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## DOES THE OLIGOPOLISTIC POSITION OF BANKS AFFECT THE PERFORMANCE OF THE BANKING SECTOR IN THE FEDERATION OF BOSNIA AND HERZEGOVINA?

### ABSTRACT:

*The level of banking concentration has increased significantly in the banking sector of Bosnia and Herzegovina as a result of the successful completion of privatization, the formation of new banks, the slow transition and rapid liberalization. Rapid liberalization has introduced strong competition in the domestic banking sector on the one hand, while there has been an increased concentration of some larger banks in the system. The main goal of this research will be to analyze the correlation between the basic measures of the oligopolistic position of banks and their impact on improving or deteriorating the performance of domestic banks, such as return on assets (ROA), return on equity (ROE) and net interest margin (NIM). The survey period covers the years from 2008: Q1 to 2020: Q4 on a quarterly basis. The following variables were used as independent variables in the model: HHI market concentration index in the context of loans, share of foreign banks in the total ownership structure of banks (FB), bank size (BS) and growth rate of total loans (GRTL). The interdependence of variables in this study was tested via the OLS regression model. The results showed that the foreign-owned Banks (FB) variable has a positive impact on the variable return on Assets (ROA), while the variables bank size (BS) and market concentration index for loans (HHI) have a negative impact. The result also showed that the two variables the growth rate of total loans (GRTL) as well as foreign-owned banks (FB) have a positive impact on the variable return on equity (ROE), while the variables market concentration index for loans (HHI) and bank size (BS) have a negative effect. The third result is that the variable net interest margin (NIM) has the strongest positive impact on the two variables foreign-owned banks (FB) and credit growth rate (GRTL), while concentrations for credit placements (HHI) and bank size (BS) have a negative effect.*

**Keywords:** Performance, privatization, concentration, banks in Federation of B&H.

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## 1. Introduction

Commercial banks are financial institutions that provide funds transfer services, from savings units for investment services. They make a profit by providing loans based on deposits received. Banks offer a large number of products to both individuals and companies. As one of the most important factors in financial intermediation, commercial banks represent a crucial part of the growth of economies around the world.

The financial system in Bosnia and Herzegovina has been liberalized. The slow transition and rapid liberalization have introduced strong competition in the domestic banking sector, where at the same time there has been a strong concentration in the banking sector. Underdeveloped countries are characterized by low gross domestic product, low credit growth rate of the real sector, lack of appropriate markets, and lack of appropriate regulations and skills. A special contribution of this research is reflected in the testing of profitability determinants from the point of view of the oligopolistic position of banks in Bosnia and Herzegovina, on the one hand, and on the other hand the lack of studies examining the impact of the oligopolistic position of banks on their profitability.

The theory of market power and the theory of efficient structure explained in detail the relationship between the market structure and the performance of banks. Structure Conduct-Performance hypothesis (SCP) and Relative Market Power hypothesis (RMP) studied Market Power (MP) theory, and the similarities between x-efficiency (XE) and scale efficiency (XE).

The aim of this research is to enrich the available literature in this area, exploring the impact of certain concentration measures that accompany the existence of an oligopoly on the market and their impact on the profitability of BH banks during the period: 2008: Q4 - 2020: Q4. During the earlier and observed period, a large number of banks experienced success, while a small number of banks faced problems, mainly domestic banks.

The paper consists of six parts. The first part is an introduction. The second unit is a literature review for some studies that examined the relationship between the oligopolistic position of banks and the performance of banking sector.

The third part analyzes a selected group of indicators of the health banks in B&H. The fourth part describes the chosen model and estimation technique, namely the Random effect model and the Fixed effect model through the application of the Hausman test. The fifth part deals with the data necessary for the analysis. The six part elaborates on the results of the research with recommendations.

## 2. A Literature Review

Goldberg and Rai (1996) investigated in their study whether there is a correlative relationship between concentration and profitability. They concluded there is no established correlation between concentration and profitability in the professional literature, while on the other hand, half of the studies state that there is a positive correlation between concentration and profitability. Claessens, et al. (2001) investigated the impact and effect of foreign banks on the domestic market in a sample of 7900 banks from 80 countries, and for the period from 1988 to 1995. Their research was based on the difference in net interest margins, overhead costs, taxes paid, and profitability between domestic and foreign banks. They concluded that foreign banks have higher profitability than domestic banks in countries in developing countries, but not in developed countries. In this regard, the study found it was generally associated with lower profitability, lower costs, and a lower range of interest rates among domestic banks. Hermes and Lensink (2003) investigated the impact of foreign bank entry in countries with a lower stage of development and higher borrowing costs and net interest margins. They used data for 990 banks from 48 countries for the period from 1990 to 1996. They concluded that the entry of foreign banks in countries with lower stages of development is associated primarily with higher costs and interest margins compared to domestic banks. On the other hand, in the higher stages of development, the entry of foreign banks has a smaller effect on domestic banks.

