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Svetozar TANASKOVIĆ
Faculty of Economics, University of Belgrade
Marko MILJKOVIĆ,
Jelica PETROVIĆ–VUJAČIĆ
Faculty of Transport and
Traffic Engineering,
University of Belgrade

DETERMINANTS OF BANK PROFITABILITY: Evidence from Serbia

Although the Serbian banking sector has not suffered major consequences of the latest global economic crisis, profitability of most banks, as well as the sector as a whole is at a very low level, especially since 2011. The aim of this paper is to identify the main factors which affect the profitability of commercial banks in the Serbian banking sector. Also, different theories of commercial bank profitability are presented, as well as results of empirical research. The methodology of research is based on an econometric panel data analysis. The analyzed sample consists of 28 commercial banks, while the observed period includes 2008–2013. The dependent variable in the model representing bank profitability is return on equity (ROE), while explanatory variables include a list of bank-specific and country-specific indicators.

1. INTRODUCTORY NOTES ON DETERMINANTS OF BANK PROFITABILITY

The latest global economic crisis reintroduced to the economic literature the issue of sensitivity of bank profitability to business cycles (Bolt et al., 2010). The profitability of commercial banks in Western

svetozar224@gmail.com ; m.miljkovic@sf.bg.ac.rs; j.petrovic@sf.bg.ac.rs

European countries was directly affected by the financial crisis. The crisis did also affect banks in Central and Eastern European (CEE) countries, but the regional effects seem to differ both with respect to timing and strength. While Western European banks had suffered severely, banks in CEE countries appear to be better on average and continue to benefit from growth opportunities and margins that are significantly higher than in Western Europe (Lindblom et al., 2011).

In the last two decades there was much empirical research done in an effort to identify the most important commercial bank profitability determinants. Usually, as an indicator of profitability, return to assets and return to equity ratios were used. On the other hand, determinants of profitability were searched among bank specific variables, such as size, assets, capital adequacy, liquidity, loans, deposits, credit risk etc., as well as among country specific variables, mostly macroeconomic ones such as inflation rate, real gross domestic product growth rate, market growth measured by M2 or M3 monetary aggregates, stock market development etc.

Some studies applied a multi-country approach and tried to identify commercial bank profitability determinants on a sample consisting of more than one country, usually a group of similar countries in terms of development or in terms of geographical region. Many of these studies often came to contradictory conclusions. Altunbas et al. (2007) for example identified a positive significant relationship between capital and profitability on a sample of European banks, while Agusman et al. (2008) came to the opposite results on a sample of Asian banks.

For the group of 77 banks from Bangladesh, Sri Lanka and Pakistan in the period 1997–2008, Sufian (2012) concluded that liquidity, non-interest income, credit risk and capitalization degree had a positive and significant effect on bank profitability. However, the effect was not uniform across the countries from the sample. Among macroeconomic indicators, only economic growth in real terms appeared to have a positive and significant effect on bank profitability, while the impact of inflation was statistically insignificant.

As for the other papers exploring impact of external factors, Albertazzi & Gambacorta (2009) report a significant relation between real GDP growth and bank profitability in developed countries. Contrary to this finding, analyzing key determinants of bank profitability in South European region, Athanasoglou et al. (2006) found that inflation had a strong positive effect on profitability, while bank profits were not significantly affected by real GDP per capita fluctuations.

On the other hand, most studies focused on a single country. As this paper also focuses on a single country, we present findings of this type of research in more detail.

Aremu et al. (2013) applied a panel data approach to the Nigerian banking sector in the period 1980–2010. They found a strong significant negative relationship between bank profitability and capital adequacy, measured by equity to assets ratio, which implies that well-capitalized banks appear less risky and as such profits are lower because they are perceived to be safer. According to the same research, liquidity risk, measured by loans to assets ratio, has a significant negative impact on profitability, which can be explained by the theory that banks which tend to hold a lower amount of liquid assets are more vulnerable to large deposit withdrawals. The credit risk variable, measured by loan loss provisions to loans ratio, has a significant negative impact on profitability, considering that riskier loans means larger amount of NPLs and a lower level of profitability. Among country specific variables, Aremu et al. (2013) identified that the M2 aggregate has a strong positive impact on profitability, while the inflation rate and GDP growth rate remained insignificant.

