AN ANALYSIS OF THE DETERMINANTS OF NET INTEREST MARGIN OF THE BANKING SECTORS IN SOUTHEAST EUROPEAN COUNTRIES

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Abstract: The paper analyzes the determinants of bank net interest margin in the selected Southeast European countries in the period from 2012 to 2021. The group includes the countries with similar socio-economic features and financial system. The aim of the paper is to identify the common determinants of net interest margin in the observed banking systems. Given the previous theoretical and empirical studies, the analysis relies on a set of data on macroeconomic and industry variables using the pooled ordinary least square (OLS) regression method, because the preliminary data analyses do not allow for the application of panel regression with fixed or random effects. The predictor variables in the model are: gross domestic product per capita, inflation, exchange rate, real interest rate, concentration, size, capitalization, liquidity of the banking sector and credit risk in the banking sector. Net interest margin (NIM) is used as a dependent variable. The results confirm that the model is statistically significant, and that exchange rate, real interest rate, concentration and size of the banking sector have a significant impact on the variation of the dependent variable. Significant variables also show the expected direction of influence on NIM trends. The growth of exchange rate, real interest rate, concentration and size of the banking sector goes hand in hand with an increase in bank net interest margin in the analyzed countries over the observed period, all other things being equal. The analysis does not confirm the influence of other predictors on NIM.

1. Introduction

Banks are the key financial institutions in financial systems where the economy and the population are predominantly financed through bank loans due to an underdeveloped financial market. In such a situation, the regulatory authorities need to ensure both the stability and the efficiency of the banking sector. Given that stability can have both a positive and a negative impact on net interest margin, for practical reasons it is important to look at the determinants of bank net interest margin, analyzing also the indicators that indirectly or directly point to the degree of the banking sector's stability. So far, numerous theoretical and empirical studies have been carried out, in order to identify that the key determinants of group of studies are naturally focused on banks.

Given that the stability and efficiency of the banking sector are bank net interest margin, some of them rely on a data set that includes the banking sectors of several countries (multi-country studies) in order to identify determinants common to a certain group of countries (Demirgüç-Kunt & Huizinga, 1999; Maudos & Fernandez de Guevara, 2004; Cruz Garcí & Guevara, 2019), while other analyses remain focused on the banking sector of a particular country (Samuelson, 1945; Ho

& Saunders, 1981; Fungacova & Poghosian, 2011) in order to identify common determinants for banks operating in the same regulatory and macroeconomic environment (single-country studies). The first group of studies can use the banking sector or banks as a unit of observation, while the second group of studies is naturally focused on banks. Given that the stability and efficiency of the banking sector are important prerequisites for the overall economic development in bank-oriented financial systems, the subject of the paper is the analysis of the determinants of bank net interest margin in the selected Southeast European countries in the period from 2012-2021. Proceeding from numerous theoretical and empirical models used to analyze the determinants of bank net interest margin, the paper aims to identify common determinants in a group of banking and macroeconomic variables for the countries with similar socio-economic characteristics. A significant contribution of this paper lies in the analysis of the determinants of bank net interest margin in the period after the recovery of the banking sector from the consequences of the global financial crisis in 2008, which previous papers dealing with these groups of countries did not have as a research focus. The mentioned period was under the impact of the crisis caused by the COVID-19 pandemic, as well as armed conflicts in Ukraine, which is a special aspect of this research. The paper includes three parts. The first part gives an overview of literature on the determinants of bank net interest margin. Data analysis, research methodology, review and discussion of research results follow. The final part of the paper gives conclusions.

2. Review of literature

A significant number of papers on interest margin and the factors affecting it indicate the importance of this parameter of banking operations. In his study, Samuelson (1945) examines how interest rate growth affects the banking system and comes to the conclusion that the rise in interest rates in the US would be beneficial for a banking system whose average maturity of liabilities is shorter than the average maturity of its assets. The model of the bank as a dealer put forward by Ho & Saunders (1981) is the starting point in numerous empirical studies. This is the first study on the determinants of bank net interest margin in one country. The analysis covers a large number of American commercial banks that operated between 1976 and 1979. In this model, the bank is seen as a risk-averse dealer on the credit market, and acts as an intermediary between surplus and deficit entities. Given the asynchronous nature of loans and deposits, net interest margin is seen as a premium covering the risks associated with maturity transformation of funds. The authors emphasize that interest margin will exist even in a highly competitive environment, as long as there is uncertainty and asynchronous trend of supply and demand of funds. Its level depends on certain factors: the degree of manager's risk aversion (i.e. the higher the risk aversion, the higher the net interest margin), the structure of the banking market (i.e. inelastic demand and poor competition on the

banking market lead to a higher net interest margin), bank size (large banks have lower interest margins) and interest rate variability (in conditions of greater interest rate variability, net interest margin tends to increase).