Staikouras and Wood (2004) investigated the analysis of time series of cross-sections examining European banks for the period from 1994 to 1998. The results showed that profitability is affected not only by factors related to the influence of bank management decisions, but also by changes in the external macroeconomic environment. The structure-performance relationship in European banking has a positive interdependence with variables of concentration or market share on the profitability of banks. The presence of foreign banks can be beneficial to consumers by offering superior products and services to the financial industry by increasing the quality of services and the economy by increasing efficiency (Jildirim and Philippatos, 2007). However, the entry of foreign banks is not without risk, especially when this entry is made without prior consolidation of the institutional framework. Claessens et al. (1998) have shown that the presence of foreign banks can facilitate increased competition, improved credit distribution and access to international capital markets. But this also entails costs related to the entry of foreign banks, the costs which may consist of increased systemic risk caused by increased competition.

Thapa (2010) investigated the correlation between strategy and performance in Nepalese banks. He concluded that there is a positive correlation between the competitive strategies that banks implement and their organizational performance.

Therefore, it was also concluded that the best effects relate to the cost management strategy, i.e., reducing operating costs, and offering competitive prices. Olivero and Wu (2011) analyzed the impact of the presence of foreign banks on bank competition at the country and year level. They concluded that there is a negative (positive) relationship between foreign ownership and market power. Audio & Ellouze (2013), according to their research results, which are consistent with the SCP hypothesis, say that the more concentrated the banking system, the higher the profit reflection on efficiency.

Rahman & Reja (2015) investigated the relationship between the ownership structure and performance of banks in Malaysia, where they found that government ownership had a major impact on changes in bank operations. Haque & Shahid (2016) examined the effects on the government ownership, foreign ownership, and ownership concentration on bank performance and concluded that the government ownership negatively affects bank profitability.

### 3. The Bosnian banking system in light of the analysis, profitability, risk and concentration indicators

The financial model in Bosnia and Herzegovina is a bank-centric type characterized by a very high level of competition. On the other hand, apart from the competition in the banking system of BH, concentration is expressed. For illustration, in the banking system of the Republic of Srpska, four large and four small banks are dominant, where banks hold almost 80% of the banking market of the Republic of Srpska. In the Federation of BH, the largest five banks hold almost 74% of the loan and deposit market. The financial system in Bosnia and Herzegovina has been liberalized.

**Table 1:** Evaluation of some indicators of the Bosnian banking sector during 2010:Q4 - 2020:Q2 (in %)

Indicators	2010: Q4	2011: Q4	2012: Q4	2013: Q4	2014: Q4	2015: Q4	2016: Q4	2017: Q4	2018: Q4	2019: Q4	2020: Q1	2020: Q2	Average
Return on assets	-0.6	0.7	0.7	-0.1	0.8	0.3	1.1	1.5	1.3	1.4	0.3	0.5	0.66
Return on equity	-5.5	5.8	5.1	-0.5	5.4	2.0	7.3	10.2	9.6	10.4	2.4	3.6	4.65
Regulatory Capital to Risk-Weighted Assets	12.6	13.6	14.1	15.2	14.3	13.8	15.0	15.7	17.5	18.0	17.8	18.4	15.5
Non-performing Loans to Total Gross Loans	11.4	11.8	13.5	15.1	14.2	13.7	11.8	10.0	8.8	7.4	6.6	6.7	10.92
Interest Margin to Gross Income	60.1	63.9	63.7	62.3	61.6	62.0	60.4	58.3	58.8	56.8	56.9	56.8	60.13
Liquid Asset Ratio	29.0	27.2	25.4	26.4	26.8	26.5	27.2	28.4	29.7	29.6	28.1	27.3	27.63

**Source:** <https://data.imf.org> (Adjusted by the author)

The banking sector of Bosnia and Herzegovina during the observed period was adequately capitalized, where the rate of regulatory capital to risk assets ranged from a minimum of 12.6% in 2010:Q4 to a maximum of 18,4% in 2020:Q4, which is significantly above the statutory minimum of 12 %. The average capital adequacy ratio was 15.50%. Toxic loans had a very volatile trend as a result of increased credit risk, risk aversion, saturation of the economy with loans, rising unemployment rates and the limited inflow of money from abroad. The largest share of non-performing loans in total gross loans was recorded in 2013:Q4 (15.1%), while on the other hand the smallest share was recorded in 2020:Q1 (6.6%). The average amount of toxic loans in total loans was about 10.92%. The reduction in credit risk and non-performing loans arose as a result of the permanent write-off of non-performing loans, mild economic growth achieved in 2019, and more favorable financing conditions in terms of falling interest rates.