Alper & Anbar (2011) tested the profitability of commercial banks in Turkey with a panel data model, in which for the dependent variable the authors used return to assets and return on equity ratios in the period 2002-2010. As explanatory variables they used a combination of bank specific indicators and macroeconomic determinants and reported similar results like Aremu et al. (2013). A positive and statistically significant effect of assets size on profitability was confirmed, which provides evidence in line with economies of scale theory. The ratio of non-interest to assets also was statistically significant with a positive coefficient which indicates a positive relation between profitability and bank activity diversification. On the other hand, the model showed a negative relationship between loans and profitability for the observed period. Among the macroeconomic indicators, only the real interest rate was found to have a positive effect on profitability, while the real GDP growth rate and inflation rate were statistically insignificant.

Alexiou & Sofoklis (2009) identified profitability determinants on a sample of six major Greek banks in the period 2000–2007. According to their findings, the most significant variables include credit risk, measured by loan loss provisions to loans ratio, and cost to income ratio, both with a negative impact on profitability. The higher the risk, the higher the accumulation of defaulted loans. On

the other hand, the cost to income ratio indicates that efficient cost management is a prerequisite for improving profitability. The size of a bank, measured by total assets value, had a positive impact on profitability, indicating an advantage of being a large company in the financial sector, providing ability to secure financing at lower costs, to offer many different products to different types of clients in the most efficient way etc. Alexiou & Sofoklis (2009) have not found any significant relationship between profitability and macroeconomic variables, such as the inflation rate, interest rates level, GDP growth, private consumption etc.

Gul et al. (2011) applied a panel data approach to the banking sector in Pakistan, using a sample of 15 top banks in the period 2005–2009. They found a significant positive relation between return on assets as a measure of profitability and bank size, level of loans and deposits, as well as with real GDP growth rate and inflation rates.

Guru et al. (2002) researched bank profitability determinants in Malaysia in the period 1985–1998. Unlike other reviewed studies, Guru et al. (2002) used net income before tax as a percentage of total assets to measure the profitability level. The authors found a significant positive relation between profitability and the level of loans and level of deposits, measured as a percentage of total assets and inflation rate, measured by the consumer price index. On the other hand, a significant negative relation was found between profitability and expenses management, measured by total expenditure to total assets ratio, liquidity measured by loans to deposits ratio and capital adequacy, measured by equity to assets ratio.

Naceur & Goaied (2008) identified profitability determinants in the Tunisian banking sector in the period 1980-2000. They concluded that high amounts of capital and large overheads are associated with higher profitability rates, as well as level of loans expressed as a percentage of total assets. On the other hand, the size of banks has a negative impact on profitability, pointing to scale inefficiencies. Among country-specific variables, a significant positive impact on profitability has the level of competition in the sector and stock market development.

Bodla & Verma (2006) carried out an analysis on a sample of 27 public sector banks in India in the period 1991–2004. These public sector bank possessed in each year of the observed period a market share of more than 80%, measured by assets value. The authors concluded that a positive significant impact on the profitability level have the interest spread level and the level of non-interest income, while on the other hand a significant negative impact is related to the level of total

operating expenses.

Table 1. Significant bank profitability determinants from various single-country studies

Authors	Country	Period	Sample	Significant bank specific variables (+/- effect)	Significant country specific variables (+/- effect)
Aremu et al. (2013)	Nigeria	1980-2010	The whole sector	Capital adequacy (-) Loans (-) Credit risk (-)	M2 level (+)
Alper & Anbar (2011)	Turkey	2002-2010	10 commercial banks	Asset Size (+) Non-interest income to assets ratio (+) Loans to total assets ratio (-)	Real interest rate (+)
Alexiou & Sofoklis (2009)	Greece	2000-2007	6 major banks	Credit risk (-) Cost to income ratio (-) Assets (+)	No
Gul et al. (2011)	Pakistan	2005-2009	15 top banks	Size (+) Loans (+) Deposits (+)	Real GDP growth rate (+) Inflation rate (+)
Guru et al. (2002)	Malaysia	1985-1998	17 commercial banks	Loans (+) Deposits (+) Expenses management (-) Liquidity (-) Capital adequacy (-)	Inflation rate (+)
Naceur & Goaied (2008)	Tunisia	1980-2000	The whole sector	Capital (+) Overheads (+) Loans (+) Size (-)	Stock market development (+) Level of competition (+)
Bodla & Verma (2006)	India	1991-2004	27 public sector banks	Non-interest income (+) Spread (+) Operating expenses (-)	No

2. THE SERBIAN BANKING SECTOR IN THE PERIOD 2008–2014

The Serbian banking sector was well prepared for the first and the second wave of the global economic crisis, having in mind the high level of capitalization of commercial banks and proactive measures of the National Bank (Filipović, 2010; Miljković et al., 2013). This resulted in a positive net pre-tax result at the level of the banking sector as a whole during the observed period from 2008 until 2014, with the exception of the year 2013.

