}$ is net asset value of pension fund *i* in month *t* and $VIUvpf_{i,t-1}$ is the absolute value of investment unit for fund *i* in month *t–1*.

An alternative regression model was also used in the research in the following form:

$$rVIUvpf_{i,t} = c + b_1 \Delta MS_{i,t} + b_2 NAV_{i,t} + b_3 VIUvpf_{i,t-1} + \alpha_i + u_{i,t} \quad (i = 1,2,...n) \qquad (5)$$

where $\Delta MS_{i,t}$ is the change in the market share of fund *i* in month *t*, which is obtained using the formula $MS_{i,t} - MS_{i.t-1}$. It is the first difference of the MS value.

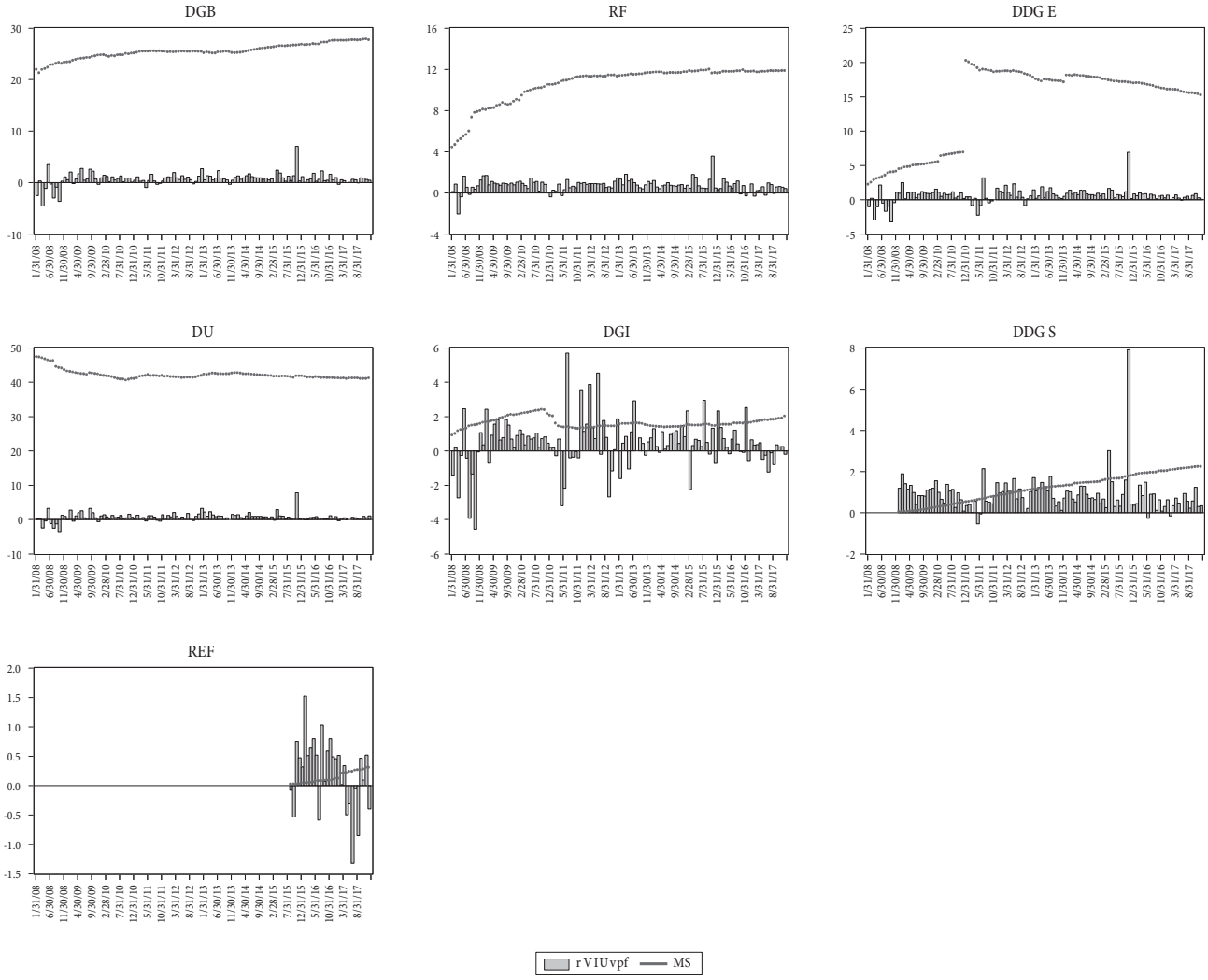
For both alternative regression models, we used the fixed effects model or the LSDV model. We tested the appropriateness of regression models using two tests: the Hausman test and the Wald test (Tables 2 to 5 in Appendix). The source of data for the conducted research was the database of the National Bank of Serbia (NBS). The data were processed in the EViews7 statistical program.

Research results and discussion

As already stated, the performance of a voluntary pension fund can be measured through the increase in its investment unit value. The researchers were interested in whether such increase was influenced by the size of market share or greater market share meant that the company also had a higher growth of the investment unit value. The diagram of the trend in market share size and the increase in investment unit value is presented in Figure 2.

As can be seen from Appendix (Table 1), the maximum value of an individual fund's market share in the observed

Figure 2: Diagram of the trend in market share size (MS) and increase in investment unit value (rVIUvpf) for all active voluntary pension funds in Serbia between 2008 and 2017 (monthly data)



Source: Authors' calculations in EViews7.

period was 47.20%, while the minimum was 0.004%. The average fund's market share size in the voluntary pension fund market in Serbia was 15.33%. Between 2008 and 2017, maximum monthly increase in investment unit value was 7.91%, and minimal increase (in this case, decrease) was -4.56%. The average monthly growth of investment unit value of voluntary pension funds in Serbia was 0.66%. The same table shows that the highest growth of market share in the analyzed period amounted to 13.37%, while the biggest decrease was 1.80%. The average change in market share was 0.032%.

The first regression model shows that there is a positive impact of the size of pension fund's market share on the movement in investment unit value; however, this impact is not statistically significant (p=0.86; p>0.01). The same goes for net assets. Only the value of investment unit with a one-month lag has a statistically significant negative impact on the growth of this value. If we talk only about the impact of market share on the movement in investment unit value, our research hypothesis should be rejected (Table 1).

Given that there is no statistically significant impact of market share size on the increase in investment unit value, the following question arises: Which part of an entity's market position can lead to an increase in its investment unit value? The response should be sought in the change in market share, which is why further research should include the analysis of the impact of changes in company's market share on the increase in its investment unit value. The changes of market share (the first difference of this value) and investment unit value are given in Figure 3.

The alternative regression model shows that there is a statistically significant positive impact of the change in the market share of voluntary pension funds on the increase in their investment unit value (p=0.0048; p<0.01) (Table 2).

The impact of the changes in market share, net assets and investment unit value of pension funds on the increase in their investment unit value in Serbia can be shown through the following equation:

$$rVIUvpf_{i,t} = c + 0.137\Delta MS_t + 0.00003NAV_t - 0.00054VIUvpf_{t-1} + \alpha_i + u_{i,t} \ (i = 1,2,...7) \quad (6)$$

The statistical analysis (Table 2) showed that the increase of one percentage point in the market share of a voluntary pension fund in Serbia leads to an increase in the value of its investment unit by slightly less than 0.14 percent. The impact of the other two variables is not statistically significant at the level of 5% (p>0.05). The R-squared value of 0.70 shows that this regression

Table 1: The results of the panel analysis of the impact of market share size (MS), net assets value (NAV) and investment unit value on the increase in investment unit value (rVIUvpf)

Dependent variable: *rVIUvpf*				
Method: Panel Least Squares				
Date: 03/26/19 Time: 16:18				
Sample (adjusted): 2/29/2008 10/31/2017				
Periods included: 117				
Cross-sections included: 7				
Total panel (unbalanced) observations: 719				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	1.469630	0.485907	3.024507	0.0026
MS	0.001995	0.011255	0.177290	0.8593
NAV	3.17E-05	2.03E-05	1.559275	0.1195
VIUvpf(-1)	-0.000567	0.000305	-1.859646	0.0634
Effects specification				
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.697753	Mean dependent var		0.680582
Adjusted R-squared	0.634041	S.D. dependent var		1.091740
F-statistic	10.95176	Durbin-Watson stat		1.824278
Prob(F-statistic)	0.000000			

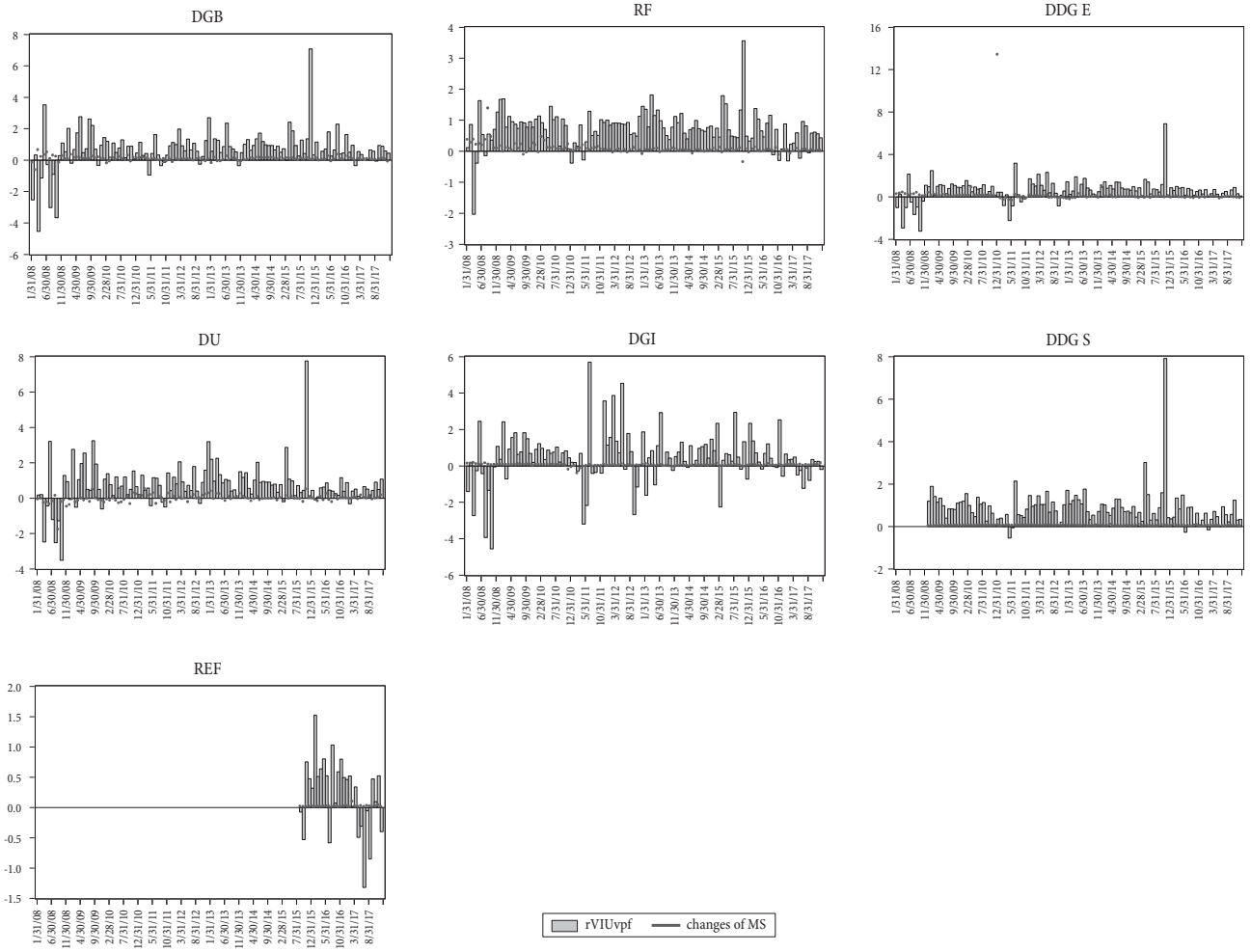
Source: Authors' calculations in EViews7.

Table 2: The results of the panel analysis of the impact of changes in market share (*ΔMS*), net assets (NAV) and investment unit value on the increase in investment unit value (rVIUvpf)

Dependent variable: rVIUvpf				
Method: Panel Least Squares				
Date: 03/28/19 Time: 18:01				
Sample (adjusted): 2/29/2008 10/31/2017				
Periods included: 117				
Cross-sections included: 7				
Total panel (unbalanced) observations: 717				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	1.457284	0.466531	3.123657	0.0019
ΔMS	0.137142	0.051607	2.657399	0.0081
NAV	2.79E-05	2.03E-05	1.376729	0.1691
VIUvpf(-1)	-0.000536	0.000304	-1.764921	0.0781
Effects specification				
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.701093	Mean dependent var		0.680936
Adjusted R-squared	0.637873	S.D. dependent var		1.092736
F-statistic	11.08964	Durbin-Watson stat		1.828168
Prob(F-statistic)	0.000000			

Source: Authors' calculations in EViews7.

Figure 3: Diagram of the changes in market share (ΔMS) and investment unit value (rVIUvpf) for all active voluntary pension funds in Serbia between 2008 and 2017 (monthly data)



Source: Authors' calculations in EViews7.

equation represents the impact of change in market share on the increase in investment unit value well, that is, 70% of changes in the value of an investment unit can be explained by this regression model, while the remaining 30% can be explained by other factors. Autocorrelation was tested using the Durbin-Watson statistic (DW = 1.83); the results indicated that there was no autocorrelation problem in the model: Field [12] considers that values below 1 and above 3 are worrying, while Dufour and Dagenais [10] claim that the values of concern fall above 2.50 and below 1.50.

Concluding remarks

High market concentration in the pension fund industry and a relatively small number of participants have influenced the pension funds' performance. This paper summarizes whether and to what extent market share really affects the value of investment unit.

It can be concluded that in the Serbian voluntary pension fund market, the market share size of individual pension funds has no impact on the increase in their investment unit values. This means that the size of a company, measured through the size of market share, does not have an impact on business performance, measured through the increase in investment unit value. Thus, the basic hypothesis of the research is rejected. However, further research has led to the conclusion that the dynamics of the change in market share actually influences the business performance of voluntary pension funds. The value of investment unit grows with the growth of market share. If a pension fund increases its market share by one percentage point, the value of its investment unit increases by slightly less than 0.14%. It can be said that the performance of a

fund depends primarily on its ability to win the market and to seize the share from other companies. The level of change in investment unit value caused by the change in company's market share can relativize this conclusion. Therefore, if a VPF management company wants to increase the value of its investment unit by 1%, it has to increase its market share by more than 7%, which is not easy in contemporary market conditions. In the end, it can be said that the market share impacts the investment unit value through its changes. However, that impact is not as great as one might think.

The presented research yields new findings about the relationship between a pension fund's market share and the value of its investment unit. The originality of this paper derives from the fact that it highlights a new approach to measuring the mentioned relationship in the voluntary pension fund market which seems to be a rather unexplored topic.

Further research should be conducted in two directions: empirically and methodologically. The first refers to the expansion of the sample of analyzed countries in order to get a wider picture about the interdependence of the two variables. The second relates to the extension of the methodological concept. This paper investigated the connection between market structure and performance, and its authors propose the application of the famous structure-conduct-performance paradigm in the field of industrial organization, which would provide a complete causal explanation.

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APPENDIX:

Table 1: Descriptive statistics of all used variables

	MS in %	*ΔMS* in %	NAV in million RSD	VIUvpf in RSD	rVIUvpf in %
Mean	15.39676	0.032879	2766.795	1613.016	0.680936
Median	11.60796	0.016053	1609.560	1501.700	0.684904
Maximum	47.14549	13.36772	14443.60	2817.170	7.912402
Minimum	0.007650	-1.803500	0.375077	876.1300	-4.564853
Std. Dev.	14.56366	0.522099	3269.974	489.5439	1.092736
Skewness	0.705736	23.25521	1.552056	0.629991	0.668580
Kurtosis	2.208361	595.4803	4.967058	2.336442	14.30608
Jarque-Bera	78.24102	10551735	403.4567	60.58245	3872.262
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	11039.48	23.57438	1983792.	1156532.	488.2310
Sum Sq. Dev.	151863.7	195.1723	7.66E+09	1.72E+08	854.9548
Observations	717	717	717	717	717

Source: Authors' calculations in EViews7.

Table 2: Hausman test for the first regression model

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. df	Prob.
Cross-section random	12.422073	3	0.0061

Source: Authors' calculations in EViews7.

Table 3: Wald test for the first regression model

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	2.994459	(6, 709)	0.0068
Chi-square	17.96676	6	0.0063

Source: Authors' calculations in EViews7.

Table 4: Hausman test for the second regression model

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. df	Prob.
Cross-section random	11.588705	3	0.0089

** WARNING: estimated cross-section random effects variance is zero.
Source: Authors' calculations in EViews7.

Table 5: Wald test for the second regression model

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	**2.887049**	**(5, 707)**	**0.0137**
Chi-square	**14.43525**	**5**	**0.0131**

Source: Authors' calculations in EViews7.

Table 6: Full results for the first regression model

Dependent Variable: *rVIUvpf*
Method: Panel Least Squares
Date: 03/26/19 Time: 16:18
Sample (adjusted): 2/29/2008 10/31/2017
Periods included: 117
Cross-sections included: 7
Total panel (unbalanced) observations: 719

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.469630	0.485907	3.024507	0.0026
MS	0.001995	0.011255	0.177290	0.8593
NAV	3.17E-05	2.03E-05	1.559275	0.1195
VIUvpf(-1)	-0.000567	0.000305	-1.859646	0.0634
Effects Specification				
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.697753	Mean dependent var		0.680582
Adjusted R-squared	0.634041	S.D. dependent var		1.091740
S.E. of regression	0.660443	Akaike info criterion		2.166007
Sum squared resid	258.6575	Schwarz criterion		2.968247
Log likelihood	-652.6796	Hannan-Quinn criter.		2.475736
F-statistic	10.95176	Durbin-Watson stat		1.824278
Prob(F-statistic)	0.000000			

Source: Authors' calculations in EViews7.

Table 7: Full results for the second regression model

Dependent Variable: *rVIUvpf*
Method: Panel Least Squares
Date: 03/28/19 Time: 18:01
Sample (adjusted): 2/29/2008 10/31/2017
Periods included: 117
Cross-sections included: 7
Total panel (unbalanced) observations: 717

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.457284	0.466531	3.123657	0.0019
ΔMS	0.137142	0.051607	2.657399	0.0081
NAV	2.79E-05	2.03E-05	1.376729	0.1691
VIUvpf(-1)	-0.000536	0.000304	-1.764921	0.0781
Effects Specification				
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.701093	Mean dependent var		0.680936
Adjusted R-squared	0.637873	S.D. dependent var		1.092736
S.E. of regression	0.657576	Akaike info criterion		2.157691
Sum squared resid	255.5519	Schwarz criterion		2.961679
Log likelihood	-647.5322	Hannan-Quinn criter.		2.468135
F-statistic	11.08964	Durbin-Watson stat		1.828168
Prob(F-statistic)	0.000000			

Source: Authors' calculations in EViews7.

Boban Stojanović

is Full Professor at the Faculty of Economics, University of Niš. He teaches the following courses: Theory and Policy of Prices and Macroeconomics at the undergraduate level, Microeconomic Models at the level of master's studies, and Contemporary Microeconomic Analysis at the doctoral level. He taught Theory of Prices and Theory of Production at the Faculty of Economics, University of Belgrade and the Military Academy of the Yugoslav National Army. He also taught at the Al-Farabi Kazakh National University in Almaty, Kazakhstan (at the level of master's studies), summer schools at the University of Nice Sophia Antipolis in France and Freiberg University in Germany. He is the founder and was the first director of the Center for Multidisciplinary Studies and Scientific Research at the University of Niš, he is President of the Niš Association of Economists, member of the Executive Board and Presidency of the Serbian Association of Economists, member of the National Council for Consumer Protection. He has been actively participating in the implementation of projects funded by the Ministry of Education, Science and Technological Development and attended many eminent meetings in the country and abroad. His fields of interest include microeconomics, monopolies, the EU market and competition protection. He authored many books and more than 50 scientific and professional papers in leading journals.

Snežana Radukić

is Full Professor at the Faculty of Economics, University of Niš, where she teaches Microeconomics and Theory and Policy of Prices. She obtained her Ph.D. from the Faculty of Economics, University of Niš, in 2009. Her research interests encompass microeconomics, market structures and competition policy. She authored a book, four monographs, and numerous papers in scientific journals and proceedings from national and international conferences. Ms. Radukić is a member of the Niš Association of Economists and a researcher on a project supported by the Serbian Ministry of Education, Science and Technological Development.

Milan Kostić

is Associate Professor at the Faculty of Economics, University of Kragujevac. He obtained his Ph.D. in Economics from the University of Kragujevac. He teaches Microeconomics at the undergraduate level, Globalisation and Transition at the level of master's studies and Competition Analyses at the level of Ph.D. studies. His main areas of interest are the following: microeconomics, competition policy, consumer ethnocentrism and impact of foreign direct investment (FDI) on economic growth. As a researcher, he has participated in various projects funded by the Commission for Protection of Competition of the Republic of Serbia, European Commission and Government of Norway. He held several positions at the Faculty of Economics and University of Kragujevac, such as the position of President of the Quality Control Council. He authored a number of scientific papers published in international and national journals, monographs and proceedings.

Zorana Kostić

is Research Associate at the Faculty of Sciences and Mathematics, University of Niš. As a scholar of the Ministry of Education, Science and Technological Development of the Republic of Serbia, she worked as Teaching Assistant at the Faculty of Economics, University of Niš, teaching the courses of Microeconomics and Theory and Policy of Prices. She also worked at the Ministry of Finance and gained international experience through study visits to Paderborn University and University of Regensburg in Germany, Belgorod State Technological University "Shukhov" in Russia, and Donetsk National University in Ukraine. She authored numerous scientific papers. Her scientific interests include industrial organization and general application of microeconomic theory with a special focus on the competition policy issues.

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Snežana Miletić
University of Belgrade
Faculty of Economics
Department for Accounting and Business Finance

Savka Vučković Milutinović
University of Belgrade
Faculty of Economics
Department for Accounting and Business Finance

AN ANALYSIS OF ACCRUAL-BASED EARNINGS MANAGEMENT IN LARGE SERBIAN COMPANIES

Analiza upravljanja obračunskim komponentama dobitka u velikim preduzećima Republike Srbije

Abstract

This study analyzes systematic differences in earnings management across 215 large companies operating in the real sector in the Republic of Serbia in the period from 2009 to 2017. To achieve the main goal of the study, we constructed an aggregate measure which covers several aspects of accrual-based earnings management. The results indicate that the accrual-based earnings management, which is immanent to economies with underdeveloped capital markets, weak investor protection and frequent changes in the regulatory framework coupled with inefficient judiciary, is widespread among large Serbian companies. Having found significant differences in the levels of earnings management across companies, we examined the mean values of the aggregate earnings management measure for numerous categorical variables in order to identify whether individual company characteristics are related to incentives for aggressive exploitation of accounting discretion.

Keywords: *earnings management, aggregate measure, accruals, accounting discretion, income smoothing.*

Sažetak

Studija analizira sistemske razlike u nivoima upravljanja računovodstvenim dobitkom među 215 velikih preduzeća realnog sektora Republike Srbije, u periodu od 2009. do 2017. godine. Za potrebe istraživanja konstruisana je agregatna mera koja obuhvata više aspekata upravljanja obračunskim komponentama dobitka. Rezultati ukazuju na to da je strategija upravljanja dobitkom računovodstvenim tehnikama, koja je imanentna privredama sa nerazvijenim tržištima kapitala, slabom zaštitom investitora, čestim izmenama zakonske regulative i neefikasnim sudskim sistemom, široko rasprostranjena među velikim srpskim preduzećima. Kako su razlike u nivoima upravljanja dobitkom među preduzećima značajne, prosečne vrednosti agregatnih mera upravljanja dobitkom izračunate su za mnogobrojne kategoričke promenljive, što je omogućilo identifikovanje individualnih karakteristika preduzeća koje se mogu dovesti u vezu sa povećanim podsticajima za agresivnim načinom eksploatacije računovodstvene diskrecije.

Ključne reči: *upravljanje dobitkom, agregatna mera, obračunske komponente dobitka, računovodstvena diskrecija, uravnotežavanje dobitka.*

Introduction

In spite of the fact that regulatory bodies, practitioners and members of the academic community around the world pay considerable attention to earnings management, there is still no consensus about a universal definition which would cover all aspects of this process that is continually evolving and threatening to completely marginalize the fundamental postulate of financial reporting– faithful representation. Three years prior to the bankruptcy of Enron, one of the best known scandals in the history of the world economy, the long-standing Chairman of the U.S. Securities and Exchange Commission, Arthur Levitt Jr., warned the public about the rapid erosion in the quality of financial accounting information because managing earnings may be giving way to manipulation . Although all members of the accounting profession have become concerned about earnings management implications on reported earnings, authors have only managed to collect inconsistent documentation in literature and limited evidence of its negative effects. The causes of such discrepancy can be sought in the absence of a clear and applicable definition of earnings management, difficulties and limitations in the available measurement methodology, and meager results in identifying the practice of earnings management.

The global economy is nowadays characterized by heterogenous entities and their commercial activities, continual innovation, modern technologies, and daily appearance of new types of transactions. To maintain its universal, informational function in a turbulent economic environment, accounting is based on flexible principles that can be adapted and applied to new and changing circumstances. Any abuse of this flexibility jeopardizes one of the rare rigid rules of the accounting profession which concerns demonstrating objectivity and integrity in financial reporting processes. Misapplication of accounting flexibility and detraction from neutral accounting practice are at the root of every definition of earnings management. Below we present several frequently quoted definitions of earnings management:

- [30,p.92] "By earnings management I really mean "disclosure management" in the sense of a purposeful intervention in the external financial reporting process, with the intent of obtaining some private gain (as opposed to, say, merely facilitating the neutral operation of the process). A minor extension to the definition would encompass "real" earnings management, accomplished by timing investment or financing decisions to alter reported earnings or some subset of it."
- [2,p.3] "I define earnings manipulation as an instance where management violates Generally Accepted Accounting Principles (GAAP) in order to beneficially represent the firm's financial performance."
- [19,p.368] "Earnings management occurs when managers use judgment in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company, or to influence contractual outcomes that depend on reported accounting numbers."
- [29,p.27] "Earnings management is a collection of managerial decisions that result in not reporting the true short-term, value-maximizing earnings as known to management. The managed earnings result from taking production/investment actions before earnings are realized or making accounting choices that affect the earnings numbers and their interpretation after the true earnings are realized."
- [21,p.18] "…using the flexibility in accounting within the regulatory framework to manage the measurement and presentation of the accounts so that they give primacy to the interests of the preparers not the users."

From the above definitions it can be observed that the authors equate earnings management with lower or higher degrees of deviation from good (neutral) accounting practice, with the intention of achieving predefined objectives, and that it is the managers who initiate this process. These definitions are difficult to operationalize since managerial intent is unobservable. Also, none of the definitions set clear limits for differentiating "earnings manipulation… and the day-to-day struggles of managers to keep costs within budgets or to get revenues to meet desired sales targets" [12,p.1].

In defining earnings management, authors Ronen and Varda [29] start from the premise that there exists an objective and neutral earnings number which they call "short-term truth". The management does not have to know the truth, but because of the superior information it holds its estimates of such amount can be taken as approximations of the "truth". Earnings management occurs when reported earnings deviate (upwards or downwards) from the amount of objective and neutral earnings or approximation thereof. Such an assumption allows for establishing a broad definition of earnings management, which includes: beneficial earnings management – signaling long-term value; pernicious earnings management – concealing short or long-term value; neutral earnings management – revealing short-term true performance.

It is important to note that different opinions in literature do not a priori give a negative connotation to earnings management, but leave room for interpretations concerning communication of privileged information about a company's future performance and prevention of informational confusion.

Earnings management strategies

The broader definition of earnings management according to which "earnings management that is a deliberate, systematic undertaking of activities aimed at reporting earnings in line with predetermined goals... and as such (in the context of whether they constitute permitted accounting practice) cannot be considered a black-and-white process" [27,p.128], means that earnings management strategies must also be placed in a broader context. Earnings management incentives are only one aspect that affects the preparation and use of accounting information. Although the storm of corporate scandals, in which creative accounting plays a major role, has undermined the trust of investors in financial statements, it should not be forgotten that managers also stand little to gain from investors relying on alternative sources of information which are not under management's control. For these reasons, Hellman [20] believes that managers also have incentives to avoid manipulation of earnings.

The area of earnings management which attracted most attention from the professional and scientific communities is income smoothing, that is "…a game of "smoothing out" the peaks and valleys in a corporation's income flow in order to reduce the apparent volatility in the corporation's returns. Thus, managements characteristically attempted to hide "excess earnings" in "rainy day reserves" in order to use such funds later to smooth out undesired declines in the firm's earnings" [7,p.22]. Income smoothing can have both positive and negative implications for the quality of financial statements, depending on the motivation it is induced by. According to Li and Richie[25], there are two schools of thought on what motivates managers to implement this strategy. The first one holds that income smoothing is an efficient way of communicating privileged information, given that it is easier for investors to make projections of future performance based on smooth earnings path. The second school of thought asserts that smoothing is an exercise undertaken by managers in an attempt to enhance their managerial careers or compensation. The results of a study carried out by Graham, Harvey and Rajgopal [18]are interesting because they interviewed more than 400 executives to determine the factors that drive reported earnings. They showed that overwhelming 96.9% of survey respondents prefer the strategy of earnings smoothing. While only 15.6% of CFOs admitted that bonus payments were one of the reasons why they opted for this earnings path, this result needs to be considered with caution because it can be difficult to elicit unambiguous responses when asking about respondents' compensation in a survey. The study emphasizes the dominant role of investors' reactions in deliberately choosing a policy of stable earnings, because smooth earnings result in lower risk of misinterpreting information presented in financial statements and underestimating the company's market value.

Accounting principles have evolved, inter alia, with the aim of overcoming informational limitations of cash basis accounting (realized cash flows have timing and matching problems that cause them to be a "noisy" measure of firm performance). Properly formulated and implemented accounting policies should result in an earnings number that smooths irrelevant cash flow volatility in such a

way that the volatility of reported earnings reflects the underlying economic variation in the company's operations. There are opinions in literature that the basic function of earnings is the effective informational allocation of cash flows to reporting periods via the accrual process [15,p.969], and that cash flows are excessively volatile and do not reflect the current or future performance as well as earnings do [9,p.7]. Accrual components of earnings give them incremental informative value[1]. The benefit of accruals comes in the shape of greater persistence and predictability of reported earnings, but accruals also introduce a new set of problems. To the extent that the management use their discretion and information advantage to opportunistically manipulate accruals estimation and recognition, earnings will become a less reliable measure of firm performance [8,p.5].

Managers can opportunistically manage accruals or the timing or structure of operations, investments or financial decisions. Both strategies are reflected in the amount of the reported earnings. Depending on whether manipulative behavior is focused on accrual components of earnings or predominantly on cash flows, the strategies of earnings management are classified into accrual-based earnings management and real earnings management.

In the first instance, companies do not alter their usual operational practices, but modify accounting policies and estimates, within the professional and regulatory frameworks (or outside of them), in order to communicate the desired amount of earnings. In the spirit of high-quality financial reporting, accounting policies should be the best reflection of the firm's economic reality and conducted economic transactions. Still, the flexibility[2] inherent in accounting standards often places companies in such situations that they need to opt out of permissible accounting methods that have materially different implications for their financial positions, which allows for the managing of earnings that does not go outside of the regulatory framework.

In the second instance, managers conduct real activities and focus on actual transactions that not only impact the reported earnings, but also affect cash flows. Acceleration of sales through price discounts and relaxation of credit terms, reductions in discretionary costs and increases in production volumes in order to reduce the costs of sold goods are only some of the examples of real economic activities whose ultimate objective is to achieve the financial reporting goals. By contrast with accrual-based earnings management, real earnings management does not detract from professional and regulatory frameworks and remains beyond the judgement of the external auditors. In their study of the prevalence of these two earnings management strategies in 38 countries, Enomoto, Kimura and Yamaguchi [13] reveal that accrual-based earnings management is prevalent in economies with weaker outside investor protection and lower level of legal enforcement, while conversely, in countries with highly efficient judiciary, relatively concentrated ownership, strong investor protection and large stock markets, accrual-based earnings management is substituted by earnings management that is based on real transactions. Given that Serbia belongs to the first group of countries, this study is focused on accrual-based earnings management.

Research design

Following the methodology that Leuz, Nanda and Wysocki [23] developed for the purpose of investigating systematic differences in earnings management across thirty countries, below we present the structural elements of the aggregate measure used in our analysis as a proxy for earnings management in large Serbian companies. In this article, we made an effort to modify this country-level aggregate measure to the firm-level aggregate measure. Our descriptive evidence suggests that accrual-based earnings management is prevalent in Serbia, despite the lack of

1 Concurrent recognition of sales revenues and related accounts receivable is an obvious example of recognition of future cash flows that impact both the current period's income statement and statement of financial position (without affecting the cash flow statement), and matches the timing of accounting recognition with the timing of the economic benefits from sale. If the collected cash differs from the previously recorded amounts of revenues and receivables, the adjustments (subsequent corrections) arising from the estimation error will impact the quality of the accrual component of earnings; thus, the quality of earnings is decreasing in the magnitude of accrual estimation errors. It follows that the extent to which accrual components of earnings map onto cash flow realizations allows for direct assessment of earnings quality.

2 "An accounting choice is any decision whose primary purpose is to influence (either in form or substance) the output of the accounting system in a particular way" [14,p.256]

capital market incentives, induced by an underdeveloped stock exchange market[3].

Defining the measures for earnings smoothing/ earnings volatility requires demarcation between the informational scope of earnings, on the one hand, and cash flows, on the other, in order to understand where the differences between them come from. Also, to prevent the misuse of accrual components of earnings for concealing relevant information, cash flows must not be bypassed in measuring volatility as a qualitative characteristic of earnings.

Consistent with a number of previous studies, Leuz, Nanda and Wysocki [23], Francis, et al. [15] and Gaio and Raposo [17], and considering all of the aforementioned, we have measured the earnings smoothness (first indicator of earnings management) as the ratio of the firm-level standard deviation of operating earnings to the standard deviation of operating cash flows:

$$EM_{1,i} = \frac{\sigma\,(PFO_{i,t})}{\sigma\,(CFO_{i,t})} \qquad (1)$$

where: $EM_{1,i}$ – is earnings volatility/smoothness[4] of company *i* measured as the ratio between standard deviations (σ) of operating earnings and operating cash flows; $PFO_{i,t}$ – is operating income[5] of company i for period *t* scaled by lagged total assets, while $CFO_{i,t}$ – is net cash flow of company i for period t scaled by lagged total assets.

For the purpose of this study, cash flow from operations is computed indirectly by subtracting the accruals from earnings[6], where accrual component of earnings is computed following the study by Dechow et al. [7]:

$$Acc_{i,t} = (\Delta CA_{i,t} - \Delta STP_{i,t} - \Delta Cash_{i,t}) - (\Delta CL_{i,t} - \Delta STD_{i,t} - \Delta TP_{i,t}) - Am_{i,t} \qquad (2)$$

where: $Acc_{i,t}$ – is the total accrual component of earnings of company *i* for period *t*; $\Delta CA_{i,t}$ – is the change in total current assets of company *i* for period *t* compared to period *t-1*; $\Delta STP_{i,t}$ – is the change in short-term financial placements of company *i* for period *t* compared to period *t-1*; $\Delta Cash_{i,t}$ – is the change in cash and cash equivalents of company *i* for period *t* compared to period *t-1*; $\Delta CL_{i,t}$ – is the change in current liabilities of company *i* for period *t* compared to period *t-1*; $\Delta STD_{i,t}$ – is the change in short-term debt of company *i* for period *t* compared to period *t-1*; $\Delta TP_{i,t}$ – is the change in income tax payable of company *i* for period *t* compared to period *t-1*; $Am_{i,t}$ – is depreciation and amortization expense of company *i* for period *t*. The changes in short-term financial placements and short-term debt are excluded from the calculation because they are associated with the company's financial (not operating) activities.

