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## BUSINESS AND INSTITUTIONAL DETERMINANTS OF EFFECTIVE TAX RATES IN SERBIAN BANKS

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The objective of the current paper is to study the influence of the selected business and institutional determinants on the annual effective tax rates in banks in Serbia. Panel data regression models are applied on 113 observations, covering the period from 2017 to 2021, where the accounting and current effective tax rates are used as a measure of the actual tax burden. The results show that the effective tax rate in banks in Serbia is significantly below the statutory level. Furthermore, for each data set, the coefficients of changes in the effective tax rate are calculated, and the most adequate model is selected using the Hausman and Breusch-Pagan tests. In the first model, the biggest change in the effective tax rates is caused by change in leverage, merger and acquisition processes and the bank size. The presence of loan loss provisions in the model completely highlights the impact of profitability and leverage. Finally, in the last model, banks with a profit before tax can manage effective tax rates and tax burdens by regulating capitalization levels. The results of this study are of interest for economy creators and for business managers in banks, helping them in effective tax planning and managing the results.

**Keywords:** tax burden, effective tax rate, leverage, loan loss provisions, capitalization, profitability

JEL Classification: G21, H21

### INTRODUCTION

The topic of the importance of income taxation gains in the context of the income and expenses recognized in the tax balance and the determinants that affect the effective tax rate is viewed through the concept of tax planning in the function of managing the bank's results. The effective tax rate reveals the actual level of a bank's tax burden and reflects the income

and expenditure management policy. It is especially emphasized in the countries with a double reporting system, where every business entity, including a bank, is obliged to prepare and submit financial reports, as well as a tax balance, thus creating a possibility of accounting results correction. In those countries, it is certain that banks will have a lower rate compared to the one determined at the state level. Also, considering the crucial role of banks in a country's financial system, expressed especially in crisis conditions, countries stimulate their operations in a way that banks enjoy additional tax exemptions

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compared to the private sector companies. In Serbia, the taxation of banks' profits differs from the taxation of the private sector companies in terms of regulations on thin capitalization, the write-off of loan receivables and tax treatment on off-balance placements (Vržina, 2018). In this context, differences in tax treatment are also mentioned, which may arise when multinational banks open their offices in countries with low taxes, such as Serbia, or use different types of tax privileges, such as intergroup lending.

Research in the effective tax rate determinants primarily focuses on internal (traditional) and external (institutional) factors. At the same time, it is an important fact that out of the total number of papers, there are but a small number of those examining the variability of the effective tax rate focusing on the banking sector. Most of these analyses were performed on the example of public or private companies in the United States, whereas some are performed in China, Australia or in the European Union countries.

Regardless of the observations or the data type used in the analysis, the largest number of the determinants of the effective tax rate are unique for any business entity. The determinant used in a lot of studies is the size of a bank as interpreted from the point of view of the tax shield. The one is that the political component has a significant impact on reducing a tax burden on banks. In addition to the company size, the level of the effective tax rate also depends on the success of the company's business operations, and the most common measure used in scientific papers is return on assets rate (ROA) or return on equity (ROE). As a determinant, leverage has also been the subject matter of many researchers in the traditional context, primarily where a greater participation of external financing sources reduces the effective tax rate. The fact that changes in leverage are limited due to the requirements determined by the Basel criteria should also be taken into account. In the recent literature, the loan loss provision appears to be a determinant of the bank's effective tax rate. These are potential loan receivables write-offs that are under continuous monitoring due to their significant impact on a bank's results and consequently on the effective tax rate,

within which loan losses are approached as future events based on forecasts and provisions. The fact that their tax treatment is prescribed by law also speaks of the importance of this determinant.

The subject matter of the research study conducted in this paper is the actual tax burden of banks in the territory of the Republic of Serbia, as well as the analysis of the business and institutional determinants of effective tax rates. Consequently, the paper tests the hypotheses of the influence of each determinant, simultaneously considering previous research in this area. Given the above research focus, the research objective includes providing a well-founded assessment of the tax policy of banks in Serbia by considering the real level of effective tax rates and identifying their change under the influence of various determinants, aimed at encouraging effective tax planning and results management. The methodological instruments applied in the research process are divided into phases according to the research subject matter. The Wilcoxon rank test is used to compare the real and statutory levels of the effective tax rate, then the influence of each selected determinant on the effective tax rate is examined using a panel regression model, where the assessment of the most adequate model is made using the Hausman and Breusch-Pagan test. Before the model implementation, the tests were conducted so as to determine the relationship between the variables and the adequacy of the selected values for the model calculating the variance inflation factor and multicollinearity.

In the domestic literature, only a few papers on the effective tax rate in banks in Serbia were published in previous years, but not a single one deals with the analysis of its determinants. To the author's knowledge, this is the first paper in Serbia in which the impact of the selected determinants on effective tax rates in banks is analyzed. In this research study, two tax rates are used in order to better understand and interpret the results and differences in the tax rates. In addition to the usual determinants of the effective tax rate, this paper examines the influence of certain institutional determinants of banks due to their importance for the Serbian banking market,

as well as the influence of one business determinant subject to a change in standards, which is important for the banks' business results.

The results of the research can be useful to both economists and bank managers in terms of providing additional information on tax issues, all for the purpose of effective tax planning. Bank owners can be interested parties because of the effective tax rate predictive power on their income.

The remainder of this paper is organized as follows: after the Introduction, Section 2 analyzes the main determinants on the effective tax rate through a Literature Review and the development of the hypotheses tested in this paper. Section 3 discusses on the methodology of the empirical research, including the selection of variables in the research sample. In Section 4, the results of the basic model and the model with control variables are summarized, while presenting the importance of the obtained indicators, compared to the previous research. Finally, conclusions and possibilities for future research areas are given in the last section.