#### 4. Model and estimation technique

In order to assess the impact of banking-specific, market and macroeconomic variables on the profitability of banks in Bosnia and Herzegovina, we used the following general model:

$$Y_{it} = \alpha + \beta' X_{it} + \mu_{it} \quad (1)$$

Where  $Y_{it}$  is the dependent variable,  $\alpha$  is the intercept term,  $\beta$  - is a  $k \times 1$  vector of parameters to be estimated on the explanatory variables and  $\mu$  is an error term (Brooks, 2008). By including all independent and dependent variables (ROA) in equation 1, model I is formulated as follows:

$$ROA_{i,t} = \alpha + \beta_{it} (+HHIloans_{i,t} + BS_{i,t} + FB_{i,t} + GRTL_{i,t}) + \mu_{it} \quad \text{Model I}$$

By including second dependent (ROE) and independent variables in equation 1, model II is formulated as follows:

$$ROE_{i,t} = \alpha + \beta_{it} (+HHIloans_{i,t} + BS_{i,t} + FB_{i,t} + GRTL_{i,t}) + \mu_{it} \quad \text{Model II}$$

Finally, by including a third dependent variable (NIM) and independent variables in equation 1, model III is formulated as follows:

$$NIM_{i,t} = \alpha + \beta_{it} (+HHIloans_{i,t} + BS_{i,t} + FB_{i,t} + GRTL_{i,t}) + \mu_{it} \quad \text{Model III}$$

The zero hypothesis supports the random-effects model. The alternative hypothesis supports the fixed effects model. The following hypotheses were tested:

- *The zero hypothesis supports the random-effects model.*
- *The alternative hypothesis supports the fixed effects model.*

If a p-value is statistically significant, the fixed-effect model should be used. On the other hand, if a p-value is not statistically significant, the random effect model should be used. The significance test was performed for all variables by using a t-test at a significance level of 95% (Chmelarova, 2007). The zero and the first hypotheses were tested by using the Hausman test.

## 5. Data and variables

The sample of this research consists of 15 commercial banks in the Federation of Bosnia and Herzegovina in the period from the first quarter of 2008 to the fourth quarter of 2020. The bank-specific data were collected from The Banking Agency of the Federation of the B&H while data on the country and market were obtained from statistical publications of Bosnia and Herzegovina and The Central Bank of Bosnia and Herzegovina. This empirical study uses quarterly data for the entire banking system of The Federation of Bosnia and Herzegovina. The dependent variables the return on asset (ROA) the return on equity (ROE) and the net profit margin were used. And four independent variables are used, they are Herfindahl-Hirschman Index (HHI), bank size (BS), foreign banks (FB) and growth rate of total loans (GRTL). As in most of the previous studies, ROA, ROE and NIM are dependent variables and they were used as a measure of individual bank profitability. In table 2 the explanatory variables and anticipated effects of dependent and independent variables are given:

**Table 2:** A brief description of the dependent and independent variables in the model

VARIABLE	MEASURED BY	ANTICIPATED SIGNS
ROA	The ratio of profit to total assets	-
ROE	This ratio is obtained by dividing the bank's net income with the equity	-
NIM		-
HHI	The Herfindahl-Hirschman index - computed as the sum of squared market shares of all banks	+or-
BS	Bank size is measured by total assets or as a logarithmic function of total bank assets	+or-
FB	Foreign-owned banks are identified as banks with 50% or more of foreign-owned assets, and are used as information to construct a foreign-owned variable.	+
GRTL	The growth rate of total loans is expressed as a percentage change (increase / decrease in credit growth) in the current compared to the previous quarter.	+or-

**Source:** *Author's study*

**Where:**

**Return on assets (ROA):** is considered to be the most appropriate measure to evaluate the performance of a bank's business. The ROA is obtained by dividing the bank's income before the interest payable on its assets.

Thus, ROA measures the effectiveness of management in using the resources of a bank to make a profit. It also evaluates the efficiency of the bank in using its financial and real investments to earn interest and other fees. This measure of bank profitability is particularly significant when comparing operational efficiency between banks (Sinkey, 1988).

**Return on equity (ROE):** expresses how much a bank earns on the book value of its investments. This ratio is obtained by dividing the bank's net income with equity, which reflects the revenue generation, operational efficiency, financial leverage, and tax planning. For some banks, ROE may be high because banks do not have an adequate capital ratio. The capital adequacy ratio in Bosnia and Herzegovina is 12%, which is the legal minimum so that almost all banks maintain a capital adequacy ratio. ROE can also be obtained as a product of ROA and leverage multiplier, where a bank can use this ratio between two ratios to improve ROE ratios. For example, banks with low ROA can increase their ROE by using additional leverage, that is, by increasing their asset-equity ratio (Koch & MacDonald, 2009).

**Net interest margin (NIM):** measures how efficient the bank is in financial intermediation, i.e. in performing the functions of taking and giving loans. The relative amount of net interest margins is obtained when interest-bearing expenses are deducted from interest-bearing income, which is increased by allocated reserves for losses and the entire amount is divided by interest-bearing assets (Plakalović & Alihodžić, 2015).