The standard deviation of earnings includes changes in actual company performance, but also reflects the impact of the company's implemented accounting policies and estimates. Scaling by cash flow from operations controls for differences in the variability of economic performance across companies. If a company uses accruals as an instrument for earnings management, the variability in earnings should be lower than the variability in cash flows. It follows that low values of $EM_{1,i}$ indicate that insiders exercise accounting discretion to smooth the reported earnings.

The assumption that one of the functions of reported earnings is the effective allocation of cash flows to reporting periods leads us to the conclusion that accrual components of earnings incorporate predictions of future cash flows. In this respect, opportunistic use of accruals presumes, for example, accelerated recognition of future revenues or deferred recognition of current expenses, in order to hide the undesirable decrease in current financial performance, or understatement of earnings using opposing techniques for the purpose of creating hidden reserves for future periods. In both cases, accrual components of earnings conceal shocks to the operating cash flow, resulting in negative correlation between changes in accruals and

3 At the end of 2017, the total number of shares listed on the regulated market in Serbia was 33 [4,p.5].

4 Due to the dichotomous nature of volatility, there is no consensus among researchers about whether low volatility is a desirable attribute of earnings, which would be logical, if the management obey the spirit of faithful representation, or whether it is an undesirable attribute of earnings that implies earnings numbers that detract from the actual firm performance.

5 This indicator is derived from Serbian statutory financial statements, specifically items ADP 1030 – Operating profit, and ADP 1031 – Operating loss. Given that the majority of items that are subject to management's discretion (such as, for instance, impairment of assets or write-off of uncollectible receivables) in Serbian statutory financial statements are classified under other expenses, in order to facilitate comparison with international studies the difference between other income and other expenses has been added to operating earnings.

6 ADP 1054 and ADP 1055.

7 The original model and calculations are adjusted to statutory financial statement forms effective in the Republic of Serbia.

changes in cash flows. As a result, the second measure of earnings smoothing is defined as the Spearman's coefficient of correlation between these variables [22],[23]:

$$EM_{2,i} = \rho(\Delta Acc_{i,t}, \Delta CFO_{i,t}) \quad (3)$$

where: $EM_{2,i}$ – is earnings smoothness of company *i* measured as the firm's Spearman's correlation (ρ) between change in accruals and change in cash flows from operations; $\Delta Acc_{i,t}$ – is the change in total accruals of company *i* for period *t* compared to period *t-1,* scaled by lagged total assets; $\Delta CFO_{i,t}$ – is the change in cash flows from operations of company *i* for period *t* compared to period *t-1*, scaled by lagged total assets.

Although the negative correlation between the change in accruals and the change in cash flows naturally results from the accrual basis of accounting, unusually high negative correlation (with a value close to -1) suggests a higher level of smoothing of reported earnings in order to neutralize the changes in cash flows that, without such an intervention, would be reflected in the amount of reported earnings [28,p.269]. In this case, a lower value of $EM_{2,i}$ indicates a higher level of earnings management.

Extensive use of reporting discretion is reflected in the magnitude of accruals; therefore, our third indicator approximates the level of earnings management to the ratio between the absolute value of firm's accruals and the absolute value of firm's cash flows from operations[8] [22],[23]:

$$EM_{3,i} = -\frac{|Acc_{i,t}|}{|CFO_{i,t}|} \quad (4)$$

where: $EM_{3,i}$ – is the magnitude of accruals of company *i*, computed as the company's negative median of the absolute value of accruals scaled by the absolute value of cash flows from operations; $|Acc_{i,t}|$ – is the absolute value of accruals of company *i* for period *t*; $|CFO_{i,t}|$ – is the absolute value of cash flows from operations of company *i* for period *t*. Due to the uniform model for interpreting earnings management measures, indicator $EM_{3,i}$ is transformed into a negative median, so that its lower value implies a higher degree of earnings management.

Finally, based on a sample of annual reports obtained from the Compustat database for the 1976-1994 period, Burgstahler, David and Dichev [6] provided compelling empirical evidence of unusually low frequencies of small decreases in earnings and small losses and unusually high frequencies of small increases in earnings and small positive income, from which they concluded that firms engage in earnings manipulations to avoid reporting earnings decreases and losses. Degeorge, Patel and Zeckhauser [11] documented earnings management driven by three thresholds: reporting positive profits, however small, sustaining recent performance, and meeting analysts' expectations. Although there is relatively little room for maneuver with regard to using discretionary rights to report positive results in the periods of high real losses, it appears that small real losses can easily be translated into small reported profits by exploiting accounting flexibility. That is why, in international studies, the ratio of small reported profits to small reported losses is often used as a measure for earnings management (see, for instance, [5],[23]).

The ratio of small reported profits to small reported losses, however, can only be computed at an aggregate level (when sub-samples being compared contain more than one company). Given that in this study earnings management measures must be computed on the firm level, this indicator cannot be computed for companies that during the analyzed period did not sustain small losses. As an alternative to this indicator which implies a specific perspective of accounting manipulation (exercising discretion to increase earnings when the level of earnings is slightly below zero), the frequency of small positive results in the analyzed period is taken into account (a similar indicator was also used by Lang, Raedy and Yetman [22,p.374], where a higher frequency of small reported profits indicates a potentially higher extent of accounting discretion to influence earnings reported in financial statements). A firm-year observation is classified as a small profit if net income[9] scaled by lagged total assets is in the range [0,0.1].

$$EM_{4,i} = -\frac{\#SmPosNI_i}{\#AFS_i} \quad (5)$$

8 The scaling controls for differences in company size and profitability.

9 ADP 1064 in statutory financial statement forms in Serbia.

where: $EM_{4,i}$ – is the negative value of the relative frequency of small profit of company *i*; $\#SmPosNI_i$ – is the number of (small) profits of company *i*, scaled by lagged total assets in the range [0,0.1]; $\#AFS_i$ – is the number of available consecutive annual financial statements for company *i*.

Indicator $EM_{4,i}$ was also transformed into negative value of the relative frequency of small reported profits, because we wanted each individual earnings management measure to have the same direction of relationship with the aggregate measure. After the transformation, lower value of indicator $EM_{4,i}$ points to a higher level of earnings management (around zero) and vice versa.

Finally, we constructed an aggregate measure as an overall summary measure that sublimates various aspects of earnings management in a way that allows for its unambiguous interpretation (each of the four earnings management measures have the same sign of association with the earnings management score). The aggregate measure of earnings management is derived from the algorithm described below [16].

Companies are ranked according to each of the four individual earnings management measures in such a way that the lowest indicator value is assigned the lowest rank, while the highest indicator value is assigned the highest rank. After generating rankings, in the next step the rankings for four individual earnings management indicators are aggregated at the firm level. The aggregate earnings management measure for an individual company in the sample is computed by averaging the rankings of four individual earnings management measures as set out in equation (6).

$$AEM_i = \frac{RANK(EM_{1,i}) + RANK(EM_{2,i}) + RANK(EM_{3,i}) + RANK(EM_{4,i})}{4} \quad (6)$$

where: AEM_i – is the aggregate earnings management measure for company *i*; *RANK* – is the ranking function defined in such a way that the lowest rank corresponds to the lowest numerical value, while the highest rank corresponds to the highest numerical value; $EM_{1,i}$, $EM_{2,i}$, $EM_{3,i}$ and $EM_{4,i}$ – are individual indicators for earnings management measures of company *i*, as defined by equations (1), (3), (4) and (5), respectively.

Sample selection

Our data set consists of historical financial data from annual reports of large companies operating in the real sector in the Republic of Serbia. In 2016, economic activity in the Republic of Serbia was carried out by 97,543 entities (excluding entrepreneurs). However, our sample includes only large companies due to several reasons. Although in 2016 305 large companies constituted merely 0.31% of the total number of companies, their dominant position in the Serbian economy provides justification for placing them in the center of our analysis. In the year of sampling, large companies engaged 44.5% of total assets, participated with 57% of net equity, generated 41% of total operating income and 39% of net income, while their participation in accumulated losses amounted to around 40%[10]. Furthermore, IFRS reporting is mandatory for large Serbian companies, which implies homogeneity in terms of the regulatory framework for financial reporting. Finally, large companies are considered public interest entities (due to a large volume of invested capital, large number of employees, high turnover or extensive business operations in sectors of strategic importance for the national economy) and are placed under greater external scrutiny by political and regulatory bodies. As a result, they are expected to devote more attention and resources to the quality of financial statements and internal control systems, which should reduce the risk of procedural errors and errors in estimation, as well as of different types of manipulations.

To be included in the sample, the companies had to meet the criteria related to annual revenues and the value of total assets, as required by the Law on Accounting effective at the time of sample selection.[11] Thus, the number of companies in the sample was reduced to 223. The sample includes companies whose total assets in 2016 exceeded EUR 17,500,000 and whose annual revenues in the same

10 Indicators were prepared by authors according to the Financial Statements Annual Bulletin for 2016 (Serbian Business Registers Agency).

11 Entities are classified by size according to the criteria laid down by Serbian legislative framework. The criteria are related to the average number of employees, annual revenues, and value of total assets. Companies must satisfy at least two criteria in order to be classified into a specific size category.

year amounted to more than EUR 35,000,000. In the last phase, companies founded after 2013 were excluded from the sample in order to ensure that each considered company in the database had financial statements for at least five consecutive reporting periods. The number of companies in the sample dropped to 215 companies that met the specified criteria. The financial statements from the sample period from 2009 to 2017 (9 reporting periods) were collected for all companies in the sample, generating a final sample of 1,884 firm-year observations.

Large companies in the real sector of the Serbian economy are mainly focused on trading and manufacturing, as around 74% of them were registered in these two sectors alone. The largest number (around 93%) are organized as limited liability companies, which reflects the rudimentary level of development of the national capital market, given that the largest companies in Serbia do not have a legal form that allows them to issue shares in order to collect capital from qualified investors.

Empirical results

Table 1 presents descriptive statistics of individual earnings management indicators (EM_1 – EM_4) computed for each large Serbian company in the sample and of the EM_1 – EM_3 indicators taken from the study conducted by Leuz, Nanda and Wysocki [23] on a sample of annual financial statements of 8,616 companies in 31 countries for the 1990-1999 period. The differences in methodologies for measuring EM_4 do not allow for the comparison of results.

The international cluster analysis demonstrated that earnings management is less prevalent in outsider economies that are characterized by low ownership concentration, extensive outsider rights and large stock markets [23,p.525]. The results for large Serbian companies are in line with these conclusions and confirm that an unstimulating business environment, plagued by infrastructural problems associated with an underdeveloped capital market and poor regulatory quality, leads to an alarming situation in financial reporting. Namely, the statistics of earnings smoothing, after controlling for the volatility of cash flows, shows that earnings are smoother in Serbia than in other countries because the mean EM_1 value of 0.317 is below the lowest value calculated by the aforementioned authors for Austria (0.345). The negative correlation between the changes in accruals and changes in cash flows indicate that earnings smoothing is more pervasive in Serbia then in other countries (the mean value of EM_2 for Serbia is -0.966, which is behind Greece where the largest recorded negative correlation was -0.928). Regarding the aggressive use of discretionary rights, approximated by the magnitude of accrual components of earnings, Serbia is also behind the country with the lowest recorded value of the EM_3 indicator (the mean value of this indicator for Serbia is -0.948, compared to the lowest value of -0.848 recorded in Germany). Although the methodology limitations present potential weaknesses of the results comparison, which is why we shall take conclusions with reserve, we can still consider them as warning signals of an impaired accounting practice among large Serbian companies caused by the opportunistic use of discretion in earnings measurement.

Table 2 presents correlations among firm-level individual earnings management measures in order to verify whether combining them into the aggregate measure is appropriate. The earnings management measures are positively correlated, and the correlation is statistically significant at the 5% level. As expected, the highest correlation exists between the EM_1 and EM_2

Table 1: Descriptive statistics of individual earnings management measures

	EM_1		EM_2		EM_3		EM_4
	Serbia	Other countries	Serbia	Other countries	Serbia	Other countries	Serbia
Mean	0.317	0.541	-0.966	-0.849	-0.948	-0.558	-0.500
Standard Deviation	0.285	0.100	0.105	0.056	0.138	0.128	0.132
Median	0.239	0.539	-0.995	-0.861	-0.985	-0.552	-0.444
Min.	0.002	0.345	-0.999	-0.928	-1.522	-0.848	-1.000
Max.	1.656	0.765	0.005	-0.722	-0.399	-0.297	-0.111

Variables EM_1, EM_2, EM_3 and EM_4 are defined by equations (1), (3), (4) and (5), respectively. The columns referring to Serbia present descriptive statistics of individual earnings management measures computed at firm level. The columns referring to other countries present descriptive statistics of individual earnings management measures computed at country level based on [23,p.515].
Source: prepared by the authors.

indicators(0.635 Pearson correlation and 0.688 Spearman's correlation), given that they capture different aspects of earnings smoothing. Moderately positive Pearson and Spearman's correlations between EM_1 and EM_3 (0.329 and 0.245) indicate that companies that had higher magnitude of accruals (compared to cash flows) also have lower volatility of earnings, meaning that they opted for such accounting practices that enabled a smooth earnings path. In addition, correlation analysis reveals that companies with higher magnitude of accruals more often exhibit small profits, as indicated by positive and statistically significant correlations between EM_3 and EM_4.

Furthermore, the factor analysis (analysis of the principal component factors) suggested that it was appropriate to present four earnings management measures with a single factor and that each variable had a certain degree of uniqueness that it did not share with the other variables. Factor loading and uniqueness are presented in Table 3.

Given that the correlation and factor analysis suggested that it was appropriate to combine the four measures into a single summary score, the aggregate earnings management measure was computed at firm level using the equation (6). The following tables present the mean values of the aggregate earnings management measure by different categorical variables. Lower rankings of the aggregate measure suggest higher levels of earnings management and vice versa.

The mean value of aggregate earnings management score for all companies in the sample is 108; there are striking differences across firms, as the aggregate earnings management measure has large cross-sectional variation (43.61). The lowest recorded aggregate measure score is 18.87 (it symbolizes the highest level of earnings management), while the highest recorded score is 207.25 (lowest level of earnings management). Table 4 presents the structure of companies according to their commercial activity[12]. Given that only a small number of companies belong to certain sectors, similar sectors with a small number of companies were grouped together. The sectors that recorded the most

12 Companies doing business in Serbia are classified according to the national standards for classification of entities as set out in the Regulation on Classification of Commercial Activities .

Table 2: Correlation matrix of earnings management measures

	EM_1	EM_2	EM_3	EM_4
EM_1	1.000	0.688	0.245	0.332
EM_2	0.635	1.000	0.249	0.377
EM_3	0.329	0.172	1.000	0.233
EM_4	0.267	0.149	0.189	1.000

Variables EM_1, EM_2, EM_3 and EM_4 are defined by equations (1), (3), (4) and (5), respectively. This table presents Pearson correlations below the diagonal, and Spearman's correlations above it. The presented coefficients are significant at the 5% level.
Source: prepared by the authors.

Table 3: Factor loading and uniqueness of earnings management measures

	$Factor_1$	*Uniqueness*
EM_1	0.875	0.235
EM_2	0.781	0.389
EM_3	0.556	0.691
EM_4	0.491	0.759

Variables EM1, EM2, EM3 and EM4 are defined by equations (1), (3), (4) and (5), respectively. The presented factor loading and uniqueness are the result of the performed analysis of principal component factors.
Source: prepared by the authors.

Table 4: Mean values of the aggregate earnings management measure for large companies in the Republic of Serbia by industrial sectors

Sector code	Sector name	Number of companies	Mean
C	Manufacturing	93	114.95
G	Wholesale and retail trade	66	104.91
J+ M+R	Information and communication + Professional, scientific and technical activities + Art, entertainment and recreation	12	127.80
H	Transportation and storage	10	106.42
F	Construction	13	67.11
D+E	Electricity, gas, steam supply + Water supply and sewerage	10	108.94
B	Mining	5	82.85
A	Agriculture, forestry and fishing	6	105.19
	Total	215	108.00 (SD 43.61)

AEM is the aggregate earnings management measure for company *i*.
Source: prepared by the authors.

favorable aggregate measure score (127.8) comprise non-manufacturing, quaternary economic activities, while manufacturing also scored above the sample mean (114.95). The highest level of earnings management occurred in construction and mining where the mean values of the aggregate measure were 67.11 and 82.85, respectively.

Table 5: Mean values of the aggregate earnings management measure for large companies in the Republic of Serbia by legal form

Legal form	PE	LTD	JSC	BFE	
Number of companies	12	157	42	4	215
Mean *AEM*	99.56	109.83	108.89	52.00	108.00

PE is a public sector entity; LTD is a limited liability company; JSC stands for a joint-stock company and BFE is a branch office of a foreign entity, while is the aggregate earnings management measure for company *i*.
Source: prepared by the authors.

Table 5 presents mean values of the aggregate earnings management measure for companies classified according to their legal form. The results which show that the mean value of the aggregate measure of public sector enterprises is below the values of LTDs and JSCs by nearly 10 ranks are not surprising. Namely, it is well-known that public sector enterprises, besides their strategic importance and participation in infrastructural activities, also show lower efficiency in using resources and have poorer financial performance compared to private sector companies. Besides the fact that they are associated with high operational and financial risks that spill over into one part of the economy, the indicators (for the 2007-2013 period) also point to the presence of substantial financial reporting manipulation risks (for more on this topic, see). In line with such conclusions is the fact that, out of all large public enterprises in the sample, in the last two years of the sample period only one third got unmodified audit opinions, providing reasonable assurance that their financial statements present their financial position and financial performance truly and objectively, in all materially significant aspects, in accordance with the accounting regulations effective in the Republic of Serbia. In the remaining eight public sector enterprises, in the last two years of the analyzed period auditors predominantly issued modified opinions (for seven companies), while for one public sector enterprise the auditor issued a disclaimer of opinion because of the going concern issue. Bearing in mind that public sector enterprises are controlled by the political establishment, which is putting personal and political objectives above the financial and public interests, and that already lenient requirements for transparent financial reporting are further relaxed in public enterprises, it is clear why the aggregate measure signalizes that their financial statements should be taken with a grain of salt.

On the other hand, it could be expected that JSCs would have the highest aggregate measure score, signifying the lowest level of earnings management, given the global practice which shows that listed companies are required to satisfy rigorous criteria in terms of the quality of their financial statements. The mean value of the aggregate measure for JSCs (108.89) is somewhat lower than the mean value of the aggregate measure for LTDs (109.83), which can be explained by the fairly lax legislation that regulates this area in Serbia, on the one hand, and the presence of small number of JSCs on the capital market, on the other. The regulated market on the Belgrade Stock Exchange consists of Prime Listing, Standard Listing and Open Market segments, where the Rules on Listing specify stricter criteria for listing securities on the Prime Listing segment. One of the requirements that is relevant for enhancing the quality and transparency of financial statements concerns audit opinions, where companies that wish to be on the Prime Listing are required to have an unmodified audit opinion on their financial statements for the year preceding the year of filing the application for such listing, while companies that wish to be on the Standard Listing are permitted to have modified opinions. However, during the security listing period a modified audit opinion is also permitted for companies that are on the Prime Listing . By contrast with the indolence of regulatory bodies verifying the financial statement quality, that is immanent to economies with underdeveloped capital markets, the SEC (in the USA) does not accept any financial statement for which auditors issued anything other than unmodified opinions (for more on this topic, see). In addition, in 2016 a total of 4 Serbian companies appeared on the Prime Listing of the Belgrade Stock Exchange, with just as many on the Standard Listing, while 43 companies were listed on the Open Market segment, out of which only 9 companies were included

in our sample. The mean value of aggregate measure for companies in the sample that were listed on the organized capital market in 2016 ranged from 127.37 (Open Market) to 141.25 (Standard Listing), which indicates that even weak regulatory requirements reduce the risk of earnings management. Namely, relatively low score of the aggregate measure for JSCs is a consequence of a higher degree of earnings management in joint stock companies that are not listed on the regulated capital market.

Tables 6a, 6b and 6c present the mean values of the aggregate measure by categorical variables that are linked to financial performance. According to the results presented in Table 6a, companies that reported losses in at least one year of the sample period had greater incentives for accruals management and earnings smoothing than companies that did not report losses. At the same time, companies that reported losses frequently, in six or more periods, had a higher aggregate measure (108.2) than companies in which losses occurred sporadically (up to five times), which indicates that the companies that have serious financial difficulties are less likely to resort to accounting techniques for the purpose of presenting better financial performance than it actually is.

From our evidence on the mean values of the aggregate earnings management measure by share of net income in total assets (Table 6b), it can be observed that the pervasiveness of earnings management is the greatest in companies that exhibit positive, yet small net income whose share in total assets is up to 5%. The low score of their aggregate measure (83.76) signalizes that discretionary rights were exercised extensively in the strategy of loss avoidance by shaping small losses into small profits. It is symptomatic that 40% of these companies (23 out of the total of 57), which did not report losses in the nine-year period, recorded the mean aggregate measure value of 77.65, while the mean value of the aggregate measure of 29 companies whose share of net income in total assets was up to 5% and that reported losses at least once or twice in the sample period was higher by 10 ranks (87.65). Companies whose net income moves significantly in the positive direction and away from zero (share of net income in total assets greater than 10%) have an aggregate measure that is higher than the aggregate measure recorded for the riskiest category by 50 ranks on average. The results presented in Table 6c which show the mean value of the aggregate earnings management measure according to the frequency of small profits confirm the conclusions of the previous studies that high frequency of small profits is an indicator of earnings smoothing, given that the mean value of the aggregate measure for companies in which small

Table 6a: Mean values of the aggregate earnings management measure for large companies in the Republic of Serbia by frequency of net losses

Number of years in which *NI*<0	0	1-2	3-5	>5	Σ
Number of companies	109	56	28	22	215
Mean *AEM*	116.34	99.69	92.00	108.20	108.00

NI is net income before tax, scaled by average total assets of company *i*; AEM is the aggregate earnings management measure for company *i*.

Table 6b: Mean values of the aggregate earnings management measure for large companies in the Republic of Serbia by share of net income in total assets

NI share in total assets	<0	Up to 5%	5%-10%	10%-15%	15%-20%	>20%	Σ
Number of companies	51	57	57	25	16	9	215
Mean *AEM*	99.54	83.76	114.02	134.86	144.94	131.01	108.00

NI share in total assets is the mean value of net income before tax, scaled by total assets of company *i*; AEM is the aggregate earnings management measure for company *i*.

Table 6c: Mean values of the aggregate earnings management measure for large companies in the Republic of Serbia by frequency of small losses

$\#SmPosNI_i$	<4	4	>4	Σ
Number of companies	23	137	55	215
Mean *AEM*	136.61	116.59	74.64	108.00

Where: #SmPosNI is the number of (small) profits of company *i*, scaled by total assets, in the range [0,0.1]; AEM is the aggregate earnings management measure for company *i*.
Source: prepared by the authors.

profits appeared up to three times is higher by nearly 62 ranks than the mean value of aggregate score of companies in which small profits appeared five or more times.

Higher sales volatility (approximated by the standard deviation of sales revenues) highlights the volatile nature of a company's core business and increases the level of uncertainty in accounting estimates. It seems related to lower predictability, lower persistence of earnings, lower accruals quality and greater room for maneuver as regards earnings smoothing. The mean values of the aggregate measure presented in Table 7 suggest that the increase in sales volatility increases the pervasiveness of manipulative accrual management.

Capital intensive companies are characterized by a high share of fixed assets in total assets and a high level of operating leverage expressed as fixed to variable costs proportion, which makes them especially sensitive to market fluctuations and changes in sales. Although a high share of long-term assets creates room for opportunistic accounting choices in terms of classification of assets, selected depreciation method, estimates of useful life, measurement for impairment purposes, etc., the results presented in Table 8 reveal that the exploitation of discretionary rights linked to long-term assets is not a prevalent way of earnings management in large Serbian companies. Companies with the lowest mean value of the aggregate earnings management measure (87.19) have the lowest share of fixed assets in total assets, while an increase in the level of capital intensity is accompanied by an increase in the aggregate measure. Exceptions are companies with the highest share of fixed assets (over 70%) whose mean value of the aggregate measure is somewhat above the mean value of the aggregate measure for the entire sample (108.5); however, we should not forget the fact that this group of companies includes 8 public enterprises (the mean aggregate measure value of those 8 public enterprises whose share of fixed assets is above 70% amounts to 75.3), which has significant implications for the aggregate measure score of this category of companies.

The length of the operating cycle, computed as the sum of days inventory and days accounts receivable, depends on the nature of the company's core commercial activity, but also on the efficiency of asset management. Table 9 shows that the increase in the length of the operating cycle is accompanied by the decrease in the average earnings management score, which means that the risks of manipulating earnings are higher in companies with longer operating cycles. The transportation, media,

Table 7: Mean values of the aggregate earnings management measure for large companies in the Republic of Serbia by sales volatility

vol_SALES	0-0.1	0.1-0.2	0.2-0.4	0.4-0.7	>0.7	Σ
Number of companies	35	50	53	36	41	215
Mean *AEM*	123.61	120.39	102.17	105.88	88.96	108.00

Where vol_SALES is sales volatility of company *i* measured as the standard deviation of sales revenues (scaled by total assets); AEM is the aggregate earnings management measure for company *i*.
Source: prepared by the authors.

Table 8: Mean values of the aggregate earnings management measure for large companies in the Republic of Serbia by capital intensity

CI	0-0.3	0.3-0.5	0.5-0.7	>0.7	Σ
Number of companies	62	63	61	29	215
Mean *AEM*	87.19	116.39	120.30	108.50	108.00

CI is capital intensity of company *i* measured as the mean ratio of long-term assets over total assets; is the aggregate earnings management measure for company *i*.
Source: prepared by the authors.

Table 9: Mean values of the aggregate earnings management measure for large companies in the Republic of Serbia by length of operating cycle

OPERCYCLE	up to 90 days	91-180 days	over 180 days	Σ
Number of companies	68	98	49	215
Mean	114.74	111.84	90.96	108.00

OPERCYCLE is the length of operating cycle of company *i*, computed as the mean value of the sum of days inventory and days accounts receivable; is the aggregate earnings management measure for company *i*.
Source: prepared by the authors.

communications, science and art and electricity and water supply sectors have the shortest operating cycles. The longest operating cycle belongs to the construction sector (178 days). The operating cycles of two sectors with the largest number of sampled companies, the manufacturing and trade sectors, have nearly the same length of around 160 days, yet the differences in the nature of their core businesses are reflected in their capital intensity (the average share of long-term assets in the manufacturing sector is nearly 50%, while in trading companies this share is 32%) and sales volatility (average standard deviations in sales revenues in the manufacturing and trade sectors are 0.33 and 0.65, respectively). Since the difference in their average earnings management scores is 10 ranks in favor of the manufacturing industry, we can assume that the incentives and possibilities for managing earnings by implementing aggressive accounting policies and estimates, are partially determined by a number of factors that define the nature of the company's core business, not only the length of its operating cycle.

A closer examination of the relation between earnings management and leverage is important for several reasons. On the one hand, highly leveraged firms may be riskier because of their financial difficulties and may have a need for more additional financing, higher agency costs, and even an increased risk of bankruptcy. The managers of companies that are close to breaching loan covenants are inclined to distort particular financial indicators, which may contribute negatively to earnings quality and jeopardize the decision usefulness of earnings. The previous research has documented that total debt to total assets is significant in seven out of nine earnings management strategies, where firms with more debt are more constrained by their debt covenants and, hence, attempt to loosen these constraints by choosing accounting policies which increase their net income. The fact that companies with pronounced earnings management activities have a high level of financial leverage was also confirmed by a study carried out in 37 countries covering the 1989-2009. On the other hand, a high level of financial leverage does not have to, by definition, jeopardize the quality of earnings, as under such circumstances creditors demand more transparent information and pay more attention to whether financial ratios are at the expected level. It appears that the examination of the influence of leverage on earnings management is especially important in emerging markets where the primary group of financial statement users are not investors. In Table 10, companies are divided into four categories according to their average financial leverage level. The mean values of the aggregate measure by leverage support the hypothesis that highly leveraged firms have greater incentives for aggressive use of accounting flexibility. A difference of 44 ranks between the mean values of the aggregate measure of the group of the least and most leveraged companies indicates that the quality of financial accounting information of highly leveraged companies is questionable, as there is high risk of earnings distortion. A particularly worrisome fact is that 89% of companies in the highest leverage category reported small profits at least four times in the sample period.

Conclusion

Earnings management is a globally widespread practice that takes different forms in the developed and developing economies. Its increasingly aggressive character jeopardizes the quality of financial accounting information and undermines public trust in the financial reporting system. Also, it presents an incredibly challenging area for researchers, as earnings management is hardly observable and difficult to measure. Furthermore, the absence of consensus regarding its definition and the extent to which it is desirable as a way of communicating privileged insider information hinders setting a clear path for researchers to follow.

Table 10: Mean values of the aggregate earnings management measure for large companies in the Republic of Serbia by leverage

LEV	0-0.5	0.5-0.8	0.8-1	>1	Σ
Number of companies	31	57	38	89	215
Mean *AEM*	137.10	114.98	109.20	92.88	108.00

LEV is the financial leverage of company *i* measured as the mean ratio of total liabilities to total assets; aggregate earnings management measure for company *i*.
Source: prepared by the authors.

The methodology for assessing the level of earnings management, used in our empirical analysis, includes four firm-level proxies that capture the outcomes of management activities focused on circumventing the stated accounting rules to avoid showing the firm's actual economic performance. In addition, the four-component earnings management measure captures various aspects of exercising discretion to manage the reported earnings. Our work contributes to the literature on national specificities in corporate financial reporting and to increasingly extensive literature on reported earnings characteristics in emerging markets. Descriptive statistics of the aggregate earnings management measure, based on 215 large Serbian companies that operated in the real sector from 2009 to 2017, suggests that the Serbian economy is not immune to earnings distortion practice and that capabilities and incentives for misrepresentation of the firm's true performance are affected by firm's characteristics. Namely, the nature of company's core business determines the length of its operating cycle, level of capital intensity, sales volatility, and the industry it belongs to. The results indicate that the sales volatility and length of operating cycle significantly influence earnings management. After analyzing the mean values of the aggregate measure by categorical variables, it can be concluded that large Serbian companies use accounting discretion in sales revenues more than in depreciation cost estimations. The mean values of the aggregate measure by legal forms suggest that the quality of corporate governance and the rigor of the regulatory framework significantly impact the pervasiveness of earnings management across companies. Our findings reveal that the companies listed on the Belgrade Stock Exchange and operating under the supervision of the Securities Commission have far higher aggregate measure score than the public sector enterprises. These results are expected since it is difficult to control the management appointed on the basis of political, not professional and ethical suitability.

This paper shows that earnings management is driven by loss avoidance and that high incidence of small profits may be the red flag for earnings manipulations. The assessment of financial statement quality requires constant vigilance in companies with low profitability because low positive earnings could be the result of earnings management activities rather than economic reality.

Finally, our empirical findings highlight an important link between leverage and earnings management and document systematic pattern showing that high leveraged firms have strong incentives to use accounting discretion to mask their economic performance. Although a relatively organized banking sector in Serbia performs an annual financial statement review as part of the risk control system, the fact that the average financial liabilities to total assets ratio amounted to around 30% supports the conclusion that large Serbian companies manage to avoid this type of supervision by financing a large portion of their assets through their operating liabilities.

To the best of our knowledge, there is a limited number of empirical studies that had thoroughly examined earnings management practice in Serbia. Although this issue has been extensively theoretically discussed in Serbian academic circles, there is no reliable evidence necessary to draw conclusions about its prevalence. The purpose of this study is to present additional evidence about earnings management in Serbia and to raise awareness among domestic investors and regulatory bodies about its pervasiveness in spite of the lack of capital market incentives. Additionally, we revealed a systematic pattern between the aggregate measure and categorical variables, contributing to our understanding of the relation between individual characteristics of companies and incentives for earnings management.

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Snežana Miletić

is Teaching Assistant at the Faculty of Economics, University of Belgrade, where she teaches Financial Accounting. In 2011, she received her magister degree in Accounting, Audit and Corporate Finance from the Faculty of Economics, University of Belgrade. Currently, she is a doctoral student at the same faculty. The fields of her scientific interest include financial statement analysis and quality, earnings management, and real estate accounting. Ms. Miletić has published numerous scientific and research papers and has participated in many conferences and projects in the field of financial reporting.

Savka Vučković Milutinović

is Associate Professor at the Faculty of Economics, University of Belgrade. She is a member of the Department for Accounting and Business Finance and teaches courses in the field of auditing within undergraduate and master's programs. As a lecturer, she has participated in many education courses related to the implementation of professional standards in Serbia. She co-authored a book on auditing and published articles in the area of auditing and financial reporting.

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Vladimir Mihajlović
University of Kragujevac
Faculty of Economics
Department of General Economics and
Economic Development

THE NEXUS BETWEEN UNEMPLOYMENT AND ECONOMIC GROWTH IN SERBIA: DOES OKUN'S LAW HOLD?

Povezanost nezaposlenosti i privrednog rasta u Srbiji – da li važi Okunov zakon?

Abstract

Starting from the empirically-based postulate that economic growth, through increasing labour demand and employment, reduces the unemployment rate, this study investigates the relationship between real GDP growth and the unemployment rate in the Republic of Serbia. The analysis is motivated by the fact that the unemployment rate in Serbia has significantly decreased over the last decade (especially after 2014), despite relatively modest rates of economic growth. These tendencies indicate the possibility of a nonlinear (asymmetric) relationship between the two variables, which has important implications for designing a more efficient economic and employment policy. Applying both linear and nonlinear Autoregressive Distributed Lags models (ARDL and NARDL) to quarterly data in the 2008-2019 period reveals that the relationship between economic growth and unemployment rate is negative, as suggested by Okun's law, but also that there is a profound asymmetry in this relationship. Namely, a 1% increase in the real output leads to a 4.74% decrease in the unemployment rate, whereas a decrease in output by the same percentage increases the unemployment rate by only 1.52%. Further analysis, based on investigating the relationship between GDP decomposed by the expenditure and production approach, and the unemployment rate, indicates that Okun's law asymmetry in the economy of Serbia is most affected by domestic demand, primarily private and government expenditures on the products of labour-intensive activities, such as services, agriculture, and industry.

Keywords: *unemployment rate, output, nonlinear ARDL model, asymmetry, economic policy.*

Sažetak

Polazeći od empirijski fundiranog postulata da ekonomski rast, preko povećanja tražnje za radom i zapošljavanja, dovodi do smanjenja stope nezaposlenosti, u ovoj studiji se ispituje odnos između rasta realnog BDP-a i stope nezaposlenosti u Republici Srbiji. Opredeljenje za navedenu analizu motivisano je činjenicom da je stopa nezaposlenosti u Srbiji značajno smanjena tokom poslednje decenije (naročito nakon 2014. godine) uprkos relativno skromnim stopama privrednog rasta. Navedene tendencije ukazuju na mogućnost nelinearne (asimetrične) veze između ovih veličina, što ima važne implikacije za dizajniranje efikasnije ekonomske politike i politike zapošljavanja. Primenom linearnog i nelinearnog autoregresivnog modela raspoređenih docnji (ARDL i NARDL) na kvartalne podatke u periodu od 2008. do 2019. godine pokazano je da je veza između privrednog rasta i stope nezaposlenosti negativna, kao što predviđa Okunov zakon, ali i da postoji izražena asimetrija u ovom odnosu. Naime, povećanje realnog autputa za 1% dovodi do smanjenja stope nezaposlenosti za 4,74%, dok smanjenje autputa u istom procentu povećava stopu nezaposlenosti za svega 1,52%. Dodatna analiza, koja stavlja u odnos komponente BDP-a prema rashodnom i proizvodnom pristupu i stopu nezaposlenosti, ukazuje da najveći efekat na asimetriju Okunovog zakona u privredi Srbije ima domaća tražnja, primarno lična i javna potrošnja usmerena na proizvode radno intenzivnih delatnosti, poput sektora usluga, poljoprivrede i industrije.

Ključne reči: *stopa nezaposlenosti, output, nelinearni ARDL model, asimetrija, ekonomska politika.*

Introduction

The negative relationship between output changes (economic growth) and the unemployment rate is one of the most sustainable postulates in macroeconomics. It is called Okun's law, after the economist Arthur Okun, who unveiled this relationship in the U.S. economy [34]. Okun's main conclusion is that a 1% reduction in the unemployment rate is associated with a 3% increase in the output. A number of empirical studies confirm Okun's law validity, at least the presence of a negative relationship between the two variables [8], [31], [34], [49]. There are, however, studies that challenge the universality of Okun's law, focusing on its stability, direction of causality, and the value of Okun's coefficient [12], [21], [42]. These controversies lead to Okun's law being constantly analysed and reassessed.