## LITERATURE REVIEW

### **Business determinants of the effective tax rate**

The analysis of the impact of a bank size on the effective tax rate is based on the two opposing theories that interpret the cause-and-effect relationship between these variables from a political perspective. On the one hand, the confirmation of the hypothesis of political costs, according to which large companies bear a greater tax burden, can be found in the papers by researchers J. L. Zimmerman (1983), F. J. Delgado, E. Fernández-Rodríguez and A. Martínez-Arias (2014), Y. M. Salaudeen and U. C. Eze (2018), Ç. A. Hazir (2019). On the other hand, researchers T. M. Porcano (1986), G. Richardson and R. Lanis (2007) and Y. A. Sudibyo and I. R. Bawono (2016) confirmed the hypothesis that large companies achieved greater tax savings due to a greater political influence and financial

opportunities. For the period from 2013 to 2017, S. Vržina (2018) came to the conclusion that larger banks in Serbia had higher accounting and current effective tax rates. Profitability mainly follows the size of the company (Delgado *et al*, 2014; Salaudeen & Eze, 2018; Hazir, 2019), which also indicates a higher tax burden for more successful banks (Omer, Molloy & Ziebart, 1993; Plesko, 2003; Díaz, Rodríguez & Arias, 2011; Fernández-Rodríguez, García-Fernández & Martínez-Arias, 2021; Lazăr & Andrieş, 2022). However, some researchers came to different results, according to which more profitable companies would pay less tax only if there were an effective tax planning system in that company (while controlling for the company size) (Rego, 2003) or if there were a strong political influence (Ajili & Khlif, 2020).

Researchers such as C. P. Stickney and V. E. McGee (1982), X. Liu and S. Cao (2007), O. Inua (2018) and Ç. A. Hazir (2019) confirm that, despite their leverage growth, banks with a greater share of foreign financing sources have a more favorable tax treatment of interest compared to dividends. S. Vržina (2019) draws the opposite conclusion when the influence on the annual effective tax rates in Serbia is considered, but the indicator is not statistically significant. According to S. Gupta and K. Newberry (1997), a positive effect may be present if the sample includes the companies with tax returns or pre-tax losses. Bearing this in mind, the authors S. Lazăr and A. M. Andrieş (2022) put forward a hypothesis on the influence of the equity capital of banks in the European Union on the level of the effective tax rate: high equity capital in the structure of the total capital-low leverage-high effective tax rate. In the recent literature, the movement of leverage has been studied under the conditions of constant tax rates with the introduction of additional tax fees for banks (for example, the fees introduced by certain European countries). The effect of reducing banking leverage in such conditions is only present in countries with lower tax rates (Chaudhry, Mullineux & Agarwal, 2015).

Given the aforementioned research studies, the following hypotheses are tested in the paper:

- H1: Banks with a larger volume of assets have a higher effective tax rate.
- H2: Banks with a higher level of profitability have a higher effective tax rate.
- H3: Banks with a higher level of leverage (borrowed capital) have a lower effective tax rate.
- H4: Banks with a higher share of equity capital have a higher effective tax rate.

### Institutional determinants of the effective tax rate

Some researchers emphasize the synergistic importance of mergers and acquisitions due to the realization of tax benefits and a reduction in the tax burden (Grubert, Goodspeed & Swenson, 2007; Zelenović & Babić, 2018). Targeted companies can achieve a reduction in the effective tax rate by 3% on average and can reach up to 8% if the buyer company implements an aggressive tax policy (Belz, Robinson, Ruf & Steffens, 2013). Companies in the seller role with a realized loss prior to taxation experience a drop in the effective tax rate on average up to 6.7% to 7.9% (Duarte & Barros, 2018). The trend of the consolidation of the banking sector in Serbia started in 2001, and the process is actively continuing in the form of a strategy for growth and competition on the market. Therefore, according to N. Miković (2022), the acquisition process was carried out on 15 banks in the period from 2017 to 2021. There are five banks in the research sample included in the paper, namely: Expobank took over Marfin Bank (2017), Alta Bank took over Jubmes Bank (2019), Eurobank took over Direct Bank (2021), Postal Savings Bank took over MTS Bank (2021), OTP Bank took over Vojvođanska Bank (2019) and Societe Generale Bank (2021). AIK Bank completed the process of acquiring Sberbank and NLB Bank completed the process of acquiring Commercial Bank in 2022, and Raiffeisen Bank's acquisition of RBA Bank is still ongoing.

The ownership structure can be viewed in two ways. Most research shows that the tax burden of state-owned companies will be significantly lower

due to tax incentives (Tran & Yu, 2008; Mahenthiran & Kasipillai, 2012). The situation is different if the banking sector, which is dominated by privatization as a part of financial integration and the development of the banking market, making the number of state-owned banks very small, is concerned. In the Serbian banking sector as of 31<sup>st</sup> December 2021, two state-owned banks (Postal Savings Bank and Srpska Bank) are actively operating, while the remaining 21 are majority privately-owned. On the other hand, banks with the capital origin in foreign countries move their operations to countries with a lower tax burden and achieve tax savings in a favorable business environment (Huizinga & Nicodème, 2006). S. Claessens, A. Demirgüç-Kunt and H. Huizinga (2001) claims differently. Their research in the sample of domestic and foreign banks from 80 countries in the period from 1988 to 1995 showed that foreign banks bore a greater tax burden in developing industries. The Serbian banking market is dominated by foreign banks, i.e. 17 foreign banks out of 23 in total, which is the total number of the banks operating on 31 December 2021, with a share of 83% in total assets.

Given the aforementioned research studies, the following hypotheses are tested in the paper:

- H5: Mergers and acquisitions processes in banks reduce the effective tax rate.
- H6: Privatization processes in banks reduce the effective tax rate.
- H7: An increase in the share of foreign capital in the banking sector reduces the effective tax rate.

### Control determinants

N. Bayraktar and Y. Wang (2004) state that the presence of foreign banks significantly determines the loan loss provisions level. This item gains in importance with the adoption of the new International Financial Reporting Standard (IFRS) number 9 - Financial Instruments. Its implementation for Serbian banks started on 1<sup>st</sup> January 2018 (National Bank of Serbia, 2017) in accordance with the Law on Corporate Income Tax. As the expenses based on the

loan loss provisions represent a tax-sensitive category, their effect will directly reflect in the reduction of the effective tax rate. Research done by S. Lazăr and A. M. Andrieş (2022) confirms the negative relationship between these two variables. In this paper, loan loss provisions are assumed to lead to a reduction in the effective tax rate.