**The Herfindahl-Hirschman index (HHI):** HHI can take different values in an interval from 0 to 10.000. The concentration index does not grow linearly, which means that, for example, an amount of 3.000 does not mean that the concentration in the system is 30%. If the concentration index ranges from 0 to 1.000, it is considered that the market is unconcerned, that is, a high level of competition is present. If the index ranges from 1.000 to 1.800, then it can be said that there is a moderate concentration of the market. And if the index record's value is ranging from 1.800 to 10.000, then the market is concentrated, i.e. there is a monopoly (Banking Agency of the Federation of Bosnia and Herzegovina, 2017).

**Bank size (BS):** is measured by total assets or as a logarithmic function of total bank assets, and is considered as one of the most important determinants of bank profitability, where it can have a positive or negative impact on bank profitability. Since the impact of a bank's size on a bank's profitability can have a nonlinear relationship, the log of total assets in order to adjust this nonlinear relationship will be used.

**The foreign bank (FB):** foreign-owned banks are identified as banks with 50% or more of foreign-owned assets, and are used as information to create the foreign-owned variable. This variable identifies the direct effect of foreign ownership on the market power of the banking sector (Claessens and van Horen, 2014).

**The growth rate of total loans (GRTL):** the growth rate of total loans is expressed as a percentage change (increase/decrease in credit growth) in the current compared to the previous quarter (Plakalović & Alihodžić, 2015).

## 6. Results

Before the hypothesis was tested, correlations and regression were shown in tables 3-10. The total number of observations is 52 which represents a representative sample both in terms of the bank sector of Bosnia and Herzegovina and the view of the timeframe.

**Table 3:** Correlation matrix (Pearson Correlation) between dependent and independent variables of banks in Bosnia and Herzegovina in the period: 2008:Q1 - 2020:Q4

		ROA	ROE	NIM	HHI	BS	FB	GRTL
ROA	Pearson Correlation	1.000	0.925	0.335	-0.493	0.499	0.666	0.166
	Sig. (2-tailed)	-	0.000	0.015	0.000	0.000	0.000	0.239
	N	52	52	52	52	52	52	52
ROE	Pearson Correlation	0.925	1.000	0.321	-0.429	0.460	0.624	0.094
	Sig. (2-tailed)	0.000	-	0.020	0.001	0.001	0.000	0.505
	N	52	52	52	52	52	52	52
NIM	Pearson Correlation	0.335	0.321	1.000	-0.305	0.146	0.019	0.259
	Sig. (2-tailed)	0.015	0.020	-	0.028	0.303	0.892	0.064
	N	52	52	52	52	52	52	52
HHI	Pearson Correlation	-0.493	-0.429	-0.305	1.000	-0.629	-0.824	0.054
	Sig. (2-tailed)	0.000	0.001	0.028	-	0.000	0.000	0.705
	N	52	52	52	52	52	52	52
BS	Pearson Correlation	0.499	0.460	0.146	-0.629	1.000	0.679	-0.333
	Sig. (2-tailed)	0.000	0.000	0.303	0.000	-	0.000	0.016
	N	52	52	52	52	52	52	52
FB	Pearson Correlation	0.666	0.624	0.019	-0.824	0.679	1.000	0.049
	Sig. (2-tailed)	0.000	0.000	0.892	0.000	0.000	-	0.731
	N	52	52	52	52	52	52	52
GRTL	Pearson Correlation	0.166	0.094	0.259	0.054	-0.333	0.049	1.000
	Sig. (2-tailed)	0.239	0.505	0.064	0.705	0.016	0.731	-
	N	52	52	52	52	52	52	52

Source: Author's calculations



The strong positive correlation between the first dependent variable in the model (ROA) was recorded with the independent variable by the share of foreign equity in the total capital structure (0.666) at the significance ( $p < 0.05$ ). The share of foreign capital in 2001 and 2002 was quite high because these were the years of privatization, and the years of the formation of new banks, which was accompanied by a higher intensity of capital investment in banking institutions. Therefore, it was a period of reducing the share of the state-owned banking sector, expanding the number of business units, introducing new products such as mortgage loans, leasing, etc. Foreign ownership has had a positive impact on banks' profitability because foreign banks have the state-of-the-art technology, high standards of governance, better risk mitigation, and can benefit from special tax breaks.

There is also a correlation between independent variables such as foreign bank and bank size, which was recorded by a positive correlation of 0.679 with a significance of  $p < 0.05$ . This is primarily the result of the increased effect of several foreign banks on the increase in banking assets. By comparing the fourth quarter of 2020, with the fourth quarter of 2008, the share of foreign banks increased by about 86%, while total assets for the same period increased by about 58% (Banking Agency of the FB&H, 2020). The second dependent variable (ROE) recorded the strongest positive correlation with share of foreign equity in the total capital structure (0.624) at the significance  $p < 0.05$ .