Empirical research to date has been directed primarily to advanced market economies, although in the last two decades the focus of a number of studies has been moved to the emerging and transition economies [2], [6] [14], [26]. A common finding from these studies is as follows: a trade-off between the output and unemployment in developed economies differs quantitatively and qualitatively compared with developing economies. The qualitative differences, which stem dominantly from the extent of market economy postulates, can be reduced to the qualitative ones, represented by the value of Okun's coefficient. It is emphasised that Okun's coefficient tends to be higher in more developed countries, primarily as a corollary of improved labour market flexibility [11]. Some authors even use the validity of Okun's law as an indicator that the transition process is finished [20].

A negative relationship between output and unemployment rate does not necessarily assume that the value of absolute change in the unemployment rate is identical in contractionary and expansionary periods. In other words, the value of Okun's coefficient could differ depending on whether the real output increases or decreases. This asymmetry in Okun's law has been a subject of intensive empirical research in the last two decades [12], [44], [53]. The results of the econometric analysis commonly suggest that the reaction of unemployment to the output changes is more intensive in economic contraction than in economic expansion. This finding is often referred to as "jobless recovery" or "jobless growth", since the unemployment rates exhibit some hysteresis (inertia) when the economy recovers and they are expected to decline more. Yet, there is some evidence that supports the opposite case, when the unemployment rates respond more to positive changes in the output (in the economic expansion) rather than to negative ones (in contraction). This hypothesis is usually called "labour hoarding" and its occurrence can be seen in some transition economies, often due to administrative constraints aimed at stopping the firing [11], [14], or in the case when the firms are reluctant to fire trained workers [32]. By all means, the valid empirical evidence about the asymmetric trade-off between output growth and the unemployment rate has important implications for designing more efficient economic policy measures in which intensity should be adjusted to different phases of the economic cycle. Albeit these implications are more significant for emerging and transition economies, there are still relatively few empirical studies dealing with these economies (some exceptions include, inter alia, [13], [14], [15] [25]).

Accordingly, this study tries to add to the empirical literature about Okun's law by assessing its validity in the context of Serbia's economy and the presence of asymmetry in this relationship. The aim is to reveal the value and the sign of Okun's coefficient and to explain its association with the specificities of Serbia's economy. The main motivation for analysing data for the Republic of Serbia (RS) lies in two facts: first, since the Great Recession, the unemployment rate in Serbia has been reduced significantly (Labour Force Survey data), whereas the data for empirical dynamics of real GDP do not indicate that economic growth corresponded to the observed decrease in unemployment, and second, according to the best of our knowledge, the presence of asymmetry in Okun's law for Serbia has not been investigated to date, although it can ameliorate the understanding of the relationship between the economic growth and the labour market.

In line with the aforementioned, in this paper the following research hypotheses are tested:

H1: The relationship between the real output growth and the unemployment rate in the Republic of Serbia is

negative and statistically significant in the analysed time period.

H2: Okun's coefficient in Serbia's economy has a different value in expansionary and contractionary periods, indicating the presence of asymmetry in the linkage between the economic growth and the unemployment rate changes.

The formulated hypotheses are evaluated by means of empirical research based on quarterly data about real GDP and the unemployment rate in the RS. An econometric methodology consists of a Nonlinear Autoregressive Distributed Lag (NARDL) approach, developed by Shin, Yu, and Greenwood-Nimmo [43], which allows joint investigation of cointegration and long- and short-run asymmetry in one model.

The rest of the paper is organised as follows. The second section presents the referent empirical studies about Okun's law, whereas the third explains the research methodology and dataset. The empirical results and discussion are presented in the fourth section. The fifth section contains an additional analysis of the impact of changes in GDP components on Okun's law asymmetry, whereas the last section concludes.

Overview of the relevant empirical literature about Okun's law

Bearing in mind there are numerous empirical studies about Okun's law validity, especially for developed economies, in this section, we focus on some of the recent research. Particular attention is directed to studies dealing with output-unemployment trade-off in emerging and transition economies, and the presence of asymmetry in this relationship.

Valadkahani and Smith [49] investigate Okun's law stability in the United States (US) in the period after World War II. They find evidence that the relationship between unemployment and output is stable over time and that it has asymmetric features. Similar findings for the US and the United Kingdom are reported by Belaire-Franch and Peiró [8], who stress that unemployment responds more strongly to contractions rather than expansions in output. Economou and Psarianos [18] conclude that Okun's law in 13 EU countries is stable and that the impact of output on unemployment is weaker for countries with increased labour market protection expenditures, and vice versa. In contrast, Rahman and Mustafa [42] provide evidence on Okun's law validity only in two out of 13 selected developed countries over the 1970-2013 period.

Dixon et al. [17] analyse Okun's relationship in 20 OECD countries over the 1985-2013 period, and reveal that the share of temporary workers could explain the Okun's coefficient changes. Novák and Darmo [34] confirm the validity of Okun's law in EU28 in the 2000-2014 period. In addition, they reveal that Okun's coefficient has a higher value in the post-crisis period (2008-2014).

Ibragimov and Ibragimov [26] find that the effect of economic growth on changes in unemployment in the Commonwealth of Independent States (CIS) is stable over time. Dajcman [16] investigates whether Okun's law holds for Slovenia and the national and regional levels. The analysis based on panel data provides evidence in favour of Okun's law validity in six out of twelve regions in Slovenia. Ball et al. [4] investigate the validity of Okun's law in 29 advanced and 42 developing countries and unveil that Okun's coefficient is about half as large in developing as in advanced economies. They also stress that the value of Okun's coefficient depends on the share of services in GDP: when the share of services is higher, the reaction of employment to the changes in the output will be more profound. Andonova and Petrovska [2] confirm the presence of a negative relationship between output and unemployment in North Macedonia. By applying the expenditure approach to GDP decomposition, they also reveal that domestic demand has a stronger impact on the unemployment rate. By means of Autoregressive Distributed Lag (ARDL) model, Tumanoska [48] also finds evidence to support Okun's law validity in this country: a 1% of economic growth leads to a 2.57% decrease in the unemployment rate.

During the last two decades, a growing body of literature has dealt with the problem of the asymmetric relationship between the output changes and unemployment. Harris and Silverstone [23] find evidence on Okun's law asymmetry in seven OECD countries. Silvapulle et al. [44] analyse post-war U.S. data and demonstrate that

the short-run cyclical unemployment is more sensitive to negative than to positive cyclical output, which indicates asymmetry in their relationship. Applying the ARDL approach to Okun's law estimation, Canarella and Miller [12] evince that in the post-Great Recession regime Okun's law breaks down as a linear relationship, and that it rather follows a more complex nonlinear asymmetric dynamics. By means of NARDL modelling, Tang and Bethencourt [46] demonstrate that Okun's law in the majority of the Eurozone countries is asymmetric. Zwick [53] analyses an asymmetry between unemployment and output for twelve Eurozone countries and reveals that, in most cases, the output is more sensitive to negative than to positive changes in cyclical unemployment.

Caraiani [13] documents that the relationship between the industrial production index and the unemployment rate between January 1991 and December 2009 in Romania is asymmetric and that Okun's coefficient is higher during a recession and lower during expansion. Similarly, Cevik et al. [14] reveal that cyclical unemployment is more sensitive to cyclical output in downswing regimes than in upswing regimes in nine transition countries. Karfakis et al. [28] find evidence on Okun's law asymmetry in Greece in the 2000-2012 period. These results for the same country are reconfirmed by Koutroulis et al. [29] for the 1990-2014 period. Boďa et al. [10] examine Okun's law validity and the presence of asymmetries between output and unemployment for the four Visegrád Group countries. Albeit the negative relationship between these variables is confirmed in all countries, this relationship is asymmetric only for Slovakia. Bariş-Tüzemen and Tüzemen [6] investigate the association between the unemployment rate and manufacturing industry growth in Turkey. They evince that direction of causality goes from unemployment to the manufacturing industry, but only in the case of negative shocks, whereas the symmetric test detects no causality at all. Similar findings of the presence of asymmetry among GDP growth, unemployment, and employment in Turkey can be found in Coşar and Yavuz [15]. They reveal that the response of labour market variables to GDP changes is more profound during recessions.

Having in mind the empirical studies to date, this paper contributes to the referent literature at least in two aspects: first, the analysis is based on data for the Republic of Serbia and could provide additional evidence about the characteristics of output-unemployment relationship in an economy still in the transition process, and second, this study employs a relatively novel econometric methodology that allows joint estimation of the long- and short-run asymmetries in Okun's law, thus providing a better understanding of the interaction between economic growth and the labour market. Additional contribution lies in applying the NARDL model to estimate the impact of separate GDP components, obtained using both the expenditure and production approach.

Research methodology and data

Methodological background of Okun's law

The observed negative relationship between unemployment and economic growth, i.e., Okun's law, is based on the fact that economic expansion leads to labour market demand increases that intensify the employment process and reduce the unemployment rate. In the case of an economic recession, this process is the opposite. In its original form, Okun's law can be expressed as follows [9, p. 208]:

$$u_t - u_{t-1} = -b(g_{yt} - \bar{g}_y) \quad (1)$$

where and denote unemployment rate in the periods and , respectively; is Okun's coefficient, refers to the growth rate of output from year to year , whereas stands for the normal or "natural" growth rate (the output growth rate necessary to neither increase nor decrease the unemployment rate). Okun's coefficient actually indicates the unemployment rate sensitivity to the real output growth changes.

This "textbook version" of Okun's law exhibits some limitations when one tries to empirically estimate the value of Okun's coefficient. The main reason reflects the fact that the exact value of the natural growth of output can hardly be calculated. Therefore, the estimation of the relationship between unemployment and output in the empirical literature is commonly based on one of two forms: the gap model that encompasses the nexus between the output gap and unemployment gap and the model with first-differences of the output and unemployment

rate. The gap model of Okun's law can be presented in the following form:

$$\mu_t = a + bx_t + \varepsilon_t, \quad b < 0 \tag{2}$$

where: $\mu_t = u_t - u^*$ and $x_t = y_t - y^*$; represents a constant, b is Okun's coefficient, μ_t and x_t refer to the unemployment gap and the output gap, respectively, u_t and y_t are actual unemployment rate and real output in period t, whereas u^* and y^* denote the natural rate of unemployment and the potential output, respectively. This version of Okun's law, albeit considered to be more general [22], can include the state of an economy relative to its trend or natural growth rate, which is usually the main motivation to use it in empirical research [23], [44], [53]. However, this approach shares the same limitations with Okun's law relation given by Equation (1), since neither the natural rate of unemployment nor the potential output is directly observable.

The first-difference version of Okun's law includes the rates of change in observed variables ($\Delta u_t = u_t - u_{t-1}$); $\Delta y_t = y_t - y_{t-1}$) and can be formulated as follows:

$$\Delta u_t = a + b\Delta y_t + \varepsilon_t, \quad b < 0 \tag{3}$$

where u_t and y_t are unemployment rate and real output, respectively, and ε_t represents the error term. In empirical research, the models (2) and (3) of Okun's law are used with almost equal frequency, whereas some studies implement both versions in order to get more robust results [14], [37].

In this paper, like in a number of empirical studies [1], [5], [34], [46], the analysis of Okun's law validity is based on the first-difference model, for at least two reasons: first, the gap model parameters' estimation assumes the natural rate of unemployment and the long-run output growth rate to be constant [5], which is not always the case, and second, the values of the unemployment gap and output gap (which are not directly observable) depend on the time series decomposition model applied [44].

Econometric model

Starting from Equation (3), one can obtain the model that represents better the dynamics of the relationship between economic growth and unemployment rate change, by using their lagged values as regressors. In that way, the ARDL model of Okun's law can be formulated. By including both short- and long-run coefficients in the same equation, the ARDL model in the error correction form can be obtained [38]:

$$\Delta u_t = \alpha_0 + \beta_1 u_{t-1} + \beta_2 y_{t-1} + \beta_3 \pi_{t-1} + \sum_{i=1}^{m} \gamma_i \Delta u_{t-i} + \\ + \sum_{i=0}^{n} \delta_i \Delta y_{t-i} + \sum_{i=0}^{p} \theta_i \Delta \pi_{t-i} + \varepsilon_t, \tag{4}$$

where α_0 is the constant, β_1, β_2, and β_3 represent the long-run coefficients, γ_i, δ_i, and θ_i are the short-run coefficients, and m, n, and p denote lag length. It should be noted that the inflation (π_t), as the third variable, is of auxiliary character in modelling as it is used to reduce the problem of suspected causal effects due to the non-inclusion of important variables in the analysed relationship. The research priority is still the relationship between the unemployment rate and economic growth. In order to test the first research hypothesis, the parameters of the model (4) are estimated. More precisely, the value of the long-run parameter measuring the impact of output growth on the unemployment rate change (L_y) is calculated, as follows: $L_y = -\beta_2 / \beta_1$ [43]. The negative value of this parameter indicates the economic growth and unemployment rate move in opposite directions in the long-run.

In order to test the second research hypothesis, the nonlinear (asymmetric) ARDL model that discovers the presence of asymmetry in the economic growth-unemployment relationship, is formulated. Following the approach developed by Shin et al. [43], the changes in real output (y_t) are decomposed into the increasing and decreasing partial sums, i.e., $y_t = y + y_t^+ + y_t^-$, where y_t^+ and y_t^- represent the partial sums of positive and negative changes in the real output, respectively, as follows:

$$y_t^+ = \sum_{i=0}^{t} \Delta y_i^+ = \sum_{i=0}^{t} max(\Delta y_i, 0); \tag{5}$$

$$y_t^- = \sum_{i=0}^{t} \Delta y_i^- = \sum_{i=0}^{t} max(\Delta y_i, 0) \tag{6}$$

By substituting y_t by variables y_t^+ and y_t^- in the model (4), we get the NARDL model in the form:

$$\Delta u_t = \alpha_0 + \beta_1 u_{t-1} + \beta_2^+ y_{t-1}^+ + \beta_2^- y_{t-1}^- + \\ + \beta_3 \pi_{t-1} + \sum_{i=1}^{m} \gamma_i \Delta u_{t-i} + \sum_{i=0}^{n} (\delta_i^+ \Delta y_{t-i}^+ + \delta_i^- \Delta y_{t-i}^-) + \\ + \sum_{i=0}^{p} \theta_i \Delta \pi_{t-i} + \varepsilon_t, \tag{7}$$

where β_2^+ and β_2^- denote the long-run coefficients, whereas δ_i^+ and δ_i^- represent the short-run coefficients of positive and negative changes in the output, respectively.

For the presentation of cumulative effects of changes in the real output on the unemployment from short- to long-run, the so-called dynamic multipliers are applied,

indicating the effects of unit changes in y_t^+ and y_t^- on u_t, by using the following formula [43]:

$$m_{h1}^+ = \Sigma_{j=0}^{h1} \frac{\partial u_{t+j}}{\partial y_t^+}, \; m_{h1}^- = \Sigma_{j=0}^{h1} \frac{\partial u_{t+j}}{\partial y_t^-}, \; h = 0,1,2... \qquad (8)$$

As the number of observations tends to infinity ($h_1 \rightarrow \infty$), the multiplier values incline to values of the long-run parameters of the positive (L_y^+) and negative (L_y^-) changes in the real output, i.e., $m_{h1}^+ \rightarrow L_y^+$ and $m_{h1}^- \rightarrow L_y^-$, where $L_y^+ = -\beta_2^+/\beta_1$ and $L_y^- = -\beta_2^-/\beta_1$, as suggested by [43].

The presence of the long-run relationship (cointegration) between dependent and explanatory variable is checked by testing the null hypothesis of no cointegration H_0: $\beta_1 = \beta_2 = 0$ and H_0: $\beta_1^+ = \beta_2^- = 0$ in Equations (4) and (7), respectively [38].

The long-run asymmetry is investigated by testing the null hypothesis of symmetry H_0: $-\beta_2^+/\beta_1 = -\beta_2^-/\beta_1$ in Equation (7), as suggested by [43] and [46]. The short-run asymmetry is checked by testing the null hypothesis H_0: $\Sigma_{i=0}^n \delta_i^+ = \Sigma_{i=0}^n \delta_i^-$. For analysis of asymmetries and cointegration, the standard Wald test is applied, as a common approach in empirical research.

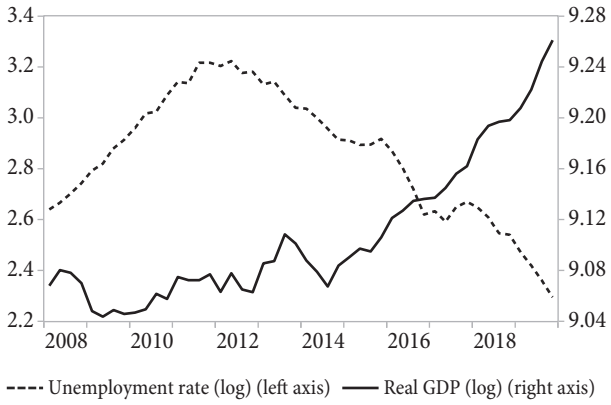
Dataset

This study uses quarterly data about real GDP, unemployment rate, and inflation. The analysed time span is from the first quarter of 2008 to the fourth quarter of 2019 (48 observations). Real GDP is calculated by dividing nominal GDP in euros with the price index (implicit deflator, 2015=100) and transformed into a logarithmic form. The inflation is measured by a Consumer Price Index (CPI). The data are collected from the Eurostat database [19]. The unemployment rate is measured as a share of unemployed persons in the total labour force. The data are obtained from the Statistical Office of the Republic of Serbia (Labour Force Survey) [45].

The comparability of data about the unemployment in the RS is aggravated by the fact that the methodology for calculation of the labour market indicators was changed in 2015. It certainly requires caution in interpreting the estimation results. Notwithstanding, this change in methodology didn't result in the structural break (see Figure 1 and the last column in Table 2) and the time series about unemployment rates can be used for analysis; the NARDL model for sub-period 2012Q1-2019Q4 is also estimated in order to get more robust results. The starting point for this sub-sample is chosen following Petrović et al. [40]. In addition, bearing in mind that the data about the unemployment rate in the 2008-2013 period were released two times a year (in April and October), the conversion to quarterly data was implemented. The unemployment data from the April release in each year of the mentioned period were assigned to the first and the second quarter of the current year, whereas the data about the unemployment rate from the October release were assigned to the third and the fourth quarter of the current year.

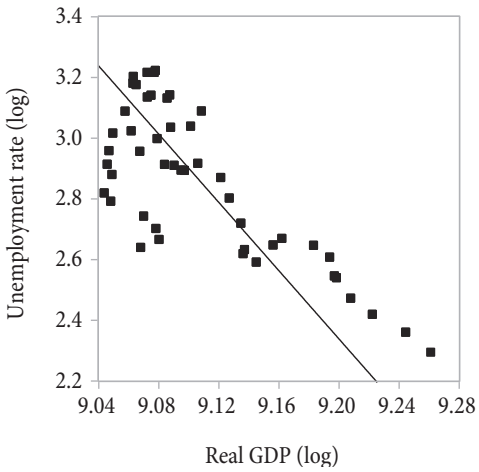
The empirical dynamics of the unemployment rates and real GDP (Figure 1) can provide a preliminary insight

Figure 1: Empirical dynamics of the unemployment rates and real GDP in Serbia in the period 2008Q1-2019Q4



Source: Author.

Figure 2: The scatter diagram for the relationship between the real output and unemployment rate



Source: Author.

into the nexus between these variables in the RS. It is evident that the relationship is negative, especially after 2012. The decrease in the unemployment rates after 2015 is more prominent, which could be, inter alia, a result of a change in the methodology for tracking the number of employed and unemployed persons. Additional insight into the relationship between unemployment and real output could be obtained by a scatter diagram (Figure 2). A negatively-sloped regression line indicates that, generally, the increases in the real output in the observed period are associated with unemployment decreases. It could be an initial signal that Okun's law in Serbia's context is valid.

Results and discussion

In order to conduct the econometric analysis which is in accord with the NARDL approach and formulated research hypotheses, some important preconditions must be fulfilled. First of all, the variables included into analysis should be stationary in levels and/or in the first differences, but none of them should be integrated of order I(2). Second, bearing in mind that Okun's law does not entail a causal relationship but only a simple correlation, the classification of variables into the explanatory and dependent ones should be confirmed by the causality test.

Accordingly, several unit root tests are performed. Table 1 reports the results of the Ng-Perron unit root test, which is considered more accurate comparing with other stationarity tests [33]. The results suggest that all variables are stationary in the first differences. The parametric Augmented Dickey-Fuller (ADF) test and nonparametric Phillips-Perron (PP) test, presented in Table 2, reconfirm the previous results, indicating that the NARDL model could be implemented. However, since the presence of structural break in time series can lead to biased results, as suggested by Baum [7], the Zivot-Andrews test is also conducted [52]. It is evident that the results are mixed, however, it can be concluded that all variables are stationary in level and/or in the first difference.

Prior to the models' estimation, in line with the second precondition, the causality analysis is applied. It is based on the Granger non-causality test. However, since the unit root tests indicate that the time series are not integrated of the same order (some of them are stationary in levels and others in the first difference), the standard F-statistic for testing the Granger causality may be misleading since the test does not have a standard distribution, as suggested by [47]. Hence, the Toda-Yamamoto approach to Granger causality is applied. It is based on a modified Wald test, which tests for the causality of time series in levels, thus

Table 1: Results of the Ng-Perron unit root test

Variable	MZa	MZt	MSB	MPT
y	0.245	0.084	0.340	12.912
u	-4.331	-1.459	0.337	5.678
π	0.412	0.302	0.734	36.244
Δy	-16.879***	-2.904***	0.172***	1.454***
Δu	-22.750***	-3.347***	0.147***	1.165***
$\Delta \pi$	-15.782***	-2.788***	0.177**	1.631***

Note: The results denoted with *, **, and *** are statistically significant at the levels of 10%, 5%, and 1%, respectively.
Source: Author.

Table 2: Results of the time series stationarity tests

Variable	ADF test		PP test		Zivot-Andrews test	
	Constant	Constant and Trend	Constant	Constant and Trend	t-statistic	Break date
y	3.38	-0.38	2.99	0.07	-2.82	2015Q2
u	1.23	-1.75	-0.02	-1.67	-4.09**	2011Q3
π	-1.85	-1.15	-2.38	-0.87	-2.87*	2010Q3
Δy	-5.59***	-5.61***	-5.66***	-6.87***	-6.42*	2013Q4
Δu	-1.94	-5.69***	-3.83***	-5.83***	-5.34***	2017Q1
$\Delta \pi$	-3.81***	-4.18**	-3.63***	-3.86**	-6.22***	2013Q4

Note: The results denoted with *, **, and *** are statistically significant at the levels of 10%, 5%, and 1%, respectively.
Source: Author.

reducing the risk of wrong identification of time series order of integration [50]. The relationship between the real output and unemployment rate is presented by transforming the time series in the standard vector autoregressive (VAR) model. The optimal lag length selection is based on the Schwarz information criterion, which is the most accurate for quarterly VAR models and sample sizes smaller than 120 observations [27]. According to the unit root tests, the maximal order of integration of time series is 1. In addition, taking into account that in the NARDL model the time series for positive and negative changes in the real output serve as regressors, the causality analysis includes these variables in the form of the asymmetric Granger non-causality test, as suggested by Hatemi-J [24]. The results are reported in Table 3.

The presence of unidirectional causality which goes from the real output to the unemployment rate is confirmed. The positive changes in real GDP (y^+) also represent an important determinant of the future unemployment rate dynamics, whereas the negative changes (y^-) have no statistically significant causal impact on unemployment. Notwithstanding, the postulated relationship between the real output as an explanatory variable and the unemployment rate is appropriate in the case of Serbia's economy.

Table 4 reports the exact specification of the ARDL and NARDL models of Okun's law in Serbia. It is obtained by successive trimming of insignificant time lags, starting from 4 lags [46]. The residual diagnostics tests (for normality, autocorrelation, heteroscedasticity, dynamic stability, and functional form) all indicate that all models are well specified and stable. The results of the cointegration test in the bottom row of Table 4 (F_{PSS}) confirm the presence of the long-run relationship between the unemployment rate and real output in all cases. As for the ARDL model specification, the value of the long-run parameter measuring the impact of the real output on the unemployment rate is negative (-2.95) and statistically significant, indicating an inverse relationship between these variables. Its value suggests that a 1% increase in the real output leads to a 2.95% decrease in the unemployment rate, and vice versa. This finding, therefore, represents the confirmation of the first research hypothesis. According to the coefficient of determination (R^2) value, the changes in the real output can explain about 58% of variations in the unemployment rate.

However, the NARDL model specification indicates that Okun's coefficient has a different value depending on whether the real output increases or decreases. In other words, the trade-off between the real output and unemployment rate is different in the expansionary and contractionary periods. The values of the long-run parameters for positive (L_y^+) and negative (L_y^-) changes in the real output are -4.74 and -1.52, respectively. These results indicate that a 1% increase in the real output leads to a 4.74% decrease in the unemployment rate, whereas a 1% decrease in the real output leads to a 1.52% increase in the unemployment rate. Therefore, it is a sign that the relationship between these variables in Serbia's economy is asymmetric. Indeed, the results of the Wald test confirm that there is not only a long-run asymmetry in Okun's law (W_{LR}) but also a short-run asymmetry (W_{SR}). Accordingly, the second research hypothesis is accepted.

An insight into the cumulative impact of the positive and negative changes in the real output on the unemployment rate, as well as the adjustment from the initial shock towards the long-run equilibrium, can be obtained by means of the dynamic multipliers [43]. The negative changes in the real output (dashed grey line in Figure 3) lead to the unemployment rate increase. This impact is more prominent in the short-run (approximately 8 quarters after the initial shock) and gradually decreases towards the long-run equilibrium. The positive changes

Table 3: The results of the Granger non-causality test for the ARDL and NARDL models

ARDL model		NARDL model Positive changes in real GDP		NARDL model Negative changes in real GDP	
H_0	χ^2	H_0	χ^2	H_0	χ^2
$y \nrightarrow u$	6.64*	$y^+ \nrightarrow u$	9.18**	$y^- \nrightarrow u$	1.89
$u \nrightarrow y$	3.96	$u \nrightarrow y^+$	4.38	$u \nrightarrow y^-$	1.63

Note: The symbol $\nrightarrow$ means "does not Granger cause"; the results denoted with *, **, and *** are statistically significant at the levels of 10%, 5%, and 1%, respectively.
Source: Author.

in the real output (continuous grey line) lead to a more pronounced reduction in the unemployment rate. The dashed black line represents the difference between the effects of positive and negative changes in the real output, that is, asymmetry. It is presented along with the black dashed lines denoting the 95% confidence interval. If the zero line is inside the confidence interval, then there is no asymmetry. The dynamic multipliers in Figure 3 indicate both short- and long-run asymmetry, which is in accord with the results of the Wald test from Table 4. Although unemployment reacts relatively strongly to the output changes in the short-run, it takes much more time to establish the long-run equilibrium.

In order to get the more robust results, and, at the same time, to use the time series that is long enough, the NARDL model is estimated for a sub-period starting from the first quarter of 2012, as suggested by Petrović et al. [40]. As presented in the last two columns of Table 4, the same direction of the long- and short-run asymmetry is still present, as Wald test indicates, although the long-run parameter of negative changes in the real output (L_y^-) is not statistically significant. Having all that in mind, one may conclude that the necessary robustness of econometric results is confirmed.

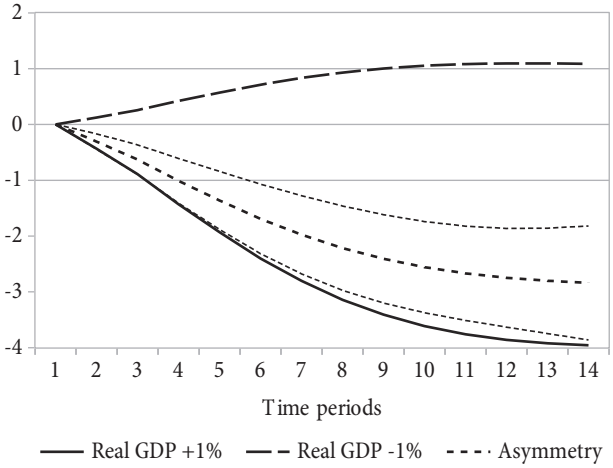
If one observes the direction of asymmetry, it appears that the nexus between real GDP and unemployment rate is not in line with the "jobless growth", but rather with the "labour hoarding" hypothesis. Albeit that hypothesis has been confirmed in empirical studies for transition economies [14], [32], a caution is needed in regard to the interpretation of the empirical results in the case of the RS. The mechanical interpretation of the empirical findings, without the relation with an actual context, could lead to the wrong conclusions. Namely, these results could indicate that economic growth reduces unemployment significantly, whereas a decrease in the real output leads to only a slight increase in unemployment. However,

Table 4: Estimation results for the ARDL and NARDL models

Variable	ARDL model		NARDL model		NARDL model 2012Q1-2019Q4	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
α_0	3.95	0.00	0.38	0.00	0.45	0.04
u_{t-1}	-0.12	0.00	-0.15	0.00	-0.18	0.01
y_{t-1}	-0.35	0.01	-	-	-	-
y^+_{t-1}	-	-	-0.70	0.00	-0.74	0.00
y^-_{t-1}	-	-	-0.22	0.07	-0.25	0.12
π_{t-1}	-0.01	0.00	-0.01	0.74	0.00	0.73
Δu_{t-1}	-	-	0.08	0.61	0.13	0.43
Δu_{t-2}	0.25	0.08	0.24	0.09	0.19	0.21
Δy_t	-0.19	0.45	-	-	-	-
Δy_{t-1}	-	-	-	-	-	-
Δy_{t-2}	0.51	0.03	-	-	-	-
Δy^+_{t-2}	-	-	-1.25	0.03	-1.32	0.04
Δy^-_t	-	-	-0.56	0.17	-1.06	0.06
$\Delta \pi_{t-2}$	0.02	0.01	0.02	0.02	0.02	0.01
L_y	-2.95	0.00	-	-	-	-
L^+_y	-	-	-4.74	0.00	-4.15	0.00
L^-_y	-	-	-1.52	0.01	-1.38	0.15
R^2 (Adjusted)	0.58		0.66		0.39	
JB test	0.51	0.78	1.35	0.51	1.43	0.49
BG LM test	0.58	0.56	0.38	0.69	0.54	0.59
BPG test	1.66	0.15	1.69	0.13	1.59	0.17
Cusum test	Stable		Stable		Stable	
Cusum Squared test	Stable		Stable		Stable	
RESET test	0.14	0.71	0.03	0.88	0.71	0.41
W_{LR}	-	-	18.14	0.00	12.62	0.00
W_{SR}	-	-	5.63	0.02	6.84	0.01
F_{PSS}	6.85	0.00	7.05	0.00	6.41	0.00

Notes: JB, BG LM, and BPG denote Jarque-Bera test for normality, Breusch-Godfrey test for autocorrelation and Breusch-Pagan-Godfrey test for heteroscedasticity of residuals, respectively; Cusum (Cusum Squared) refers to the cumulative sum of residuals (squared residuals) test; W_{LR} and W_{SR} denote the results of the short- and long-run asymmetry Wald tests, respectively; F_{PSS} refers to the F-statistic of the Bounds test for cointegration [38].
Source: Author.

Figure 3: Dynamic multipliers for the impact of positive and negative shocks in output on unemployment



Source: Author.

bearing in mind that the real output is the only explanatory variable in the estimated models (except inflation, but which has only auxiliary character), the changes in the unemployment rate can likely be a result of some other factors, not included in the analysis. For instance, the change in the methodology of tracking of either unemployed or employed persons might result in an unemployment rate reduction. Addressing this question from the aspect of the number of employed persons, Kovačević et al. [30] and Arandarenko and Aleksić [3] point out that including labour market characteristics such as "non-standard employment" and "labour underutilisation" can explain the significant employment growth which coexists with relatively modest economic growth. A likely corollary of this point could be a more significant decrease in the unemployment rate. There are some other views that should be mentioned, for instance in Petrović et al. [40], which essentially dispute the validity of the Labour Force Survey data.

An additional factor that could explain the significant reduction of the unemployment rate is associated with the emigration flows from the Republic of Serbia. According to the OECD database, in the 2007-2017 period, about 460 thousand persons left Serbia [35]. These migration flows have led, inter alia, to the reduction of the number of unemployed persons, which resulted in an unemployment rate decrease. Indeed, the impact of emigration flows on the source country's unemployment rate reduction has been confirmed in a number of studies [41], [51].

Although either of these factors could potentially explain the source of observed Okun's law asymmetry in the RS, the analysis of their impact is beyond the scope of this study. Rather, the further analysis is based on the effects of GDP components on the unemployment rate, in order to reveal whether the relationship between these components and unemployment can explain Okun's law asymmetry in the RS.

Changes in GDP components as drivers of Okun's law asymmetry

Now we turn to the analysis of potential causes of observed asymmetry between the changes in output and unemployment rate in the RS. The focus is on the different components of GDP and its particular long-run impact on the unemployment rate. GDP is decomposed using both the expenditure and production approach. More precisely, starting from Equation (3), the relationship between the unemployment rate and the changes in disaggregated GDP (expenditure approach) can be expressed as follows:

$$\begin{aligned}\Delta u_t &= a + b(\lambda_C \Delta C_t + \lambda_I \Delta I_t + \lambda_G \Delta G_t \\ &\quad + \lambda_{EX} \Delta EX_t - \lambda_{IM} \Delta_I M_t) + \varepsilon_t \\ &= a + \sum_i \mathrm{b}_i \Delta y_{i,t} \lambda_i + \varepsilon_t, \end{aligned} \tag{9}$$

where C_t denotes private consumption, I_t stands for investments, G_t is the final consumption expenditure of the general government, whereas EX_t and IM_t refer to exports and imports of goods and services, respectively. Coefficient λ_i measures the moving-average weight of each individual component in GDP. In further analysis, following Anderton et al. [1], the separate coefficients for each component (b_i) are estimated. Since the aim is to investigate the effects of changes in GDP components on the overall Okun's law asymmetry, the nonlinear behaviour of these components is analysed as well, applying the NARDL model. For instance, the estimated NARDL model for the private consumption that includes the positive and negative changes in this variable and their impact on the unemployment rate in the long- and short-run can be formulated as follows:

$$\begin{aligned}\Delta u_t = \alpha_0 + \beta_1 u_{t-1} + \beta_2^+ \lambda_C C_{t-1}^+ + \beta_2^- \lambda_C C_{t-1}^- + \sum_{i=1}^m \gamma_i \Delta u_{t-i} + \\ \sum_{i=0}^n (\delta_i^+ + \lambda_C \Delta C_{t-i}^+ + \delta_i^- \lambda_C \Delta C_{t-i}^-) + \varepsilon_t . \end{aligned} \tag{10}$$

The NARDL models for the rest of the GDP components are formulated in an analogous manner. In addition, GDP is disaggregated using the production approach, thus separating the gross value added in the agriculture (*Agr*), construction (*Con*), industry (*Ind*), and the sector of services (*Ser*). The relationship between the unemployment rate and the changes in disaggregated GDP then can be presented as:

$$\begin{aligned}\Delta u_t &= a + b(\lambda_{Agr} \Delta Agr_t + \lambda_{Con} \Delta Con_t \\ &\quad + \lambda_{Ind} \Delta Ind_t + \lambda_{Ser} \Delta Ser_t) + \varepsilon_t \\ &= a + \sum_i b_i \Delta y_{i,t} \lambda_i + \varepsilon_t \end{aligned} \tag{11}$$

For each of these GDP components, the separate NARDL model is estimated, like the model given by Equation (10).

Table 5 reports the long-run elasticity of unemployment to the components of GDP that are disaggregated by the expenditure approach. The unemployment elasticity is calculated by multiplying the values of the long-run coefficients for the positive and negative changes in each component with its average weight in the total GDP. The long-run parameters are obtained by dividing the values of unemployment elasticity with the long-run coefficient for unemployment rate with one time lag (u_{t-1}), which is estimated for each NARDL model separately (not presented in the table due to space limitations). Finally, the last column contains the results of the Wald test for the long-run asymmetry, obtained by testing the null hypothesis that the long-run parameters for each component are equal.