V. Todorović, J. Bogićević and S. Vržina (2019) point at the importance of including banks with pre-tax losses observations in the analysis (those banks may have an income tax liability or carry forward losses from previous years and reduce tax liabilities). Considering this, researchers S. Gupta and K. Newberry (1997), Ç. A. Hazir (2019), and S. Lazăr and A. M. Andrieş (2022) include companies with a pre-tax loss in the analysis by limiting the values of the calculated effective tax rate, the lower value being 0% for the companies that, despite a negative result, had a tax refund, and the upper value of the rate 100% for the companies that paid tax and obtained a negative result, with the aim of providing adequate data in the sample.

## DATA AND RESEARCH METHODOLOGY

### Data and the sample selection

The sample consists of 23 commercial banks active at the end of 31<sup>st</sup> December 2021, covering the five-year period from 2017 to 2021. The list of the banks is presented in the Appendix.

The paper used publicly available data on the banks from the official website of the National Bank of Serbia and the financial data from the financial reports retrieved from the official websites of the banks. The data on the loan loss provisions are found in the Notes to the financial reports, the Risk Management section, the Credit Risk item, the "Loans and Receivables from Clients" category. Loan loss provisions are considered as summary for all three levels.

For this research, an unbalanced panel of data with 113 observations was formed, out of which 94

observations had an income before taxation and the remaining were the observations with a loss before taxation. The unbalanced panel results from the fact that the research did not include the data for OTP bank (formerly Societe Generale Bank JSC Belgrade) for the years 2018 and 2017, given the fact that the financial reports for those years were not available on the website at the time of the research in question. The unbalanced panel is not a preferred model in the literature, bearing in mind certain limitations of its application, such as the impossibility of conducting an analysis of one unit in each time period of the research, which results in a limited possibility of preventing the influence of the heterogeneity of the unit on the results, causing the model to be biased towards one class instead of objectively looking at the whole set observation.

### Research model

In this paper, the effective tax rate is used as a measure of the income tax burden and a dependent variable. In theory, it is recommended that more than one effective tax rate should be used in analysis (Omer, Molloy & Ziebart, 1991).

Namely, the first dependent variable used in this research is the accounting (total) effective tax rate (in the paper ETR 1). S. Vržina (2018) used this rate as the measure of the tax burden. In line with the International Accounting Standard 12 "Income Taxes", the accounting (total) effective tax rate is given below:

$$\text{Average Annual Accounting Effective Tax Rate} = \frac{\text{tax expense (income)}}{\text{accounting income}} \quad (1)$$

where the tax expense (income) is the total amount of tax consisting of the current tax for the current accounting period which the loss resulting from a reduction in deferred tax assets and the creation of deferred tax liabilities is added to, and/or which the gain from the creation of deferred tax assets and a reduction in deferred taxes is subtracted from. The accounting income represents a gain or a loss of the period before the tax expense deduction.

A more realistic measure in the calculation of the tax burden is the current effective tax rate (in the paper ETR 2). It eliminates the influence of the permanent difference between accounting income and taxable income by putting the current tax expenditure in the ratio of income before taxation:

$$\text{Average Annual Current Effective Tax Rate} = \frac{\text{current tax expense (income)}}{\text{accounting income}} \quad (2)$$

where the current tax expense (income) is the amount of tax paid in the current accounting period. The accounting income represents a gain or a loss of the period before the tax expense deduction.

In the paper, the influence of the independent variables (determinants) on the effective tax rate is examined and classification into business and institutional is made in accordance with the reference literature in this area. The relationship between the independent and dependent variables in this paper can be interpreted using predictive signs, which is shown in Table 1. The model also includes the control variable of loan loss provisions.

The research section of the paper is organized in three parts, within the framework of the applied methodology and the research objectives.

- Two different models are used calculate the effective tax rate, where certain values are

modeled at 0% and 100% (based on the research by S. Gupta and K. Newberry (1997) and Ç. A. Hazir (2019)). The values of the effective tax rate in each year are compared with the statutory tax rate using the Wilcoxon rank test (applied in the research by S. Vržina (2018)) in order to determine the differences and calculate the actual tax burden of banks. It is based on the hypothesis that there is a statistically significant difference between the statutory and effective tax rates.

- The impact of individual determinants on the effective tax rate is calculated, as well as the level of the changes that determine the growth of or a decline in the tax burden on the banks. The hypotheses are tested using the panel regression models - Ordinary Least Squares, the Fixed effects model and the Random effects model, for both effective tax rate types. The decision to apply the appropriate method for each dataset in the analysis was made using the Durbin-Wu-Hausman test and, if necessary, the Breusch-Pagan test, as applied in the research by S. Gupta and K. Newberry (1997).
- The robustness of the results is verified by changing the variables and changing the observations. The first test introduces the "loan loss provisions" independent variable into the sample and the second test excludes the banks with pre-tax losses from the sample. The difference in the results from the original ones is evaluated.

**Table 1** The independent variables and the predictive sign

Determinants (variables)		Measure	Sign
business	Size (SIZE)	A natural logarithm of the total assets (in 000 RSD)	+
business	Leverage (LEV)	(Income before taxes / Total assets) x 100	-
business	Profitability (ROA)	(Total liabilities / Total assets) x 100	+
business	Capitalization (CAP)	(Equity capital / Total assets) x 100	+
institutional	Mergers and acquisitions (M&A)	The bank that participated in the process (the customer) 1, otherwise 0	-
institutional	Privatization process (POW-SOW)	A private bank is marked with 1, a state-owned bank with 0	-
institutional	Share of foreign capital (D-F)	A domestic bank is marked with 1, a foreign one with 0	-
control	Loan loss provisions (LLP)	(Provisions/Total assets) x 100	-

Source: Author

The model used to calculate the effect of the determinants on the effective tax rates is given in the Equation 3:

$$ETR_{it1} \text{ or } ETR_{it2} = \beta_0 + \beta_1 \times SIZE_{it} + \beta_2 \times LEV_{it} + \beta_3 \times ROA_{it} + \beta_4 \times CAP_{it} + \beta_5 \times M\&A_{it} + \beta_6 \times POW-SOW_{it} + \beta_7 \times D-F_{it} + \text{dummy variable for years} + \varepsilon_{it} \quad (3)$$

where  $i$  represents the bank,  $t$  represents the year in the period from 2017 to 2021, and  $\beta$  is the regression coefficient. The dependent variable can be  $EPS_{it1}$  (the accounting effective tax rate) or  $EPS_{it2}$  (the current effective tax rate).