Subsequent models arose to amend the initial model on the determinants of net interest margin, referring critically to the view that the bank is a "risk-averse dealer" (Ho & Saunders, 1981, p. 598). On the contrary, in its operations the bank faces numerous risks (credit, market, operational risk) and in its mediation it has the so-called operating costs. In this regard, empirical tests of the theoretical model on the determinants of net interest margin take into account a larger number of determinants and often focus on several countries, in order to identify the common determinants of net interest margin, but also the influence of differences in the determinants that primarily characterize the observed countries' banking sectors.

Demirgüç-Kunt & Huizinga (1999) analyze the determinants of bank net interest margin by looking at a sample of 80 developed and developing countries in the period from 1988 to 1997. The analysis covers a large number of determinants of net interest margin, taking into account macroeconomic indicators, tax and regulatory variables, as well as institutional parameters (such as deposit insurance) apart from banking industry variables (size, leverage, type of business activities and type of bank ownership), In order to examine the impact of these variables on bank net interest margin in developing and developed countries, gross domestic product per capita is used as a control variable. The research shows lower interest margins in banking industries characterized by a higher bank-asset-to-gross domestic product ratio, as well as lower market concentration. What is more, foreign banks have higher margins than domestic banks in developing countries, with opposite pattern in the group of developed countries. As for macroeconomic variables, research confirms a significant and positive influence of inflation, which causes higher interest margins in countries under inflation. The analysis of the influence of institutional variables shows that poor protection of users of banking services creates a favorable environment to increase bank interest margin, with a more pronounced influence of these variables in developing countries compared to developed countries. Explicit deposit insurance reduces the deposit interest rate to a certain extent, on the one hand, and can encourage risky bank behavior and higher credit rates, on the other hand. Nevertheless, previous research confirms the impact of deposit insurance on lower net interest margin. Here, however, it is not possible to draw a general conclusion about the impact of the deposit insurance system on net interest margin, bearing in mind that it is an institutional component that guarantees bank stability in the financial system and is characterized by different solutions depending on the specific national financial system. Finally, the analysis shows a positive impact of the tax treatment of interest on net interest margin, less pronounced in developed countries, considering that the tax burden is ultimately transferred to the bank's clients.

Maudos & Fernandez de Guevara (2004) analyze the determinants of net interest margin on the European Union's main banking markets (Germany, France, England, Italy and Spain) in the period from 1993 to 2000, emphasizing the importance of operating costs and risks. The analysis shows the decline in interest margin in European banks even during the period of strong market power of banks, given the intense concentration in the banking sector, resulting from the wave of deregulation after the 1990s. That is, lower operating costs and lower interest and credit risk in the observed period nullified the effect of higher interest margin due to intensive mergers and acquisitions in European banking. This confirms the influence of multiple factors on bank interest margin, rather than only the market structure and competition in the sector.

Fungacova & Poghosyan (2011) study the determinants of net interest margin of the Russian banking sector in the period from 1999 to 2007, taking into account the banks' ownership structure, given that, in that period, the Russian banking sector had a dominant share of domestic state capital and modest share of foreign capital. The analysis shows the different influence of certain banking determinants (market structure, asset size, credit and liquidity risk) on bank net interest margin with different ownership structures. The rule that more concentrated banking sectors have higher interest margins applies only to foreign banks. This is due to more lenient rules for the entry of foreign capital into the domestic market aimed at higher competitiveness on the banking market. When looking at the impact of liquidity risk on interest margin, the theoretical rule of a negative correlation applies only in domestic private banks. State-owned banks are more prone to risky behavior because they count on state support in case of difficulties in their operations. Foreign banks, on the other hand, count on the support of their parent company, so state-owned and foreign banks have fewer problems with low liquidity than domestic private banks. As such, they are able to charge higher interest margins. Then, the negative correlation between credit risk and interest margin applies only in the case of domestic private banks, which insist on greater market discipline. This does not apply to state-owned banks, bearing in mind that they count on the state support in case problems arise, and accordingly enter into riskier activities and count on a higher interest margin. Operating costs and risk aversion are the only determinants of net interest margin that do not differ in the group of banks with different ownership structures.