The values of the long-run parameters from Table 5 reveal that the unemployment rate dominantly responds to the positive changes in private consumption, and then to the positive changes in imports and exports, as well as to the positive changes in the government expenditure. The negative relationship between the import growth and unemployment appears to indicate that the direction of causality might be opposite than in the model (7) and that the reduction of the number of unemployed supports the consumption of the import products. The impact of investment changes on the unemployment rate is relatively modest, indicating mostly the capital-intensive character of the production processes in which it is invested.

By all means, the relatively high values of the long-run parameters in the model with total GDP (Equation (7)) are largely due to the changes in private consumption, as the largest component of GDP. In addition, the main impact on Okun's law asymmetry stems from the asymmetry in private consumption, as well as in government expenditure, as indicated by the Wald test. For instance, a 1% increase (decrease) in private consumption leads to a 9.78% decrease (a 3% increase) in the unemployment rate.

Using the production approach, the impact of GDP components on the unemployment rate is presented in Table 6. Unemployment exhibits the largest elasticity to the positive changes in the value of total services, which is not the case when one observes the negative changes. The asymmetric relationship with unemployment is particularly present in agriculture, as the cycle-sensitive and labour-intensive activity. In addition, the positive and negative changes in the value of industrial production also have an asymmetric impact on the unemployment rate, thus contributing to the overall asymmetry in Okun's law.

The cumulative impact of changes in GDP components is presented by dynamic multipliers (in the Appendix). It is evident that the long-run asymmetries are in line with the results from Tables 5 and 6 about the impact of components that primarily induce the overall Okun's law asymmetry. There are also significant short-run asymmetries in most cases, whereas a relatively long period of time is necessary for establishing the new long-run equilibrium.

As far as for the values of the long-run parameters, some parallels between the results from Table 5 and Table 6 could be drawn. For instance, it is apparent that the domestic demand in the RS (private and government consumption) is linked with labour-intensive production

Table 5: Long-run unemployment elasticity to GDP components – expenditure approach

GDP component	The long-run coefficient	Average weight of GDP component	Unemployment elasticity to GDP component	Long-run parameters		Long-run asymmetry (Wald test F-statistic)
$\lambda_C C_{t-1}^+$	-1.19*	0.74	-0.88	L_C^+	-9.78**	4.61**
$\lambda_C C_{t-1}^-$	-0.37		-0.27	L_C^-	-3.00	
$\lambda_I I_{t-1}^+$	-0.38**	0.20	-0.08	L_I^+	-0.62***	1.04
$\lambda_I I_{t-1}^-$	-0.25*		-0.05	L_I^-	-0.38**	
$\lambda_G G_{t-1}^+$	-0.79	0.17	-0.13	L_G^+	-1.86*	5.16**
$\lambda_G G_{t-1}^-$	0.64		0.11	L_G^-	1.57	
$\lambda_{EX} EX_{t-1}^+$	-0.32*	0.41	-0.13	L_{EX}^+	-1.63***	0.21
$\lambda_{EX} EX_{t-1}^-$	-0.59		-0.24	L_{EX}^-	-2.87	
$\lambda_{IM} IM_{t-1}^+$	-0.46**	0.52	-0.24	L_{IM}^+	-2.06***	0.18
$\lambda_{IM} IM_{t-1}^-$	-0.27		-0.14	L_{IM}^-	-1.20	

Notes: The results denoted with *, **, and *** are statistically significant at the levels of 10%, 5%, and 1%, respectively. The long-run parameters for the positive and negative changes in GDP components are calculated as and, respectively.
Source: Author.

processes, mainly with services, industry, and agriculture. In other words, it appears that the input of labour dominates in the sector of services and that it is mainly correlated with private and government consumption in the domestic market. The impact of the value-added in industry and agriculture on the unemployment reduction is also in line with the effect of the export growth on unemployment, bearing in mind the significant share of products from these activities in the total exports.

In addition, these findings coincide well with some of the recent empirical studies. For instance, Anderton et al. [1] find that unemployment in 17 euro area countries is most sensitive to changes in private consumption, which reflects the highly labour-intensive nature of the services as the largest component of consumer expenditure. Similar results for Lithuania are reported by Pesliakaitė [39], who finds that domestic demand components (in the case of expenditure approach to GDP decomposition), as well as services, agriculture, and construction (the production approach) all have a significant impact on the unemployment rate movement. The results of a study for North Macedonia by Andonova and Petrovska [2] also support these findings.

Conclusion

This study investigated the nexus between real GDP and the unemployment rate in the RS in order to reveal whether Okun's law is valid in the context of the RS economy. Although the estimated results suggest that the relationship between these variables is negative and in line with Okun's law, there is also evidence in favour of asymmetry between output and unemployment. The empirical analysis has unveiled that the unemployment rate responds more significantly to the positive rather than to the negative changes in the real output. In contrast to the "jobless growth" hypothesis, these findings seem to indicate that the "labour hoarding" hypothesis is more appropriate for the relationship between the economy and the labour market in the RS.

Additional analysis based on GDP components has indicated that Okun's law asymmetry is most likely a corollary of the asymmetric relationship between private consumption (as the component with the largest share in GDP) and unemployment rate, albeit the government expenditure also has a certain effect. Therefore, an asymmetry in the nexus between the real output and unemployment rate is dominantly due to the aggregate demand dynamics. According to the gross value added approach, agriculture and industry are GDP components with the strongest effect on Okun's law asymmetry. The sector of services, although the component with the largest gross value added, does not contribute to the overall asymmetry between real GDP and unemployment rate.

As for the economic policy implications, the analysis demonstrated that the economic policy measures should be directed to the aggregate demand management, bearing in mind that domestic demand induces the largest extent of asymmetries between real GDP and unemployment. In addition, active labour market policies should tackle the

Table 6: Long-run unemployment elasticity to GDP components – production approach

	The long-run coefficient	Average weight of GDP component	Unemployment elasticity to GDP component	Long-run parameters		Long-run asymmetry (Wald test F-statistic)
$\lambda_{Agr}\Delta Agr^{+}_{t-1}$	-0.53**	0.08	-0.04	L^{+}_{Agr}	-0.44***	6.15**
$\lambda_{Agr}\Delta Agr^{-}_{t-1}$	-0.12		-0.01	L^{-}_{Agr}	-0.11	
$\lambda_{Con}\Delta Con^{+}_{t-1}$	-0.31**	0.05	-0.02	L^{+}_{Con}	-0.18***	2.38
$\lambda_{Con}\Delta Con^{-}_{t-1}$	-0.21*		-0.01	L^{-}_{Con}	-0.09**	
$\lambda_{Ind}\Delta Ind^{+}_{t-1}$	-0.72*	0.26	-0.19	L^{+}_{Ind}	-2.71*	3.99*
$\lambda_{Ind}\Delta Ind^{-}_{t-1}$	-0.24		-0.06	L^{-}_{Ind}	-0.86	
$\lambda_{Ser}\Delta Ser^{+}_{t-1}$	-0.84*	0.61	-0.51	L^{+}_{Ser}	-5.67**	0.19
$\lambda_{Ser}\Delta Ser^{-}_{t-1}$	-0.16		-0.10	L^{-}_{Ser}	-1.11	

Notes: The results denoted with *, **, and *** are statistically significant at the levels of 10%, 5%, and 1%, respectively. The long-run parameters for the positive and negative changes in GDP components are calculated as and , respectively.
Source: Author.

sectors which could potentially reduce the asymmetric features of Okun's law, such as agriculture, industry, but also services, as the sector with the largest share in GDP.

There are at least two limitations of the research that should be mentioned. First, the changes in the methodology of tracking the number of employed and unemployed persons required the application of approximated values for the unemployment rates in the 2008Q1-2013Q1 period; although the robustness check indicated that there are no significant changes in the estimation results, using more reliable data would improve the validity of empirical findings. Second, the analysed time span covers twelve years (48 observations), which is a relatively small sample. Undoubtedly, including more observations would enlighten the relationships among analysed variables in a more complete way. In addition, the tendency of a significant reduction of the unemployment rate in the RS could be better explained by including into analysis the variables connected with emigration flows, demographic changes, and so on. That should certainly be a part of some future research.

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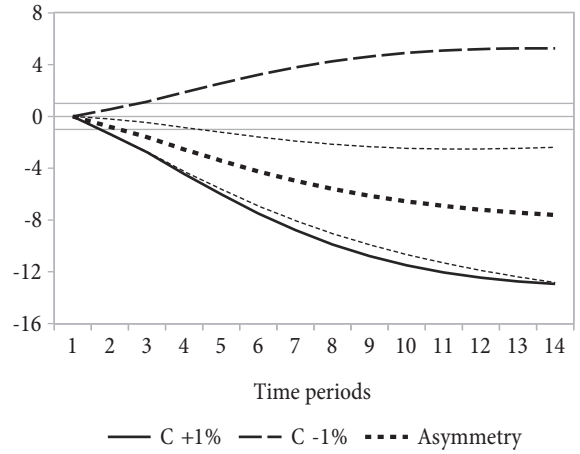
Vladimir Mihajlović

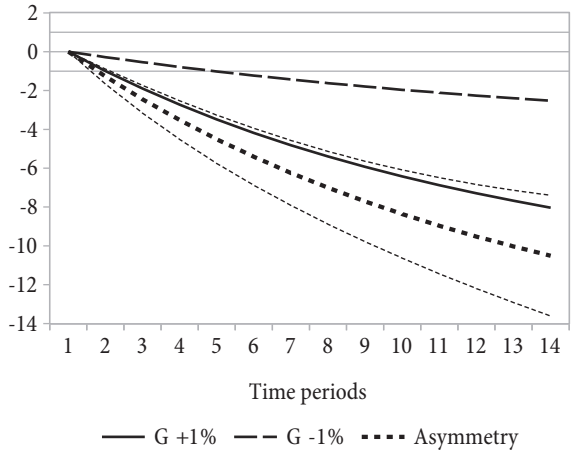
is Assistant Professor at the Faculty of Economics, University of Kragujevac, where he obtained his Ph.D. Mr. Mihajlović teaches the following courses: Economic Doctrines, Macroeconomic Analysis, and Controversies in Macroeconomics. He is a researcher on the project of the Faculty of Economics, University of Kragujevac, entitled "Economic Aspects of the European Integration: Experiences and Perspectives of the Republic of Serbia". Mr. Mihajlović is author and co-author of numerous scientific papers in international and national journals. His main fields of scientific interest are macroeconomic modelling, history of economic thought, macroeconometrics, and labour economics. He is proficient in statistical packages EViews and SPSS.

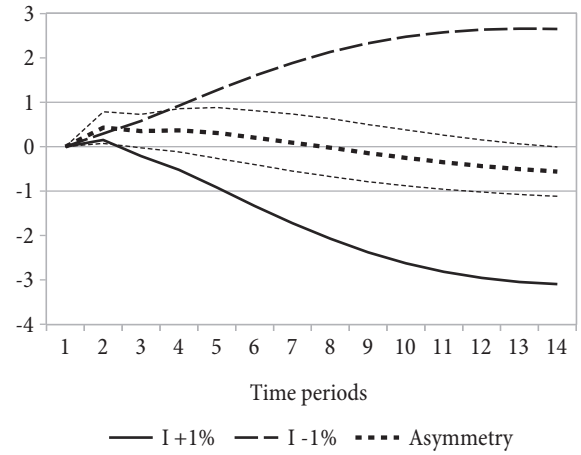
APPENDIX

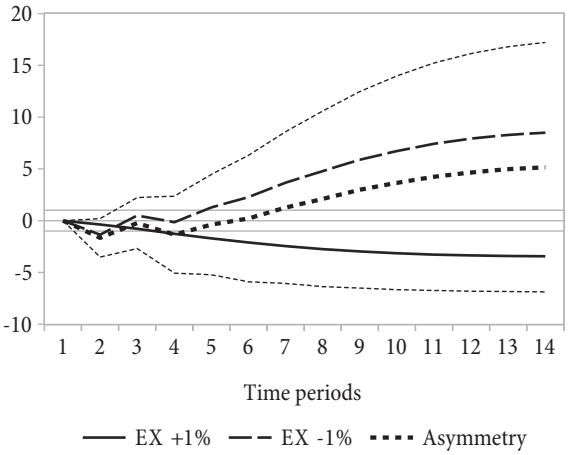
Dynamic multipliers for the impact of positive and negative shocks in GDP components on unemployment

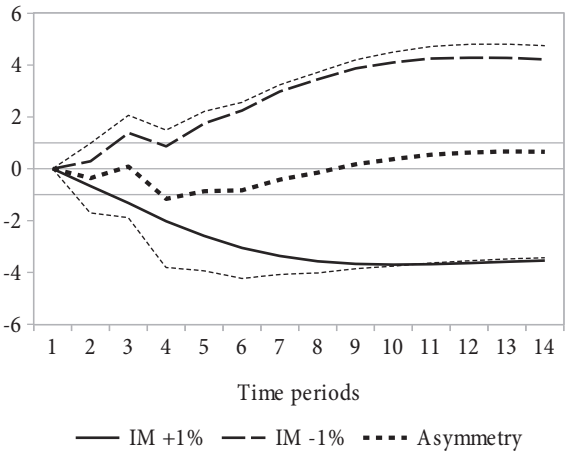
(a) Expenditure approach



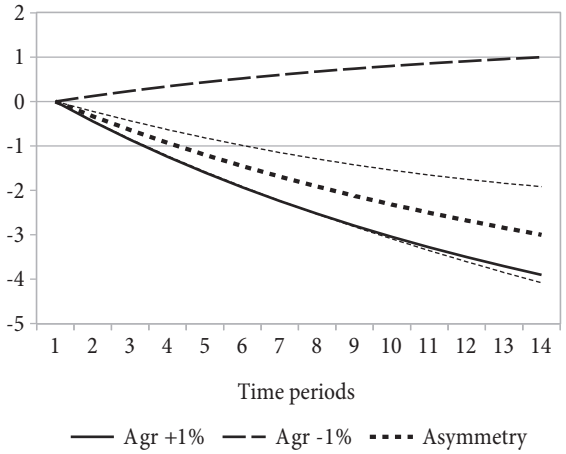


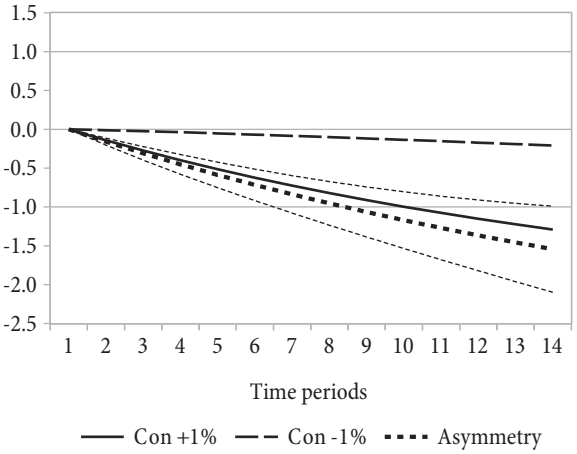


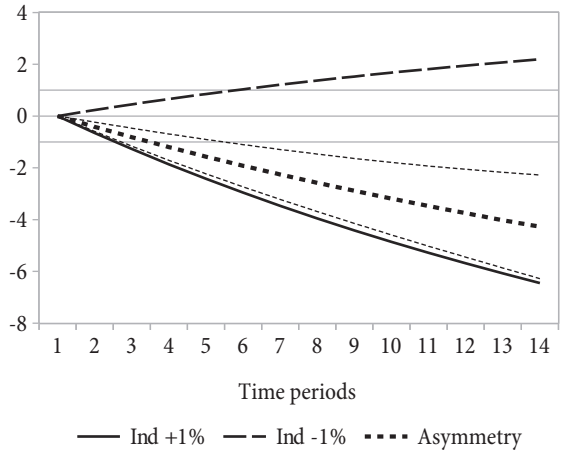


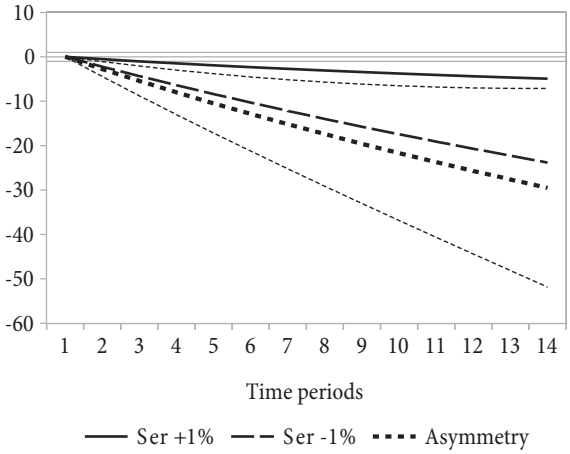


(b) Production approach









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Mihajlo Babin
Metropolitan University
FEFA Faculty
Belgrade

Goran Radosavljević
Metropolitan University
FEFA Faculty
Belgrade

Ivan Đokić
University of Belgrade
Faculty of Law
Department for Criminal Law

LEGAL UNCERTAINTY AS THE IMPEDIMENT TO ECONOMIC GROWTH OF SERBIA

Pravna nesigurnost kao prepreka za ekonomski rast u Srbiji

Abstract

Legal uncertainty represents one of the major impediments to sustainable economic growth of transition countries. Inadequate legal framework is often the source of legal uncertainty and strong impediment to effective rule of law and efficient judiciary. The purpose of this paper is to investigate the effect of penal policy on the prevention of tax indiscipline. The improvement of legal framework and tax discipline creates a synergistic effect for attraction of FDI, enhanced allocation of resources and higher economic growth. The analysis of the shortcomings of the existing legal solution is accompanied by the assessment of the prevailing case law and tax evasion criminalization in the selected European countries. Holistic approach to research allowed for the development of a specific proposal for the enhancement of legal framework and, consequently, the increase of legal certainty with positive effects on the economic growth of Serbia in the medium and long term.

Keywords: *legal uncertainty, economic growth, tax evasion, tax fraud, criminal policy, tax discipline.*

Sažetak

Pravna nesigurnost predstavlja jednu od najvećih prepreka za održiv ekonomski rast u zemljama u tranziciji. Neodgovarajući pravni okvir je često izvor pravne nesigurnosti i nepremostiva prepreka za efektivnu vladavinu prava i nezavisno sudstvo. Svrha ovog naučnog rada je istraživanje uticaja kaznene politike na prevenciju poreske nedisciplине. Unapređenje pravnog okvira i poreske discipline stvara sinergetski efekat za privlačenje stranih direktnih investicija, unapređenje alokacije resursa i snažniji ekonomski rast. U radu su analizirani nedostaci postojećeg zakonskog rešenja, sudska praksa i kriminalizacija poreske evazije u odabranim evropskim državama. Holistički pristup u istraživanju je omogućio definisanje konkretnog predloga za unapređenje pravnog okvira i posledično povećanje pravne sigurnosti čime se pozitivno utiče na ekonomski rast Srbije u srednjem i dugom roku.

Ključne reči: *pravna nesigurnost, ekonomski rast, poreska evazija, poreska prevara, kaznena politika, poreska disciplina.*

Introduction

Legal uncertainty represents one of the major impediments to sustainable economic growth in transition countries [35]. Inadequate legal framework is often the source of legal uncertainty and strong impediment to effective rule of law and efficient judiciary. The improvement of legal framework and tax discipline would create a synergistic effect for attraction of FDI [2], [3], enhanced allocation of resources and higher economic growth. After its decline in the 1990s due to wars in former Yugoslavia and international sanctions, GDP growth was predominantly positive in the 2000-2019 period with the negative growth episodes in 2009, 2012 and 2014. GDP per capita in Serbia increased more than three times due to the positive economic growth and demographic decline (from EUR 1943.9 in 2001 to EUR 6137 in 2018) [23]. On the other hand, numerous external and internal factors, especially the economic crisis of 2008-2009, prevented quicker economic convergence of Serbia towards the EU-27 average. Potential remedies leading to enhanced economic growth of Serbia include the development of the industrial policy [12], new growth model [13], attraction of FDI [31], shadow economy formalization [18], innovation [30] and digital transformation [27]. However, the aspect of legal uncertainty was not in the focus of any research study, especially bearing in mind that it is found at an extremely important crossroads dividing tax discipline, company business operations and penalty policy. In order to further investigate this issue, our qualitative research follows quantitative, econometric analyses which have proved that Serbia's growth is currently two percentage points below its potential (it is above 3% instead of being around 5%) and that roughly one half of the growth gap could be explained by underperforming institutions (1 p.p.), while the other half could be ascribed to low investment (0.7 p.p.) and poor education (0.2 p.p.) [26].

The persistence of shadow economy and consequently tax evasion represent a persistent impediment to higher economic growth, efficient allocation of resources, sound budgetary balance and improvement of living standards for the vast majority of citizens in Serbia. Analyses based on macro-fiscal data indicate that in the period from 2012 to 2017 there was no significant reduction in the shadow economy in Serbia [1]. In 2012, it amounted to around 30% of GDP, which was by one-sixth higher than the CEE average and by almost 50% higher than the European average [18].

Illegal tax evasion is one of the drivers of shadow economy, which is very prevalent in all Western Balkan countries and ranges from 25% to over 30% of GDP according to various studies [22, p. 18]. One of the consequences of such a high degree of shadow economy is lower fiscal revenues than was actually possible. Analysis at the EU level shows that budget losses from tax evasion on average amount to around 22.1% of overall budget revenues [24, p. 16]. The lack of revenue often leads to high budget deficits in these countries. The analysis shows that the loss of revenues resulting from tax evasion was almost the same as the budget deficit in 16 out of the 26 analysed EU countries [24, p. 14]. In addition, a high degree of tax indiscipline makes it difficult to plan and implement fiscal policy, because no change in the fiscal policy will have the desired effect, since some of the taxpayers will go into the grey zone. All this results in lower GDP growth and lower standards of living.

In countries with poor tax discipline, such as Serbia, tax collection is a continuous challenge. In addition to an effective tax administration and a clear legislative framework, an adequate policy of sanctioning illegal tax evasion is the key to increasing tax discipline. Therefore, the subject matter of this paper will be the analysis of the adequacy of penal policy and its compliance with tax regulations. The aim is to determine the manner in which an adequate penal policy would affect tax discipline and to investigate whether the existing description of the criminal offence of tax evasion is an adequate solution for the fulfilment of two basic goals: the increase of public revenues and the efficiency of court proceedings. In other words, the analysis is focused on whether it is necessary to propose a new criminal offence to be introduced with the aim of severely sanctioning illegal acts with a higher degree of negative social impact. We will focus on adequate punishment of illegal tax evasion, legislation and case law, as well as recommendations for improving these segments. Also, adequate international practice, especially in the

EU, will be analysed in order to find examples of good practice in this field.

Tax evasion and penal policy in Serbia

Effective tax policy and public revenue generation are essential for the provision of necessary funds and implementation of economic and social policy goals [28, p. 464]. Bearing that in mind, as well as the constitutional obligation to pay taxes and other duties [4, Article 91], an adequate penal mechanism is necessary to provide the tax system with sufficient protection. Failure to comply with tax obligations and the obligation to pay certain contributions is punishable. Depending on the amount of these obligations, the act may be considered a misdemeanour or a criminal offence [35, p. 66]. The basic instrument of criminal law in this area is the criminal offence of tax evasion [9, Article 225], which belongs to the group of criminal offences against the economy. In general, tax crimes in the Republic of Serbia are stipulated by the Law on Tax Procedure and Tax Administration (hereinafter ZPPPA) [20] and the Criminal Code (hereinafter CC) [9]. They all have a number of common characteristics, regardless of the regulations governing them, beginning with the fact that almost all crimes are blanket, include solely intent as a form of guilt, the existence of a specific intent, etc. [35, p. 66].

A crime called tax evasion first appeared in Serbian legislation in 1959. With the entry into force of the ZPPPA in 2002, the offence was renamed tax avoidance (Article 172). However, the new Criminal Code of 2005 provided for the criminal offence of tax evasion, thereby returning this incrimination back to basic criminal legislation [19, p. 322]. In addition, it should be emphasized that the term 'tax evasion' is not quite adequate (the adoption of this term in Serbia was probably influenced by German law, since in Germany this offence is also referred to as tax evasion - Steuerhinterziehung); one should rather talk about tax fraud, since the taxpayer falsely presents or conceals facts relevant to determining their tax liability, as opposed to appropriating a movable thing which was entrusted to them or which they found, which basically represents evasion. That was, at the time, the reason why tax legislature coined the term 'tax avoidance' for this crime, not tax evasion [16, p. 41].

Tax evasion is a blanket offence. In order to determine whether the criminal law norm has been violated, the criminal court should find a violation of some other non-criminal regulations which supplement the norm envisaging the criminal offence and more closely determining the nature and content of tax liability. For example, taxes, contributions and levies are defined by the ZPPPA [29, p. 6]. Thus, it is the duty of the taxpayer to present accurate and true information on the facts relevant for determining their tax liability, in accordance with the ZPPPA, but, depending on the case, other regulations and accounting standards also have to be taken into consideration [28, pp. 465-466].

The act of committing this offence can have multiple definitions and may comprise the following: a) providing false information about the generated income, obtained objects or other facts that influence the determination of such obligations, b) failing to declare (in the case of compulsory declaration) the income or objects acquired or other facts that have an effect on the determination of such obligations or c) otherwise concealing information relevant for the determination of such obligations.

Providing false information implies that the taxpayer files a tax return with the competent authority, presenting false information in it. This is most commonly encountered in practice and presupposes active performance. This criminal conduct means that the perpetrator formally acts under the legal obligation to report to the tax authority facts relevant to determination of their obligation to pay taxes, contributions or other prescribed duties, but does not fulfil this obligation materially, as the tax authority is misled when it comes to the amount of the tax base, making it a false presentation of facts, which gives this act the character of a particular form of fraud [35, p. 66]. Committing the offence in this way primarily relates to the taxpayer's income (showing less revenues or higher expenses than the real ones) or to items subject to taxation, but false information may also refer to other facts, depending on a particular type of taxes or contributions relevant to proper determination of the liability amount (e.g., number of

employees, number of family members, etc.) [17, p. 461]. It is indisputable for this form of offence that it is necessary to file an application with the competent tax authority [21, Article 38], regardless of the form and manner, as well as to provide false information on facts that do not influence the determination of tax liability. Also, it is the dominant standpoint in our criminal law theory that if the crime is done by falsifying certain information, there will be no criminal offence for that, only for tax evasion [29, p. 6], [35, p. 69].

The second manner of committing this offence includes omission. Unlike the previously described form, here the offender does not report the income or other facts that influence the determination of tax liability. Failure to do so constitutes an act of committing this offence only if there is a legal obligation to file a tax return in particular case. It is considered that the offence is committed at the moment of missing the deadline for filing the tax return for income, objects or other facts in order to avoid payment of prescribed duties. In addition, this offence will also exist when the perpetrator files a tax return, but does not enter into it the information on facts pertaining to a particular tax base or relevant for determination of contributions (e.g., in the annual personal income tax return, one can declare only personal income, but not other incomes) [17, p. 461].

The offence may also comprise concealing other data related to the determination of the obligation. Although the legislator specified typical manners of committing this crime, it left the possibility of the offence being committed in some other way, i.e., by concealing relevant information. This manner of offence committal is mainly reflected in incorrect calculation of tax liabilities, followed by misrepresentation of individual financial statement items, keeping two sets of books, etc. [25, p. 143]. According to the case law, this offence is being committed when the director of a company conceals data relevant for determination of the obligation to pay taxes and contributions by making payments to employees on the basis of advance payments for tasks that had not been performed yet [32, p. 160].

Before adoption of amendments to the Criminal Code in 2016, it was necessary for the income related to a criminal act to be lawfully obtained. Specifically, the legislative description of the offence explicitly stated that it must be related to legally acquired income. Since this condition confounded and impeded the work of the courts, which were obliged to determine the legality of the obtained income, the legislator has now removed it from the definition of the criminal offence (there was a strong case-law view that the failure to establish that the proceeds were lawfully obtained led to the conclusion that not all the essential elements of the crime of tax evasion had been materialised (the judgment of the Appellate Court in Kragujevac, Kž. 187/14 as of 27 February 2014) [33, p. 757]). However, this does not mean that from now on there is an obligation to also report income from illegal activities (in some countries, some illegally earned income is subject to taxation and failure to report it may constitute the criminal offence of tax evasion, but this is explicitly provided for in tax regulations) [33, p. 757], but that whether income has been obtained legally will not be considered an essential element of the crime, i.e., it goes without saying that the income is legitimate, because if it is illegally obtained, there will be no tax evasion, but some other criminal offence to which some other sanctions from the CC (confiscation of illegal assets) or other laws (Law on Seizure and Confiscation of the Proceeds from Crime) are applied.

In addition to the above, in order for tax evasion to be a criminal offence, it is necessary that the amount of fiscal liability evaded exceed one million RSD. If the amount of such obligation does not exceed one million RSD, it will not be considered a criminal offence under Article 225 of the CC, but will be deemed a tax misdemeanour depending on the conditions. Previously, this amount was slightly lower and amounted to one hundred and fifty thousand RSD. After the amendments to the CC in 2016 it was increased to 500,000 RSD, only to be raised to one million RSD after the last amendment to the CC in May 2019 (the amendments came into force on 1 December 2019). One can accept the standpoint recently adopted in Serbian literature that raising the amount, as a necessary condition for establishing the existence of an offence, is a justifiable move by the legislator, since in practice it is often more efficient to conduct misdemeanour proceedings than criminal proceedings [35, p. 72]. As regards this element of the crime, it is important to

emphasize the prevailing opinion that this is actually the so-called objective condition of incrimination. This means that the offender does not have to be conscious of the amount of the evaded tax obligation; it is sufficient for the existence of the offence to objectively fulfil this condition, irrespective of whether the offender has been conscious of it. However, such predominant opinion in our theory and practice deserves a more detailed analysis. If it follows from the stated view that for the existence of the offence it is irrelevant whether the perpetrator is aware of the amount of the obligation to be evaded, it means that the offence would exist even if the perpetrator had the intention to evade payment of a smaller amount, but as circumstances would have it that amount exceeded one million RSD. When the perpetrator intends to commit the crime and is aware of all its elements, it practically means that they must be aware that they are committing tax evasion that exceeds the statutory amount [35, p. 73]. Also, the amount to be evaded is the amount pertaining to one calendar year. If the offender avoids paying taxes for several years, this can be construed as a continuing offence [9, Article 61].

The perpetrator of this offence is the taxpayer who provides false information or fails to report the income, objects or other relevant facts about lawfully obtained property or a person who otherwise conceals the information relevant for determining taxes, contributions or other prescribed duties. In addition to the aforementioned, the perpetrator may also be a person who has a legal obligation to report this information as the legal representative of a natural or legal person [28, p. 470]. For the basic form of the offence, the Criminal Code stipulates a cumulative sentence of one to five years and a fine (amendments to the CC from May 2019 increased the special minimum for the basic form of the offence, which previously amounted to six months in prison). Tax evasion also has two aggravated forms which differ from the basic form in the amount of the taxable obligation. Qualified form exists if the amount of evaded liability exceeds five million RSD. Previously, this amount was lower and amounted to one million five hundred thousand RSD. Imprisonment of two to eight years and a fine are stipulated in this case (prior to the changes, the law provided for a sentence of one to eight years and a fine).

The most serious form includes evading the payment of more than 15 million RSD (previously 7.5 million RSD), which the law sanctions with a prison sentence of three to ten years and a fine. It is noticeable that the legislator tightened the prescribed penalties for all forms of this offence on several occasions, beginning with the amendments introduced in 2009 and ending with the changes from 2019. The tightening of the penal policy indicates the legislator's increased awareness of the importance of the object of protection and the need for more severe penalties as a response to the forms of manifestation of this offence. However, it is also noticeable that there is a huge discrepancy between the prescribed and imposed sentences for this crime. On the one hand, by expanding the range of prescribed penalties, the legislator seeks to tighten the criminal policy of courts, which, on the other hand, often do not use sufficiently wide ranges of the sentences and weigh them closer to the specific minimum. Although for the general preventive effect of the punishment, its extent is only one of the possible factors of influence, there is an opinion that the strengthening of the legislator's penal policy in this area should be accompanied by adequate court practice in order to enhance the preventive effects in the field of financial crime [28, pp. 470-471].

In theory, when it comes to amounts stipulated in aggravated forms, the legal nature of these elements is debatable. There is an opinion that this is also an objective condition of incrimination [17, p. 463], which therefore means that the perpetrator's guilt does not apply to it. This would be unacceptable, since the severity of the act and the duration of the sentence would depend on an objective circumstance in relation to which the perpetrator may not have had intention. Therefore, in theory, the prevailing opinion is that in qualifying forms the amounts are considered qualifying circumstances, to which the perpetrator's guilt must apply, with no need for the perpetrator to be aware of the specific amount of tax evasion, but to be generally aware that they are committing an aggravated form of the crime by evading the payment of a larger amount [17, p. 463], [21, p. 625], [28, p. 470], [33, p. 759]. Although correct, this view runs

counter to the view that, with respect to the basic form of the criminal offence, the amount of evaded obligation is considered an objective condition of incrimination in relation to which the existence of a subjective element is not required. Finally, it may be difficult to justify these double standards and different treatment on the basis of the same characteristic, because the difference is not qualitative, but purely quantitative. Therefore, it would be more correct to require the existence of intention in relation to the amount of fiscal obligation even with regard to the basic form.

Summary of international experiences

Based on the analysis of the legal framework in the following countries: Germany [14, article 370], Austria [15, article 33], Finland [6, Chapter 29], Norway [8, Section 378], Montenegro [7, Article 264], Croatia [5, Article 256], it can be concluded that the crime of tax evasion is usually regulated by the criminal code, although in a few countries it is regulated by another law, primarily the one governing tax matters (Germany, Austria). There is a clear similarity among the presented legislations regarding the act of committing this criminal offence, consisting either in a fraudulent act or in the omission or failure to file a report in case of duty to report income, contributions, etc. It is also noticeable that in some countries for the criminal offence to exist the perpetrator's conduct needs to result in tax evasion, in whole or in part (Austria, Croatia), while in most legislations it is sufficient for the perpetrator to act towards that goal. It is also significant that for the existence of the offence the existence of a certain amount whose payment has been avoided or attempted is not, as a rule, required as an additional condition (except in Montenegro and Croatia). Legislation providing for an easier form of tax evasion (Finland) is rare. In addition to the basic form, there are usually aggravated forms that exist due to the higher amount of the evaded obligation, when the offence is committed over a longer period of time or by perpetrators with a special connections, or when the offence is committed by abusing power or authority, that is, by using forged documents, books, etc. (in the last case mentioned a separate, aggravated form of the crime is stipulated in Austria). German legislation even provides for criminal and political reasons to be released from punishment in the event that the perpetrator acts appropriately, i.e., corrects inaccurate information submitted to the competent tax authority, completes information or submits a missing application. On a subjective level, intention is always required. Legislation that penalises negligent committal of the offence (Norway) is rare. When comparing the prescribed sentences, one can be note that, in addition to imprisonment which in some legislations goes up to 10 years for the most aggravated forms, a fine is envisaged (except in Croatia) as an alternative to or cumulatively with imprisonment. At the very end of this summarised comparative view, it can be concluded that the form of tax evasion as envisaged by Serbian CC is closer to that stipulated in the countries with which we had shared the same legal order for decades. However, in some respects, it does not differ much from that envisaged by other systems which, in other respects, may serve as a model for future reform. It is particularly evident that with regard to assessment of the social danger of tax evasion and corresponding penalties, our legislation is ranked among the most stringent in Europe.

Possible reforms of penal policy in Serbia

Tax offence detection falls within the jurisdiction of tax police which have the same pre-investigation powers as the regular police (except for movement restrictions) [33, p. 759]. The law defining the jurisdiction of the tax police and control thereof is the Law on Tax Procedures and Tax Administration (ZPPPA). Significant changes in the tax audit procedure were introduced by amendments to the 2012 Law, which enabled more efficient control over unregistered and undeclared activities and illegal work. The changes refer to the possibility of performing an unannounced audit, outside the working hours and premises owned by the taxpayer, which was impossible until then.

After the tax audit, tax police can file a criminal complaint against the taxpayer and participate in the procedure, as well as cooperate with the prosecution and the police in the investigation procedure. The ZPPPA sets

forth four cases in which criminal liability exists and the corresponding penalties. The first concerns the unfounded disclosure of the amounts for tax refund and tax credit. Furthermore, jeopardizing tax audit and illegal trade in excise goods are also criminal offences, the latter because it leads to frequent tax evasion. Finally, illegal storage of goods also constitutes a criminal offence.