In terms of the negative correlation, the third dependent variable, the net interest margin (NIM) recorded the strong negative correlation for the market concentration index HHI (-0.305) with a significance of  $p < 0.05$ . Bikker and Haaf (2002) investigated the conditions of economic competition and the structure of the banking sector in 23 countries around the world. They concluded that the greatest degree of competition was shown by large banks, usually in international markets. Contrary to these findings, they concluded that smaller banks in local markets have a lower degree of competition. In this regard, they came to the new conclusion that a higher level of concentration leads to lower competition. Therefore, there is a moderate concentration of the Bosnian-Herzegovinian bank market. Based on the previous negative correlation between the NIM and the HHI index, it can be concluded that with a decrease in concentration, the net interest margin can increase, observed for the entire banking system, and not only at the level of individual banks. Table 4 shows summary statistics of the total correlation of the first three dependent variables in the model (ROA, ROE and NIM).

**Table 4:** Summary correlation statistics between dependent and independent variables of banks in Bosnia and Herzegovina in the period: 2008:Q1 - 2020:Q4

Dependent variables	R	R Square	Adjusted R Square	Std Error of the Estimate	Durbin - Watson
ROA	0.708	0.501	0.459	0.32763	1.489
ROE	0.659	0.434	0.386	4.926	1.140
NIM	0.541	0.293	0.232	3.70421	0.586

**Source:** *Author's calculations*

All three observed dependent variables have a correlation greater than 0.50, which indicates the conclusion that this is a medium-strong correlation. Durbin and Watson (1951) applied this statistic to the least-squares regression residues, and developed limit tests for the null hypothesis that the errors were serially uncorrelated with the alternative, that they followed a first-order autoregressive procedure. If the values of Durbin Watson statistics are significantly less than 2 then there is a positive serial correlation. In terms of Durbin Watson the correlations of values are different, the first two dependent variables in the model (ROA and ROE) had values greater than 1 and less than 2, which implies the conclusion that this is a positive serial correlation. The NIM variable has a very low correlation in terms of the Durbin Watson correlation value.

This research is focused on the impact of specific variables of market concentration of banks, as well as some specific factors on the profitability of domestic, foreign and all banks in the Federation of Bosnia and Herzegovina. The regression results for Model I are presented in table 5.

**Table 5:** Fixed effects regression between dependent (ROA) and independent variables of banks in Bosnia and Herzegovina in the period: 2008:Q1 - 2020:Q4 - (Model I)

Fixed-effects (within) regression		Number of obs = 52				
R-sq: within = 0.5174		Number of groups = 4				
between = 0.6073						
overall = 0.4961		Obs per group: min = 13				
avg = 13.0						
max = 13						
F(8,44) = 11.80						
Prob > F = 0.000						
ROA (dependent)	Coeff.	Std. Err.	t	P> t	[95% Conf. Interval]	
HHI	-0.000764	0.00062	-1.24	0.223	-0.00048	0.002009
BS	-0.122499	0.88899	-0.14	0.891	-1.91415	1.669153
FB	7.19e-07	1.68e-07	4.28	0.000	3.80e-07	1.06e-06
GRTL	0.048448	0.038931	-1.24	0.220	0.12690	0.030013
_cons	-1.30732	6.565485	-0.20	0.843	-14.5391	11.92454
sigma_u	0.151679					
sigma_e	0.309180					
Rho	0.193986					

**Source:** *Author's calculations (STATA 13.0).*

The total number of observations is 52 which makes the models relatively representative. The empirical value of the F test for 8 degrees of freedom in the numerator and 44 in the denominator was 11.80. The probability based on the fixed effects regression is 0.000, which means that the model is very significant. In the previous table, it can be seen that independent variables (p-value < 5%) mostly affect the dependent variable return on asset (ROA) such as the share of foreign capital of banks in total capital (0.000).

The estimated results of the observed 15 banks in the Federation of B&H show that most of the analyzed variables have a significant impact on the profitability of banks. Based on the negative correlation between bank size and return on asset (-0.122), it can be concluded that there is no evidence that larger banks ultimately make higher profits due to the impact of economies of scale. Therefore, it should be clear to the management of commercial banks in the Federation of B&H that a higher level of total assets is not a sine qua non for greater profitability of the bank.

**Table 6:** Random effects (GLS) regression between dependent and independent variables of banks in Bosnia and Herzegovina for the period: 2008:Q1 - 2020Q4 - (Model I)

Random-effects GLS regression						Number of obs = 52
R-sq: within = 0.5129						Number of groups = 4
between = 0.6109						
overall = 0.5010						Obs per group: min = 13
avg = 13.0						
max = 13						
Wald chi2 (4) = 47.19						
Prob > chi2 = 0.000						
ROA (dependent)	Coeff.	Std. Err.	z	P> z	[95% Conf. Interval]	
HHI	-0.000820	0.00065	-1.26	0.208	-0.000456	0.002097
BS	-0.237625	0.90930	0.794	0.794	-2.01983	1.544577
FB	7.56e-07	1.76e-07	4.30	0.000	4.12e-07	1.10e-06
GRTL	0.07412	0.037429	1.98	0.048	1.14748	0.000759
_cons	-0.60313	6.709846	-0.09	0.928	-13.7541	12.54792
sigma_u	0					
sigma_e	0.309180					
rho	0					

**Source:** Author's calculations (STATA 13.0).

The results showed that the Generalized Least Squares Regression (GLS) better describes the impact of independent variables on return on asset (ROA). The results of the Hausman test showed that  $Pro>chi2 = 0.272$ , that is, the random effect GLS model gives higher significance than fixed effects regression, for the simple reason that the value of  $Pro>chi2 > 0.05$  (Appendix I - Model I). The most significant positive effect on the dependent variable (ROA) was recorded by the following independent variable: foreign banks with a significance of less than 0.05.