Cruz Garcí & Guevara (2019) analyze the determinants of the banking interest margin on a sample of 31 OECD countries during the period from 2000 to 2014. They extend the model developed by Ho and Saunders (1981) to explicitly include certain elements of banking regulation, i.e. capital and deposit insurance, as the determinants of net interest margin. The analysis shows a positive correlation between regulatory capital requirements and deposit insurance premium, on the one hand, and net interest margin, on the other hand. This implies that higher capital requirements and deposit insurance premium lead to higher interest margin

for banks. This behavior of banks can be understood because the crisis triggered a review of banks' attitudes towards risk. The results show that the cost of higher stability is transferred to the bank's clients in the form of higher interest rates on loans and lower interest rates on mobilized deposits. The acceptance of a lower interest rate by depositors is justified by the existence of deposit insurance, which means that their funds are less exposed to risk.

Bustos-Contell et al. (2019) have done the research to identify the determinants that influence the significant decline in the contribution of interest margin to the total income of Spanish credit institutions in the period from 1985 to 2015. They divided the determinants into two groups: internal (banking) and external. The variables recorded in the balance sheet, income statement and other financial reports in accordance with current regulations are internal determinants, while external determinants are the variables that are not directly related to the bank's operations, but reflect the economic conditions in which banks operate and as such affect the bank's operations and performance. In this context, the banking determinants are: bank size, liquidity and capital, operating costs and credit risk exposure; while the external determinants are: market power, gross domestic product, ownership structure, interest rates and inflation. Using panel analysis, the results confirm that interest margin has decreased from 80% to less than 50% of the total income of credit institutions in two decades. This is due to higher liquidity requirements, investment in related companies, bank size, market power, rise in the rate of probability of default, as well as a decrease in risk-weighted assets. Higher fees and commissions charged in this period compensate for lower bank interest margins. Among external determinants, the increase in interest rates, gross domestic product and inflation measured by the consumer price index influence a drop in interest margin. Apart from these, the entry of new competitors into the financial market also decreases bank interest margins. Except for this trend of interest rate reduction, the 2008 crisis, as well as the period of supply of significant public funds in 2001 and 2002, leads an increase in the interest margin.

Abreu & Mendes (2001) study the determinants of bank net interest margin in the selected EU countries in order to see if the countries that use a common currency have the common determinants of net interest margin. Analyzing the influence of banking, macroeconomic, regulatory and financial structure indicators, the authors single out the common determinants of bank net interest margin in the observed European countries, namely: inflation, unemployment rate, loan-to-asset ratio, operating costs and capitalization, with only the unemployment rate showing inverse trend in relation to net interest margin.

Claeys & Vander Vennet (2008) do the research on a sample of over 2,000 banks from 36 Western and Eastern European countries in the period from 1994 to 2001, in order to find the differences in the determinants of bank net interest margin in Eastern European countries compared to developed Western European countries. As in previous studies, the determinants are divided into macroeconomic, banking and

regulatory. Additionally, the authors try to assess whether poor bank performance in many transition economies is a consequence of low efficiency and uncompetitive market environment, on the one hand, or deficiencies in the regulatory environment and high information asymmetry, on the other hand. The analysis shows that capital adequacy is an important determinant of bank margins in all observed countries, but also that progress in bank reform reduces the importance of capital as bank solvency indicator. Then, the authors observe a significant influence of credit risk on interest margin, with the corporate sector reform decreasing the importance of this effect. Higher operational efficiency of banks and thus lower interest margin are present in the banks operating in Western European and acceding countries, but not in the banks in Eastern European countries. In addition, the determinants of bank interest margin in accession countries and the determinants of bank interest margin in Western European countries are gradually converging.

Kasman et al. (2010) try to establish the differences in the determinants of bank net interest margin in Central and Eastern European countries that recently joined the EU (Malta and Cyprus) and candidate countries (Croatia, Macedonia and Turkey). In order to see the impact of the financial reform conditioned by the financial sector liberalization and deregulation, the determinants of interest margin in the observed countries are analyzed in two periods: the period before (from 1995 to 2000) and after consolidation (from 2001 to 2006). Bearing in mind the effect of the banking sector consolidation, they also analyze the determinants of bank net interest margin among new and old EU members within the observed periods. All banking and market structure variables have a positive correlation with net interest margin in the period before consolidation, except for the size and management efficiency, GDP growth and capitalization. In the post-consolidation period, competition intensifies; as a result of which banks enter into riskier business activities in order to achieve higher interest margins. Macroeconomic variables, on the other hand, do not confirm their significance, bearing in mind that banking sector consolidation reduces the differences between the analyzed countries. However, the analysis of the determinants of bank net interest margin in the old and new EU member states shows different regularities. Capital adequacy has a statistical significance in the case of old EU members, but not in the case of the new ones. The concentration index is a significant determinant of net interest margin in both groups of countries, but it has a different direction of influence. This is because of a significant pressure on the reduction of interest margin in the old EU members. Then, the macroeconomic variables confirm their significance in the group of new EU members, taking into account the still present differences in the legal, financial and macroeconomic features of these countries. Certainly, the tendency of a greater degree of financial integration of these countries assumes that these differences decrease over time.