However, there are still certain paradoxes in the ZPPPA that indirectly discourage legal business. Namely, according to Article 179 of the ZPPPA, if a taxpayer fails to fulfil one of the technical requirements (e.g., fails to submit some documentation within the prescribed deadline), a fine of up to 2 million RSD will be imposed. On the other hand, if they work illegally and get arrested, they are allowed a period of 30 days to register their business and continue with their activities after paying the prescribed fine. We believe that this indirectly discourages legal businesses, especially micro-enterprises and entrepreneurs, and directly contributes to tax evasion. These provisions should be reconsidered.

In addition, better cooperation between the tax police and the prosecution in the investigative process is necessary in order to improve the audit process and increase the efficiency of application of criminal provisions, with the aim of increasing the degree of tax discipline. In this regard, further training of the judiciary to handle tax evasion cases may be necessary. This is especially true of procedures related to excise evasion, since the level of tax evasion in this segment is high.

The first step towards increasing tax morale involves improving the ability of public administration to perform its task effectively. At the same time, it is also necessary to improve the penal policy. The analysis of the case law shows a marked difference in the number of defendants and convicted persons in tax evasion proceedings. In 2017, only one-third of defendants were convicted in the Belgrade Court of Appeal, which generally coincides with the data on the total number of complaints and convictions throughout the country. In 2018, 967 criminal charges were filed and only 27% of defendants were convicted of tax evasion. All of the above is a clear indication of how difficult it is to prove this crime in practice and of the difficulties encountered by courts in practical application of imprecise, broad-ranging and vague regulations, in the light of disparate case law, all of which results in legal uncertainty. In addition to this, it is noteworthy to mention that all parties involved in the procedure, from public prosecutors, inspectors, court experts, attorneys to judges themselves show noticeable lack of knowledge of the relevant tax regulations [11, p. 107]. Furthermore, in most cases (70% of cases in 2018) courts pronounce a suspended sentence, and in rare cases where imprisonment has been pronounced, the sentences are usually short – up to 6 or 12 months (often in variants of the so-called house arrest – see Table 1).

Taking all this into consideration, the question could be raised whether courts implement adequate penal policy. The generally lenient attitude towards the perpetrators in practice has influenced the criminal legislator, who has repeatedly amended the Criminal Code, to increase the penalty for both basic and aggravated forms of tax evasion (in theory, there has long been a view that a stronger preventive effect contributes to greater likelihood that the sentence will be enforced than to the duration of the sentence itself, although undoubtedly both factors are significant; in the economic analysis of the penalty, it is pointed out that citizens will sooner refrain from illegal ways of tax evasion if the punishment for the offence is severe and if they are aware that they will almost certainly be punished, i.e., if the loss resulting from committing the criminal offence is greater than that which would result from following the rules (deterrence model) [10, p. 112]).

Table 1: Case law statistics related to the criminal offence of tax evasion

Year	Criminal charges	Indictments	Convicted	Imprisonment/ house arrest	Suspended sentence
2015	715	778	449	69/16	341
2016	734	643	419	73/34	300
2017	649	N/A	392	72/43	264
2018	967	N/A	266	50/17	185

Source: Statistical Office of the Republic of Serbia.

However, this only widens the gap between the prescribed and imposed sentences. It is indisputable in criminal law that, on the one hand, intensifying repression in certain areas can have the opposite effect to the desired one and, instead of being generally preventive, it could result in even more frequent offences, especially if the competent authorities do not apply the law in most cases, i.e., when the addresses of Criminal Law norms are not aware of an almost certain punishment as a consequence of criminal behaviour. On the other hand, an overly selective and lenient penal policy remains without particular influence on the behaviour of citizens as potential perpetrators of criminal offences and has no preventive effect. Therefore, in the area of tax delinquency, and above all in relation to the crime of tax evasion as the basic offence in that group, it is necessary to find a balance between a preventive and a repressive approach.

One of the recommendations for improving penal policy is to replace the nominal limit of a criminal offence with a relative one and/or to set different limits for different taxpayers. Although some changes to Criminal code were made in this regard in 2019, when the fiscal limit was raised from five hundred thousand to one million RSD, we believe that the established amount of tax liability is not suitable for all categories of taxpayers. Namely, for certain categories of taxpayers, the amount of one million RSD is very large (e.g., entrepreneurs or micro-enterprises). Therefore, despite the intention of this category of taxpayers to evade tax, they will never be held responsible for the crime of tax evasion, which will potentially be very frequent within these types of companies. On the other hand, for certain categories of companies, which discharge very high tax liabilities on a daily basis (e.g., taxpayers producing excise goods), the amount of one million RSD represents a small part of their annual tax liability. In this regard, in order to create a coherent and effective legal framework that would suit taxpayers of different sizes and economic strengths, we believe that the following should be considered as a potential solution:

a) specified limits for different types of taxpayers;
b) annual turnover;
c) level of tax liability; and
d) ratio between potential tax liability and annual turnover.

Conclusion

The basic conclusion of the paper is that the existing definition of tax evasion as a criminal offence and lenient case law create legal uncertainty and make their basic purpose, i.e., prevention of the negative impact on the collection of public revenues, impossible. One of the solutions that would strengthen the case law and remove the described normative obstacles to the more efficient work of the judiciary is the introduction of a new criminal offence of tax fraud. In addition, the presented solution also contributes to the improvement of criminal legislation and a higher degree of coordination of the goals of criminal and fiscal policies in the Republic of Serbia.

Namely, the criminal offence of tax evasion could be solely related to the avoidance of payment of public revenues caused by the failure to act (omission), while for the existence of the criminal offence of tax fraud it would be necessary for the perpetrator to actively commit the offence. Furthermore, in addition to the amount of evaded public revenues which should exceed 10 million RSD, tax fraud should also take into account the ratio between the value of the evaded liability and the total business income of the company. Namely, when an identical amount of liability is stipulated, in the case of a large company, failure to pay public revenues may be the result of an accounting error, which is ruled out in the case of companies with smaller business income on an annual basis. Therefore, the existence of a criminal offence would require the following prerequisites to be met:

- specific intent to avoid payment of public revenues;
- the amount of evaded public revenues exceeds 10 million RSD on an annual basis;
- in case the legal entity has avoided payment of public revenues in the amount of more than 10 million RSD on an annual basis, it is necessary for the condition that the stated value is greater than or equal to 1% of the average operating revenues in the previous three years to be fulfilled.

The proposed introduction of a new offence (tax fraud) would allow taxpayers to be divided into two groups:

1. Taxpayers who, by failing to discharge their liabilities, caused damage to public revenues, while committing some of the existing three forms of the criminal offence of tax evasion;
2. Taxpayers who had an unambiguous specific intent to avoid the payment of public revenues in excess of 10 million RSD on an annual basis, along with the cumulative requirement for companies that this amount is greater than or equal to 1% of the average business income in the previous three years.

It is expected that the proposed change in legislation, followed by more efficient case law and enhanced tax administration digitalisation, would contribute to a more effective and efficient functioning of the penal policy and consequently to an increase in tax revenues. Finally, enhanced legal certainty would create and strengthen the preconditions for the sustainable economic growth in Serbia in the forthcoming period.

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Mihajlo Babin

is Associate Professor of Economics at the FEFA Faculty. Mr. Babin is deeply involved in the development of education policy, public finance and public sector reforms. As a student, he was elected to the position of Student Vice-Rector at the University of Novi Sad (2002-2004) and was a member of the Executive Board of the Student Union of Serbia (2005). Since 2009, he has been participating in the World Bank development projects as a consultant in the fields of pre-university education financing, higher education and research and innovation financing. He has been actively involved in the process of higher education reform in Serbia, has participated in numerous TEMPUS projects and was a member of the national team of Higher Education Reform Experts (HERE) between 2008 and 2010. He was the Serbian representative to the Bologna Follow-up Group (2015-2016). Mr. Babin is one of the co-authors of Serbia's Education Strategy 2020 and continues to participate in education policy research.

Goran Radosavljević

is Associate Professor at the FEFA Faculty in Belgrade, Serbia, and Secretary General of the National Petroleum Committee of Serbia. He is also a member of the World Petroleum Council Congress Programme Committee. Having graduated in Economics from the University of Belgrade, he received MSc in Mathematical Economics and Econometrics from GREQAM, EHESS, Marseille-Paris, France, and a PhD in Public Finance. From December 2012 to January 2018 he worked at NIS Gazprom Neft as Deputy Executive Director, and from 2014 as Advisor to Deputy CEO. From June 2007 to May 2011 he served as Economic Advisor to the Deputy Prime Minister of the Republic of Serbia, while from May 2011 to July 2012 he was State Secretary in the Ministry of Finance of the Republic of Serbia. From 2002 to 2007, he worked as Teaching Assistant at the Faculty of Economics, University of Belgrade, and as a researcher at the Centre for Advanced Economic Studies in Belgrade (CEVES) and the Foundation for the Advancements of Economics (FREN). He is the founder and owner of Bike Adventure Belgrade, the first all inclusive offroad biking platform in the Western Balkans. In addition to his native tongue, Serbian, he speaks English and French.

Ivan Đokić

was born on 13 February 1980 in Belgrade, where he obtained his primary and secondary education. He graduated from the Faculty of Law, University of Belgrade in 2004 (GPA 9.25 out of 10). In 2009, he obtained his master's degree from the Faculty of Law, University of Belgrade, defending a master's thesis on the act of minor significance. He was awarded the degree of Doctor of Laws in 2015, after defending his doctoral dissertation entitled "The Subjective Element of the Criminal Offence in English Law". He presently works as Assistant Professor in the field of criminal law at the Faculty of Law, University of Belgrade. Mr. Đokić is the Secretary of the Editorial Board of Crimen – Journal for Criminal Justice and participant in two scientific projects: "Identity Transformation of Serbia" – Faculty of Law, University of Belgrade, and "Penal Reaction in Serbia as a Key Element of the Rule of Law" – Ministry of Education, Science and Technological Development.

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Nataša Stanojević
Institute of International Politics and Economics
Belgrade

EXPORT POTENTIAL OF SERBIA'S DEFENSE INDUSTRY*

Izvozni potencijal vojne industrije Srbije

Abstract

This paper empirically tests an augmented gravity model of international trade in order to investigate the impact of various factors on the volume and direction of export of the Serbian defense industry. The results show that military expenditure, arms import and a dummy variable referring to historical ties in arms trade have positive effects, while, on the other hand, population, distance and degree of industrial development of partner countries have negative effects on Serbia's military export. The study resulted in three empirical models, all with a high coefficient of determination but different statistical significance of variables. One of them was selected and applied to all export partners of the Serbian defense industry. Out of 61 countries, 21were determined as target markets based on the combination of two criteria – the trade potential index, determined by the application of the gravity model, and trade dynamics.

Keywords: *defense industry, gravity model, arms trade, military expenditure, Competitive Industrial Performance Index.*

Sažetak

U ovom radu se empirijski testira prošireni gravitacioni model međunarodne trgovine kako bi se istražio uticaj različitih faktora na obim i smer izvoza srpske odbrambene industrije. Rezultati pokazuju da pozitivne efekte na srpski izvoz oružja imaju vojna potrošnja i uvoz naoružanja partnerskih zemalja, kao i *dummy* varijabla koja se odnosi na istorijske veze u trgovini oružjem. S druge strane stanovništvo, geografska razdaljina i stepen industrijskog razvoja partnerskih zemalja imaju negativne efekte. Rezultat su tri empirijska modela, svi sa visokim koeficijentom determinacije, ali različitim statističkim značajem nezavisnih varijabli. Jedan od ova tri modela je izabran i primenjen na sve zemlje uvoznice srpske odbrambene industrije. Od 61 analizirane zemlje, njih 21 su određene kao ciljna tržišta na osnovu kombinacije dva kriterijuma: indeksa trgovinskog potencijala, dobijenog primenom modela gravitacije, i trgovinske dinamike.

Ključne reči: *vojna industrija, model gravitacije, trgovina oružjem, vojna potrošnja, indeks konkurentskih industrijskih performansi.*

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Inroduction

The main feature of Serbia's foreign trade is the constant, rapid growth of trade deficit and a limited number of export partners. Finding new markets is of key importance for overcoming these weaknesses.

Arms production and trade, besides their geopolitical and security aspects, have a strong impact on economies of numerous countries. From the point of view of the manufacturers themselves, defense industry does not differ significantly from any other material goods production. The advantage of this industry is that it has a secure market, as production is most often realized on the basis of the previously obtained military orders.

In addition to direct sales revenues, military industry products can be an impetus for industrial development by embracing new technologies, increasing the capacity of related industries (metal processing, electronics, textile and rubber industries, etc.), engaging versatile workforce, etc. Production of arms for export is the only profitable military activity, often more profitable than many other types of production.

Military exports contribute to the development of the economy in the same way as all other types of exports: they ensure an influx of foreign currency, which pays for the import of goods or equipment for the expansion of domestic production and reproduction, or provide financial resources for services and activities that create conditions for faster economic development. Finished product exports constitute only one part of military industry's exports. There is a full range of ancillary services, which are also subject to trade: "assistance" in handling deliverables, "technical assistance" in maintaining those assets, including overhaul and delivery of spare parts, construction of military infrastructure facilities (airports, base facilities, launch ramps), as well as resource production facilities [14, p. 104].

Military industry is one of few sectors of Serbian economy that has the potential to significantly improve the placement of its products in foreign markets. As the current level of military spending in the world is, by international standards, very high with a tendency to grow further, this gives the military industry an opportunity to grow and improve.

The purpose of this study is to identify the influencing determinants of Serbian military exports. A single-country gravity model will be applied to the export of arms and military equipment. The data about the composition of trade flow is the panel data.

The coefficients obtained will be used to create an equation for the calculation of Serbian military export potential. More specifically, the second goal is to assess which export markets offer most opportunities to increase the exports, by applying the coefficients obtained in the first part of the research and the trade dynamics with individual countries.

Literature review

Ever since the gravity equation was introduced by Tinbergen [25] and Linnemann [7], it has been used in hundreds of papers for estimating the determinants of bilateral trade. For a long time, gravity equations, primarily as a macroeconomic model, were used only for the assessment of a country's overall export. As Harrigan [5, p. 41] noticed, it is "surprising how little work has been done on examining disaggregated gravity equations". Among few studies, only two analyzed the relationship between product categories and the parameters of the gravity equation. One is the study by Rauch [19] who identified that dummy variables for a common language and colonial ties had very different impacts on the selected three product categories. The other is the paper of Mohlmann et al. [15] who reported the importance of using different product categories for the parameters of the gravity equation.

Not until the 2010s did the application of the gravity model to a particular sector become a more common topic of research. Several research studies explored the determinants of exports for product-specific trade. Some of the most important are: Wei et al. [28] who used the gravity model to estimate the impact of food safety standards on China's exports of honey, Atif et al. [2] analysed Pakistan's agricultural and chemical products export, Rahman et al. [17] used the gravity model for the analysis of Bangladeshi textile and apparel industry's export, Shahriar et al. [20] analyzed the export of China's animal meat, etc.

Papers on the defense industry's impact on economy are very rare. Most of them refer to the impact of military spending on the domestic economy. These are studies by: Ram [18], Yakovlev [30], Dunne et al. [4], etc. They all feature the following explanations:

- Military spending increases aggregate demand which reduces unemployment and increases capital utilization.
- Military research and development stimulates infrastructural development and spillover effects of technology for civilian use.

Some of the literature on defense spending and economic growth revealed an inverse relationship between them. Mankiw, Romer and Weil [8] argue that huge military spending causes reallocation of resources from a more productive market to less productive ventures financed with taxes. This can create welfare losses and reduce labor supply.

Even rarer are the theoretical and empirical studies of the economic aspect of arms trade. The first step in exploring this topic was made by Anderton [1] who applied international trade models to arms trade. In the study of Zubair and Wizarat [31], the effects of arms exports on economic growth are analyzed. They viewed arms exports as one of the variables of economic growth, in addition to military expenditure, GDP, labor and the dummy variable for military conflict. Their results showed that a 1% increase in arms exports (of top arms exporting countries) results in a 39% increase in GDP of the arms exporting countries [31, p. 93]. To our knowledge, there is no empirical research conducted primarily on military exports.

There are few important studies which presented the state and capacities of the military industry in Serbia and they are important for this research because of their abundance of factual data. Mirković [14] elaborated on the condition and history of the military industry of Yugoslavia, followed by that of Serbia, and presented the data on the status, capacities, volume and structure of exports and imports in the military industry. Kovačev et al. [6] provided the documentation on the capabilities of the military industry of SFRY, which predominantly preceded the modern military industry of Serbia in terms of technology, physical capabilities, and manpower. Matović [9] discussed the business arrangements of the Yugoslav military institutions, military industry enterprises, and, in particular, the business operations of Yugoimport-SDPR, a Yugoslav and afterwardsSerbian company with a monopoly on international arms trading. This monograph is particularly important for this research because it provides data on the trade relations and agreements with the importing countries, which Serbia inherited from former Yugoslavia.

Đokić [3] analyzes the recent state of Serbia's military industry, highlighting the problem of accumulated debts, unresolved ownership structures and outdated production capacities. The author points to the Government's attempts to resolve these issues through various measures, such as converting debts into creditors' shares, favorable loans and direct financial assistance. The article by Vidović et al. [27] is thematically closest to this research. The paper analyzed the export potential of this industrial branch, as well as its impact on the overall economy of Serbia and the economic activity of the country. The method used was SWOT analysis.

An overview of Serbia's military industry

Within the Socialist Federal Republic of Yugoslavia (SFRY), Serbia had an industry that was not far behind the most industrialized economies in the West in terms of quality. Military production, with the capacity of more than 550 factories, was one of the most successful manufacturing sectors. The diversified production of small arms and light weapons (SALW), tanks, armored vehicles, rocket launchers, ammunition, etc. was of high quality and sold in many regions worldwide, yielding significant revenues. The military industry employed about 57,000 workers, 27,000 of whom worked in the territory of what was then Serbia [5, p. 140]. About 80% of military production, for the needs of the armed forces at the time, was covered by the domestic military industry, including product development at domestic institutes [16, p. 437]. About 30% of the military industry capacity was manufacturing for export [16, p. 438] which amounted to $1-2 billion per year.

During the transition period after the 1990s, all industries suffered significant damage. The production of

many was reduced, in terms of technology and product finalization. The military industry did not develop during this period either. However, it did not lose its former level of quality, while its production capacity was only slightly reduced. Currently, Serbia's military industry is growing and undergoing significant modernization. It has been generating more notable income in recent years, given the rise in armed conflicts across the world.

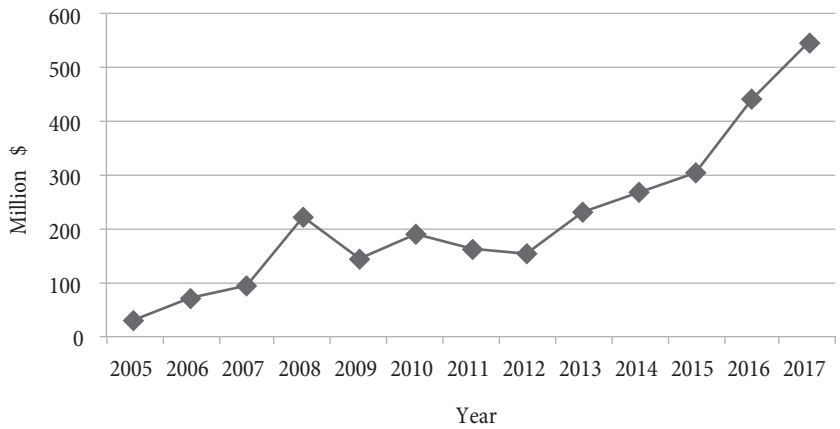
One of the advantages is that the state is the major owner of the defense industry. The law stipulates that the state's total share in production cannot be less than 51 percent; in fact, the defense industry is almost 80% state-owned. The Serbian government annually invests about 50 million euros in this sector, of which more than 80% is earmarked for the development of new technology. The Register of Producers of Weapon and Military Equipment records 52 companies that are licensed to produce weapons [10]. They employ 8-10 thousand workers. The largest production and export are realized by 6 companies which are under the control of the government group "Defense Industry of Serbia". As of January 2020, the group includes additional 13 companies operating in various sectors: textile, manufacturing of trucks and other vehicles, optics, tire manufacturing, civil aviation, etc. The public company Yugoimport-SDPR still has a monopoly on arms trading.

The industry produces all kinds of weapons, except for high-end armaments, such as supersonic combat aircrafts, air defense systems, long-range missiles and navy vessels. The product range is identical to the one previously produced in Yugoslavia (ammunition, small arms, rockets, grenades, explosives, armored vehicles, etc.), yet all these product groups underwent continuous technological development and innovations. In these sectors, production exceeds the needs of the Serbian Armed Forces by far. That is why the military industry of Serbia is mainly an export-oriented industry, which contributes to a significant surplus in foreign trade.

Competition in this sector is not small. Most of the top manufacturing countries are also the top exporting countries. More than 1,000 companies from some 100 countries produce the same groups of products as Serbia. About 80 countries currently produce small arms ammunition for revolvers, pistols, rifles, carbines, and machine-guns. Only about a dozen countries produce advanced guided light weapons [21]. Zastava arms company is one of the twenty largest companies in the SALW category, along with the famous Glock, Berreta, Remington, Heckler & Koch, Smith & Wesson, etc. Zastava has positioned itself as one of the leading manufacturers of hunting and sporting rifles, assault rifles, machine-guns and grenade launchers in the world market [21].

The share of exports of Serbian weapons and ammunition in the world market is considerable, given that these goods are exported to over 65 different countries. The volume of export continues to increase by expanding into new markets and signing new contracts in the existing markets. The highest value in export sales was achieved by exporting to: the United Arab Emirates ($138.24 million or about 25% of total military exports), the United States of America ($112.68 million or about 21%), the Kingdom of Saudi Arabia ($61.83 million or 11%), and the Republic of Bulgaria ($47.03 million or about 9%) [13, p. 12]. In

Figure 1: Exports of the Serbian military industry in 2005-2017 (million $)



Source: Serbian Ministry of Trade, Tourism and Telecommunications.

2017, total military export amounted to $546.27 million. Compared to 2016, the value of realized export increased by $103.76 million (by about 23%).

The predictions are in favor of the Serbian military industry. The largest increase is envisaged in the sectors of small arms and light weapons and ammunition, which are the most important strategic sectors of the Serbian military industry. The procurement analysis suggests that within a fifty-year period the world production of military assault rifles, carbines, pistols, and light and heavy machine-guns will range between 36 and 46 million units, annual production of small arms alone (firearms rather than light weapons) averaging 700,000 to 900,000 [21]. Additional growth of the military industry and an increase in its exports would be of great importance for Serbia's economy.

Data and methodology

Variables and data

The dependent variable in the gravity model is usually export. In this research, we are specifically exploring the exports of the defense industry of Serbia. The data are provided by the Ministry of Trade, Tourism and Telecommunications of the Republic of Serbia in the form of annual reports. In terms of transparency in arms trade, Serbia is the fourth exporter in the world in the SALW category, behind Switzerland, Germany and the Netherlands [25]. Therefore, the export data from annual reports can be considered reliable, which is a common problem with arms trade research. Due to large annual variations in the value of arms exports, we will use a three-year average.

The independent variables commonly included in the gravity model are the size of the economy of the importing and exporting country, most often represented by GDP, geographical distance, as an indicator of transportation costs, and a whole range of potentially important dummy variables, such as common language, border, former colonial relations, etc.

On the basis of general information on the level of armament of many small Arab and African countries, it is clear that the size of the economy does not play a significant role in the import of weapons. The quantities that are relevant for the import of weapons as specific goods must be identified. Preliminary research using simple regression has identified several potential factors that define the export of Serbia's defense industry.

Military expenditure (Mex) includes spending on the creation, maintenance and strengthening of a state's armed forces with regard to their physical capacity, training and financing of human resources. It is expressed in monetary terms or as a share in GDP or government expenditure. Although the share in GDP is more reflective of the state's willingness to allocate funds to this social segment, the expenditure expressed in monetary terms is an indicator of both the willingness and financial capability to realize it. For this research, the data on military expenditure was obtained from the Military Expenditure Database of the Stockholm International Peace Research Institute (SIPRI) [23].

The import of weapons and military equipment (Imp) is the second variable, which is not collinear with the previous one. For the import value the data from SIPRI (2020b), that has developed a special trend-indicator value (TIV), were used. This is a unique system of measuring the volume of international transfers of major conventional weapons by using TIV as a common unit. It is "based on the known unit production costs of a core set of weapons and is intended to represent the transfer of military resources rather than the financial value of the transfer" [24]. This amount is expressed in millions of dollars, but it does not denote the sales prices for arms transfers. "They should therefore *not* be directly compared with GDP, military expenditure, sales values or the financial value of export licenses…" [24]. This is the main reason for the lack of collinearity with the previous variable.

Population (Pop) is used in gravity models as a signifier of market size. It is not directly related to the value of arms procurement. The countries with small and large populations may have equal needs in view of the number of tanks, armored vehicles, military aircrafts or air defense systems, which depend on the size of their territory and the configuration of terrain. However, in this research the population determines the framework for the sale of ammunition and SALW, which are the most important export products of the Serbian defense

industry. In this case, the larger the population is, the larger the quantity of weapons, especially light weapons, it requires. However, for Serbia, as a small country, the size of export market is not an advantage. We expect a negative sign of the coefficient for this variable. Namely, small countries do not have the capacity to meet the needs of big armies, which is why they find other suppliers. Serbia has already had this problem with large markets in other manufacturing sectors.

Distance (D) between the trade partners represents transport costs.

Competitive Industrial Performance Index (CIP) is a performance indicator, developed by UNIDO, for the assessment of industrial competitiveness. "It captures a country's ability to produce and export manufactured goods competitively". It includes eight indicators, defined along three dimensions:

1) capacity to produce and export manufactured goods,
2) level of technological deepening and upgrading, and
3) country's impact on global manufacturing.

Industrial competitiveness directly determines a country's capacity for its own military production and the technological capability of its industry, including the military industry, thus defining which combat assets must be imported and of what quality, at the same time somewhat identifying its trading partners.

YU dummy variable refers to the export markets of former Yugoslavia's defense industry. Namely, most capacities of the former Yugoslavia's military industry, both for production and research, were located in the territory of Serbia. Further, as a successor to former Yugoslavia, in addition to debts and numerous obligations Serbia also assumed arms delivery obligations arising from the previously concluded agreements. Most partners continued cooperating despite Yugoslavia changing its political identity. On the other hand, in terms of production, the relations with the factories located in the territories of the breakaway republics were completely terminated [16, p. 438], which is why these new states, although former members of Yugoslavia, are not included in the YU group.

GDP per capita (GDP pc) shows the capacity of countries for import in general.

Although common in gravity models, GDP as a variable had no statistical significance in the preliminary simple correlation in this study or in any variant of the gravity model. The reason for this is the fact that the degree of a country's militarization is not related to the size of its economy. The "mass" of a traditional gravity model is represented by some of the previous variables: military expenditure, import of weapons and military equipment and population. All of them explain different aspects of the demand for defense industry products.

In order to select the variables, a test of multicollinearity between independent variables should be conducted (Table 1). The higher the multicollinearity, the more it reflects on the beta coefficients, due to which they are poor indicators of the relative influence of each independent variable. It is not easy to determine the acceptable level of multicollinearity, because it depends on the number of independent variables in the model and the number of correlated variables. The common approach is that correlation between several independent variables of up to 0.5 should not affect the regression coefficients, since the correlation coefficients over 0.7 are unacceptable.

Table 2: Sources and definitions of variables

Variables	Description	Source	Unit of measurement
Exp	Export of the Serbian defense industry (dependent variable)	Serbian Ministry of Trade, Tourism and Telecommunications	Thousand $
Mex	Military expenditure	SIPRI	Million $, at constant 2017 prices and exchange rate
Imp	Import of weapons and military equipment	SIPRI	Million $, assessed on the basis of TIV
Pop	Number of citizens of importing countries	World Bank	Millions of citizens
D	Airway distance between Belgrade and the capitals of the importing countries	distance calculator	Kilometers
CIP	Competitive Industrial Performance Index is the indicator of industrial competitiveness	UNIDO	Index
YU	Dummy variable indicating the importing countries of former Yugoslav defense industry	Various sources	1/0 dummy

Source: Author.

Table 1: Multicollinearity test

	Mex	Imp	Pop	D	CIP	GDP pc	YU
Mex	-	0.15	0.45	0.14	0.45	0.24	0.10
Imp	0.15	-	0.30	0.10	-0.08	-0.07	0.27
Pop	0.45	0.30	-	0.16	0.29	-0.14	-0.05
D	0.14	0.10	0.16	-	-0.11	0.01	0.16
CIP	0.45	-0.08	0.29	-0.11	-	0.65	-0.49
GDP pc	0.24	-0.07	-0.14	0.01	0.65	-	-0.42
YU	0.10	0.27	-0.05	0.16	-0.49	-0.42	-

Source: Author's calculations.

In the multicolliearity testing, GDP per capita and the CIP index have shown a high degree of collinearity (0.65) because both are basically related to the development of countries. These variables should not be found in the same model. In all the proposed models, the CIP index is included instead of GDP per capita. It suits the specific subject of research better because it refers specifically to the manufacturing sectors which include military production. The CIP index also showed lower p-value, that is, greater statistical significance. The other combinations of independent variables met the common criteria.

Model specifications

In this research, we use the gravity model to calculate the possibility of increasing the export of the Serbian defense industry. We suspect the gravity model will produce much better results when applied to a particular sector or product than to total exports determined by the coefficients that are the same for all exported products. The empirical analysis is based on an ordinary least squares (OLS) regression used to estimate the parameters of linear equations. The parameters of equations were defined by minimizing the residual sum of squares.

We will determine the coefficients for the export of Serbian weapons using a panel dataset for all 61 countries – the destinations of Serbian military exports. In most countries, the volume of arms procurement is very uneven by nature. That is why the average volume of exports for three years (2015, 2016 and 2017) is used, which is the latest data on arms exports. Since there were no exports to some countries in certain years, our sample includes 173 observations.

The variables described above will be included in the analysis by applying the stepwise selection method to the model. This is why the model specification and results cannot be clearly separated.

All the relevant variables are included in the first model. The extended gravity equation takes the following form:

$$Exp_{sjt} = \beta_0 + \beta_1 Mexjt + \beta_2 Imp_{jt} + \\ + \beta_3 Pop_{jt} + \beta_4 D_{sj} + \beta_5 YU_j + \beta_6 \mathrm{CIP} + e_i \quad (1)$$

In this combination, the D and CIP variables had high p-values (Table 3), which is why they were excluded from the following equation:

$$Exp_{sjt} = \beta_0 + \beta_1 Mex_{jt} + \beta_2 Imp_{jt} + \\ + \beta_3 Pop_{jt} + \beta_4 YU_j + e_i \quad (2)$$

The model with no dummy variables is also tested:

$$Exp_{\mathrm{tsjt}} = \beta_0 + \beta_1 Mex_{\mathrm{jt}} + \beta_2 Imp_{\mathrm{jt}} + \\ + \beta_3 Pop_{\mathrm{jt}} + \beta_4 D_{\mathrm{sj}} + \beta_5 CIP_{\mathrm{jt}} + e_i \quad (3)$$

The subscripts *s*, *j* and *t* stand for Serbia, the trade partner of Serbia and the time period, respectively. Exp_{sjt} denotes military exports of Serbia to country *j* in year *t*, *Mex* is military expenditure of country *j* in year *t*, Imp_{tj} is the military import value of country *j* in year *t*, calculated according to the SIPRI TIV methodology, Pop_{jt} denotes the population of country *j* in year *t*, *D* is the distance between Serbia and the partner country, YU_j is the dummy variable whose value is 1 for former Yugoslavia's military export partner *j*, and CIP_{jt} is the Competitive Industrial Performance Index signifying the level of industrial production of country *j* in year *t*.

Empirical results

The testing of the gravity model resulted in three empirical models, all with the high coefficient of determination but different statistical significances of variables.

As already mentioned, Model 1 contains two variables, CIP and D, that are not statistically significant, CIP also having a high standard error. In Models 2 and 3, p-value of all variables is under 0.01 (Table 3); they encompass the same variables referring to military

expenditures, arms imports and population, since they have high statistical significance. Model 2 has a very strong YU dummy variable indicating complex political and diplomatic relations, which had been developed for decades. Without this dummy variable, Model 3 has a smaller determination coefficient and a slightly larger statistical error (Table 3).

Table 3: Results of the estimated gravity model

Variables	(1)	(2)	(3)
Mex	0.13*** (0.01)	0.12*** (0.01)	0.14*** (0.01)
Imp	5.84*** (1.25)	5.79*** (1.25)	7.37*** (1.24)
Pop	-23.18*** (4.25)	-24.08*** (4.22)	-25.72*** (4.38)
YU	7763.6*** (1955.4)	8640.5*** (1732.5)	-
D	-0.30 (0.19)	-	-0.37* (0.20)
CIP	-8018.8 (8066.5)	-	-23004*** (7437.4)
R^2	0.60	0.60	0.57
Standard error	9606	9631	9834
F	42.01	61.97	43.42
Significance F	0.00	0.00	0.00
Observations	173	173	173

Notes: ***p<0.01; **p<0.05; *p<0.1. Standard error is given in parentheses.
Source: Author's calculations.

Nonetheless, Model 3 is chosen for the estimation of export potentials. This model has more variables than Model 2, with the additional CIP index of import countries and the distance. In addition, the YU dummy is less reliable because it is actually an approximation of "important export markets". Namely, the importance of some trading partners of former Yugoslavia is not a fixed category, having changed to some extent over the decades.

Since the values of variables are not in logarithmic form, the values of coefficients show their impact on Serbian military exports expressed in thousands of dollars. An increase of $1 million in military expenditure induces an increase of $140 in Serbian military export. An increase of $1 million in military import, assessed on the basis of TIV, results in an increase of $7,370 in Serbian military export. As a variable in Serbia's export model, population indicates the potential scope of arms purchase and, as expected, has reverse causality with military exports in all three models. In the chosen third model, population growth of 1 million results in the reduction of $25,720 in Serbian arms exports. Distance, as usual, has a negative effect on export. Every additional kilometer of distance between the export market and Belgrade leads to a reduction of $370 in military exports. The CIP index is also in inverse proportion to Serbian arms exports. Industrialized countries mainly produce weapons for their own use or import them from other countries that are industrially more developed than Serbia. With the growth of the CIP index of the export market, Serbian exports fall by $23 million.

Trade potential of Serbian military exports

The trade potential index of Serbia's exports to partner countries is calculated on the basis of the third equation of Serbian bilateral exports. Model 3 includes the following variables: Mex, Imp, Pop, CIP and D. The obtained coefficients have been applied to all trading partners. The goal is to determine the existence and extent of the potential for additional military exports to these countries. The data included in the formula are: average military expenditure and SIPRI TIV imports in the three-year period, due to large annual variations, Pop derived from the population data for 2019, and the CIP index for 2018, which are the latest available data.

We will calculate the trade potential index by dividing the actual observed value for all 61 import countries by the value of the obtained research results. If the index is below 1.00, the potential for export to a trading partner is high. A lower value signifies more "room" for Serbia's export to this partner. If the trade potential index is above 1.00, Serbia's potential for military export to this partner has been fully developed. As a rule, this means that there is no potential for further improvement, at least not until significant changes occur in some of the variables. In arms exports, these changes occur in case of destabilization of security conditions, due to which countries tend to significantly increase their military spending and imports, and in case of wars which, as a rule, extremely raise these two variables.

In practice, however, the largest importers generally increase their imports much more than others, even

when there are no extraordinary circumstances, as their continued increase in the level of armament is a part of their long-term policy. Thus, the countries with seemingly fulfilled import potential import even more year by year. By contrast, the values of export potential close to zero can signify that there are some specific constraints not covered by the gravity models. Those might be the sanctions against and bans on the import of weapons imposed on a specific country, like Iran for example, or the domination of another exporter which is more competitive (China's military exports) or politicaly more influential (USA exports). These are not the factors that are commonly included in the model as variables, but present an insurmountable obstacle to increasing export in specific bilateral trade.