The data are statistically processed using the STATA computer software version 13.0, whereas the confidence levels  $\alpha = 0.05$  are used to determine statistical significance.

## RESEARCH RESULTS AND DISCUSSION

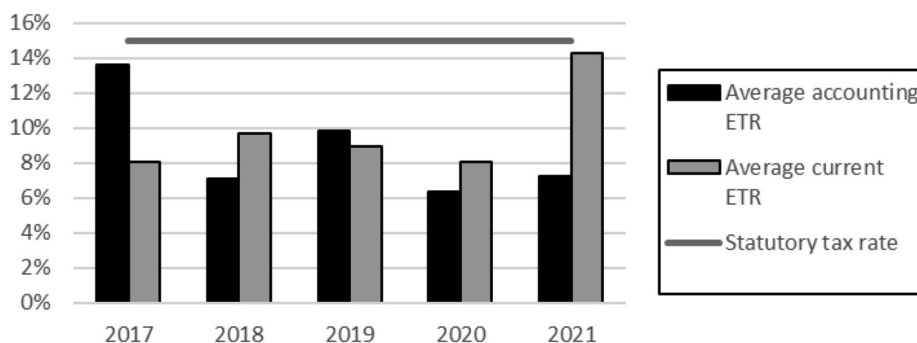
### Calculation of the effective tax rate

The calculation of the tax burden in the Serbian banks for the observed period from 2017 to 2021 shows that the accounting and current effective tax rates are continuously below the statutory tax rate although a slight growth trend is evident. In accordance with the aforementioned, 96% of the banks had a lower accounting effective tax rate (107 observations out of

a total of 113 in the sample), as well as a lower current effective tax rate (108 observations out of a total of 113 in the sample), compared to the statutory tax rate. The results are presented in Figure 1. Average rates were calculated for the entire set of observations, taking into account the modeled values of the effective tax rate used in the paper.

The arithmetic mean of both effective tax rates is significantly below the statutory, except in two years (the average accounting effective tax rate in 2017 is 13.59% and the average current effective tax rate in 2021 is 14.30%). Leaving out the influence of the two banks that, despite the loss, paid tax in all years (due to the modeled effective tax rate at 100%), the average current tax rate would be at a much lower level, considering the fact that 10 banks reported current tax at the level of 0% in their balances in 2021.

Table 2 shows the results of the descriptive statistics. Since there is one bank with the effective tax rate of 0% in the sample for each year, the minimum value of the rate is zero. The current effective tax rate reaches a maximum value of 100% in all the years, which indicates that within each year there was at least one bank with a realized loss before taxation, so for such cases in the paper the effective tax rate is modeled at 100%. The maximum value of the accounting effective tax rate deviates from 100% in three years, when, despite the pre-tax loss, two banks achieved tax income (API Bank and MOBI Bank) and when the



**Figure 1** The trend of the accounting and current effective tax rates comparing to the statutory tax rate

Source: Author

**Table 2** The descriptive statistics and the Wilcoxon test on the effective tax rates

Panel A. Observations with the accounting effective tax rate							
Year	n	SD	Median	Mean	Min	Max	Z (Wilcoxon)
2017	23	28.115	1.035	13.599	0.000	100.000	-2.530 <sup>b</sup>
2018	23	8.010	4.235	7.061	0.000	30.370	-3.108 <sup>b</sup>
2019	23	21.361	0.000	9.848	0.000	100.000	-2.877 <sup>b</sup>
2020	22	8.325	2.850	6.394	0.000	33.280	-3.409 <sup>b</sup>
2021	22	6.522	6.850	7.248	0.000	19.320	-3.845 <sup>b</sup>
Panel B. Observations with the current effective tax rate							
Year	n	SD	Median	Mean	Min	Max	Z (Wilcoxon)
2017	23	21.270	0.010	8.069	0.000	100.000	-3.311 <sup>b</sup>
2018	23	21.254	0.345	9.740	0.000	100.000	-3.158 <sup>b</sup>
2019	23	21.046	0.070	8.968	0.000	100.000	-3.235 <sup>b</sup>
2020	22	20.859	0.000	8.033	0.000	100.000	-3.481 <sup>b</sup>
2021	22	27.812	6.090	14.308	0.000	100.000	-2.488 <sup>b</sup>

The statutory tax rate = 15% for the examined period; b - level of statistical significance 0.05.

Source: Author

total tax rate was reported as 0% (MOBI Bank). Due to the absence of the normal distribution of data, the results are observed via the median. In 2021, there was a sharp increase in the effective tax rates, as a result of which the median values also increased compared to the previous years. The increase in the accounting tax rate was due to a larger number of the banks with recognized deferred tax income, whereas the increase in the current tax rate was the result of a more paid tax expense in that year and the value of the effective tax rate modeled at 100% due to the negative financial result recorded at two banks. The results of the Wilcoxon test confirm the hypothesis of a statistically significant difference between the statutory and effective tax rates at the significance level of 0.05. The results are in line with the findings of S. Vržina (2018).