Among the papers that analyze the determinants of bank net interest margin within single-country framework one of the first to cover the Republic of Serbia was Marinković & Radović (2014). In their empirical research, the authors study the determinants of bank net interest margin in the Republic of Serbia, taking into account bank-specific, industry-specific and macroeconomic variables. As these are banks that operate in the same legal, regulatory and macroeconomic environment, macroeconomic variables do not confirm their significance. Among the banking variables, the analysis shows that banks with an above-average capital-to-asset ratio tend to operate with higher net interest margins. Also, the analysis shows an inverse relationship between a default risk and net interest margin. In the group of sectoral determinants, the variable measuring the sector concentration is significant and has its predicted impact on net interest margin. The contribution of the paper is particularly reflected in an effort to look at the differences in the determinants of bank net interest margin by type of ownership and asset size. In terms of size, the results confirm that larger banks are superior in managing interest rate risk through liability management, while the superior performance of foreign banks can be attributed to more conservative lending practices and better access to foreign sources of financing.

The following table gives an overview of the variables singled out as significant determinants of bank net interest margin in research covering a large number of countries.

Table 1. Determinants of NIM in the empirical literature

Determinants of bank net interest margin	Demirguc-Kunt & Huizinga (1999)	Abreu & Mendes (2001)	Claeys& Vander Vennet, (2008)	Kasman et al. (2010)	Fungacova & Poghosian (2011)	Cruz Garcí & Guevara (2019)
Macroeconomic variables						
GDP		*	*	*		*
Inflation		*	*	*		
Interest rate			*	*		*
Exchange rate		*				
Banking industry variables						
Concentration			*			
Competition	*		*			
Capitalization		*	*			*
Liquidity					*	
Bank size	*	*			*	*
Credit risk	*			*	*	*
Efficiency			*	*		*
Institutional variables						
Bank regulations			*			*

The analysis of theoretical and empirical papers dealing with the determinants of bank net interest margin in several countries shows that in the largest number of models, the following macroeconomic variables confirm their significance: gross domestic product, inflation rate and interest rate, while in the group of banking variables, these are credit risk exposure, the level of capital adequacy, market size and structure.

3. Model and analysis of the results

In order to analyze the influence of the determinants of bank net interest margin in the selected Southeast European countries in the period from 2012-2021, a selection of the banking sector (industry-specific) indicators and macroeconomic indicators has been made. They are used as independent variables, i.e. predictors, in this research, while net interest margin (NIM) is a dependent or dependent variable. The specification and description of the variables are given in Table 2.

Table 2. Definitions of variables

Variable	Definition
NIM	Net interest income divided by total assets
GDP_pc	GDP per capita
Inflation	Consumer price index (year-on-year growth)
Exchange rate	Domestic currency vs. USD
Real interest rate (ex post)	Nominal credit interest rate minus realized inflation
Concentration	Herfindahl-Hirschman concentration index (total assets)
Capitalization	Ratio of regulatory capital to risk-weighted assets
Liquidity	Liquid assets to total assets ratio
Size	Total assets (in USD)
Credit risk	Ratio of nonperforming loans to total loans

The analysis covers a sample of 10 countries (n=10), Albania, Bosnia and Herzegovina, Montenegro, Greece, Cyprus, Kosovo-UNMIK, Moldova, North Macedonia, Serbia and Turkey, in the period from 2012 to 2021 (t=10). The net interest margin trend in the analyzed banking sectors over the observed period is shown in the following chart.