Due to all these irregularities, the export potential cannot be precisely determined this way. The obtained data on potential increase in exports to individual countries should be combined with the data on the export trends to those countries. Contrary to the theory of application of the gravity model, insights into the dynamics of military exports indicate that the countries with "too much room", i.e., with the trade potential index close to zero, should not be considered potential export markets. If exports, which are far below their potential, have stagnated or fallen over the years, the fulfilment of the statistically determined potential cannot be expected. On the other hand, if exports show an upward trend, an increase can be expected and supported, even if the index is well above 1.00. An increase in exports to the countries where exports meet both criteria, can be expected with relative security.

The results of this research show that the trade potential index is lower than 1.00 in 49 out of 61 countries, it being higher than 1.00 in the remaining countries. For the reasons stated above, in further assessment of export potential we will not include all 49 countries from the first group, nor will we eliminate the 12 countries from the second group.

We will make a small digression to illustrate the reasons for:

1) Elimination of a large number of markets, which statistically show high export potential (<1.00), and
2) Inclusion of countries that statistically show that the potential is fulfilled, that there is no more "room" to increase exports (>1.00).

The first group includes China and Russia, which produce all groups of weapons by themselves, have sufficient capacity to meet domestic demand from domestic resources and are oriented towards achieving that goal. This group also includes many countries that are predominantly importing weapons from China, such as African and Latin American countries which used to be Serbia's important export markets, and from Russia, the former USSR republics to which Serbia's exports have never been significant. It also comprises a lot of European countries with stagnant imports that can be explained by different reasons. Many European countries are also increasing the volume of arms imports from Serbia; this phenomenon is not related to the level of development, membership in NATO or the European Union. Otherwise, these countries would be included in the model as separate variables. In these countries, arms imports from Serbia cannot be expected to increase.

The second group, with theoretically "unjustifiably" large exports, includes: Germany, Bulgaria, Singapore and the United Arab Emirates. Bearing in mind the remarkable growth of military imports from Serbia in 2016 and 2017, they should be considered potential export markets, despite the fact that the export to these countries is significantly higher than the potential.

The results of further research show that in only 14 out of 49 cases with the estimated index below 1.00, there is also an increase in exports. In these 14 countries, a slight increase in exports can be expected or encouraged. We do not consider the remaining 35 countries to be potential export markets. Of course, they may become that in the future, but in certain considerably different circumstances, which Serbia cannot influence by its economic policy, diplomacy or price adjustments.

In the group of countries with the trade potential index higher than 1.00, 7 out of 12 show an upward export trend. These 7 countries will not be eliminated as potential markets, despite their high index (above 2.00, even reaching 4.00). Table 4 shows the countries that, according to these criteria, are considered significant as markets, which can be expected to increase Serbia's

Table 4: Potential and realized Serbian military export (million $, according to the trade potential index)

Trade potential index: < 1.00					
Country	Potential export	Realized export	Country	Potential export	Realized export
Egypt	20.0	18.3	Slovakia	6.4	4.8
Iraq	19.2	10.7	Italy	9.6	2.3
S. Arabia	41.6	31.7	Poland	7.2	2.9
Hungary	6.5	4.8	Oman	12.9	1.5
Nigeria	3.2	3.1	Netherlands	4.2	0.5
USA	80.4	81.7	Jordan	10.7	3.1
Vietnam	9.5	7.7	Romania	8.0	7.5
Trade potential index: > 1.00					
Country	Potential export	Realized export	Country	Potential export	Realized export
Canada	6.6	7.9	Bulgaria	8.6	35.2
Malaysia	3.7	3.8	Singapore	4.4	6.2
Myanmar	7.3	8.7	Germany	1.6	3.4
UAE	15.6	67.5			

Source: Author's calculations.

exports. This group encompasses 21 out of 61 analyzed countries, which register an increase in imports from Serbia and have different trade potential indices (Table 4).

Conclusions

The Serbian military industry is one of the few sectors that has the potential to significantly increase the sale of its products in foreign markets. As the current level of military spending in the world is, by international standards, very high with a tendency to grow, this gives the military industry an opportunity to grow and improve. This research has identified the determinants of Serbian military exports. These are: military expenditure, import of weapons and military equipment, population, geographical distance and the CIP index as an indicator of industrial competitiveness; all of them were individually identified for the importing countries. In addition to these, the dummy variable for the most important military export markets of former Yugoslavia, which Serbia largely inherited, showed great statistical significance. These variables were applied in three different models with the high coefficient of determination, two of which showed statistical significance for all variables.

The obtained coefficients were used to assess which export markets offer most opportunities for increasing exports. The model which includesfive of these variables, without the YU dummy, was applied to all the trading partners. Based on the results of the model application, as well as the dynamics of trade with each individual country, 21 countries were identified as having real potential for the military export of Serbia. These are all its current trading partners in the Arab world, followed by some neighboring countries and countries in Eastern Europe (Bulgaria, Hungary, Romania, Poland, Slovakia), but also some of the most developed countries that have their own weapons production (USA, Germany, Italy). Most of these countries, specifically the developed countries and the Arab countries, experience continuous growth in arms imports, in general and from Serbia. Their import of arms and military equipment from Serbia will spontaneously continue the upward trend. By contrast, the neighboring countries and the countries of Eastern Europe do not have a balanced supply or a well-established import partner. Economic diplomacy, additional enhancement of Serbia's military industry and possible price adjustments or favorable terms of supply would significantly contribute to the acquisition of permanent export markets.

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Nataša Stanojević

has been working at the Center for Neighboring and Mediterranean countries of the Institute of International Politics and Economics since 2019. The most important area of her research is international economics (foreign trade, foreign investment and international economic relations) with a particular interest in the international position and challenges of transition economies in East and Southeast Europe, Russia and the post-Soviet space. Also, an important place in her research belongs to the region of the Middle East and North Africa, which is a central topic of her doctoral dissertation, numerous scientific papers and conferences and the region with which she has achieved intensive international cooperation.

She graduated in 1995 from the Faculty of Political Sciences, University of Belgrade, where she also earned her MA degree in 2003. She holds a PhD from the Faculty of International Economics in Belgrade (2007). Ms. Stanojević authored six books and monographs and 30 articles in top-ranking scientific journals and participated in international conferences in the country and abroad, among which the conferences in Tehran, Tenerife, New Delhi, Yinchuan and Belgorod stand out. Her career was previously mainly related to higher education: Faculty of International Economics, Faculty of Philology, University of Belgrade (Department of Oriental Languages, Literatures and Cultures), British Academy for Business in Belgrade. At the Faculty of International Economics, she was the coordinator of the Sector for the Middle East and North Africa and founder and first coordinator of the Iranian Center. She is a member of the Belgrade Society of Economists.

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Igor Kovačević
University of Belgrade
Faculty of Economics
Department for Business Economics and Management

Aleksandra Anić
University of Belgrade
Faculty of Economics
Department for Statistics and Mathematics

Maja Ribić
University of Belgrade
Faculty of Economics
Department for Accounting and Business Finance

Aleksandra Đorđević Zorić
University of Belgrade
Faculty of Economics
Department for International Economic Relations

ECONOMIC IMPACT OF THE CREATIVE INDUSTRY AND THE EXAMPLE OF SERBIA*

Ekonomski doprinos kreativne industrije i primer Srbije

Abstract

The creative industry plays an important role in the economic development of countries. Its role has been the topic of various studies, confirming not just the importance, but also the specifics of its operations and characteristics. Creative industry in Serbia is an important part of the economy. This paper creates additional value in terms of understanding its economic impact and shows that this sector in Serbia demonstrated evident growth in the analysed period, with the average increment rate of the number of entities being 6.2% when observing the narrow classification and 7.8% when observing the broad one. Having in mind the structure of the sector in Serbia, 73.8-77% of its participants are entrepreneurs, and 92-93% of the companies are micro firms. In addition to this, most of the creative industry firms are registered in the capital city. In the observed period, GVA of the creative industry's private sector increased by 64.9% in terms of the narrow classification, with average annual growth rate of 18.1%. The share of GVA in GDP of the creative industry when taking into account the broad classification is higher compared to certain traditional industries in Serbia, such as construction, and somewhat lower than the share the agriculture. This paper also analyses the employment structure in this sector and its impact on overall employment.

Keywords: *creative industry, creative economy, economic impact.*

Sažetak

Kreativna industrija ima značajnu ulogu u ekonomskom razvoju zemalja. Njen značaj je bio predmet različitih istraživanja koja su potvrdila ne samo važnost ovog sektora, već i specifičnosti njegovog funkcionisanja i karakteristike. Kreativna industrija ima važnu ulogu i u ekonomiji Srbije. Ovaj rad kreira dodatnu vrednost u razumevanju ekonomskog uticaja i pokazuje da ovaj sektor u Srbiji beleži jasne stope rasta u analiziranom periodu, sa prosečnom stopom prirasta broja preduzeća od 6,2% po užem, i 7,8% po širem obuhvatu. Sa aspekta strukture sektora u Srbiji, 73,8-77% čine preduzetnici, dok 92-93% kompanija spada u mikro preduzeća. Takođe, najveći broj firmi je registrovan u Beogradu. U posmatranom periodu, BDV privatnog sektora kreativne industrije prema užoj definiciji porastao je za 64,9%, sa prosečnom godišnjom stopom rasta od 18,1%. Učešće BDV-a kreativne industrije prema široj definiciji u BDP-u veće je od udela nekih tradicionalnih industrija, kao što je građevinarstvo, i nešto ispod učešća poljoprivrede. Rad analizira i strukturu zaposlenosti u ovom sektoru i njegov doprinos zaposlenosti.

Ključne reči: *kreativna industrija, kreativna ekonomija, ekonomski uticaj.*

* The results presented in this paper are based on the project "Analysis of the Economic Impact of Creative Industries in Serbia", performed by NICEF, for the purposes of Serbia Creates platform within the PM's Office.

Understanding and the definition of creative industry

The first instances of using the term creative industry in Europe were recorded at the end of the last century, when conversations about knowledge workers as the foundation of post-industrial economy started [18, p. 3]. Since then, various definitions and explanations of creative industry have been put forward. Most of them place special emphasis on personal and company's talents and skills to create knowledge [13]. "Creative industries are those activities based on creativity, individual talent and skill, and that have the potential to create jobs and wealth through the generation and exploitation of intellectual property" [3, p. 4]. Numerous products that are based on creative content (i.e., the film industry, applied arts, design, IT and so forth) are increasingly more important to the global economy, having in mind the positive effect of the creative industry sector on various macroeconomic indicators, such as employment, GDP and others [21, p. 6], [7, p. 19], [4, p. 4], [5], as well as on total economic competitiveness [10, p. 3] and intensifying entrepreneurship [9, p. 16]. In addition to the economic impact, it is important to note that creative industries are also seen as post-industrial urban economy that adds value to the development of cities [27, p. 1] through processes such as gentrification and redefinition of the characteristics of consumption and lifestyle [20, p. 4], [8, p. 4].

In the literature and professional practice, four models for defining and classifying creative industries can be identified [24], [25], [26], [2], [23], [12]: DMCS model, WIPO copyright model, symbolic texts model and concentric circles model. DCMS model does not differentiate the involved industries in any manner, while the other models do make a distinction between major and the supporting industries.

Creative industries in Serbia and the influence they have on the local economy have been topics of various studies in the previous years, some of which were pioneer steps in understanding this valuable sector from the economic point of view, but also as a part of social development [11], [15]. At the same time, one of the first tangible pieces of data that helped understand the creative sector in Serbia and made it more visible in the eyes of the decision-makers and public stakeholders resulted from the World Bank's technical assistance support project to the Government of Serbia [16], and it used the "narrow" DCMS definitional approach [25] and the additional "broad" approach, as the variation of WIPO [22], when defining the scope of creative industries.

In order to have a permanent understanding of the creative industries in Serbia, and to secure continued scientific research over the sector, this paper follows the proposed approaches of using the "narrow" and the "broad" classification of the involved industries. However, this paper is based on a different methodology of calculating GVA and contribution to GDP, different analysis of the structure of the sector and different analysis of the employment structure and the sector's contribution to overall employment, compared to the methodology employed by Mikić, Radulović and Savić in their paper [16], which showed that this sector contributed with 3.7% to the total GDP of Serbia, and with 3.3% to the total number of employees.

In comparison to Mikić et al., who "determine the GVA based at current prices by using income approach" [16, p. 205], this paper implements a different methodology based on the SORS and SNA, defining consistency as a priority, since any deviation from the official SNA methodology (comparable with ESA) would provide artificial results. Also, the results of Mikić et al. are based "on the financial records for the entities registered under a business code that is not covered by our classification, but are nevertheless operating and providing services in the creative industries" [16, p. 204], while this paper takes into account only those entities that are officially registered within the determined classification. In addition, based on the data acquired for 2018 and, partially, 2019, this paper covered additional periods of research that were not covered in any previous studies. Due to the difference in methodology, there are obvious differences in the results, as well. However, the most important conclusion is that the research into the positive influence of creative industries on the national economy in Serbia conducted by Mikić et al. provided excellent results that this paper further proved and upgraded by implementing a different methodology.

Gross value added of the creative industries in Serbia

Gross value added (GVA) is a macroeconomic aggregate that stands for the difference between total value of production (output) and total value of intermediate consumption. Intermediate consumption includes costs of inputs, production and non-production services, but excludes wages of employees and amortization. According to the production approach, gross domestic product (GDP) is calculated as GVA plus taxes on products minus subsidies on products. We use the methodological guidelines of the European system of accounts 2010 (ESA 2010) in order to translate financial accounting principles into national account concepts. Main data sources are balance sheets, income statements, cash flow statements, statements of changes in equity and statistical reports. Statistical reports are the most important data source. Table 1 presents EDP[1] categories used to calculate production and intermediate consumption.

Since the methodological note "Methodology of calculating gross domestic product, sources and methods" [18] is not sufficiently detailed, a personal consultation interview with the System of national accounts' (SNA) team from the Statistical Office of Republic of Serbia (SORS) was carried out.[2] The above-presented calculations include the nonfinancial incorporated businesses (i.e., private companies). It is not possible to calculate GVA for a particular public company or for all the public companies in a particular activity sector. GVA can be calculated only for the entire government institutional sector. Therefore, we followed SORS' guidelines and did not calculate GVA for public companies. Methodological consistency is a priority, since deviation from the official SNA methodology (comparable with ESA) would provide artificial results.

When calculating macroeconomic aggregates for entrepreneurs and self-employed persons, researchers and statisticians face numerous problems that make it impossible to accurately calculate the basic aggregates. The reasons are the high frequency of establishing and closing down entrepreneurial businesses, instability in terms of core business and employment, as well as the high level of shadow economy. In addition to this, entrepreneurs and self-employed persons usually have a low response rate in surveys, and the quality of data on entrepreneurs and the self-employed is very low. An additional problem is the fact that personal property and business property of an entrepreneur are not separated. Besides all of these problems, the biggest limitation is probably the lack of

Table 1: EDP categories needed to calculate gross value added at company level

EDP code	Name of position	Sign
1002	Income from sales of merchandise	+
1009	Income from sales of products and services rendered	+
1020	Income from own use of products, services and merchandise	+
1021	Increase in value of finished goods, work in progress and services in progress	+
1022	Decrease in value of finished goods, work in progress and services in progress	-
1017	Other operating income	+
1019	Costs of merchandise sold	-
9078	Land rental fees income	-
	Production =1002+1009+1020+1021-1022+1017-1019-9078	
1023	Costs of materials	+
1024	Costs of fuel and energy	+
1026	Costs of production services	+
1029	Non-production costs	+
9056	Costs of remunerations according to contracts (gross)	+
9057	Costs of remunerations to the manager, members of the Management Board and the Supervisory Board	+
9065	Tax costs	-
9066	Contribution costs	-
9060	Land lease costs	-
	Intermediate consumption =1023+1024+1026+1029+9056+9057-9065-9066-9060	

Source: Authors' presentation based on RZS' (2018) and SORS' consultations.

1 Electronic data processing.

2 The authors are thankful for SORS' help.

double-entry bookkeeping and detailed financial reporting obligations. The SORS estimates GVA for entrepreneurs through a combination of different methods and with numerous adjustments. The calculation of these values, however, is only available at the double-digit level of activity.

Based on the interview with the SNA team, the only way to calculate GVA for entrepreneurs at the four-digit level of activity, which is in this case necessary, is by applying the following approximation:

- GVA for entrepreneurs at the double-digit level of activity is divided by the sum of the number of entrepreneurs and the number of persons employed by entrepreneurs in the specified activity. Therefore, we calculated GVA per employee for entrepreneurs at the double-digit level for each activity. We calculated the value of GVA for entrepreneurs at the four-digit level of activity by multiplying this ratio with the sum of the number of entrepreneurs and the number of employees of entrepreneurs in each activity at the four-digit level. Although this approximation is rather general, this is the only method that can be applied based on the available data.

Table 2 presents GVA of the creative industry in the 2014-2017 period. GVA includes GVA of private companies and entrepreneurs (public companies excluded, as explained above). GVA of the creative industry's private sector as a percentage of total GVA amounted to approximately 2% according to the narrow definition and to 6% according to the broad definition.

GVA of the creative industry's private sector (narrow definition) increased by 64.9%, whereas according to the broad definition, the increase was 24.1% in 2017 compared to 2014. Average growth rate in the 2014-2017 period was 18.1% for the narrow definition, and 7.5% for the broad definition.

IT, software and computer services have the highest share, and this share increased significantly in the analysed period. The share amounted to around 50% in 2014 and to more than 60% in 2017. Significant shares have also been observed for the following groups: Advertising and marketing; Industrial, graphical and fashion design; and Publishing. Contrary to IT, software and computer services, their share dropped in 2017 compared to their respective share in 2014. The share of Advertising and marketing amounted to 12.8%, Industrial, graphical and fashion design amounted to 11.8%, and Publishing amounted to 9.6% in 2017.

Table 3 compares GVA of the creative industry's private sector as a share of GDP with the respective share of GVA of the selected industries. According to the broad definition, the GVA share of the creative industry's private sector is higher than the share of construction, lower than the share of agriculture and significantly lower than the share of manufacturing and trade.

Table 2: GVA of the creative industry's private sector, 2014-2017

Year	GVA narrow definition in RSD	GVA broad definition in RSD	GVA total, current prices in mil. RSD	GVA narrow % GVA total	GVA broad % GVA total
2014	50,632,461,271	179,594,799,725	4,160,548.5	1.45	5.14
2015	63,129,162,565	192,646,657,335	4,312,038.1	1.76	5.36
2016	74,208,081,558	209,646,103,704	4,521,264.7	1.98	5.59
2017	83,472,858,749	222,942,310,133	4,754,368.4	2.12	5.65

Note: It is not possible to calculate GVA for 2018. The data for private companies are provided jointly for 2018 and a part of 2019 (until 22nd November 2019). SORS data for entrepreneurs are available for 2018. GVA data are revised data.
Source: Authors' calculations based on BRA's data and SORS' data for total GVA.

Table 3: GVA of the creative industry's private sector and of the selected industries, % GDP, 2014-2017

Year	GVA narrow	GVA broad	Agriculture	Manufacturing	Construction	Trade
2014	1.22	4.3	7.1	15.0	3.2	11.0
2015	1.46	4.5	6.7	14.7	3.7	11.1
2016	1.64	4.6	6.8	14.7	3.9	11.1
2017	1.76	4.7	6.0	15.1	4.1	11.4

Note: GVA is expressed in current prices and revised data. NACE Rev 2. Classification is used: Agriculture, forestry and fishing (A), Manufacturing (C), Construction (F) and Wholesale and retail trade: repair of motor vehicles and motorcycles (G).
Source: Authors' calculations based on BRA's data for the creative industry and SORS's data for GVA.

According to the broad definition, operating income of the creative industry amounted to RSD 690,131,386 in 2018 and 2019[3]. Average growth rate was 8.5% in the 2014-2017 period. The largest growth was recorded in Computer gaming (132.6%) and Retail of computers, computer peripherals and software in specialised shops (123%)[4]. According to the narrow definition, operating income of the creative industry amounted to RSD 258,684,011 in 2018 and 2019, and the average growth rate was 14% (2014-2017). The largest average growth was recorded in Computer gaming (132.6%) and Libraries and archives industry (58.5%).

Structure of the creative industry sector in Serbia

We can illustrate the size of the creative industry sector through the number of registered economic entities[5] engaged in activities that belong to this sector. According to the broad definition, in 2018, the total number of economic entities was 70,792. Out of that number, 18,452 were private companies (about 12.6 percent of the total number of private companies in Serbia), 52,249 were entrepreneurs (around 19.1 percent of all entrepreneurs in Serbia), and 91 were public (state) companies (16.2 percent of all public companies in Serbia). According to the narrow definition, the CI sector consisted of 45,136 registered economic entities, out of which 10,368 were private companies, 34,718 entrepreneurs and 50 public companies.

In order to get an impression of the development of this sector during the observed period (2014-2018), the following tables show the number of registered economic entities, according to the broad and narrow definition, per abovementioned groups (private companies, entrepreneurs and public companies).

The number of economic entities in the CI sector shows a growth trend. The average annual increment rate

Table 4: Number of registered economic entities according to the broad definition

	Private companies	Entrepreneurs	Public companies	Total
2014	14,489	30,576	107	45,172
2015	15,427	34,523	133	50,083
2016	16,402	39,911	107	56,420
2017	17,432	45,422	103	62,957
2018	18,452	52,249	91	70,792

Source: Authors' calculations based on BRA's data.

Table 5: Number of registered economic entities according to the narrow definition

	Private companies	Entrepreneurs	Public companies	Total
2014	7,923	18,422	80	26,425
2015	8,484	21,302	83	29,869
2016	9,064	25,314	60	34,438
2017	9,709	29,407	56	39,172
2018	10,368	34,718	50	45,136

Source: Authors' calculations based on BRA's data.

of economic entities from the broadly defined CI sector in the period from 2014 to 2018 was 6.2 percent, with the increment rate increasing from year to year. During the observed five-year period, the increment rate increased by more than 5 percentage points. According to the narrow definition, the average increment rate for this sector in the same period was 7.8 percent. Similar to the broad definition, this rate increased every year, and over a five-year period it has increased by close to 7 percentage points.

If we look at the broad definition of the sector, 73.8% of the total number of economic entities are entrepreneurs, whereas according to the narrow definition of the sector, the share of entrepreneurs in the total number of economic entities is 77%.

If we look at the newly founded economic entities according to the broad definition, the average growth rate of newly founded companies (both private and public) in the observed five-year period was 5.6%, while the average growth rate of newly founded entrepreneurs was 24%. When we look at the narrow definition, the average growth rate of companies in this period was 8.1%, whereas this rate for entrepreneurs was 27%.

The largest number of both companies and entrepreneurs in this period, both according to the narrow and broad definition, respectively, was founded in Computer programming activities. If we look at the activities from

3 Data for 2018 and 2019 were jointly provided by BRA. Data for 2019 cover the period before 22nd November 2019.

4 The difference between the growth of these two activities and the average growth is significant because in certain activities the growth rate was negative (according to both definitions) in the 2014-2017 period.

5 Economic entities include private companies, entrepreneurs and public companies.

the broad definition, the next one in terms of the number of founded companies and entrepreneurs are Engineering activities and related technical consultancy.

The largest number of private companies and entrepreneurs are registered in the Belgrade region. According to the narrow definition, the number of private companies increased in 2018 compared to 2014 by 1,682, i.e., by 33.4%. In the region of Vojvodina, the number of private companies increased by 460, i.e., by 29%. The number of entrepreneurs in the Belgrade region increased by 7,111, i.e., by 87.4% in 2018 compared to 2014, while in Vojvodina the number of entrepreneurs in the observed period increased by 3,045, i.e., by 92.4%. According to the broad definition, the number of private companies in the Belgrade region increased by almost 2,500, while the number of entrepreneurs increased by about 9,000 in 2018 compared to 2014. In the region of Vojvodina, the number of private companies according to the broad definition increased by almost 800, whereas the number of entrepreneurs increased by about 5,000 in 2018 compared to 2014. Compared to the Belgrade region and Vojvodina, the number of private companies is much smaller in the region of Šumadija and Western Serbia and in the region of Southern and Eastern Serbia. According to the narrow definition, the average number of private companies in the Belgrade region in the 2014-2018 period was almost 6,000, while the average number in the region of Šumadija and Western Serbia was approximately 750, and in the region of Southern and Eastern Serbia it was less than 700. In addition to this, the average number of entrepreneurs in the Belgrade region was about 11,000 (narrow definition), while in the region of Southern and Eastern Serbia it was approximately 3,000. We see that the concentration of private companies and entrepreneurs is the highest in the Belgrade region, followed by the region of Vojvodina, while it is the lowest in the region of Southern and Eastern Serbia.

Impact of the creative industry on employment in Serbia

We needed the data on the number of employees on four-digit level by NACE Rev 2. Classification in order to analyse employment in the creative industry. Research on registered employment is based on a combination of Central Register of Compulsory Social Insurance (CRCSI) and Statistical Business Register data. The term employee comprises persons who have formal legal employment contracts, i.e., who entered into employment with an employer for a definite or indefinite period of time, and persons who work on the basis of a contract on performing temporary or occasional jobs, persons performing occupations/activities independently or who are founders of enterprises or unincorporated enterprises, as well as

Table 6: Activities with the largest number of newly founded companies and entrepreneurs according to the broad definition in the 2014-2018 period

Activity	Number of companies	Activity	Number of entrepreneurs
Computer programming activities	1,148	Computer programming activities	8,716
Engineering activities and related technical consultancy	598	Engineering activities and related technical consultancy	2,564
Advertising agencies' activities	500	Computer consultancy activities	1,484
Technical testing and analysis	449	Specialised design activities	1,449

Source: Authors' calculations based on BRA's data.

Table 7: Activities with the largest number of newly founded companies and entrepreneurs according to the narrow definition in the 2014-2018 period

Activity	Number of companies	Activity	Number of entrepreneurs
Computer programming activities	1,148	Computer programming activities	8,716
Advertising agencies' activities	500	Computer consultancy activities	1,484
Computer consultancy activities	312	Specialised design activities	1,449
Motion picture, video and television programme production activities	207	Motion picture, video and television programme production activities	1,180

Source: Authors' calculations based on BRA's data.

persons performing agricultural activities but are in the records of CRCSI.

Table 8: Geographical distribution of economic entities in the creative industry sector

NARROW DEFINITION	2014	2015	2016	2017	2018
Belgrade region					
Private companies	5,037	5,397	5,767	6,248	6,719
Public companies	2	11	11	13	13
Entrepreneurs	8,133	9,503	11,298	13,114	15,244
Vojvodina					
Private companies	1,585	1,707	1,843	1,944	2,045
Public companies	31	29	21	18	15
Entrepreneurs	4,493	5,130	6,156	7,021	8,326
Šumadija and Western Serbia					
Private companies	665	718	746	775	820
Public companies	27	22	12	11	10
Entrepreneurs	3,296	3,784	4,426	5,237	6,341
Southern and Eastern Serbia					
Private companies	604	629	674	707	748
Public companies	19	20	15	13	11
Entrepreneurs	2,440	2,825	3,363	3,950	4,716

BROAD DEFINITION	2014	2015	2016	2017	2018
Belgrade region					
Private companies	8,346	8,902	9,466	10,145	10,804
Public companies	10	31	30	31	28
Entrepreneurs	12,528	14,324	16,640	19,009	21,677
Vojvodina					
Private companies	3,076	3,265	3,481	3,668	3,865
Public companies	40	41	33	30	25
Entrepreneurs	7,667	8,622	9,937	11,133	12,823
Šumadija and Western Serbia					
Private companies	1,682	1,793	1,892	1,977	2,062
Public companies	30	31	21	23	21
Entrepreneurs	6,121	6,795	7,762	8,900	10,337
Southern and Eastern Serbia					
Private companies	1,319	1,397	1,491	1,568	1,646
Public companies	24	27	20	16	14
Entrepreneurs	4,137	4,648	5,424	6,219	7,239

Note: Data are as of 31st December, excluding the entities deleted during the year.
Source: Authors' calculations based on BRA's data.

Table 9: Employment in the creative industry, numbers and share, 2016-2018

	2016	2017	2018
Number of employees in the creative industry			
Narrow definition	63,322	67,254	72,112
Broad definition	113,431	119,101	127,357
Total	*1,920,679*	*1,977,358*	*2,052,546*
Share in total employment			
Narrow definition	3.3%	3.4%	3.5%
Broad definition	5.9%	6.0%	6.2%

Note: Total number of employees comprises employees of legal entities (companies, enterprises, cooperatives, institutions and other organisations), persons individually running businesses, entrepreneurs and their employees.
Source: Authors' calculations based on SORS' data.

It is not possible to obtain precise and consistent information on employment at the four-digit level. Therefore, the Statistical Office of the Republic of Serbia (SORS) offered approximation data that were used to calculate employment in the creative industry.[6]

The number of employees in the creative industry was just above 63 thousand in 2016 and 72 thousand in 2018, according to the narrow definition. When using the broad definition, the number of employees was approximately 113 thousand in 2016 and 127 thousand in 2018. The share in total employment in the 2016-2018 period was 3.3%-3.5% according to the narrow definition and 5.9%-6.2% according to the broad one.

The highest share of employees is aged 30-34, which is 18% according to the narrow definition and 17% according to the broad one. Employees aged 15-24 and 65+ (i.e., the youngest and the oldest group) make up for the lowest share in creative industry employment. Employees aged 25-45 have the highest share in creative industry employment according to both of the definitions. The share of employees aged 25-40 is almost 50%, whereas the share of those aged 25-45 is more than 60%. The structure is similar according to both of the definitions.

Gender distribution shows that the share of male employees is higher than that of female ones according to both of the definitions. The share of males amounted to 60% according to the broad definition. When applying the narrow definition, the share of males amounted to 55%, whereas the share of females amounted to 45%.

Distribution of employees according to their education level is incomplete, due to lack of data. The information on the level of education in 2016 was missing for 48.2% of employees according to the narrow definition and for 48.5% according to the broad definition. The share of missing

6 Data are presented by major activity of the business subject instead of by activity of the business unit. Due to this difference between data provided and data by the registered employment methodology, the data used in the analysis are not directly comparable with official registered employment data. It is not possible to obtain data by activity of local units which reflect the cross-section of activity and personal characteristics of employees. The activity of local units is obtained by research into the local units, meaning that the number of employees by CRCSI is distributed by "pure" activity according to the structures obtained from local units' research data. Annual average of the number of employees is stock average for 12 months. Slight differences for totals at different levels of aggregation are possible due to averaging and rounding. Detailed CRCSI data are available as of 2016.

data was lower in 2018 than in 2016, but nevertheless high. The missing data share in 2018 was 38.1% according to the narrow definition and 42% according to the broad definition. Therefore, the analysis according to the education level is provided only for those employees for whom we managed to obtain data on their level of education.

The share of employees with high education is more than 50% according to the narrow definition, and somewhat lower when applying the broad definition (47.5%, 48.8% and 49.2% in 2016, 2017 and 2018, respectively). The share of employees with a low education level is around 8%. The share of secondary education amounts to 40% according to the narrow definition and to slightly more than 40% according to the broad definition. The share of highly educated employees is high according to both of the definitions.

Analysis of employment by individual characteristics is approximate, since there is no possibility to obtain precise data on individual characteristics of employees and activity (see footnote number 7). We summarize the main conclusions. In 2018, the creative industry made up for 3.5% and 6.2% of total employment according to the narrow and broad definition, respectively. The share slightly increased during the 2016-2018 period. According to the age categories, the highest share of employees was recorded in the age category 30-34. The distribution according to the age intervals is as expected, since the medium age group (25-45) has the highest share, and the lowest shares are taken up by the youth (15-25) and elderly (65+). The share of male employees is higher than that of female ones and the males' share is higher according to the broad definition. Due to the significant lack of data on education levels, education level analysis should be taken with caution and only as an approximation. The highest share of missing data was observed for the broad definition in 2016, i.e., 48.5%. The share of employees with tertiary education was around 50%, whereas low education level had a share of 8%. The share of employees with tertiary education is slightly higher according to the narrow definition than according to the broad one.

Conclusion

The creative industry sector in Serbia demonstrated clear growth in the analysed period. The average increment rate of the sector (by the number of economic entities) in the 2014-2018 period was at the level of 6.2% for the narrow, and 7.8% for the broad classification approach. Having in mind the structure of the sector in Serbia, 73.8-77% of the participants are entrepreneurs, while 92-93% are micro firms, and this confirms the previous findings that self-employed entrepreneurs, micro and small companies constitute the biggest portion of the creative industry sector [6], [19], since they are the major drivers of innovation and creative content [27]. In addition to this, most of the creative industry firms are registered in Belgrade, the capital city, which recorded the highest growth, which again is in line with previous findings that creative industries tend to be located in the major urban areas of each country [14], [1]. In the observed period, GVA of the private sector in creative industry according to the narrow definition increased by 64.9%, with average annual growth rate of

Table 10: Creative industry employment structure by education level, numbers and share, 2016-2018

		Number of employees				Share			
		Law	Medium	High	Total	Law	Medium	High	Total
Narrow	2016	2,509	13,320	16,930	32,759	7.7%	40.7%	51.7%	100.0%
	2017	3,004	15,137	20,747	38,888	7.7%	38.9%	53.4%	100.0%
	2018	3,468	17,043	24,041	44,552	7.8%	38.3%	54.0%	100.0%
Broad	2016	4,573	26,013	27,665	58,251	7.9%	44.7%	47.5%	100.0%
	2017	5,435	29,833	33,650	68,918	7.9%	43.3%	48.8%	100.0%
	2018	6,436	33,988	39,210	79,634	8.1%	42.7%	49.2%	100.0%

Notes: Total is the total number of employees for whom we obtained data on their level of education, not the total number of employees in the creative industry. Low education level: without education, primary education and low secondary education (1-2 years); medium education level: higher secondary education (3-4 years) and post-secondary non-tertiary education; high education level: tertiary education (short-cycle tertiary education, bachelor's or equivalent, master's or equivalent and doctoral or equivalent).
Source: Authors' calculations based on SORS' data.

18.1%. The GVA share in GDP was higher than that of some traditional industries in Serbia, such as construction, and somewhat lower than the share of agriculture. Operating income of the sector reached an average annual growth rate of 8.5% according to the broad definition, and 14% according to the narrow one, with the highest growth in the Video gaming industry (132.6%). Employees aged 25-40 years make up for almost 50% of all employees in the sector. According to the narrow approach, there is almost an equilibrium among male and female workers (55%:45%), and a highly positive finding is that the largest portion is made up of highly educated employees.

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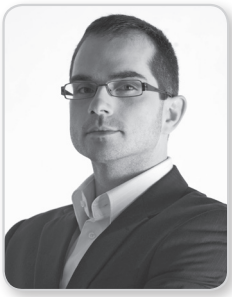

Igor Kovačević

is Assistant Professor at the Faculty of Economics, University of Belgrade. He teaches courses in business economics and management (Marketing in Tourism and Management of Tourism Enterprises) and a course in economic policy and development (Tourism Economics). His academic and professional interests are primarily related to tourism marketing and management, with special emphasis on the meetings industry (MICE) and business travel, as well as on the creative industries.

Aleksandra Anić

is Assistant Professor at the University of Belgrade, Faculty of Economics, at the Department for Statistics and Mathematics, and also works as researcher at the Foundation for the Advancement of Economics. She teaches Economic Statistics and Introduction to Econometrics. She was engaged as researcher in many projects dealing with different topics, such as labour market, inequality, social policy, nonbanking financial institutions, film and the creative industry. Aleksandra is member of the Editorial Board of the Quarterly Monitor. She uses many macroeconometric and microeconometric techniques in her research.

Maja Ribić

is Teaching Assistant at the Faculty of Economics, University of Belgrade, where she teaches Financial Accounting. At present, she is also a PhD candidate at the same Faculty. She enrolled her PhD studies in Business Management in 2018, and her area of interest is fair value accounting.

Aleksandra Đorđević Zorić

is Teaching Assistant at the Faculty of Economics, University of Belgrade. She received her MSc degree from the Faculty of Economics, University of Belgrade and she is currently a PhD candidate (study programme: Economics) at the same Faculty. Her areas of interest and research are international finance, international economic relations of Serbia, international economics, exchange rates, and foreign direct investments. She has participated in a number of research projects, domestic and international conferences and published several papers in scientific journals.