As compared with 2008, a year before the spillover effects of the global economic crisis were transmitted to the Serbian market, the Serbian banking sector is significantly more contracted today.

The number of banks operating in the sector declined by five and amounted to 29 at the end of the fourth quarter in 2014. The banks operate today through 1,787 business units and employ 25,106 people, which means a decrease of 35% and 22% respectively, in comparison with 2008. Most banks in the sector are foreign-owned, while among domestic-owned banks state-owned banks still prevail.

Today the banking sector is also more fragmented than in the pre-crisis period. However, the Hirschmann-Herfindahl concentration index of assets amounted to 794 at the end of fourth quarter in 2014, which is still lower than 1000 indicating that the sector is highly un-concentrated. By observing the values of HHI in the countries of Central, Eastern and South Eastern Europe, Miljković et al. (2013) noticed that the Serbian market is one of the most fragmented, although most of the countries of this region are characterized by a un-concentrated banking market with a HHI lower than 1000. Also, considering simple concentration ratios we can conclude that the five largest banks possess more than a half of total assets of the sector, while the ten largest banks possess more than three quarters of the total assets.

The total assets of the sector as a whole amounted to 2,969 RSD billion at the end of 2014, while total equity amounted to 614 RSD billion. During the entire observed period, total assets and equity have been increasing, though by lower growth rates in recent years. Total deposits have also been increasing during the entire observed period reaching the amount of 1,892 RSD billion at the end of 2014. Within the sectoral distribution of deposits households prevail with a share of 58%, followed by corporations (public and private) with a share of 25%. The cur-

rency structure of deposits shows that 70% of deposits are denominated in foreign currency (out of which 95% in EUR), while 30% are denominated in domestic currency. Considering the maturity structure of deposits, more than 60% of deposits belong to short term up to 3 months deposits.

Table 2. Selected balance sheet indicators of Serbian banking sector in the period 2008-2014, RSD bln

Balance sheet indicator	2008	2009	2010	2011	2012	2013	2014
Assets	1777	2160	2533	2650	2880	2846	2969
Equity	420	447	496	546	591	595	614
Loans	1028	1290	1535	1672	1752	1686	1653
Deposits	1025	1301	1505	1526	1699	1727	1892

Source: National Bank of Serbia, Bank Supervision department, Quarter Reports 2008, 2011 and 2014

On the other hand, total loans of the sector as a whole have not been following the dynamics of deposits and other selected balance sheet indicators. Since 2012, the sector has been facing a decreasing trend in the total amount of loans, which at the end of 2014 amounted to 1,653 RSD billion. The highest share in the sector distribution of loans belongs to the corporate sector (43%) and households (36%). The currency structure of loans is very similar to structure of deposits with only 30% denominated in RSD, while within the maturity structure long term loans prevail over 1 year loans.

The level of non-performing loans (NPL), which significantly affect bank profitability, was continuously increasing during the entire observed period from 2008 till 2014 and amounted to 21.5% in 2014. Such an increase in NPLs (see Figure 1) was a direct consequence of fast credit growth in the pre-crisis period, considering that large credit lines created an excessive burden on the real sector after it went into recession. Due to this negative trend, commercial banks started to allocate larger amounts of capital for the purpose of securing problematic loans (Miljković et al., 2013). The negative effects of NPLs on the banking sector in Serbia is a typical case of the loophole hypothesis defined by Waheed and Younus (2010). When a credit crunch decreases the ability of the real economy to finance its operations and service its loans, there is an increase in NPLs that leads to stricter conditions for new lending thus reducing of growth.
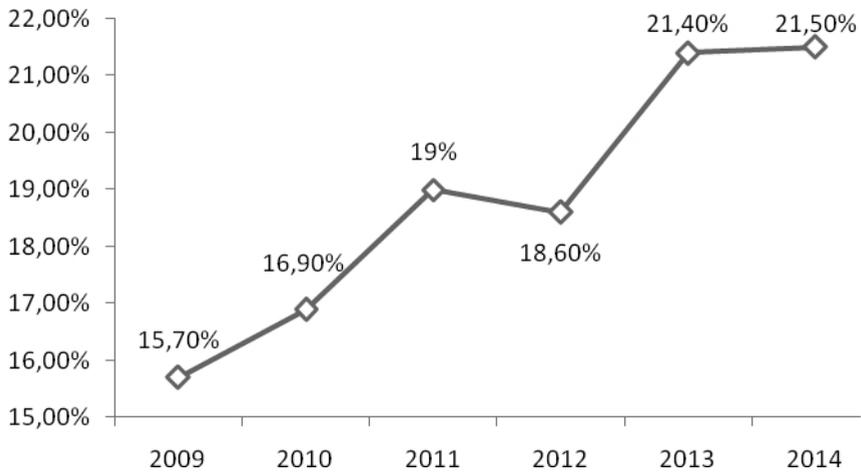
Figure 1. Gross non-performing loans in Serbian banking sector