**Chart 1: NIM trend in the selected Southeast European countries
in the period from 2012-2021**
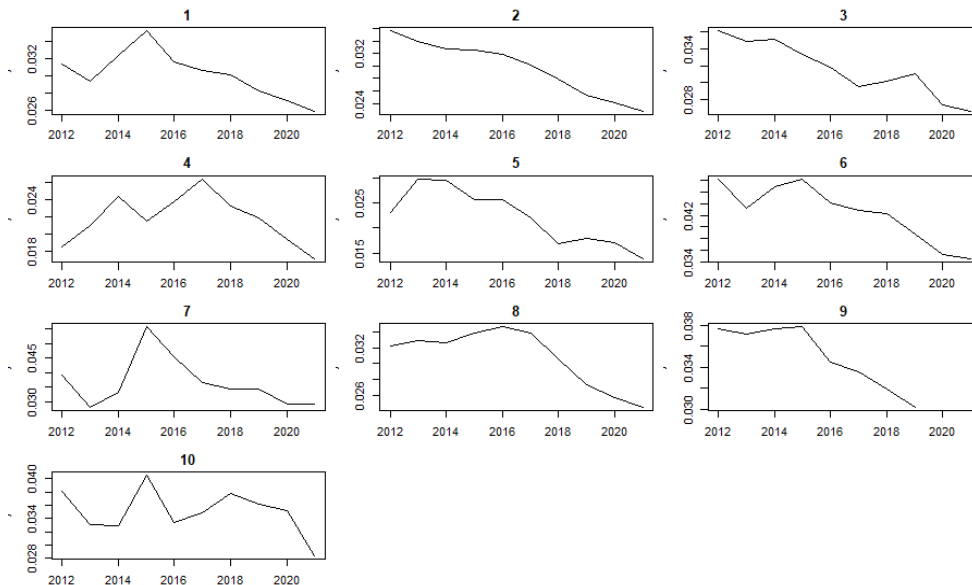
Source: IMF, authors' calculations
Note: 1-Albania, 2-Bosnia and Herzegovina, 3-Montenegro, 4-Greece, 5-Cyprus, 6-Kosovo
UNMIK, 7-Moldova, 8-North Macedonia, 9-Serbia, 10-Turkey

The analyzed period shows a downward trend in bank net interest margin in the observed countries, which is clearly visible after 2016 and after the outbreak of the COVID-19 pandemic. Such circumstances additionally stress the importance of identifying the NIM determinants in the observed period for the observed group of countries. The panel is unbalanced there being no data for every year and for every country. In addition, for three countries (Albania, Bosnia and Herzegovina and North Macedonia), there is no data on the concentration index. The data is collected from the IMF and World Bank databases. The data is processed using the Stata 12 software. The following Table (3) shows the descriptive statistics of the variables.

Panel regression is used to examine the impact of the selected sectoral and macroeconomic variables on NIM. Predictor variables in the model are: GDP pc, inflation, exchange rate, real interest rate, concentration, capitalization, liquidity, size and credit risk. The dependent variable is NIM. Before selecting the model, residual normality test, time series stationarity test (Im-Pesaran-Shin unit-root test), autocorrelation (Wooldridge test for autocorrelation in panel data) and heteroskedasticity (Breusch-Pagan/Cook-Weisberg test for heteroskedasticity) tests are performed. The results of the time series stationarity tests show that all series are stationary, which is why there is no need to transform them.

Table 3. Descriptive statistics

Variable		Mean	SD	Min	Max	N
NIM	Overall	0.031	0.007	0.014	0.056	98
	Between		0.006	0.022	0.042	10
	Within		0.004	0.023	0.051	9.8
GDP_pc	Overall	9.636	7.656	2.732	30.798	98
	Between		7.876	3.738	27.545	10
	Within		1.118	5.499	12.890	9.8
Inflation	Overall	3.004	4.295	–2.046	28.702	98
	Between		3.630	–0.352	12.191	10
	Within		2.495	–2.907	19.515	9.8
Exchange rate	Overall	27.455	40.846	0.753	125.962	98
	Between		43.505	0.843	111.855	10
	Within		4.093	13.264	41.561	9.8
Real interest rate	Overall	3.468	3.852	–16.202	11.427	95
	Between		2.839	–2.316	7.836	10
	Within		2.781	–10.418	11.808	9.5
Concentration	Overall	1466.41	506.682	678.000	2332.000	51
	Between		501.140	780.875	2120.167	7
	Within		210.151	833.245	1950.412	7.286
Capitalization	Overall	17.924	3.644	7.343	31.031	98
	Between		3.070	15.254	25.380	10
	Within		2.189	6.462	23.575	9.8
Liquidity	Overall	32.645	10.034	15.528	61.230	98
	Between		8.894	22.244	50.238	10
	Within		5.291	14.633	45.708	9.8
Size	Overall	0.627	1.353	0.003	9.346	98
	Between		1.175	0.004	3.725	10
	Within		0.745	–1.727	6.248	9.8
Credit risk	Overall	13.617	10.988	1.933	47.748	98
	Between		9.092	3.264	30.674	10
	Within		6.639	–7.896	33.527	9.8

Source: Authors' calculations

In order to check the residual normality, the Jarque-Bera panel data test is used to test the null hypothesis that the residuals are normally distributed across clusters (countries). The test result is shown in Table 4.