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Gordana Radović
"Dnevnik-Poljoprivrednik"
AD Novi Sad

COMPARATIVE OVERVIEW OF THE STATE OF AGRICULTURAL INSURANCE IN SERBIA AND CROATIA

Uporedni prikaz razvijenosti osiguranja poljoprivrede u Srbiji i Hrvatskoj

Abstract

The aim of this paper is to assess the level of agricultural insurance development for family agricultural farms in Serbia and Croatia. To that end, a comparative analysis of the characteristics of agricultural insurance and of the level of its development for family agricultural farms was conducted for these two countries, which were taken as comparative examples due to significant similarities relevant for the subject of research. According to the categorization of the Organization for Economic Cooperation and Development (OECD), the territories of both countries are dominated by rural areas which are, according to the structure of the agricultural entities, dominated by family agricultural farms, while agriculture has approximately the same share in gross domestic product (GDP) of both countries. The author analyzes the development of agricultural insurance from 2006 to 2018, with family agricultural farms that can be considered micro enterprises important for the growth of the insurance industry in the observed countries. Based on the conducted research, the author concludes that in both Serbia and Croatia, agricultural insurance of family agricultural farms is underdeveloped and that there are significant opportunities for the growth of the insurance industry in this market segment. In 2018, only 3.99% of all family agricultural farms in Serbia were insured, with this percentage being 4.26% in Croatia. Bearing in mind that supply is satisfactory, that solvency should not be viewed as a problem, as is often done, given there is significant subsidization of agricultural insurance premiums, it will be necessary, before all, to develop demand.

Keywords: *agricultural insurance, development, family agricultural farms, Serbia, Croatia.*

Sažetak

Cilj rada je procena nivoa razvijenosti poljoprivrednog osiguranja kod porodičnih poljoprivrednih gazdinstava u Srbiji i Hrvatskoj. U tu svrhu realizovana je uporedna analiza karakteristika poljoprivrednog osiguranja i nivoa njegove razvijenosti kod porodičnih poljoprivrednih gazdinstava u ove dve države, koje su uzete kao uporedni primeri zbog značajnih sličnosti važnih za predmet istraživanja. Na teritoriji obe države, prema kategorizaciji Organizacije za ekonomsku saradnju i razvoj (OECD), dominiraju ruralna područja, u strukturi poljoprivrednih subjekata dominiraju porodična poljoprivredna gazdinstva, a poljoprivreda ima približno isto učešće u bruto domaćem proizvodu (BDP). Autorka analizira razvijenost osiguranja poljoprivrede u periodu od 2006. do 2018. godine kod porodičnih poljoprivrednih gazdinstava koja se mogu smatrati mikro preduzećima značajnim za rast industrije osiguranja u posmatranim državama. Autorka na osnovu realizovanog istraživanja zaključuje da je i u Srbiji i u Hrvatskoj nerazvijeno osiguranje poljoprivrede kod porodičnih poljoprivrednih gazdinstava i da postoje značajne mogućnosti za rast industrije osiguranja u ovom segmentu tržišta. U 2018. godini u Srbiji je bilo osigurano samo 3,99%, a u Hrvatskoj 4,26% od ukupnog broja porodičnih poljoprivrednih gazdinstava. Imajući u vidu da je ponuda zadovoljavajuća, da platežnu sposobnost ne bi trebalo posmatrati kao problem, kako se to često čini, jer postoji značajno subvencionisanje premija poljoprivrednog osiguranja, potrebno je, pre svega, razviti tražnju.

Ključne reči: *osiguranje poljoprivrede, razvijenost, porodična poljoprivredna gazdinstva, Srbija, Hrvatska.*

Introduction

Property insurance represents the protection of property interests of natural persons and legal entities against the occurrence of risks, i.e., insured perils, at the expense of insurance funds formed by collecting such premiums [48, p. 9]. There are a number of forms of insurance that are most commonly grouped as life and non-life insurance [30, pp. 65-73]. The subject of analysis in this paper is agricultural insurance as a type of non-life insurance, i.e., a type of property insurance.

Agricultural insurance is divided into crop insurance and livestock insurance. Crop insurance has existed for more than three centuries, more precisely since 1719, when crop insurance against hail was introduced in Germany. Today, globally, crop insurance accounts for about 90% of total agricultural insurance premiums [21, p. 11]. Crop insurance is one of the riskiest forms of insurance, thus insurance protection is offered for only a limited number of risks. Risks are most often divided into three main groups: natural, social and economic [56, p. 10]. According to [24, p. 9], at the present time there is a growing need to insure crop production against climate changes, and insurance programs have an important place in the protection against the dangers associated with climate change, such as floods or droughts. However, despite the great social importance, agricultural insurance, i.e., crop insurance, in many countries, is only in the initial phase of development due to numerous difficulties that hinder its financial viability [2, pp. 31-32].

According to research by a group of authors, a farmer's decision to opt for crop insurance is influenced by a number of factors, the most important of which is risk awareness and the competitive impact of other risk management tools, while farmers who have a higher level of awareness of the risks of falling yields are more likely to enter into insurance contracts [66, p. 108]. The size of an agricultural holding has a positive correlation to a decision to purchase a policy, because it is often too expensive to do so for smaller holdings [5, p. 480]. According to one opinion, older and more educated farmers are more likely to purchase insurance [6, p. 353]. Based on the opinion of numerous authors, the costs of agricultural insurance are negligible in comparison to the benefits it provides to policyholders - agricultural producers [29, pp. 149-159]. According to research results [49, p. 177], insurance costs are very low and on average account for 1.5% to 2% of total agricultural production costs. According to research results from a group of authors, "the main factors affecting demand for crop insurance in Serbia are connected with financial resources available to farmers and their awareness on risk and insurance" [71, p. 1119].

There is an almost unanimous opinion in literature that due to the specificity, complexity and high administrative costs, as well as significant risks that accompany crop production and often cause enormous damage, it is necessary to manage this type of insurance with state support and intervention, which often takes the form of insurance premium subsidies. In developed countries, governments subsidize crop insurance to reduce farm income instability, which is caused by reduced yields due to a number of risks that accompany crop production [20, p. 370]. In general, on a global level, there is a direct correlation between state involvement and the level of development of crop insurance [3, p. 28]. In 2004, the average subsidies in the European Union were 32%, with large differences between countries [23, p. 725].

In recent years, due to the emergence of new animal diseases, the need for livestock insurance has been growing. According to [25, p. 292], for full economic protection, a stronger connection between farmers, insurance companies and the state is required in order to create an integrated risk management system in livestock breeding. "Based on an analysis carried out by numerous researchers, it can be concluded that livestock insurance, i.e., animal insurance, viewed on a global level, is growing at a slower rate than crop insurance, i.e., crop and fruit insurance [1, p. 12].

In Serbia and Croatia, almost all agricultural companies have economic protection for their production. The reason for that is the fact that both countries originated from Yugoslavia, where the law mandated that agriculture must be insured by legal entities. Chronologically, after the Second World War, compulsory insurance of crops and fruits grown on state-owned agricultural land, as well as

livestock on state-owned farms, was in force [67]. The order defining against which risks an economic organization was required to insure its fixed assets, working capital and common consumption assets, was issued in 1958 [68]. The Law on Compulsory Insurance of Property and Persons prescribed compulsory insurance of socially-owned assets, including crops and fruits, which were grown on socially-owned agricultural land, i.e., livestock bred on socially-owned property [69]. With the basic law on insurance and insurance organizations, compulsory insurance of crop production and livestock in the social sector was abolished [70]. Having in mind the above, it can be concluded that compulsory production insurance is a tradition for agricultural companies, which has been maintained, in both countries, up to the present.

According to current literature, agricultural insurance of family agricultural farms is underdeveloped in both countries. Based on an exhaustive and comprehensive analysis, the authors [22, p. 15] conclude that the possibilities of the insurance market in the Republic of Serbia are greater than the current level of development. According to research results [53, p. 218], in Serbia during the 2006-2014 period, agricultural insurance was most developed in 2014, but even then only 4% of the total number of agricultural holdings were insured, and the insurance covered only 15% of total arable land. Insurers estimate that in 2014, only 4% of arable land in Croatia was insured, which is seven times less than the average of the 15 oldest members of the European Union [45]. Croatia has an unfavorable structure of agricultural farms with very small family agricultural farms, and the small size of the lot is one of the reasons for the inefficiency of agricultural production [73, p. 6]. In Croatia, despite significant subsidies for agricultural insurance premiums, only 7-8% of the total number of agricultural holdings insures their production [72]. In Serbia, the insurance of animal, i.e., livestock production, is even less developed when compared to crop insurance [74, p. 73]. The situation in Croatia is similar, and according to one research, most of the surveyed farmers do not insure their cattle or do so from time to time, mainly when required by loan terms, i.e., when insurance is required as a guarantee [44, p. 809].

Methodological approach

The aim of this paper is to assess the level of agricultural insurance development for family agricultural farms in Serbia and Croatia. To that end, a comparative analysis of the characteristics of agricultural insurance, and the level of its development for family agricultural farms, was conducted for these two countries, which were taken as comparative examples due to significant similarities important for the subject of research. According to the categorization of the Organization for Economic Cooperation and Development (OECD), the territories of both countries are dominated by rural areas which are, according to the structure of the agricultural entities, dominated by family agricultural farms, while agriculture has approximately the same share in gross domestic product (GDP) of both countries.

Based on the OECD categorization, 85% of the territory of Serbia is considered a rural area, while in Croatia it is as much as 91.6% of the total territory. The share of agriculture in the formation of gross domestic product (GDP) in 2018 in Serbia was 6.3% [65], and 4.5% in Croatia [26]. In both countries, the structure of agricultural subjects is dominated by family agricultural farms. In Serbia, they make up 99.7% [57], and in Croatia 96.8% [26] of the total number of agricultural holdings. The subject of research in this paper is not the state of the development of agricultural insurance in agricultural companies, i.e., legal entities, considering that they are beneficiaries of agricultural insurance, almost entirely in both countries, in accordance with an inherited tradition from the former common state.

This paper uses analysis, synthesis, descriptive and comparative methods, as well as descriptive statistics. The sources of data are statistical reports, including reports from relevant authorities and institutions in both countries.

Research results

In order to implement research, we analyzed, by comparative method, potentials, conditions and level of development of agricultural insurance in Serbia and Croatia.

Potentials for the development of agricultural insurance

Potentials of primary importance for the development of agricultural insurance, in accordance with the defined goal of research, are: (a) the total number of family agricultural farms (FAF); (b) the area of utilized agricultural land used by family agricultural farms; (c) the average size of the agricultural holding of the family agricultural farms; (d) the structure of the utilized agricultural area; (e) livestock fund; (f) the structure of farmers by age and educational level.

As stated in the section on methodology, the subject of research is the level of development of agricultural insurance for family agricultural farms in Serbia and Croatia. The number of family agricultural farms (FAF), their share in the total number of agricultural holdings (AH), the share of the area used by FAF in the total area of arable agricultural land, as well as the average size of FAF holdings in 2018, in both countries, have been presented in Table 1.

Table 1: Total number of FAF, used agricultural land and average size of holdings in 2018

In 2018	CROATIA	SERBIA
Number of AGRICULTURAL HOLDINGS (AH)	167,676	564,541
Number of FAMILY AGRICULTURAL FARMS (FAF)	162,248	562,869
Participation of FAF in the total number of AH	96.8%	99.7%
Used agricultural land	1,133,851.8 ha	3,475,894 ha
Area used by FAF	862,302.9 ha	2,916,125 ha
Share of areas used by FAF in the total area of used agricultural land	76.1%	83.9%
Average property size of FAF	5.3 ha	5.18 ha

Source: [26], [57].

Based on the data presented in Table 1, it can be concluded that in both countries family agricultural farms (FAFs) dominate in the structure of agricultural holdings (AH). They make up 96.8% in Croatia and 99.7% in Serbia out of the total number of agricultural holdings. We conclude that in both countries, family agricultural farms have approximately the same importance in the structure of agricultural farms.

The share of agricultural land used by FAFs in the total area of used agricultural land is dominant in both countries; in Croatia it is 76.1%, and in Serbia 83.9%. The average size of FAFs in Croatia is 5.3 ha, and in Serbia 5.18 ha. Based on the above data we can conclude: (a) that in both states, FAFs have approximately the same significance in terms of the "use" of total available agricultural land; (b) that in both states, FAFs have approximately the same economic strength, in terms of the average size of the agricultural holding.

Table 2: Potentials for the development of crop insurance in 2018

Structure of used agricultural land	CROATIA	SERBIA
• arable land and gardens	54.1%	73.98%
• meadows and pastures	40.9%	19.47%
• orchards	2.2%	5.26%
• vineyards	1.4%	0.59%
• vegetable gardens	0.1%	-
• olive groves	1.3%	-
• nurseries	-	0.04%
• other plantations	-	0.02%
• house gardens	-	0.64%

Source: [26], [64].

Both analyzed countries have a significant potential for the development of crop insurance, as well as livestock insurance. The structure of agricultural land, as well as the structure of livestock is similar (Tables 2 and 3).

Table 3: Potentials for the development of livestock insurance in 2018

Structure of livestock production in 2018	CROATIA	SERBIA
• cattle	414,125	881,152
• pigs	1,049,123	3,266,102
• sheep	636,294	1,799,814
• goats	80,064	218,397

Source: [26], [62].

When looking at the age structure of farmers, in Croatia 37.7% are older than 65 years, and in Serbia 42.5% of the total number of farmers are of this age. In both countries, about 11% are younger than 44 years of age. From the aspect of the educational level, 33.1% of farmers in Croatia have a secondary education (SSE), while this number in Serbia equals 45.2%. About 6% of the total number of farmers in both countries have a college or university degree (UD). In 2018, 21.1% of the total number of farmers in Croatia had no more than a primary school education, and in Serbia it is estimated that 48.6% of farmers have only a primary education, or almost twice as many (Table 4).

Table 4: Structure of farmers by age and educational level in 2018

Structure of farmers	CROATIA	SERBIA
• owners of family agricultural farms (FAF) over 65 years of age	37.7%	42.5%
• FAF owners under 44 years of age	11.5%	11.8%
• FAF owners who have only a primary school education	21.1%	48.6%
• FAF owners who have a SSE	33.1%	45.2%
• FAF owners who have a UD	6.5%	6.0%

Source: [26], [60].

Based on the data presented in Table 4, it can be concluded that in both countries, the structure of farmers is dominated by people over 65, as well as farmers with a secondary education (SSE). These data are not encouraging given that education is crucial for the development of agricultural insurance, and it is natural that younger people are more willing to learn compared to older farmers.

Conditions for the development of agricultural insurance

In order to develop agricultural insurance, quality conditions are needed, which include: (a) state support in the form of subsidies for insurance premiums; (b) a quality offer on the agricultural insurance market.

Insurance premium subsidies

Since 2006, subsidies in Serbia have been paid from the state (agrarian) budget to support farmers in applying for insurance. The funds are paid in the form of recourse (refund) for the entire paid amount for the agricultural insurance premium. The return on funds was initially 30%, but has risen to 40% of the premium amount since 2008. As of 2019, farmers who work under difficult business conditions are entitled to a refund up to 45%, and those whose production is located in five districts (Moravica, Zlatibor, Kolubara, Šumadija or Podunavlje) that are particularly vulnerable to weather disasters, have the right to up to 70% recourse on insurance premiums. Local governments can also participate in the recourse of the remaining part of agricultural insurance premiums, so that there are municipalities in which farmers can fully insure their production at the "expense of the state". In accordance with the current Rulebook [50], only registered agricultural holdings have the right to premium recourses and can submit only one claim per year, which may include one or more types of incentives, on the basis of which they can collect up to 2.5 million dinars.

Until Croatia's accession to the European Union in 2013, farmers were entitled to subsidies for agricultural insurance premiums, 25% from the state budget and usually another 10% from the local government. Since 2014, farmers have been entitled to co-financing up to 65% of the value of the annual crop, livestock and plant insurance policy, based on a co-financing model from the European Agricultural Fund for Rural Development (EAFRD) [45]. Since 2016, Croatia has been implementing Measure 17 "Risk management", and Submeasure 17.1. "Crop, animal and plant insurance" from the Rural Development Programme of the Republic of Croatia for the 2014-2020 period. In 2018, the Ministry of Agriculture introduced changes to the implementation of this submeasure in order to increase the interest of farmers in insurance. Subsidies have been increased and are now paid in the amount of up to 70% of the insurance premium. They participate in the payment of these subsidies with 85% from funds from the budget of the European Union, and with 15% from funds from the budget of the Republic of Croatia. The maximum amount of subsidies per user is EUR 75,000 per year. Since 2018, the way of submitting the claim for the payment of subsidies has also changed, i.e., the user was required to pay the entire insurance premium before submitting the claim. Now, under the insurance contract, farmers pay 30% of the insurance premium, and after that, they submit the claim for the payment of subsidies to the Paying Agency for Agriculture, Fisheries and Rural Development. The agency carries out the administrative processing of applications, and when it is determined that the necessary conditions have been met, the remaining 70% of the insurance premium is paid to the account of the insurance company, which closes the obligation of the user - farmer [51]. According to data from the Ministry of Agriculture of the Republic of Croatia, in 2019, 9,347 claims for subsidies were submitted by farmers, which is almost four times more than during 2016. This confirms that these changes have had a positive impact on the development of agricultural insurance [27].

Offer on the agricultural insurance market

There are five insurance companies operating on the agricultural insurance market of Serbia, four of which have a dominant share. Farmers can insure their production against basic and additional risks. The basic insurable risks for plant production include hail, fire and lightning strikes. The risk from hail is the most represented both in terms of frequency and severity of consequences. It is estimated that in Serbia, 90% of crop insurance is hail risk insurance. Additional insurable risks of plant production are storms, floods, spring and autumn frosts [52, p. 397]. Risks (perils) that endanger animals can be classified into two groups: diseases and accidents. As a consequence of their effect, there is damage from the death of animals, injuries, forced slaughter or forced killing, treatment costs and other things, all of which can be secured with insurance protection [72, p. 73]. According to research results [54, p. 91], there is a satisfactory offer for crop insurance on the Serbian agricultural insurance market, which includes insurance against the most significant risks and all for the purpose of providing insurance possibilities from current experience on foreign markets. It is necessary to have a greater offer of insurance against drought risk and loss of income as, at the moment, this insurance is only offered by one insurer. In addition, on the Serbian agricultural insurance market, there is a satisfactory offer for livestock insurance against the most significant risks for livestock production, and the development of this insurance requires, in addition to quality information and education of agricultural producers, an increase in the livestock fund [55, p. 96]. Therefore, in order to develop agricultural insurance in Serbia, it is necessary to stimulate demand.

There are four insurers operating on the Croatian agricultural insurance market, one of which has an almost 70% market share [72]. Crop insurance covers the risks of hail, fire and lightning strikes and, in addition to these basic coverages, insurance against the risk of storms, spring frosts, salt sediments or floods can be contracted [46]. On the agricultural insurance market, there is a growing demand for insurance against the risk of drought, which is increasingly present under conditions of growing climate change. As many as 80% of farmers believe that without covering this risk it makes no sense to insure agricultural production. On the other hand, for insurers insuring against this risk this is unacceptable under conditions where only 0.5% of agricultural holdings have irrigation systems. In Croatia, for now, only one insurer offers drought risk insurance [45]. Domestic insurance covers damage caused by death, emergency slaughter or euthanasia due to disease or accident, for 16 different species of domestic animals. In addition to basic coverage, additional coverage can be contracted [47].

Table 5: Comparative overview of agricultural insurance policies in Serbia and Croatia, 2006-2018

	SERBIA					CROATIA				
Year	Number of crop insurance policies (PPIP)	% in number of AGIP	Number of livestock insurance policies (AIP)	% in number of AGIP	Number of agricultural insurance policies (AGIP)	Number of crop insurance policies (PPIP)	% in number of AGIP	Number of livestock insurance policies (AIP)	% in number of AGIP	Number of agricultural insurance policies (AGIP)
2006	9,351	80	2,278	20	11,629	12,421	66	6,372	34	18,793
2007	10,305	80	2,582	20	12,887	11,982	70	5,203	30	17,185
2008	15,186	87	2,250	13	17,436	15,034	76	4,810	24	19,844
2009	10,165	85	1,807	15	11,972	23,726	85	4,029	15	27,755
2010	11,172	90	1,212	10	12,384	18,461	84	3,488	16	21,949
2011	11,548	89	1,487	11	13,035	18,238	87	2,818	13	21,056
2012	14,871	74	5,259	26	20,130	16,565	87	2,370	13	18,935
2013	18,658	82	4,167	18	22,825	17,535	89	2,191	11	19,726
2014	19,768	78	5,466	22	25,234	14,625	88	1,998	12	16,623
2015	27,652	83	5,564	17	33,216	13,315	89	1,620	11	14,935
2016	28,749	84	5,313	16	34,062	20,596	94	1,385	6	21,981
2017	30,346	89	3,642	11	33,988	22,359	94	1,367	6	23,726
2018	39.212	90	4,506	10	43,718	39,299	96	1,813	4	41,112
Total	**246,983**	**84**	**45,533**	**16**	**292,516**	**244,156**	**86**	**39,464**	**14**	**283,.620**

Source: [7-19], [31-43].

The level of development of agricultural insurance

The level of development of agricultural insurance in Serbia and Croatia has been analyzed for the 2006-2018 period based on: (a) number of agricultural insurance policies; (b) total agricultural insurance premiums, i.e., crop insurance premiums and livestock insurance premiums; (c) share of total agricultural insurance premiums in total non-life insurance premiums; (d) number of family agricultural farms eligible for agricultural insurance premium subsidies.

A comparative overview of agricultural insurance policies in Serbia and Croatia, for the 2006-2018 period, has been presented in Table 5. Based on the presented data, it can be concluded that the total number of concluded insurance policies for plant production during the observed period in Serbia was 246,983, and in Croatia it was 244,156. The total number of concluded livestock insurance policies during the observed period was 45,533 in Serbia, and 39,464 in Croatia. The average share of the number of crop insurance policies in the total number of agricultural insurance policies during the analyzed period in Serbia was 84%, and in Croatia 86%. The average share of the number of livestock insurance policies in the total number of agricultural insurance policies during the 2006-2018 period in Serbia was 16%, and in Croatia 14%.

The total number of agricultural insurance policies in Serbia had a growth trend from 2006 to 2008, followed by a continuous decline until 2012. Given that subsidies for agricultural insurance premiums in 2008 increased from 30% to 40%, it can be concluded that they are not a decisive factor for the development of agricultural insurance. Since 2012, there has been an increase in the total number of agricultural insurance policies with a slight decline only in 2017.

The total number of agricultural insurance policies in Croatia experienced significant oscillations during the analyzed period. A continuous decline was recorded in the period from 2009 to 2012 and from 2013 to 2015, with a continuous growth since then. Bearing in mind that in 2014, with the accession of Croatia to the European Union, subsidies for agricultural insurance premiums increased significantly, from 25% to 65%, this did not significantly affect the growth of insurance demand. However, the total number of agricultural insurance policies grew by as much as 73% in 2018 compared to the previous 2017. In Croatia, from 2018, subsidies were increased, amounting to 70% of agricultural insurance premiums; however, as of this year, the policy of paying subsidies has changed. We believe that this was decisive for the growth of demand. In particular, the obligation of farmers to pay the entire premium before submitting the claim for the payment of the subsidy has been abolished.

Based on the conducted analysis, it can be concluded that in both countries there are significant opportunities for the growth of the agricultural insurance market, given that the number of family agricultural farms in 2018 was:

(a) 562,869 in Serbia, with a total of only 43,718 agricultural insurance policies concluded in that year;
(b) 162,248 in Croatia, with only 41,112 agricultural insurance policies concluded in that year.

Table 6: Comparative overview of crop insurance premiums in Serbia and Croatia, 2006-2018

Year	SERBIA		CROATIA	
	Total crop insurance premium in euros at the official middle exchange rate at the end of the year	% in the total agricultural insurance premium	Total crop insurance premium in euros at the official middle exchange rate at the end of the year	% in the total agricultural insurance premium
2006	7,742,924	60	8,692,484	50
2007	9,483,809	59	9,642,694	50
2008	12,473,990	68	14,493,015	55
2009	7,787,520	66	15,006,435	54
2010	7,524,991	74	13,000,779	52
2011	9,259,534	78	14,443,285	53
2012	9,904,853	72	13,421,952	53
2013	13,118,383	79	13,256,969	55
2014	13,259,942	78	11,763,668	59
2015	13,753,578	76	10,362,215	53
2016	14,959,987	70	9,596,460	51
2017	17,636,021	70	10,819,778	53
2018	19,406,944	68	16,842,566	57
Total	156,312,476	71	161,342,300	54

Source: [7-19], [31-43].

A comparative overview of the total amount of crop insurance premiums in Serbia and Croatia during the 2006-2018 period has been presented in Table 6. By analyzing the presented data, it can be concluded that, although in both countries during the observed period the average number of crop insurance policies has approximately the same share in the total number of agricultural insurance policies (Table 5), the average share of total crop insurance premiums in total agricultural insurance premiums is different. In Serbia it is 71%, and in Croatia it is 54%.

The analysis of the data presented in Table 6 shows that in Serbia during the analyzed period, total insurance premiums for crop production recorded mainly a growth trend, more precisely from 2006 to 2008 and from 2011 to 2018. The decline in the value of total crop insurance premiums was recorded only in the period from 2008 to 2010. The percentual share of total crop insurance premiums in total agricultural insurance premiums was the highest in 2013, when it amounted to 79%. In Croatia, total crop insurance premiums experienced a growth trend from 2006 to 2009, from 2010 to 2011, and from 2016 to 2018. The percentual share of total crop insurance premiums in total agricultural insurance premiums was the highest in 2014, when it amounted to 59%. During the analyzed period, total crop insurance premiums in Serbia amounted to EUR 156,312 million, and in Croatia to EUR 161,342 million, i.e., approximately the same values for both countries.

A comparative overview of the total premium amount of livestock insurance premiums in Serbia and Croatia during the 2006-2018 period has been presented in Table 7. By analyzing the presented data, it can be concluded that, although in both countries during the observed period the average number of livestock insurance policies has approximately the same share in the total number of agricultural insurance policies (Table 5), the average share of total premiums for livestock insurance premiums in total agricultural insurance premium is significantly different. In Serbia, it is 29%, and in Croatia it is 46%. This can be interpreted in two ways: that domestic livestock insurance is more expensive in Croatia than in Serbia or that the scope of risk coverage in domestic livestock insurance in this country is higher.

The analysis of the data presented in Table 7 shows that in Croatia during the analyzed period, total insurance premiums for domestic livestock mostly had a downward trend, while an upward trend was recorded only in the period from 2006 to 2009, from 2010 to 2011, from 2014 to 2015, and from 2016 to 2018. The percentual share of total domestic livestock insurance premiums in total agricultural insurance premiums was the highest in 2006, when it amounted to 50%. In Serbia, total insurance premiums for domestic livestock during the analyzed period had the longest continuous growth trend in the period from 2013 to 2018. In Serbia, the percentual share of total domestic livestock insurance premiums in total agricultural insurance premiums was the highest in 2007, when it amounted to 41%. During the analyzed period, in Serbia total insurance premiums for domestic livestock amounted to EUR 65,085 million, while in Croatia they amounted to EUR 139.647 million, i.e., almost twice that of Serbia.

A comparative overview of the share of total agricultural premiums in total non-life insurance premiums in Serbia and Croatia during the 2006-2018 period has been presented in Table 8. Based on the presented data, we can conclude that, in Serbia during the analyzed period, the cited participation experienced significant oscillations while continuous growth was recorded only from 2010 to 2014, and from 2015 to 2018. In Croatia, the share of total agricultural insurance premiums in total non-life insurance premiums during the analyzed period generally had a declining trend. Specifically, the downward trend was recorded in the period from 2011 to 2016, while the upward trend was recorded in the period from 2016 to 2018. Total agricultural insurance premiums in Serbia from 2006 to 2018 amounted to EUR 221,398 million, and in Croatia they were about 36% higher and amounted to EUR 300,990 million. However, the difference between total

Table 7: Comparative overview of livestock insurance premiums in Serbia and Croatia, 2006-2018

Year	SERBIA		CROATIA	
	Total livestock insurance premium in euros at the official middle exchange rate at the end of the year	% in the total agricultural insurance premium	Total livestock insurance premium in euros at the official middle exchange rate at the end of the year	% in the total agricultural insurance premium
2006	5,186,544	40	8,659,809	50
2007	6,519,987	41	9,326,113	49
2008	5,770,217	32	12,025,654	45
2009	3,936,852	34	12,867,019	46
2010	2,684,216	26	12,100,461	48
2011	2,572,608	22	12,931,948	47
2012	3,855,114	28	11,926,648	47
2013	3,534,958	21	10,662,452	45
2014	3,643,727	22	8,226,749	41
2015	4,292,393	24	9,154,888	47
2016	6,534,648	30	9,054,767	49
2017	7,436,895	30	9,773,681	47
2018	9,117,430	32	12,937,517	43
Total	65,085,589	29	139,647,706	46

Source: [7-19], [31-43].

non-life insurance premiums during the analyzed period, in these two countries, is significantly larger. During the period 2006-2018, total non-life insurance premiums in Serbia were EUR 6,421 billion, and in Croatia EUR 11,198 billion. The average share of total agricultural insurance premiums in total non-life insurance premiums during the analyzed period was 3.45% in Serbia, and 2.69% in Croatia. Based on this data, it can be concluded that agricultural insurance is slightly more important in the non-life insurance market in Serbia than in Croatia. In addition, based on this data, it can be concluded that, in both countries, total agricultural insurance premiums have a small share in total non-life insurance premiums, which testifies to the underdevelopment of agricultural insurance.

Comparative overview of the number of paid claims for subsidies for agricultural insurance premiums and the amount of paid funds for these subsidies in Serbia and Croatia for the 2016-2018 period have been presented in Table 9.

Based on the presented data in Table 9, it can be concluded that the number of submitted claims had a growth trend in both countries during the analyzed period. However, bearing in mind that in 2018 there were 562,869 family agricultural farms in Serbia, while in Croatia this number was 162,248, we can conclude that in 2018 the right to subsidies for agricultural insurance premiums was realized in Serbia at only 3.99%, and in Croatia at 4.26%, of the total number of family agricultural farms. This data can be considered relevant for the percentage of insured family agricultural farms in both countries, which testifies to the underdevelopment of agricultural insurance despite significant subsidies for agricultural insurance premiums.

Conclusion

This paper presents research conducted for the purpose of assessing the level of agricultural insurance development

Table 8: Comparative overview of the share of total agricultural premiums in non-life insurance premiums in Serbia and Croatia, 2006-2018

Year	SERBIA			CROATIA		
	Total agricultural insurance premiums in euros according to the official middle exchange rate at the end of the year	Total non-life insurance premium in euros according to the official middle exchange rate at the end of the year	% of total agricultural insurance premiums in total non-life insurance premiums	Total agricultural insurance premiums in euros according to the official middle exchange rate at the end of the year	Total non-life insurance premium in euros according to the official middle exchange rate at the end of the year	% of total agricultural insurance premiums in total non-life insurance premiums
2006	12,929,468	433,963,127	2.98	17,352,293	818,928,205	2.12
2007	16,003,796	502,806,924	3.18	18,968,808	898,576,285	2.11
2008	18,244,207	517,371,091	3.53	26,518,669	974,865,194	2.72
2009	11,724,372	476,108,294	2.46	27,873,454	947,505,125	2.94
2010	10,209,207	447,099,742	2.28	25,101,240	919,119,972	2.73
2011	11,832,142	452,225,583	2.62	27,375,233	891,580,682	3.07
2012	13,759,967	436,238,565	3.15	25,348,599	871,673,569	2.91
2013	16,653,341	435,931,050	3.82	23,919,421	856,047,605	2.79
2014	16,903,668	441,473,888	3.83	19,990,417	773,163,926	2.59
2015	18,045,970	506,153,646	3.56	19,517,103	758,378,043	2.57
2016	21,494,635	534,616,088	4.02	18,651,227	766,490,641	2.43
2017	25,072,916	593,694,860	4.22	20,593,459	814,808,732	2.53
2018	28,524,374	644,036,276	4.43	29,780,083	907,013,141	3.28
Total	**221,398,063**	**6,421,719,134**	**3.45**	**300,990,006**	**11,198,151,120**	**2.69**

Source: [7-19], [31-43].

Table 9: Comparative overview of the number of paid claims for subsidies for agricultural insurance premiums and the amount of paid funds for these subsidies in Serbia and Croatia, 2016-2018

Year	SERBIA		CROATIA	
	Number of paid claims	Total disbursed funds in euros at the official middle exchange rate at the end of the year	Number of paid claims	Total disbursed funds in euros at the official middle exchange rate at the end of the year
2016	20,112	4,699,193	2,056	3,698,712
2017	22,171	5,092,730	2,956	5,704,074
2018	22,475	5,778,946	6,917	11,943,675

Source: [27], [28].

for family agricultural farms in Serbia and Croatia. To that end, a comparative analysis of the characteristics of agricultural insurance, and the level of its development for family agricultural farms, was conducted for these two countries, which were taken as comparative examples due to significant similarities important for the subject of research. According to the categorization of the Organization for Economic Cooperation and Development (OECD), the territories of both countries are dominated by rural areas which are, according to the structure of the agricultural entities, dominated by family agricultural farms, while agriculture has approximately the same share in gross domestic product (GDP) of both countries. The subject of research is not the state of the development of agricultural insurance in agricultural companies, i.e., legal entities, considering that these entities are, almost entirely, the beneficiaries of agricultural insurance in both countries, in accordance with the inherited tradition from the former common state.

Based on the conducted research, it can be concluded that both countries have approximately the same potentials of primary importance for the development of agricultural insurance in accordance with the defined goal of research: (a) family agricultural farms in the structure of agricultural holdings in Serbia make up 99.7%, and in Croatia 96.8%; (b) the share of agricultural surface used by family agricultural farms in the total area of utilized agricultural land is dominant in both countries, 76.1% in Croatia and 83.9% in Serbia; (c) the average size of family agricultural farms in Croatia is 5.3 ha, and in Serbia 5.18 ha, i.e., in both countries family agricultural farms have approximately the same economic strength from the aspect of the average size of agricultural holdings; (d) both countries have significant potential for the development of crop and livestock insurance; (e) in both countries, the structure of farmers is dominated by people over 65, as well as farmers with a secondary education, which is not favorable given that education is crucial for the development of agricultural insurance, and it is natural that younger people are more willing to learn in relation to older people.

Regarding insurance terms, from the aspect of the offer on the agricultural insurance market and subsidies for agricultural insurance premiums, it can be concluded that they are favorable in both analyzed countries. Considering that the paper observes the development of agricultural insurance as at 2018, it is necessary to say that during this period, agricultural insurance subsidies were higher for family agricultural farms in Croatia than in Serbia. Specifically, in Croatia they amounted to up to 70% of agricultural insurance premiums, and in Serbia up to 40%, with individual examples of, most often, an additional 10% of subsidies coming from the budgets of individual local governments.

The development of agricultural insurance in Serbia and Croatia was analyzed for the period from 2006 to 2018, on the basis of the number of agricultural insurance policies, the total amount of agricultural insurance premiums and its share in total non-life insurance premiums, as well as the number of family agricultural farms which had the right to subsidies for agricultural insurance premiums. Based on this research, it can be concluded that during the analyzed period: (a) the average share of the number of crop insurance policies in the total number of agricultural insurance policies was 84% in Serbia and 86% in Croatia; (b) the average share of the number of livestock insurance policies in the total number of agricultural insurance policies was 16% in Serbia and 14% in Croatia; (c) the total number of agricultural insurance policies in Serbia was 43,718 and in Croatia 41,112; (d) the average share of total crop insurance premiums in the total agricultural insurance premium in Serbia was 71% and in Croatia 54%; (e) the average share of total livestock insurance premiums in the total agricultural insurance premium was 29% in Serbia and 46% in Croatia; (f) the average share of total agricultural insurance premiums in total non-life insurance premiums in Serbia was 3.45% and in Croatia it was 2.69%; (g) in 2018, only 3.99% of the total number of family agricultural farms in Serbia were entitled to agricultural insurance premium subsidies, and in Croatia this was 4.26%. This last data can be considered relevant for the percentage of insured family agricultural farms in both countries, which testifies to the underdevelopment of agricultural insurance despite significant subsidies for agricultural insurance premiums. The underdevelopment of agricultural insurance in both countries is confirmed by the low average share of total agricultural insurance premiums in total non-life insurance premiums during the analyzed period.