Foreign banks have higher productivity compared to domestic banks. Also, further analysis showed that foreign banks in Serbia during the crisis were better capitalized than domestic banks, and had a lower ratio of liquid assets, i.e., higher credit ratio to deposit activity (Kovačević, 2012).

**Table 7:** Fixed effects regression between dependent (ROE) and independent variables of banks in Bosnia and Herzegovina in the period: 2008:Q1 - 2020:Q4 - (Model II)

Fixed-effects (within) regression		Number of obs = 52				
R-sq: within = 0.436		Number of groups = 4				
between = 0.685						
overall = 0.431		Obs per group: min = 13				
avg = 13.0						
max = 13.0						
F(8,44) = 8.50						
Prob > F = 0.000						
ROE (dependent)	Coeff.	Std. Err.	t	P> t	[95% Conf. Interval]	
HHI	-0.0149	0.009765	-1.53	0.132	-0.00470	0.034657
BS	-2.2387	14.04662	-0.16	0.874	-26.0703	30.54786
FB	0.00001	2.66e-06	3.79	0.000	4.71e-06	0.0000154
GRTL	0.37557	0.615136	0.61	0.545	1.615302	0.864148
_cons	-54.2786	103.738	-0.52	0.603	-263.349	154.792
sigma_u	1.584					
sigma_e	4.885					
Rho	0.0951					

**Source:** Author's calculations (STATA 13.0).

From table 7, it can be seen that the strongest positive correlation with the ROE variable was recorded by the FB variable (0.00001) at a significance of less than 5%. A study by Claessens and Lee (2003) found that the participation of foreign banks was beneficial for domestic banks in terms of reducing financial intermediation costs. In addition, foreign banks have made the financial system more efficient and powerful. Their study included 58 low-income countries. In this regard, it can be concluded that the entry of foreign banks had a positive implications for the banking system of developing countries.

**Table 8:** Random effects (GLS) regression between dependent and independent variables of banks in Bosnia and Herzegovina for the period: 2008:Q1 - 2020Q4 - (Model II)

Random-effects GLS regression		Number of obs = 52				
R-sq: within = 0.4330		Number of groups = 4				
between = 0.6771		Obs per group: min = 13				
overall = 0.4343						
avg = 13.0						
max = 13						
Wald chi2 (4) = 36.08						
Prob > chi2 = 0.000						
ROE (dependent)	Coeff.	Std. Err.	z	P>[z]	[95% Conf. Interval]	
HHI	-0.0154	0.0097967	-1.57	0.116	-0.00381	0.03458
BS	-0.4192	13.67108	-1.57	0.116	-26.3755	27.21412
FB	0.000010	2.64e-06	3.97	0.000	5.31e-06	0.0000157
GRTL	0.674103	0.562738	1.20	0.231	-1.77705	0.428844
_cons	-42.1937	100.880	-0.42	0.676	-239.915	155.528
sigma_u	0					
sigma_e	4.885219					
Rho	0					

**Source:** Author's calculations (STATA 13.0).

According to Havrylchyk and Jurzyk (2006), a positive correlation was found between the market concentration of domestic banks and profitability, while foreign banks are not significantly affected by market concentration. Also, according to the results obtained from table 8, there is a positive correlation between the market concentration index (HHI index) and ROE, but not of high significance. Banks in the Federation of B&H have an oligopolistic position, i.e., 3 to 5 dominant banks have a significant role in relation to the entire banking system. According to the branch structure of placing loans in the Federation of B&H, the largest relative share in 2019, belongs to the industrial production sector of about 14.9%, followed by the trade sector of about 19.0%. Observed on the other hand, the least placed loans refer to the agricultural sector of only 1%, catering of 1.7% and the construction sector of only 3.3% (Banking Agency of the Federation of Bosnia and Herzegovina, 2019).