### Multicollinearity testing

Before the model implementation, it is necessary that a multicollinearity test calculating the linear relationship among the explanatory variables in the regression model should be performed. The absence of collinearity among the independent determinants

was confirmed by calculating the Variance Inflation Factor (VIF). The result of the VIF test is presented in Table 3. It is observed that all the variables have a VIF coefficient lower than 10, based on which it can be concluded that the independent variables in the model are not highly correlated with each other (O'Brien, 2007). The mean VIF of 2.06 is also below the limit level.

**Table 3** The variance inflation factors (VIF) test

Independent Variables	VIF	1/VIF
SIZE	2.64	0.378085
LEV	2.00	0.500657
ROA	1.54	0.648205
CAP	4.22	0.237060
M&A	1.12	0.890274
POW-SOW	1.45	0.691473
D-F	1.41	0.707383
Mean VIF	2.06	

Source: Author



## Stationarity testing

Given the fact that an unbalanced data panel is used in the research, Fisher's unit root test is applied so as to confirm stationarity, combining the p-values from the unit root tests using the four methods proposed by I. Choi (2001). In Fisher's test, all the panels contain a unit root and are non-stationary (the null hypothesis) or at least one panel is stationary (the alternative hypothesis). In this paper, the results of all four tests for both effective tax rates reject the null hypothesis that the panels contain a unit root, implying that at least one panel is stationary at the 5% level of statistical significance. This means that there are no unit roots in the panels under the given test conditions (including the panel mean and the time trend). Table 4 shows the results of Fisher's test.

## Analysis of the determinants of the effective tax rates

By applying regression models and appropriate tests for selecting the most relevant model and assessing the fulfillment of the standard model assumptions, a conclusion is drawn that the influence of the determinants on the effective tax rates is best described by the random effects model (Table 5). The first model examines the influence of the determinants on the first set of data in this paper covering all 113 observations. As can be seen, based on the results of the Hausman test, both p-values are greater than 0.05 in the panel with the accounting and current effective tax rates, which is indicative of the fact that the random effects model is the appropriate model. Also, in the panel with the accounting effective tax rate where the p-value is 0.0003 and in the panel with

**Table 4** Fisher's unit root test

		ETR 1		ETR 2	
		Statistics	p-value	Statistics	p-value
Inverse chi-squared	P	175.2790	0.0000	70.6051	0.0113
Inverse normal	Z	-5.8726	0.0000	-3.2140	0.0007
Inverse logit t	L*	-10.4753	0.0000	-4.3467	0.0000
Modified inv. chi-squared	Pm	13.4783	0.0000	2.5653	0.0052

Source: Author

**Table 5** The Hausman and Breusch-Pagan model selection test

ETR 1	Result	Conclusion
Hausman test	$\chi^2(4) = (b-B)' [(V_b - V_B)^{-1}](b-B) = 7.39$ Prob > $\chi^2 = 0.1165$	Random effects model
Breusch-Pagan test	$\chi^2(01) = 11.91$ Prob > $\chi^2 = 0.0003$	Random effects model
ETR 2		
Hausman test	$\chi^2(4) = (b-B)' [(V_b - V_B)^{-1}](b-B) = 1.07$ Prob > $\chi^2 = 0.8989$	Random effects model
Breusch-Pagan test	$\chi^2(01) = 50.32$ Prob > $\chi^2 = 0.0000$	Random effects model

Source: Author

the current effective tax rate where the p-value is 0.0000 and both are less than 0.05, the Breusch-Pagan test evaluates that the random effects model should be applied.

Table 6 shows the regression coefficient scores obtained, with explains the impact of the banks' business and institutional determinants on the effective tax rate with the statistical significance of the impact on that change (p value). There is a comparative overview of the coefficients obtained by applying the ordinary least squares, the fixed effects model and the random effects model.

The obtained results of the adjusted R<sup>-squared</sup> indicate a very low explanatory power of the model below 0.05 level for both effective tax rates. However, within the model, several determinants can be singled out with a statistically significant influence on the banks' effective tax rates.

The results of the random effects model are presented below. In the model with the accounting effective tax rate, only the "leverage" variable has a statistically significant effect on the accounting effective tax rate at the level of 1%, where an increase in leverage by 1% decreases the tax rate by 0.83%. The results are consistent with the research carried out by C. P. Stickney and V. E. McGee (1982), X. Liu and S. Cao (2007), O. Inua (2018) and Ç. A. Hazir (2019). In the panel with the current effective tax rate, the influence of leverage is not statistically significant. The random effects model in the panel with the current effective tax rate is statistically significant for the determinant size (at the level of 10%), capitalization (at the level of 5%), and mergers and acquisitions (at the level of 10%). The biggest change in the current effective tax rate is caused by change in the "mergers and acquisitions" determinant, where its increase by 1% lowers the rate by 17.14%. The result is in line with the findings of T.

**Table 6** The regression panel model with the original data set

	ETR 1			ETR 2		
	Fixed-effect	Random-effect	Ordinary least squares	Fixed-effect	Random-effect	Ordinary least squares
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
SIZE	14.30245 (p=0.365)	2.022367 (p=0.714)	-0.6950407 (p=0.856)	51.29576 (p=0.002**)	14.87268 (p=0.071*)	4.530438 (p=0.374)
LEV	0.000821 (p=0.999)	-0.8338045 (p=0.001***)	-0.7236761 (p=0.001***)	-0.4243554 (p=0.566)	-0.1005125 (p=0.765)	0.0710505 (p=0.798)
ROA	-1.204921 (p=0.176)	-0.9927682 (p=0.212)	-0.8518625 (p=0.274)	1.556539 (p=0.090*)	1.122536 (p=0.210)	-0.0339541 (p=0.974)
CAP	1.110631 (p=0.140)	-0.0048548 (p=0.984)	-0.0945882 (p=0.579)	1.133039 (p=0.143)	0.9405987 (p=0.009**)	0.531624 (p=0.013**)
M&A	0	-6.73183 (p=0.216)	-6.185444 (p=0.086)	0	-17.14328 (p=0.051*)	-14.03267 (p=0.004**)
POW-SOW	0	-5.217761 (p=0.579)	-4.552595 (p=0.457)	0	5.716542 (p=0.709)	7.544946 (p=0.354)
D-F	0	-6.886395 (p=0.260)	-7.390821 (p=0.065)	0	-2.351658 (p=0.8103)	-3.862523 (p=0.465)
_cons	-123.6901	69.60898 (p=0.227)	83.03669 (p=0.039**)	-382.0249 (p=0.012**)	-117.6517 (p=0.169)	-44.55984 (p=0.401)

Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.001

R-squared 0.2115

Adj R-squared 0.1589

Prob>chi<sup>2</sup> 0.0006

Number of observations: 113

R-squared 0.2048

Adj R-squared 0.1518

Prob>chi<sup>2</sup> 0.0009

Source: Author

Belz *et al* (2013). In the period covered by the research work, the effect of mergers and acquisitions on the current effective tax rate was confirmed for the banks that successfully carried out acquisitions in previous years in the territory of the Republic of Serbia, such as Expobank, Addiko Bank, Halkbank, and Alta Bank, in whose balance sheets the amount of the current income tax expenditure is zero. It can be concluded that, in the observed period, there are more banks playing the role of buyers with the completed acquisition process that had zero current tax. The next determinant causing the greatest change is the size, where its growth of 1% increases the current effective tax rate by 14.87%, thus confirming the hypothesis of the political costs that larger banks are exposed to a greater tax burden. The results confirm the previous research in this area done by J. L. Zimmerman (1983), F. J. Delgado *et al* (2014), Y. M. Salaudeen and U. C. Eze (2018), Ç. A. Hazir (2019) and S. Vržina (2018) in the field of banking. In the observed period, the largest banks in Serbia reported the largest amount of the total and current tax expenditures, such as Aik Bank, Banca Intesa, Raiffeisen Bank, Unicredit Bank. With the increase in capitalization, there is an increase in the current effective tax rate 0.94%, which is in line with the results of S. Lazăr and A. M. Andrieş (2022).

As a determinant, profitability did not stand out either in terms of a statistically significant influence or in terms of the size of the changes in the random effects model. An increase in the banks' profitability decreases the accounting effective tax rate by 0.99%

(in accordance with the research conducted by the author S. O. Rego (2003)) and increases the current effective tax rate by 1.12%, which is confirmed in the papers by T. C. Omer *et al* (1993), G. A. Plesko (2003) and E. Fernández-Rodríguez *et al* (2021).

To summarize, the hypotheses set in this paper are confirmed for the following determinants: the bank size, leverage, mergers and acquisitions, and the share of foreign capital. The determinants "profitability" and "capitalization" confirmed the research hypothesis only for the current tax rate, and the determinant "privatization process" confirmed the hypothesis only for the accounting effective tax rate.

### *Results after including the "loan loss provisions" determinant in the model*

The results verification was carried out by including the "loan loss provisions" determinant in the model, which brings us to the second model in this paper. Performing the Hausman and Breusch-Pagan tests on the data set containing the "loan loss provisions" variable showed that there was a change in the adequacy of the model that should be applied compared to the model tested on the original variables. In table 7, there are the results of the tests. In the panel ETR 1, Breusch-Pagan test indicates that the ordinary least squares model is more appropriate, considering the p-value 0.1132 greater than 0.05. In the panel with ETR 2, the Hausman test proposes the fixed effects model as a more appropriate model.

**Table 7** The Hausman and Breusch-Pagan tests

ETR 1	Result	Conclusion
Hausman test	$\chi^2(5) = (b-B)'[(V_b - V_B)^{-1}](b-B) = 3.06$ Prob > $\chi^2 = 0.6908$	Random effects model
Breusch-Pagan test	$\chi^2(01) = 1.46$ Prob > $\chi^2 = 0.1132$	Ordinary least squares model
ETR 2		
Hausman test	$\chi^2(5) = (b-B)'[(V_b - V_B)^{-1}](b-B) = 18.25$ Prob > $\chi^2 = 0.0026$	Fixed effects model
Hausman-ov test	$\chi^2(5) = (b-B)'[(V_b - V_B)^{-1}](b-B) = 18,25$ Prob > $\chi^2 = 0,0026$	Fixed effects model

Source: Author

In the cases where the Hausman test confirms the existence of the statistically significant difference between the model coefficients, in favor of the fixed effects model as in this case, then the ordinary least squares model is not suitable for use (Dougherty, 2011). Consequently, there was no need to perform the Breusch-Pagan test in the current tax rate panel.

The presence of loan loss provisions in the ordinary least squares completely overshadows the statistically significant impact of the “leverage”, “profitability” and “share of foreign capital” determinants on the effective tax rates. Also, loan loss provisions themselves have a statistically significant influence on the accounting effective tax rate.

Table 8 accounts for the results of the tests. In the ordinary least squares model, the panel with the accounting effective tax rate, the growth of each determinant by 1% leads to a decrease in the effective tax rate, from which it follows that the credit risk management policy covers every segment of the banks’ operations, influencing all the variables of this model, which indirectly reflects in the effective tax rate. Despite “leverage” and “provisions” having the most significant influence (p=0.00), a decline in the effective tax rate under their influence is very small (-0.90 and -0.18, respectively). The paper confirms the hypothesis set by S. Lazăr and A. M. Andrieș (2022). In the fixed effects model, the bank size and its profitability are the most statistically significant