Source: National Bank of Serbia, Bank Supervision department, Quarter Reports 2011 and 2014

The highest level of NPLs is in the sector of enterprises (26.7% without public enterprises), entrepreneurs (26.5%), while the level of NPLs in the household sector amounted to 10.3% at the end of 2014. When observing the structure of corporate NPLs, the highest share goes to the processing industry, the commerce sector and construction, while the highest share in the structure of individual NPLs goes to housing and cash & consumer loans, as presented in the next figure.
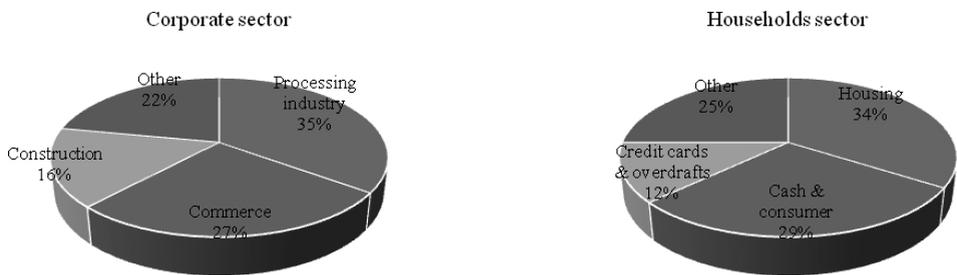

Figure 2. Structure of gross NPLs

Source: National Bank of Serbia, Bank Supervision department, Quarter Report 2014

The profitability of the Serbian banking sector, measured either by the net pre-tax result of the sector as a whole (see Figure 3) or by a return on assets and return on equity (see Figure 4), has been at a significantly lower level since 2011, as compared with the previous years.
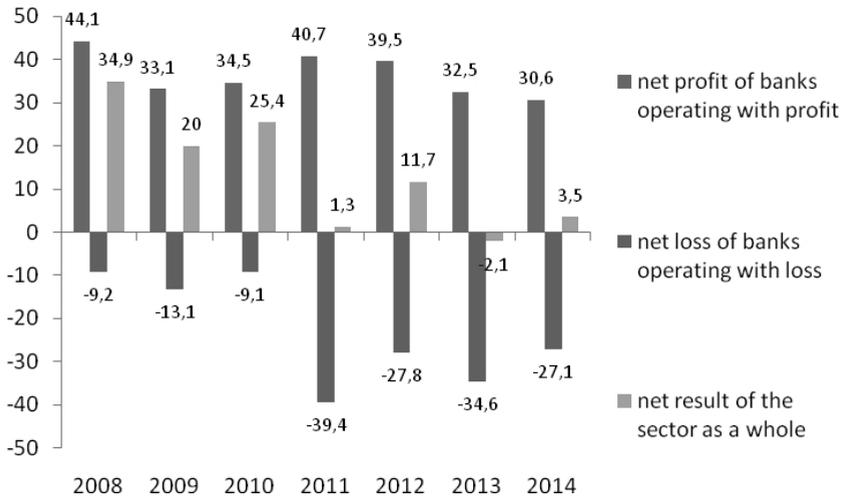
Figure 3. Net pre-tax result of Serbian banking sector during 2008-2014, RSD bln
Source: National Bank of Serbia, Bank Supervision department, Quarter Reports 2008, 2011 and 2014