**Table 9:** Fixed effects regression between dependent (NIM) and independent variables of banks in Bosnia and Herzegovina in the period: 2008:Q1 - 2020:Q4 - (Model III)

Fixed-effects (within) regression						Number of obs = 52
R-sq: within = 0.3033						Number of groups = 4
between = 0.1128						
overall = 0.2912						Obs per group: min = 13
avg =13.0						
max =13						
F(8,44) = 4.79						
Prob > F = 0.001						
NIM (dependent)	Coeff.	Std. Err.	t	P>[t]	[95% Conf. Interval]	
HHI	-0.0293275	0.007354	-3.99	0.000	-0.044148	-0.01451
BS	-0.3135765	10.57885	-0.03	0.976	-21.6338	21.0067
FB	5.58e-06	2.00e-06	2.79	0.002	-9.61e-06	1.55e-06
GRTL	0.447063	0.46327	0.97	0.340	-1.38073	0.48660
_cons	68.55654	78.1278	0.88	0.385	-88.8997	226.012
sigma_u	1.138449					
sigma_e	3.67917					
Rho	0.08738					

**Source:** Author's calculations (STATA 13.0).

F statistic and Wald chi2 are significant at the significance level of 5% for the observed data sets, which indicates that the proposed model corresponds well to the data. The overall shows that 29.26% of change in profitability of all banks in the Federation of Bosnia and Herzegovina is explained by the variables that are used in this model.

**Table 10:** Random effects (GLS) regression between dependent (NIM) and independent variables of banks in Bosnia and Herzegovina for the period: 2008:Q1 - 2020Q4 - (Model III)

Random-effects GLS regression						Number of obs = 52
R-sq: within =0.3019						Number of groups = 4
between = 0.1529						
overall =0.2926						Obs per group: min = 13
avg =130						
max = 13						
Wald chi2 (4) =19.44						
Probe > chi2 = 0.000						
NIM (dependent)	Coeff.	Std. Err.	z	P>[z]	[95% Conf. Interval]	
HHI	-0.02824	0.007367	-3.83	0.000	-0.042681	-0.013802
BS	0.96004	10.28061	0.09	0.926	-19.18959	21.10967
FB	5.45e-06	1.99e-06	2.74	0.004	-9.35e-06	1.56e-06
GRTL	0.516599	0.423178	1.22	0.222	-1.346013	0.312815
_cons	57.43475	75.86171	0.76	0.449	-91.25147	206.121
sigma_u	0					
sigma_e	3.679175					
Rho	0					

**Source:** Author's calculations (STATA 13.0).

The third dependent variable (NIM) recorded the strongest positive correlation with the (FB) variable at a significance of less than 5%. On the other hand, this variable (NIM) had the strongest negative correlation with the variable (HHI\_credits) at a significance of less than 5% (-0.028). For developing countries, the conclusions are that foreign banks have a higher net interest margin, profitability and tax payment compared to domestic banks. It is also pointed out that with the entry into the developing markets, foreign banks did not take into account the need for larger amounts of reserves and commissions. In any case, the entry of foreign banks has created a greater efficiency in the domestic banking system (Claessens, et al. 2001). Foreign banks can not only increase the availability of credit by placing loans directly to domestic companies, but they can also encourage competition and strengthen the financial system, thus helping all borrowers. Likewise, foreign banks often enter the market by merging or merging in a process that changes the market power of all banks present in the system.

## 7. CONCLUSIONS

In this study, the impact of oligopolistic position measures on the profitability of banks in the Federation of Bosnia and Herzegovina was investigated. This study covers the research period: 2008:Q1 - 2020:Q4. The pooled cross - sectional analysis is applied to data from 15 commercial banks. The two variables that show significance in the pooled sample of 52 observations are the foreign banks and the credit market concentration index. Foreign banks played a significant role in the completed privatization of state capital in the Federation of Bosnia and Herzegovina, as well as in reducing intermediation costs, which at the end of this study showed a positive correlation with the first two profitability indicators ROA and ROE. Foreign banks also influenced the increase in competition in the initial years, and later the trend of moderate concentration appeared. The effect of the independent variables on the dependent variable using the pooled OLS regression model (FE) model and the random-effects GLS regression model by using the Hausman test were used. The most significant impact through the OLS regression model and GLS regression model had the following variables: foreign bank as well as credit market concentration index. In terms of testing hypotheses through the Hausman test, we came to the conclusion that the null hypothesis was accepted and the alternative was rejected because the GLS regression model best describes the effect of the independent variables on the dependent variable. Foreign banks have better productivity compared to domestic banks, are also better capitalized, and have a higher loan-to-deposit ratio. The market concentration index has an inverse causality with all three dependent variables in the model, which leads to unequal profitability of the observed individual banks

in the system. With increasing competition and decreasing concentration, the overall profitability of banks could increase. Also, based on the results of this research, it can be concluded that the size of a bank does not necessarily determine and influence its profitability. Therefore, a larger data set of B&H banks could help to incorporate more determinants into the model and better understand the impact of oligopolistic position measures on the bank's profitability. Also, assessing the implications of concentration on overall banking profitability is an important task for banks as well as policymakers. As the results of the study market concentration is negatively related with performance of the bank so that policy makers should concentrate on policies that promote market competition in banking industry and making less market concentration. Improving the performance of banks in Bosnia and Herzegovina over the next few years will be a major challenge due to the influence of external factors such as slower economic growth, competitiveness, saturation of economy and population with credit, slow growth of employment and income, etc. In this regard, a successful response to a turbulent environment is certainly to forecast the bank's performance.