Based on the conducted research, it can be concluded that in both Serbia and Croatia there are significant opportunities for the growth of the insurance industry in the market segment related to the insurance of family agricultural farms. Bearing in mind that supply is satisfactory, that solvency should not be viewed as a problem, as is often done, given there is significant subsidization of agricultural insurance premiums, it will be necessary, before all, to develop demand. To that end, it will be necessary to educate farmers about the importance and possibilities of insurance, which should be jointly organized by state institutions and insurers. It is also necessary to "restore" farmers' trust in the insurance system, which has been eroded due to incorrect damage assessments by some insurers.

The results of the conducted research indicate the importance of the policy of subsidy payments for agricultural insurance premiums on the growth of demand. Specifically, in Croatia, in 2018, the obligation of farmers to pay the entire premium before submitting the claim for the payment of the subsidy was abolished. Farmers were allowed to submit a claim for subsidies with the payment of only 30% of the agricultural insurance premium, with the Paying Agency for Agriculture, Fisheries and Rural Development paying the remaining amount of the premium directly to the insurers. We believe that this was the key to the growth of the total number of agricultural insurance policies, which increased in 2018 compared to the previous year by as much as 73%. This was not the case even when, with the entry of this country into the European Union, subsidies for agricultural insurance premiums were increased from 25% to 65%.

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Gordana Radović

is Director of the joint stock company "Dnevnik-Poljoprivrednik" AD Novi Sad. She has a Ph.D. in economics and agroeconomics. In 2016, Ms. Radović acquired the scientific title - research associate in the field of social sciences and economics. In her scientific research work, she predominantly deals with problems in the financing of agriculture and rural development, as well as in the development of agricultural insurance in Serbia. Her scientific research work thus far resulted in about 70 scientific and review papers, and a book entitled *Finansiranje poljoprivrede u Republici Srbiji* (Financing of Agriculture in the Republic of Serbia) published in 2014. Ms. Radović is the first elected associate member of the Serbian Scientific Society of Economists, since this title was established. She is a member of the Balkan Scientific Association of Agricultural Economists, the Association of Economists of Vojvodina, the Novi Sad Society of Economists and the Belgrade Society of Economists.

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Jelena Lukić
Modern Business School
Department for Management and Marketing
Belgrade

Jamila Jaganjac
Vitez University
Faculty of Business Economics
Department for Entrepreneurship and Management
Travnik

Snežana Lazarević
College of Sports and Health
Department for Sports Management
Belgrade

THE SUCCESSFULNESS OF CRISIS MANAGEMENT TEAMS' RESPONSE TO THE CRISIS CAUSED BY THE COVID-19 PANDEMIC

Uspešnost kriznih timova u odgovoru na krizu izazvanu pandemijom COVID-19

Abstract

Crises are an inevitable part of the life cycle of any organisation, regardless of its location, size, market, and sector. At the beginning of 2020, all organisations faced a new crisis caused by a COVID-19 pandemic. The rapid spread of the disease and its consequences to human health required a quick reaction of organisations to protect the health and safety of employees through physical distancing. Organisations had to reorganise their way of doing business and adapt to new circumstances. The first response to the crisis is to activate or form a crisis management team. The main goal of the crisis management team is to prepare the organisation for a new way of functioning by using all its opportunities and strengths to minimise the negative effects of the crisis. The success of crisis management and the recovery of an organisation depend on the quality of functioning of the crisis management team. The results of a survey conducted during April and May 2020 which included 108 members of crisis management teams showed that the respective teams responded adequately to the crisis caused by the COVID-19 pandemic. Research results showed that team members reacted quickly to the first signs of the crisis. They made real-time decisions by using a holistic approach due to their different knowledge, skills and experience, clear team roles, commitment to a common goal, open, honest and effective communication, and mutual trust.

Keywords: *organisational behaviour, teamwork, crisis management, leadership, communication, decision-making, engagement, COVID-19.*

Sažetak

Krize su neizbežan deo životnog ciklusa svake organizacije, bez obzira na njenu lokaciju, veličinu, tržište i delatnost. Sve organizacije su se početkom 2020. godine suočile sa novom krizom koju je izazvala pandemija COVID-19. Naglo širenje i posledice koje ova bolest ostavlja po zdravlje ljudi zahtevale su brzu reakciju organizacija i zaštitu zdravlja i bezbednosti zaposlenih kroz fizičko distanciranje. Organizacije su morale da reorganizuju svoj način funkcionisanja i pronađu načine da nastave svoje poslovanje u novim okolnostima. Prvi odgovor organizacija na kriznu situaciju bio je aktiviranje ili formiranje timova za upravljanje krizom. Ključni cilj tima za upravljanje krizom jeste da organizaciju pripremi i osposobi za nov način poslovanja, odnosno da pronađe način da iskoristi sve prednosti i snage kako bi minimizirao negativne efekte krize. Kvalitet i način funkcionisanja tima za upravljanje krizom u velikoj meri determinišu uspešnost kriznog menadžmenta i oporavak organizacije nakon krize. Rezultati istraživanja sprovedenog u aprilu i maju 2020. godine u kojem je učestvovalo 108 članova kriznih timova pokazali su da su ovi timovi adekvatno odgovorili na krizu izazvanu pandemijom COVID-19. Članovi kriznih timova su brzo odreagovali na prve signale krize i donosili odluke u realnom vremenu primenjujući holistički pristup zbog različitih znanja, veština i iskustava, jasnih uloga, posvećenosti zajedničkom cilju, otvorene, iskrene, efektivne komunikacije i međusobnog poverenja.

Ključne reči: *organizaciono ponašanje, timski rad, krizni menadžment, liderstvo, komunikacija, odlučivanje, angažovanost, COVID-19.*

Introduction

Organisations operate in a very complex environment characterised by a high degree of uncertainty, risk, and turbulence caused by various natural disasters, terrorist attacks, health and environmental disasters, economic and technological crises, political instability, corporate scandals, etc. [28], [69]. The unforeseen high or low-intensity crisis events, caused by natural or human activity [39], have profound and far-reaching consequences on the organisation and employees and require their rapid response [50].

The crisis often reveals the true face of an organisation, because it exposes the organisation to new circumstances and provides a completely new insight into how the organisation operates, which is difficult to notice in normal circumstances [61]. Each crisis moves the organisations from their usual way of doing business to a whole new context in which their vulnerabilities, but also the abilities not noticed before, come to the fore [9], [37]. The ability to adapt the entire organisation and its business in times of crisis determines the organisation's business outcomes and performance in the coming period [20].

This paper aims to highlight the role and importance of crisis management teams in organisations, with reference to the global crisis caused by the COVID-19 pandemic. On 31st December 2019, the World Health Organization received information about the outbreak of an epidemic of pneumonia of unknown origin in the city of Wuhan in China. On 7th January 2020, the Chinese authorities identified a new SARS-CoV-2 virus, known as coronavirus or COVID-19. As the virus began to spread with significant consequences, the Director-General of the World Health Organization declared an epidemic on 30th January 2020, and a global pandemic was declared on 11th March 2020 [20]. Global risks that COVID-19 poses to human health are specific because it spreads rapidly and easily [75], with a far-reaching social, psychological, and economic impact [76]. Consequently, COVID-19 has caused crises in organisations, industry, the market and society [67], challenging them to find new ways of functioning while adhering to the physical distancing measures as a means of prevention of further transmission and spread of the virus [64]. Networked business and the dynamism of the environment caused a faster and more intense transmission of the crisis effects. Flattening the infection curve inevitably unbalanced all the supply chains and increased business uncertainty [33]. All of the abovementioned facts and circumstances called for a systematic and planned crisis management.

Key characteristics of a crisis situation

Theorists and practitioners agree that any crisis is an uncertain, unknown, and undesirable event that imposes the need for a quick response and that has significant consequences for the organisation and all the stakeholders [62], [69], [52]. Each crisis tests an organisation's ability to adapt to new circumstances and to direct its future [30]. Regardless of its intensity and origin, a crisis poses a great danger to organisations because it can jeopardise their reputation, financial stability, and human lives [12], [50], [51]. Likewise, a crisis leads to possibilities for organisations to open up for new business opportunities, as well as to strengthen their capabilities and capacities [4], [5], [62]. Organisations do not just face more crises today than they did a decade ago, but the rate of the crisis occurrence is also increasing [14]. Dealing with a crisis involves changes in the way an organisation functions, leading to uncertainty and the need for rapid response and organisational adjustment and change [21]. For all those directly or indirectly exposed to the crisis, it is a complex, stressful, and an energetically and mentally exhausting event [63]. In times of crisis, it is very important for organisations to be resilient and to rely on their business continuity plans [6], [56]. The International Organization for Standardization defines business continuity as the ability of an organisation to continue delivering products or services at an acceptable level in conditions of disruption, while business continuity management aims to provide an effective response to a crisis and protect the interests of all stakeholders, reputation and brand [31].

Since its appearance, COVID-19 has started to spread very quickly and massively, with grave consequences for the health of people, the health systems of countries, and the entire economy and society. There is a high degree of

unpredictability during a pandemic [59], and epidemiologists, health systems, politicians, community, and leaders of organisations need to direct and coordinate all their efforts and activities to prevent the spread of COVID-19 by physical distancing and hygiene measures [16]. COVID-19 led to the emergence of a new, so-called socially distant world [15]. In organisations, it has launched and stimulated the process of reducing the bureaucratic mechanism in order to foster faster responses and flexibility [55]. Therefore, the crisis is an invitation to organisations to acquire new knowledge and skills [4]. In addition to learning from their own experiences and mistakes, organisations can also learn from other organisations that had previous experience in the same or similar crisis [58]. There are various directions in preparation for post-pandemic business, such as openness to innovation [7], focus on consumers, and demonstration of value [61]. A large number of organisations have realised that they must find new ways of doing business by relying on digital technologies [59]. The crisis requires changes in the way employees work, thus finding motivational drivers for greater employee engagement during and after the pandemic [48].

Any crisis may have negative consequences regarding the profit and overall business of the organisation, its reputation, and internal and external stakeholders. That is why every crisis is unique and requires a different approach. There is no universal crisis management solution that can be applied in all situations [4], [21], [41], [62]. The main goal of crisis management is to systematically prepare the organisation and all its stakeholders to avoid a crisis and to adapt to the new working conditions with as few negative consequences as possible [54]. The first step in strategic crisis management is to form a crisis management team [8], [45].

The role and importance of the crisis management team

Regardless of the type of team, teamwork has numerous advantages: higher employee productivity, better decisions, higher degree of innovation, better quality of products and services, greater flexibility, and agility of the organisation [43]. Due to that, many organisations upgraded their organisational structures with appropriate teams [42], [46]. People behave differently when they work in teams, hence to have effective teamwork, it is necessary to make an effort during the process of forming a team and to monitor the way it works [25]. Effective teams are those that successfully perform their tasks and achieve goals [72]. Clear roles of team members, commitment to a common goal, heterogeneity of knowledge, skills, competencies, and experiences of members, mutual trust, and good leadership are the key characteristics of successful teams [44].

A specific type of team in organisations that is a very important factor during crisis management is the crisis management team [26], [65]. Each crisis needs a crisis management team, because an individual (leader/manager) cannot respond to all of the challenges, especially if such individual has never left their comfort zone and has no previous experience in dealing with crises [54]. In general, teams are nowadays different from the teams in the past – they are more diverse, digital, dynamic, and remote [27]. Those differences and characteristics are even more expressed in crisis management teams, as they are responsible for conceiving strategies, policies, and plans in order to respond quickly and adjust the way the organisation operates so that the negative consequences of a crisis are minimised or completely avoided [59], [66]. The key role of crisis management teams is to anticipate the sources of risk, provide adequate support to other employees, and position the organisation to the new normal course of operation [74]. Members of a crisis management team should review, consider, analyse, plan and evaluate all the effects of the crisis on the organisation's operations and prepare the organisation for new ways and methods of work. The activities of the crisis management team continue when the crisis ends with the aim to evaluate the entire crisis event, minimise the post-traumatic effects on employees, and mitigate the negative effects on the business [1].

Many organisations have established permanent crisis management teams that are activated once a crisis event is detected [68]. However, in cases when organisations do not have a permanent crisis management team, one should be formed at the first sign of crisis so that team members may understand their roles and establish the

way of functioning before the crisis hits. Management should always have a list of employees that would be suitable members of the crisis management team so that it can quickly form this team [24]. In practice, there are organisations that select team members and form crisis management teams when the crisis has already started to take its toll.

The spread of COVID-19 has intensified the role and importance of crisis management teams. A crisis management team for dealing with COVID-19 is primarily focused on physical distancing, which means a different organisation of work processes and organisation of business as much as possible in the remote mode, by using modern technologies [18]. The crisis management team should consider all the effects of the crisis on employees, customers, and business as a whole [15], [71]. For effective functioning of a crisis management team, it is important to have engaged team members. Employee engagement is interpreted as the extent to which employees feel committed to their jobs and to investing maximum knowledge in their work with the aim to produce added value [36]. In a crisis situation, it is more than ever necessary to have employees that will invest their energy, hearts and minds in order to help the organisation to overcome all the negative effects of a crisis.

Composition of the crisis management team

Crisis management teams are generally cross-functional [35], composed of representatives and managers connected to the key organisational processes that have specific knowledge, skills, and experience. A combination of talents and competencies ensures successful crisis management and certainty of achieving the planned results. Team members provide effective and supportive leadership during stressful times. The members of the crisis management team that are considered mandatory are the owner or director, top management, employees from the communications department, employees from the human resources department, and a project manager [41]. The crisis management team should include employees working at the front office (sales, customer relations, marketing) and employees from the back office (finance, procurement, quality, legal department, risk management, security, safety and health at work) in order to ensure a variety of knowledge, skills and experiences [34]. The key goal of forming a cross-functional crisis management team is to provide a holistic view of the organisation and to quickly communicate all relevant circumstances within the entire organisation [2]. The practice has shown that the formation of a cross-functional crisis management team creates a sense of security that the response to a crisis will be adequate [22], [53]. However, the effectiveness of a crisis management team depends not only on the composition of the team (selection of team members and their roles), but also on the team's size, knowledge of the team members, leadership and defined norms and rules of team behaviour [40].

The leader of the crisis management team should encourage team members to actively engage in knowledge sharing and in the process of formulating crisis recovery strategies [73]. In addition to this, each member of the crisis management team should have a clearly defined description of duties and responsibilities regarding their assigned team role. A team role is a set of expected behaviours that suits each member of the team. It is a tendency for each team member to behave in a precisely defined way following the role assigned to them [3]. Forming a team involves engaging members who will be assigned the roles of a lead coordinator who stimulates new ideas, an evaluator who considers and evaluates the alternatives, implementers, researchers, and finishers. One of the potential obstacles in the functioning of a crisis management team is the overlapping of roles in a situation when team members do not have clearly defined duties and responsibilities, but rather perform all activities ad hoc [19]. In crises, where circumstances are changing rapidly, it is especially important to ensure that every employee has a clear role that corresponds to the knowledge and competencies of that employee.

The pressure to quickly form a crisis management team sometimes leads to the wrong choices of team members by not taking into account their personality characteristics, capabilities, and inclinations towards teamwork [11], [63]. Since the key challenges of the crisis management teams are high risk, time pressures, and uncertainty [37], all team members need to actively listen, understand all relevant information, analyse problems, evaluate, and consider all

the positive and negative effects of the alternatives [26]. In organisations that have permanent crisis management teams, team members go through various trainings and acquire adequate knowledge and skills needed in crises: group decision-making, active listening skills, conflict resolution, stress management [13] and so forth. Training the team members during crisis is essential and it is supposed to prepare them to assume the key business processes and activities in the event of absence or sick leave of another team member [18].

The ability of team members to perceive all the circumstances that seem unrelated at first glance, to understand them and translate them into a simple form is of key importance for the effective functioning of the team [70]. In times of crisis, team members need to think creatively about how to minimise the negative effects of the crisis or how to turn them into advantages [73]. A crisis is sometimes a catalyst for a different way of thinking and functioning of organisations.

Research methodology

The research was conducted by using a specially designed online questionnaire consisting of several groups of questions: (1) questions related to the members of the crisis management team (gender, length of service in the organisation, work position); (2) questions related to the organisation (place, industry, number of employees); (3) statements relating to the functioning and operation of the crisis management team, by using the five-point Likert scale; (4) open-ended questions to which the respondents submitted their views related to the key problems, difficulties, and challenges they faced during the crisis. In the period from April to May 2020, a total of 108 members of crisis management teams filled the questionnaire. The collected answers were processed and analysed by using the Statistical Package for Social Sciences – SPSS, version 21.0. (Armonk, NY: IBM Corporation).

The normality of data distribution was tested by using the Kolmogorov-Smirnov test, as well as by reviewing histograms, skewness, kurtosis, normal probability curve (Normal Q-Q plot) and boxplot. As the tests performed confirmed the normality of data, parametric statistical techniques were applied. A t-test was used to examine the differences in two groups within the measurement scale, while the One-Way ANOVA was used to examine the differences in three or more groups. The confidence interval was 95%.

In all of the tests comparing differences between groups, the Levene's test for equality of variances was applied. In all cases, the homogeneity of variance assumption was met ($p > 0.05$). For all parametric tests of the difference between the groups, the effect size was calculated by eta square (η^2), where the values of the effect size of 0.01; 0.06 and over 0.14 were considered small, medium, and large, respectively [10].

Basic information regarding organisations in which crisis management teams operate

Crisis management team members that participated in this research came from three different countries: Serbia (56.5%), Bosnia and Herzegovina (30.5%), and Croatia (13%).

In terms of the size of the organisations measured by the number of employees, the highest number (44%) are medium-sized organisations that have between 50 and 249 employees. 22% of the sample was made up of small-sized organisations, 27% of large organisations, and only 7% were micro organisations. The highest number of team members that participated in this research works in organisations from the private sector (63%), while 37% works in organisations from the public sector.

When it comes to the core business of the organisations, the majority of crisis management team members work in education (37%), manufacturing (15%), and health care (14%). Approximately one-third of crisis management team members are from banking and finance (8.3%), trade (7.4%), consulting (7.4%), state authorities (6.5%) and transport and logistics (4.6%).

Basic information regarding the members of crisis management teams

When observing gender structure, there is almost an equal number of male and female members of crisis management teams (51% male and 49% female).

More than half of the respondents have more than 10 years of work experience in the organisation (54%), while 22% have from 6 to 10 years, and 21% have from 1 to 5 years of work experience. Only a small number of team members have less than 1 year of working experience in the respective organisation. Experience and tacit knowledge about the organisation and its processes are very important factors in dealing with crises. This result is positive because a crisis management team should have appropriate work experience and knowledge about the organisation.

Crisis management teams consist mostly of top and middle managers. About one-third of the members of the crisis management teams are in top management (34%) and middle management positions (33%). About 16% of team members are first-line managers, while 17% are employees with no managerial position.

Out of the total number of respondents, 101 answered the question regarding the size (number of members) of the crisis management team. The smallest crisis management team consists of 2 members, while the largest counts 39 team members (the respective organisation is large in terms of the number of employees). An aggravating circumstance in the process of forming a team in large organisations is the fact that a maximum of ten team members is considered optimal for effective team functioning [40]. Research results showed that the average number of team members in the crisis management team was 7.64.

More than half of the organisations (56.5%) did not establish a crisis management team before the emergence of COVID-19, while 50% of organisations did not have a crisis management plan. Those results showed that more than half of the organisations were not prepared for the crisis that occurred. This situation is not so rare in practice – according to EY Global Risk Survey, 79% of companies responded that they were not sufficiently prepared to deal with the current crisis [71].

Results regarding the functioning of crisis management teams

A Likert scale called "Crisis Management Team Composition and Functioning" which consists of 15 statements was created with the aim to examine the functioning of the crisis management teams. Respondents were asked to select a number from 1 to 5 for each of the statements in accordance with the level of their agreement or disagreement (1 – strongly disagree, 5 – strongly agree). The Cronbach's alpha coefficient for all the statements in the scale was 0.954, which demonstrated a high degree of reliability of the scale [23], while the Kolmogorov-Smirnov test showed a normal distribution of data.

All statements have a mean value higher than 4, which is a very satisfying and positive result. The highest mean value is awarded to the statement that all members of the crisis management team are committed to a common goal (4.50), which reflects a great unity of team members

Table 1: Mean values for statements in the Likert scale Crisis Management Team Composition and Functioning

Statements	Mean
Team members come from different parts of the organisation (different organisational units).	4.20
The team responded quickly to the first signs of crisis to prevent possible business losses.	4.31
Team members completely understand their role in the team.	4.16
The new roles of team members largely match their roles prior to the crisis.	4.09
All members of the crisis management team are committed to a common goal.	4.50
The team has all the resources necessary to function normally.	4.15
The team is constantly taking action to mitigate any losses and prevent problems from escalating.	4.40
The team responds immediately (in real time) to new circumstances.	4.39
The team makes important decisions quickly (in real time).	4.38
Team members consider how their decisions will affect the business of the entire organisation.	4.26
There is trust between team members.	4.27
Communication channels were quickly established within the team.	4.45
Communication between team members is effective.	4.40
Communication between team members is open and honest.	4.21
The team quickly shares all relevant information with other teams and employees.	4.29

Source: Authors' calculations based on SPSS.

and their shared vision. The second highest mean value is awarded to the statement that communication channels were quickly established within the team (4.45), which means that there is an undisturbed and formalised flow of information between team members.

Results showed that:

- 79.6% of the respondents agree that team members come from different parts of the organisation (different organisational units).
- 82.4% of the respondents agree that team members consider how their decisions will affect the business of the entire organisation.
- 80.6% of the respondents agree that team members completely understand their role in the team.
- 77.8% of the respondents agree that the new roles of team members largely match their roles prior to the crisis. Almost 14% of the respondents take the neutral stand regarding this statement.
- 81.5% of the respondents agree that team quickly responded to the first signs of crisis to prevent possible business losses.
- 89.9% of the respondents agree that all members of the crisis management team are committed to a common goal.
- 87% of the respondents agree that the team is constantly taking action to mitigate any losses and prevent problems from escalating.
- 86.1% of the respondents agree that the team responds immediately (in real time) to new circumstances.
- 86.1% of the respondents agree that the team makes important decisions quickly (in real time).
- 82.5% of the respondents agree that there is trust between team members.
- 75.9% of the respondents agree that the team has all the resources necessary to function normally. About 18% of the respondents take the neutral stand regarding this statement.
- 88.9% of the respondents agree that communication channels were quickly established within the team.
- 87.1% of the respondents agree that communication between team members is effective.
- 81.4% of the respondents agree that communication between team members is open and honest.
- 82.4 of the respondents agree that the team quickly shares all relevant information with other teams and employees.

Research results showed that crisis management teams responded quickly to the first signs of crisis. Members of those teams reacted in real or near real time to the crisis, which allowed the organisation to conduct its regular processes and activities with minimal waste and bottlenecks. Furthermore, research results showed that the team context was stimulative for the effective functioning of the team: members were empowered to contribute to the shared vision with their knowledge, expertise, skills and experience. As an ideal crisis management team is cross-functional and consists of employees from different hierarchical levels and organisational units [29], research results regarding this aspect are also positive.

Results regarding communication in crisis management teams are also encouraging, because one of the key challenges for organisations during the COVID-19 pandemic was how to stay connected during physical distancing. Rapidly established communication channels with clear, open, honest, and real-time communication are of great importance in a crisis situation. This kind of communication consequently leads to mutual trust between team members, their greater unity, commitment, and better results [46].

Crisis management teams had to deal with some challenges in their functioning at the onset of the crisis caused by the COVID-19 pandemic. In order to identify them, the last question in the questionnaire was open-ended, allowing the respondents to point out to the key problems, obstacles, and challenges they faced during crisis management team functioning. Out of the total number, only ten members of crisis management teams answered this question, stating that the key problems, obstacles, and challenges were:

- Establishment of a new model of functioning and communication;
- Initial misunderstandings and confusion between team members;
- Lack of equipment needed for effective team functioning;
- Communication problems – information overload, ambiguities, late feedback;

- Uncertainty, concern, fear, nervousness, panic reactions of some employees;
- Consolidation of the team during the first week;
- Lack of consensus between all team members in the decision-making process;
- The need to make decisions in real time;
- Making priorities when there is a large number of activities;
- The speed of adaptation to new information, rules and change.

The occurrence of those problems is not surprising, because they are commonly present during the first two stages of team development – the forming stage, when there is confusion, tension, conflicts, and nervousness of team members, and the storming stage, when team members slowly begin to understand their duties and responsibilities, but when there are still frequent disagreements, conflicts, low level of trust and cohesion. Forming effective and high performing teams requires a planned approach, a lot of effort, hard work, time, and energy [47].

Key differences between organisations regarding crisis management teams

Further statistical analysis with t-test and ANOVA revealed the following results.

Members from different parts of the organisation are more frequently observed in crisis management teams of public organisations than in those of the private ones.

There is a statistically significant difference in the statement *Team members come from different parts of the organisation* (*different organisational units*) between members of crisis teams who come from public (M=4.50; SD=0.906) and private organisations (M=4.03; SD=1.315), $t_{(108)}$=-2.195, Sig.(2-tailed)=0.030. Out of the total variance, 4.35% can be accounted for by the sector of the organisation (η^2 is medium 0.0435).

Public organisations quickly established channels of communication in crisis management teams more frequently than the private ones.

There is a statistically significant difference in the statement *Communication channels were quickly established within the team* between members of crisis teams who come from public (M=4.68; SD=0.526) and private organisations (M=4.32; SD=0.871), $t_{(108)}$=-2.756, Sig.(2-tailed)=0.010. Out of the total variance, 6.01% can be accounted for by the sector of the organisation (η^2 is medium 0.0606).

Public organisations responded quickly to the first signs of the crisis in order to avoid possible business losses more frequently than the private ones.

There is a statistically significant difference in the statement *The team responded quickly to the first signs of crisis to prevent possible business losses* between members of crisis teams who come from public (M=4.60; SD=0.672) and private organisations (M=4.13; SD=1.091), $t_{(108)}$=-2.756, Sig.(2-tailed)=0.007. Out of the total variance, 6.69% can be accounted for by the sector of the organisation (η^2 is medium 0.0686).

Organisations that had adopted a crisis plan before the COVID-19 crisis formed teams made of employees that are members of different parts of the organisation more frequently than the organisations that did not have a crisis plan.

In the statement *Team members come from different parts of the organisation* (*different organisational units*), a statistically significant difference was identified between the organisations that had adopted a crisis plan before the crisis (M=4.53; SD=0.902) and the organisations that did not have such a crisis plan (M=3.89; SD=1.369) Sig. (2-tailed)= 0.006, $t_{(105)}$ = 2.813. The difference between the mean values of the features by the groups is medium, η^2 = 0.07.

Organisations that established a crisis team before the COVID-19 crisis had in their crisis management teams employees from different organisational units more frequently than the organisations that did not have a crisis team.

There is a statistically significant difference in the statement *Team members come from different parts of the organisation* (*different organisational units*) between the organisations that had a crisis team before the crisis (M=4.53; SD=0.935) and the organisations that did not have such a crisis team (M=4.02; SD=1.271) Sig.(2-tailed)= 0.006, $t_{(104)}$=2.396. The difference between the mean values of the features by the groups is medium, η^2 = 0.053.

There is a statistically significant difference in the statement *Team members come from different parts of the*

organisation (*different organisational units*) $F(_{107})=4.434$; Sig.=0.002. Additional comparisons with Tukey HSD test showed that the mean value of micro organisations (M=3.14; SD=1.345) is significantly different from the mean value of small (M=3.63; SD=1.555) and medium-sized organisations (M=4.52; SD=0.799). The difference between the mean values is large, $\eta^2=0.1469$. This result is not surprising, because micro and small organisations are not as complex in terms of the number of organisational units and hierarchical levels.

Results from the conducted statistical tests showed that, compared to private organisations, crisis management teams from public organisations were better prepared for the crisis in terms of the team composition (team members came from different organisational units), establishment of communication channels and the speed of reaction. Public organisations expected guidance and recommendations from the Government on how to act and perform during the COVID-19 pandemic. A group of authors stated that governments reacted quickly in order to respond to the crisis, recover from its impact, and move on after the crisis ends [17]. Governments' role is to provide information about the crisis, maintain order, provide support and coordinate the recovery from the crisis [32]. Furthermore, statistical tests showed that organisations that had permanent crisis management teams had a better composition of team members in terms of different knowledge, skills, and experience.

Discussion, implications and limitations of the research

Results from the conducted research showed that crisis management teams in organisations responded adequately to the crisis caused by the COVID-19 pandemic.

Crisis management team members came from different parts of the organisation, unified under a common goal, and shared a vision to quickly respond to the crisis in order to prevent business losses and protect the health of employees. Each member of the crisis management team used their expertise to solve problems and propose solutions, having in mind the overall functioning and results of the organisation. In addition to that, team members possessed diverse knowledge, skills, different perspectives regarding the crisis, methods of thinking and examining the situation, and took a holistic approach in the decision-making process. Such composition of team members enables the organisation to cover all key areas of management during the crisis. The majority of team members understood their new roles in the crisis management team, which largely matched the roles they had before the crisis. In general, the most important factor for effective teamwork is that team members understand their roles, responsibilities, and have an awareness of the overall situation [49].

According to the results, the majority of team members disposed of all the necessary resources and tools to act. Communication channels were established quickly – communication was effective, open, and honest, with real-time information flow and decision-making. Consequently, members of the crisis management teams built and nurtured mutual trust and responded immediately to the new circumstances. The inability to respond to new information during a crisis may be very dangerous for organisations [60], but the development and massive usage of modern digital technologies as one of the key features of the 21st century [57] has made it possible for organisations to quickly establish new ways of functioning.

Most of the existing literature regarding teams and teamwork assumes a stable environment and does not cover the key characteristics of a crisis situation (uncertainty, dynamics, time pressure, changed business environment). In this paper, these topics were explored by examining the way in which teams functioned in the crisis situation caused by the COVID-19 pandemic. It is obvious that this kind of crisis will also be present in the future, therefore an increasing amount of attention is being and will be paid to the effective and efficient functioning of crisis management teams. For that reason, this paper may be useful to leaders and managers, but also to all members of crisis management teams.

The conducted research has certain limitations. The first limitation is the sample size. The reasons for the low response rate may be the engagement of members of the crisis management teams in consolidating the business, as well as a large number of various surveys conducted

during the respective period (April and May 2020) with the aim to investigate the work of companies during the COVID-19 pandemic. Therefore, the results obtained cannot be generalised. Another limitation is the number of countries covered by the survey. Future research on this topic should include a larger number of countries, taking into account other variables, such as cultural differences.

Conclusion

When a crisis occurs, a single individual cannot deal with it adequately. Proper response to the crisis in an organisation requires coordinated effort of different actors, i.e., employees. One of the key activities in organisations when dealing with a crisis is to activate or form a crisis management team with the aim to deal with the crisis as best as possible for organisations and all the stakeholders.

This paper indicates that even those organisations that do not have permanent crisis management teams can adequately respond to a crisis if they timely decide to form a crisis management team and respond to the imposed challenges. Results of the research conducted during April and May 2020 which included 108 members of crisis management teams showed that those teams managed to respond adequately to the COVID-19 pandemic.

Crisis management team members quickly responded to the first signs of the crisis. They made real-time decisions by using a holistic approach due to their different knowledge, skills, and experience, clear team roles, commitment to a common goal, open, honest, effective communication, and mutual trust.

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Jelena Lukić

is Assistant Professor and Assistant Director for International Cooperation at the Modern Business School in Belgrade. She received her bachelor's (2011), master's (2012) and doctoral degree (2017) from the Faculty of Economics, University of Belgrade. From 2011 to 2017 she worked in private ICT companies in Serbia where she obtained valuable practical experience. Her current areas of interests are human resource management and organisational behaviour. She authored and co-authored a number of scientific papers and participated in numerous conferences.

Jamila Jaganjac

is Associate Professor at the Faculty of Business Economics, Vitez University in Travnik. Ms Jaganjac holds a bachelor's degree from the Faculty of Tourism and Foreign Trade in Dubrovnik and a Master's Degree and PhD in Economics from the Faculty of Business Economics, Pan-European University Apeiron in Banja Luka. Her main interests and areas of expertise are entrepreneurship and intellectual capital. She has been engaged in the work of several international organisations and also worked in the financial sector.

Snežana Lazarević

is Assistant Professor at the College of Sports and Health in Belgrade. Ms Lazarević holds a bachelor's and master's degree from the Faculty of Economics, University of Belgrade, and a PhD from the Faculty of Organisational Sciences, University of Belgrade. She is author or co-author of a number of scientific research papers published in relevant national scientific journals of international importance. She has many years of leadership and management experience in higher education institutions.

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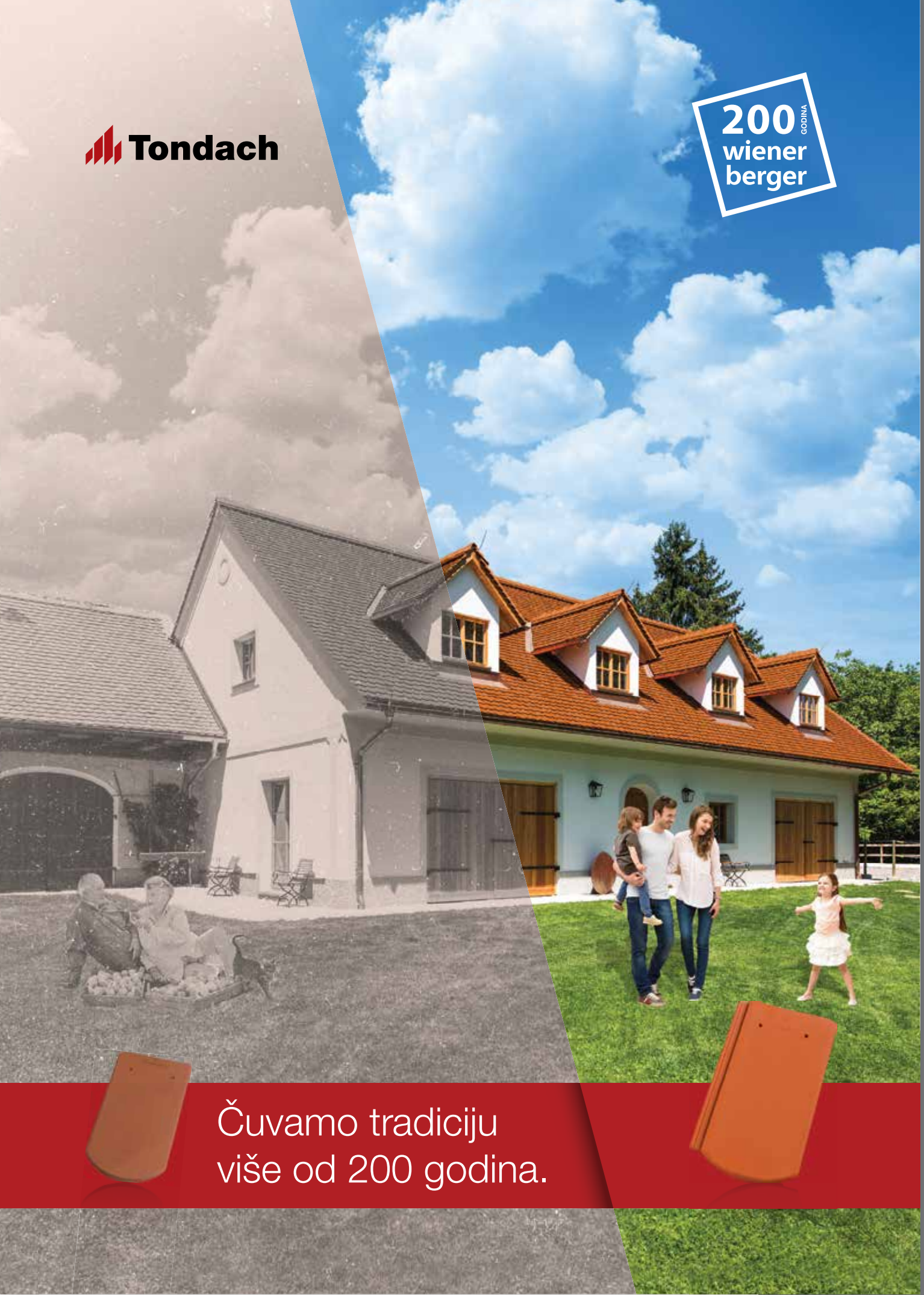

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