Table 4. Residual normality test

					95% confidence interval	
	Coefficient	Bootstrap SE	z	p	Lower bound	Upper bound
Error skewness	4.154	2.203	1.89	0.059	–0.163	8.471
Error kurtosis	29.403	12.161	2.42	0.016	5.567	53.239
Residual skewness	2.872	0.777	3.70	0.000	1.350	4.395
Residual kurtosis	2.552	1.056	2.42	0.016	0.483	4.621

Source: Authors' calculations

Error and residual distribution is positively asymmetric (Skewness>0) and has long tail (Kurtosis>0). Error distribution cannot be considered approximately normal, $\chi2(2)=9.40$, p=0.001. Residual distribution cannot be considered approximately normal, $\chi2(2)=19.52$, p<0.001. The autocorrelation test shows that there is no serial correlation in the panel data $F(1,6) = 3.230$, p=0.122. The heteroskedasticity test reveals heteroskedasticity $chi^2(7) = 53.19$, p<0.001.

The Hausman test and the Breusch and Pagan Lagrangian multiplier test are used to select between the OLS model, the fixed-effects model and the random-effects model. The Hausman test tests the null hypothesis that the random-effects model is better than the fixed-effects model. Since the results of the Hausman test chi2(6)=23.01, p<0.001 suggest the rejection of the null hypothesis, we conclude that the fixed-effects model is better than the random-effects model. The Breusch and Pagan Lagrangian multiplier test tests the null hypothesis that there is no factor in the panel data that is not covered by the model variables, and which is specific to each country. The results of the test $chi^2(1)=0.00$, p=1.000 suggest that the null hypothesis cannot be rejected, which is why we can conclude that there are no panel effects in the data. The test results show that the OLS regression model is reliable and objective, which is why data is tested under OLS regression. The Breusch-Pagan/Cook-Weisberg test for heteroskedasticity is used to test data heteroskedasticity. The null hypothesis is that the variance is constant. Based on the test result $chi^2(1)=4.47$, p=0.034, at the error level of 5% we reject the null hypothesis and conclude that there is data heteroskedasticity. Therefore, the OLS model with a robust estimator is selected. The results of the analysis are presented in Table 5.

Table 5. OLS regression with robust estimator

	β (95% CI)	SE	p
GDP_pc	–0.0003 (–0.0007, 0.0001)	0.0002	0.087
Inflation	0.0013 (0.0006, 0.0027)	0.0007	0.061
Exchange rate	0.0001 (0.0000, 0.0002)*	0.0000	0.014
Real interest rate	0.0016 (0.0010, 0.0023)*	0.0003	0.000
Concentration	0.0076 (0.0007, 0.0146)*	0.0034	0.032
Liquidity	–0.0002 (–0.0005, 0.0001)	0.0001	0.209
Size	0.0060 (0.0004, 0.1164)*	0.0028	0.035
Credit risk	–0.0001 (–0.0003, 0.0001)	0.0001	0.351
Capitalization	–0.0001(–0.0007, 0.0006)	0.0003	0.836
const	0.0211 (0.0052, 0.0369)*	0.0078	0.011
N	48		
F(9,38)	16.24		
p	<0.001		
R^2	0.6984		
RMSE	0.005		

*p < 0.05

Source: Authors' calculations

The model is significant because F(9,38)=16.24; *p*<0,001. All independent variables explain 69.84% of the variation of the dependent variable (R^2=0.6984). The variation of dependent variable is significantly affected by *exchange rate* (*β*=0.0001, 95% CI=0.0000-0.0001, *p*=0.01), *real interest rate* (*β*=0.0016, 95% CI=0.0010-0.0023, *p*<0.01), *concentration* (*β*=0.0076, CI=0.0007-0.0146, *p*=0.03) and *size* (*β*=0.0060, CI=0.0004-0.1164, *p*=0.04). An increase in the exchange rate by 1 monetary unit leads to an increase in NIM by 0.0001 on average, with other values unchanged. An increase in the real interest rate by 1 increases NIM by 0.0016 on average, with the values of other variables unchanged. An increase in the level of concentration by 1 index point increases NIM by 0.0076 on average, with unchanged values of other variables. An increase in the bank size by one million dollars leads to an increase in NIM by 0.006 on average, with the unchanged values of other variables.

When interpreting the results of this analysis, it should be borne in mind that in banking industries burdened with a high degree of financial euroization, the official statistics on net interest margin somewhat reduces this indicator whenever there is a noticeable exchange rate trend. That is, only a part of the total income from lending activities will be reported as interest income, while a significant part will be recorded as income from currency translation differences and the so-called

effects of the contracted currency clause. For the same reason, the importance of data on interest expenses will be reduced too. Nevertheless, the position of net interest income will retain a greater part of its importance in the analyses. However, it should be noted that income from currency translation differences and the effects of the contracted currency clause will be more significant under the pronounced depreciation of the domestic currency, because, as a rule, the degree of credit euroization is higher than the degree of deposit (liabilities) euroization.