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## DA LI OLIGOPOLSKA POZICIJA BANAKA UTIČE NA PERFORMANSE POSLOVANJA BANKARSKOG SEKTORA U FEDERACIJI BOSNE I HERCEGOVINE?

### SAŽETAK:

*Nivo bankarske koncentracije se značajno povećao u bankarskom sektoru Bosne i Hercegovine kao rezultat uspješno završene privatizacije, formiranja novih banaka, spore tranzicije i brze liberalizacije. Brza liberalizacija je u domaći bankarski sektor uvela jaku konkurenciju s jedne strane, dok je s druge strane došlo do pojačane koncentracije pojedinih većih banaka u sistemu. Osnovni cilj ovog istraživanja bit će usmjeren na analizi uzajamno-korelativne veze između osnovnih mjera oligopol-ske pozicije banaka te njihovog uticaja na poboljšanje ili pogoršanje performansi efikasnosti poslovanja domaćih banaka, kao što su povrat na aktivu (ROA), povrat na vlasničku glavicu (ROE) i neto kamatna margina (NIM). Period istraživanja pokriva godine od 2008: Q1 do 2020: Q4 na kvartalnoj osnovi. Sljedeće promjenljive su korištene kao nezavisne promjenljive u modelu: HHI indeks tržišne koncentracije u kontekstu kredita, udio stranih banaka u ukupnoj vlasničkoj strukturi banaka (FB), veličina banke (BS) i stopa rasta ukupnih kredita (GRTL). Međuzavisnost promjenljivih u ovoj studiji ispitana je pomoću OLS regresionog modela. Rezultati su pokazali da promjenljiva udio stranih banaka u ukupnoj vlasničkoj strukturi (FB) ima pozitivan uticaj na promjenljivu prinos na aktivu (ROA), dok promjenljiva veličina banke (BS) i indeks tržišne koncentracije za kredite (HHI\_krediti) imaju negativan uticaj. Rezultati su također pokazali da dvije nezavisne promjenljive stopa rasta ukupnih kredita (GRTL) kao i udio banaka u stranom vlasništvu (FB) imaju pozitivan uticaj na promjenljivu prinos na vlasničku glavicu (ROE), dok varijable indeks tržišne koncentracije kredita (HHI\_krediti) i veličina banke (BS) imaju negativan efekat. Treći rezultat je promjenljiva neto kamatna margina (NIM) koja ima najsnažniji pozitivan uticaj na dvije promjenljive, udio banaka u stranom vlasništvu (FB) i stopu kreditnog rasta (GRTL), dok koncentracija za kreditne plasmane (HHI) i veličina banke (BS) imaju negativan efekat.*

**Ključne riječi:** Performanse, privatizacija, koncentracija, banke u Federaciji BiH.

**JEL:** G21, G34, C51.

**Appendix I:** Results obtained using Hausman test for return on asset (ROA) - Model I

Variables	b(fixed)	B(random)	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
HHI	0.0007636	0.0008204	-0.0000568	-
BS	-0.1224999	-0.2376258	0.1151259	-
FB	7.19e-07	7.56e-07	-3.75e-08	-
GRTL	-0.0484478	-0.07412	0.0256721	0.0107091

**Source:** authors' own calculations (STATA 13.0).

$$\chi^2(3) = (b-B)'[(V_b-V_B)^{-1}](b-B)$$

$$= 3.90$$

$$\text{Prob}>\chi^2 = 0.2721$$

**Appendix II:** Results obtained using Hausman test for return on asset (ROE) - Model II

Variables	b(fixed)	B(random)	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
HHI	0.0149785	0.0153833	-0.0004048	-
BS	2.238753	0.4192998	1.819454	3.226328
FB	0.0000101	0.0000105	-4.35e-07	2.44e-07
GRTL	-0.375576	-0.6741039	0.2985271	0.2484297

**Source:** authors' own calculations (STATA 13.0).

$$\chi^2(3) = (b-B)'[(V_b-V_B)^{-1}](b-B)$$

$$= 9.60$$

$$\text{Prob}>\chi^2 = 0.0223$$

**Appendix III:** Results obtained using Hausman test for return on asset (ROE)-Model III

Variables	b(fixed)	B(random)	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
HHI	<b>-0.029327</b>	<b>-0.02824</b>	<b>-0.00108</b>	-
BS	-0.3135765	0.960040	-1.273617	2.494213
FB	<b>5.58e-06</b>	<b>5.45e-06</b>	<b>1.30e-07</b>	<b>2.14e-07</b>
GRTL	-0.4470626	-0.5165992	0.069536	0.1885286

**Source:** authors' own calculations (STATA 13.0).

$$\chi^2(3) = (b-B)'[(V_b-V_B)^{-1}](b-B)$$

$$= 10.34$$

$$\text{Prob}>\chi^2 = 0.0159$$