**Table 8** The regression panel model with loan loss provisions

	ETR 1			ETR 2		
	Fixed-effect	Random-effect	Ordinary least squares	Fixed-effect	Random-effect	Ordinary least squares
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
SIZE	13.77834 (p=0.391)	-1.301389 (p=0.774)	-2.042849 (p=0.556)	52.843980 (p=0.002)**	8.938954 (p=0.223)	2.731426 (p=0.553)
LEV	-0.109641 (p=0.901)	-0.8918349 (p=0.000***)	-0.9042379 (p=0.000***)	-0.0979 (p=0.914)	-0.1436747 (p=0.639)	-0.1699577 (p=0.506)
ROA	-1.263366 (p=0.176)	-1.913859 (p=0.015)	-2.201034 (p=0.004**)	1.729186 (p=0.072)*	0.3916962 (p=0.678)	-1.834785 (p=0.069)*
CAP	0.9953968 (p=0.280)	-0.0081891 (p=0.967)	-0.050984 (p=0.741)	1.473441 (p=0.120)	0.8505882 (p=0.007)**	0.631364 (p=0.003)**
LLP	-0.0292502 (p=0.827)	-0.1766153 (p=0.000***)	-0.1854563 (p=0.000***)	0.0864051 (p=0.530)	-0.1471396 (p=0.034)**	-0.2475412 (p=0.000)**
M&A	0	-8.259009 (p=0.058*)	-8.069201 (p=0.015**)	0	-17.62322 (p=0.017)**	-16.54705 (p=0.000)**
POW-SOW	0	-8.567659 (p=0.254)	-8.545317 (p=0.128)	0	3.095058 (p=0.810)	2.215587 (p=0.765)
D-F	0	-9.856129 (p=0.044**)	-10.02533 (p=0.007**)	0	-5.512307 (p=0.510)	-7.378976 (p=0.128)
_cons	-108.0079 (p=0.509)	107.8986 (p=0.023**)	115.8275 (p=0.002**)	-428.3501 (p=0.012)	-59.79695 (p=0.434)	-0.7917615 (p=0.987)

Note: \* p<0.1; \*\* p<0.05; \*\*\* p<0.001

R-squared 0.3619  
Adj R-squared 0.3128  
Prob>chi² 0.0000

R-squared 0.3575  
Adj R-squared 0.3081  
Prob>chi² 0.0000

Number of observations: 113

Source: Author

variables. An increase in bank assets by 1% leads to the current effective tax increase by more than 50%. Observing the original data set and the set with the “provisions” variable included, the fixed effects model shows that change in the bank size leads to the largest shifts in the effective tax rate, through its growth that goes up to over 50%. Profitability has a statistically significant effect in both panels.

In the examined model, the hypotheses of this paper are confirmed for the determinants with the 1%, 5% and 10% levels of significance: the bank size (ETR 2), leverage (ETR 1), profitability (ETR 1 and ETR 2), loan loss provisions (ETR 1) and mergers and acquisitions (ETR 1).

### *Results after excluding the banks with a pre-tax loss from the model*

The second verification of the results was carried out by excluding the banks with a pre-tax loss from the model (without the “loan loss provisions” determinant), thus creating the third model of this paper. A negative financial result is present in 19 observations. In other words, six banks operated with a pre-tax loss in the observed time period (API Bank, Mirabank, Mobi Bank, Bank of China, Expobank and OTP Bank), whereby Mirabank and Mobi Bank constantly had a loss. The results presented in Table 9 indicate the fact that the fixed effects model is more appropriate for the panel with the accounting effective tax rate and the random effects model is more appropriate for the panel with the current effective tax rate. In the cases where the Hausman

test confirms the existence of a statistically significant difference between the model coefficients, namely in favor of the fixed effects model in this case, then the ordinary least squares model is not suitable for use (Dougherty, 2011). Consequently, there was no need to perform the Breusch-Pagan test in the current tax rate panel.

The results of the panel regression models are shown in Table 10.

By excluding the banks with a negative pre-tax financial result, the “capitalization” determinant gains in importance. The banks with a profit before tax can manage effective tax rates and tax burdens by regulating capitalization levels, which is additionally supported by the Basel capital requirements. If the equity capital share increases by 1%, only for the banks operating at a profit, it will lead to a decrease in the accounting effective tax rate by 0.33% and an increase in the current effective tax rate by 0.12%. S. Lazăr and A. M. Andrieş (2021) came to the same findings. The significant influence of the “bank size” determinant dominates in the current effective tax rate panel, as well as in all previous calculations performed for the current effective tax rate. For the banks operating at a profit before tax in the observed time period, an increase in the bank’s assets by 1% leads to an increase in the current effective tax rate by 11.46%.

In the examined model, the hypotheses set in this paper are confirmed for the “bank size” (ETR 2) and “capitalization” (ETR 2) determinants with the 1% level of significance.

**Table 9** The Hausman and Breusch-Pagan tests

ETR 1	Result	Conclusion
Hausman test	$\text{chi2}(4) = (b-B)'[(V_b - V_B)^{-1}](b-B) = 2.89$ $\text{Prob} > \text{chi2} = 0.5759$	Random effects model
Breusch-Pagan test	$\text{chibar2}(01) = 3.56$ $\text{Prob} > \text{chibar2} = 0.0295$	Random effects model
ETR 2		
Hausman test	$\text{chi2}(4) = (b-B)'[(V_b - V_B)^{-1}](b-B) = 33.39$ $\text{Prob} > \text{chi2} = 0.0000$	Fixed effects model

Source: Author

**Table 10** The regression panel model with the excluded banks with a pre-tax loss

	ETR 1			ETR 2		
	Fixed-effect	Random-effect	Ordinary least squares	Fixed-effect	Random-effect	Ordinary least squares
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
SIZE	5.75480 (p=0.596)	-4.281385 (p=0.107)	-4.874507 (p=0.012)**	11.45949 (p=0.072)*	-1.232369 (p=0.584)	-3.217497 (p=0.024)**
LEV	-0.2643343 (p=0.643)	-0.2771783 (p=0.157)	-0.4158164 (p=0.012)**	-0.2616895 (p=0.429)	-0.1835364 (p=0.195)	-0.1450662 (p=0.232)
ROA	0.511036 (p=0.800)	0.2847851 (p=0.593)	0.570115 (p=0.284)	-0.020731 (p=0.952)	0.2283673 (p=0.501)	1.08525 (p=0.007)**
CAP	-0.2016628 (p=0.797)	-0.3279384 (p=0.038)**	-0.3974515 (p=0.002)**	0.122159 (p=0.788)*	0.2288229 (p=0.078)*	-0.3554083 (p=0.000)***
M&A	0	-2.511004 (p=0.354)	-2.031509 (p=0.281)	0	-4.903898 (p=0.038)*	-3.848523 (p=0.007)**
POW-SOW	0	-2.653191 (p=0.544)	-3.950368 (p=0.194)	0	3.895744 (p=0.309)	3.209968 (p=0.155)
D-F	0	-4.771381 (p=0.109)	-5.642143 (p=0.008)**	0	-4.589048 (p=0.075)*	-4.783514 (p=0.003)**
_cons	-14.7970 (p=0.895)	72.90445 (p=0.016)**	90.70104 (p=0.000)***	-66.64242 (p=0.306)	32.31067 (p=0.184)	45.67595 (p=0.009)**

Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.001

R-squared 0.2127

Adj R-squared 0.1486

Prob>chi<sup>2</sup> 0.0036

Number of observations: 94

R-squared 0.4218

Adj R-squared 0.3747

Prob>chi<sup>2</sup> 0.0000

Source: Author

## CONCLUSION

The research presented in this paper covered the banking sector of Serbia, all the banks operating on 31<sup>st</sup> December 2021, making a sample of 113 observations for the five-year time period from 2017 to 2021. The empirical research included two types of effective tax rates, the accounting and the current effective tax rates, examining how the “business” and “institutional” determinants affected them.

The research results in the observed period show that the average accounting and current effective tax rates are continuously below the statutory tax rate, on the basis of which it can be concluded that the real tax burden of the banks in Serbia is significantly less than the legal one. In Serbia, the statutory tax rate on

a bank's income during the observed period is 15%, while the average accounting effective tax rate for the entire period is at the level of 8.83% and the average current effective tax rate is 9.82%. It is possible that the elimination of the modeled values of the effective tax rate at 100% would lead to the average current tax rate being at an even lower level, considering that 10 banks in their balance sheets for the year 2021 reported current tax at the level of 0%. In other words, they have no current tax expenses. It is concluded, and simultaneously confirmed by earlier research, that the law in Serbia enables banks to have significant tax incentives, primarily motivated by investments and the development of the economy and society. Competition among banks on the Serbian market leads to mergers and acquisitions, which additionally

has a positive effect on lowering effective tax rates, which is confirmed in the findings of this paper in the part dealing with the influence of the determinants on effective tax rates. The research results obtained on the original sample show that changes in mergers and acquisitions, such as growth by 1%, compared to other business and institutional determinants, reduces the current tax liability by 17.14%, and growth in the bank size by 1% increases the current effective tax rate by 14.87%. According to the foregoing, it can be concluded that the consolidation of assets and capital as a result of mergers and acquisitions reduces the current effective tax rate only up to a certain level (up to a certain size of the bank), that is to say as the bank grows, current effective tax rates start to grow as well at some point. Loan loss provisions are the key segment in banks' operations, and the fact is that they are increasingly attracting more and more attention from the theoretical point of view and through banks' practical operations in terms of credit risk management. In the model that includes provisions, a 1% increase in every determinant leads to a reduction in the accounting effective tax rate to a certain extent, where a 1% increase in a bank's assets leads to an increase in current tax by more than 50%. Profitability, leverage and provisions in that model have a statistically significant impact on the tax burden even though the tax rates slightly change. The research results for the model that excludes the banks with pre-tax losses show that the banks can manage effective tax rates and tax burdens by regulating capitalization levels and their size. The other determinants in the model are not significant and do not lead to larger shifts in tax rates.

Based on the presented results, a conclusion can be made that the banks enjoy low tax rates due to their business policy and the policy of the state in which they operate. Monetary policymakers manage the statutory tax rate with special care, and despite the potential for an increase in effective tax rates, they are aware of the risks that would be caused, such as the banks' ability to shift the tax burden to their clients through an increase in the prices of banking products and services. Tax policy management in the modern world implies that banks take into account every business segment and every influencing factor that,

as shown, can cause changes in the effective tax rate to a certain extent. Some determinants are amenable to simpler management, some are not. The real tax burden of the banks in Serbia expressed through the current effective tax rate is, in all the models of this paper, under the greatest influence of changes in mergers and acquisitions and the bank size, which are the processes actively taking place in the banking market of Serbia in the last few years.

The above conclusions are subject to certain limitations. As a potential disadvantage, it can be pointed out that this work covers only one group of the determinants that affect the actual tax burden of banks. Also, in order to neutralize the negative values in the analysis, the tax rates are modeled, which can distort the research results. This was partly resolved in the model with omitted observations with a pre-tax loss. Suggestions for future research can include several, such as extending the timeframe used in the analysis, applying other types of effective tax rates, as well as including banks from the countries of the region. The analysis of the determinants of the effective tax rate can be the basis for a later analysis on how these effects lead to the tax burden spillover on end-to-end users.

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## APPENDIX

The list of the sampled banks

No.	Name	No.	Name
1	Hypo-Alpe-Adria Bank (present name: Addiko Bank)	13	NLB Bank (present name: NLB Commercial Bank)
2	AIK Bank	14	Mirabank
3	Jubmes Bank (present name: Alta Bank)	15	Telenor Bank (present name: Mobi Bank)
4	VTB Bank (present name: API Bank)	16	Sber Bank (present name: AIK Bank)**
5	Banca Intesa	17	Opportunity Bank (present name: 3 Bank)
6	Postal Savings Bank	18	Vojvodanska Bank, Societe Generale Bank (present name: OTP Bank)
7	Bank of China	19	Procredit Bank
8	Credit Agricole Bank (present name: RBA Bank)*	20	Raiffeisen Bank
9	Marfin Bank (present name: Expobank)	21	Srpska Bank
10	Erste Bank	22	Unicredit Bank
11	Eurobank (present name: Eurobank Direct)	23	Commercial Bank***
12	Halkbank	-	-

\*In 2022, the acquisition process of Raiffeisen Bank over RBA Bank started.

\*\* In 2022, the acquisition process of AIK Bank over Sber Bank was completed.

\*\*\* In 2022, the acquisition process of NLB Bank over Commercial Bank was completed.

Source: Author, based on the National Bank of Serbia's website