The high degree of financial euroization in the analyzed set of banking sectors is responsible for the great importance of exchange rate, as a macro-financial variable, in banking operations (Marinković & Radović, 2017). Two macroeconomic and two banking industry variables have proven to be significant for the variability of net interest margin. Among the macroeconomic variables, the variability of exchange rate and real interest rates has proven to be significant in explaining the variability of NIM, the same applying to inflation rate but with somewhat lower statistical confidence. All variables have a positive sign, which means that their increase also increases net interest margin. In the case of exchange rate, given the way this variable is recorded, the depreciation of the domestic currency is estimated to increase net interest margin. As according to the exchange rate monetary theory, the difference in inflation and the difference in real interest rates are the key elements in the equation of the nominal exchange rate, we can conclude that the statistical significance of these three variables confirms the rule that the effect of depreciation of (internal and external) domestic currency is more fully incorporated into lending than in deposit arrangements. The growth of interest rates on loans with no growth of interest rates on deposits in the same degree will clearly expand net interest margin. Such trends are more likely in banking sectors with a higher degree of concentration and an oligopolistic market structure. This can also explain the statistical significance of the degree of banking sector concentration. The effect of the size of the banking sector is positive, which means that large banking sectors, as well as the growth of banks' assets, give a higher net interest margin. The interpretation of this direction of influence would make more sense if the indicator of the size of the banking sector was normalized by GDP, that is, defined as the bank-asset-to-GDP ratio.

Predictors that indicate the degree of exposure of the banking sector to credit and certain market risks do not confirm their influence on NIM, nor does the degree of solvency that should indicate the capacity of banks to absorb/finance risk exposure. One of the reasons that can lead to the absence of the influence of these variables on NIM is the influence of prudential regulation on banking operations. Although the regulatory framework may differ on a country basis, it is regularly shaped according to supranational guidelines, and as the countries in the sample, if they are not members of the European Union, they set the EU membership as a strategic priority, that means that they largely apply the same solutions that are already applied in the EU. Even if the bank, rather than the banking sector, was

used as the unit of observation, the influence of these variables would be lower because the regulation limits the variability of these predictor variables. At the level of the banking industry, variability is further reduced because in such research data are averaged.

Conclusion

The paper analyzed the determinants of bank net interest margin in the selected Southeast European countries. The analysis covered the period from 2012 to 2021. Net interest margin is a key indicator of bank efficiency, and the main input of bank profitability. Proceeding from previous theoretical and empirical research, the analysis relied on a set of data on macroeconomic and banking industry variables by using Pooled OLS regression method. Due to the high level of financial euroization in the banking sectors of Southeastern European countries, NIM is expected to be influenced by exchange rate. In addition to exchange rate, real loan interest rates and inflation are macroeconomic variables proved to be significant predictors (with somewhat lower statistical confidence). All variables have a positive sign, which means that their rise increases net interest margin. Statistical significance of these three variables confirmed the rule that the effect of domestic currency depreciation is more fully incorporated into lending arrangements than into deposit arrangements. The growth of interest rates on loans with no growth of interest rates on deposits in the same degree will clearly expand net interest margin. Such trends are more likely in banking sectors with higher concentration and oligopolistic market structure. This can also explain the statistical significance of the banking sectors' degree of concentration. Predictors indicating the degree of exposure of the banking sector to credit and certain market risks did not confirm their influence on NIM, nor did the degree of solvency, which we can attribute to the influence of the similar framework of prudential regulation.

References

Abreu, M. & Mendes, V. (2001). Commercial bank interest margins and profitability: Evidence from some EU countries. *Pan-european conference jointly organised by the IEFS-UK & University of Macedonia Economic & Social Sciences,* 34, 17-20.

Bustos-Contell, E. Climent-Serrano, S. & Labatut-Serer, G. (2019). A fuzzy-set qualitative comparative analysis model to predict bank bailouts: A study of the Spanish financial system, *Economic Research*, 34:1, 2555-2571

Bustos-Contell, E. Climent-Serrano, S. & Labatut-Serer, G. (2019). Changes in determinants of the interest margin in today's economy, *Economic Research*, doi: 10.1080/1331677X.2019.1696693

Claeys, S. & Vander Vennet, R. (2008). Determinants of bank interest margins in Central and Eastern Europe: A comparison with the West. *Economic Systems,* 32(2), 197–216.

Cruz-García, P. & Fernández de Guevara, J. (2019). Determinants of net interest margin: The effect of capital requirements and deposit insurance scheme, *The European Journal of Finance,* DOI: 10.1080/1351847X.2019.1700149

Demirgüç-Kunt, A. & Huizinga, H. (1999). Determinants of commercial bank interest margins and profitability: Some international evidence, *Worl Bank Economic Review,* 13 (2), 379-408.

Fungáčová, Z. & Poghosyan, T. (2011). Determinants of bank interest margins in Russia: Doesbank ownership matter? *Economic Systems*, 35(4), 481-495.

Ganić, M. (2018) An empirical analysis of factors affecting bank interest margins: Evidence from the South East European countries, Comparative economic research. *Central and Eastern Europe,* 21(2), doi:/10.2478/cer-2018-0013

Ho, T. S. & Saunder, A. (1981). The determinants of bank interest margins: Theory and empirical evidence. *The Journal of Financial and Quantitative Analysis* 16 (04): 581–600.

IMF (2024)., preuzeto sa: https://data.imf.org/regular.aspx?key=63174547, pristupljeno: 6. Aprila 2024.

Kasman, A. & Tunc, G. & Vardar, G. & Okan, B. (2010). Consolidation and commercial bank net interest margins: Evidence from the old European Union members and candidate countries, *Economic Modelling* 27, 648-655.

Lopez-Espinosa, G. Moreno, A. & Perez de Gracia, F. (2011). Banks' net interest margin in the 2000s: A macro-accounting international perspective. *Journal of International Money and Finance*, 30, 1214- 1233.

Marinković, S. & Radović, O. (2014). Bank net interest margin related to risk, ownership and size: An exploratory study of the Serbian banking industry*, Economic Research,* 27:1, 134-154, doi: 10.1080/1331677X.2014.952114

Marinković, S. & Radović, O. (2016). What drives a local currency away from banking markets? Some Southeast Europe insights, in Goić et al. (ed.), *Finance in Central and Southeastern Europe*, Springer International Publishing, Switzerland, 35–56.

Maudos, J. & Fernandez de Guevara, J. (2004). Factors explaining the interest margin in the banking sectors of the european union. *Journal of Banking and Finance,* 28, 2259–2281.

Samuelson, P. A. (1945). The effect of interest rate increases on the banking system. *American Economic Review*, 35(1), 16–27. http://www.jstor.org/stable/1810106

Saunders, A. & Schumacher, L. (2000). The determinants of bank interest rate margins: An international study. *Journal of International Money and Finance* 19 (6): 813–832.

ANALIZA DETERMINANTI NETO KAMATNE MARŽE BANKARSKIH SEKTORA U DRŽAVAMA JUGOISTOČNE EVROPE

Rezime: U radu se analiziraju determinante neto kamatne marže banaka u izabranim državama Jugoistočne Evrope u periodu od 2012. do 2021. godine. U skup su uključene države sa srodnim društveno-ekonomskim obeležjima i karakterom finansijskog sistema. Cilj rada je da identifikuje zajedničke determinante neto kamatne marže u posmatranim bankarskim sistemima. Polazeći od prethodnih teorijskih i empirijskih istraživanja, analiza je sprovedena na bazi skupa podataka o makroekonomskim i varijablama koje obeležavaju bankarski sektor primenom metoda regresije sa običnim najmanjim kvadratima (pooled OLS regression), jer preliminarnim analizama podataka nisu utvrđeni uslovi za primenu panel regresije sa fiksnim ili slučajnim efektima. Prediktorske promenljive u modelu su: bruto domaći proizvod po gravi stanovnika, inflacija, devizni kurs, realna kamatna stopa, mere koncentracije, veličine, kapitalizacije, likvidnosti bankarskog sektora i prisustva kreditnog rizika u bankarskom sektoru. Kao kriterijumska promenljiva korišćena je neto kamatna marža (NIM). Rezultati su potvrdili da je model statistički značajan, i da varijaciji kriterijumske promenljive značajno doprinose devizni kurs, realna kamatna stopa, stepen koncentracije i veličina bankarskog sektora. Značajne varijable su pokazale i očekivani pravac uticaja na kretanje NIM. Rast deviznog kursa, realne kamatne stope, stepena koncentracije i veličine bankarskog sektora praćen je povećanjem neto kamatne marže banaka u analiziranim državama za posmatrani period, uz nepromenjene vrednosti ostalih varijabli. Analiza nije potvrdila uticaj ostalih prediktora na NIM.

Ključne reči: neto kamatna marža, bankarski sektor, makroekonomske determinante, Jugoistočna Evropa

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