In the period 2011–2014 the net profit of banks operating with profit has been decreasing, while the net loss of banks operating with loss was at a significantly higher level than in the years before 2011. However, such a poor result was caused by an increase of net expenses arising from the write-off of loans, investments and provisions registered by only a few banks, indicating a high concentration of net loss in the sector (Miljković et al., 2013).
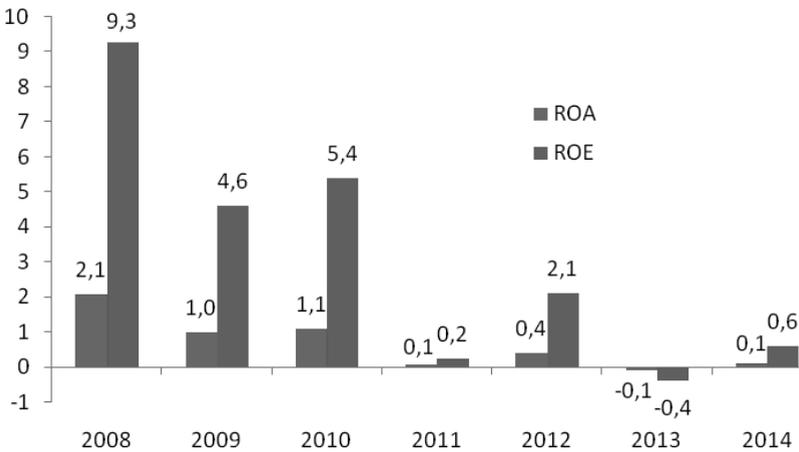

Figure 4. Return on assets (ROA) and return on equity (ROE) of Serbian banking sector, 2008–2014

Source: National Bank of Serbia, Bank Supervision department, Quarter Reports 2008, 2011 and 2014

A certain impact on declining profitability in the Serbian banking sector during the observed period, beside non-performing loans, can be attributed to interest rate trends (Miljković et al., 2013). The average weighted lending interest, calculated as interest income to average interest-bearing assets ratio, amounted to 8.0% in 2014, which is by 4.8% lower than in 2008. On the other hand, the average weighted deposit interest, calculated as interest expense to average interest-bearing liabilities, amounted to 2.7% in 2014, which is by 2.6% lower than in 2008. Considering a quite faster decreasing trend of the lending interest rate as compared with the deposit one, interest spread, calculated as the difference between an average weighted interest receivable and average weighted interest payable, was continuously declining during the entire observed period, reaching the level of 5.3% in 2014 (see Figure 5).
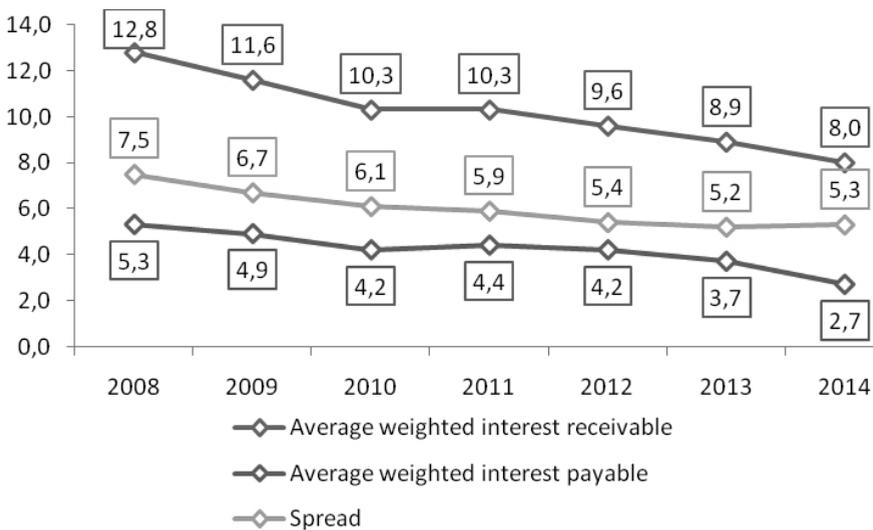
Figure 5. Interest rate trends in Serbian banking sector during 2008–2014, in %
Source: National Bank of Serbia, Bank Supervision department, Quarter Reports 2008, 2011 and 2014

3. DATA AND METHODOLOGY

The data set consist of 28 commercial banks operating in Serbia in the period 2008–2013. During this period, the global financial crisis has fully revealed its effects in the Serbian banking system, including a high rise of NPLs and a fast decline of lending activity in the enterprise sector. Four banks that have lost their

licenses[1] in the observed period are excluded from the sample due to a problem with data availability and also because of restrictions that emerge when econometrical tests are performed with unbalanced panel data. Hence, the sample comprises a balance panel data of 168 annual observations of financial and control macroeconomic variables. The financial data were obtained from the statistical reports of the National Bank of Serbia (NBS) for each bank in the sample while the control variables have been gathered from official reports of the Statistical Office of the Republic of Serbia. In the overall observed period, financial reports of the commercial banks that are included in statistical reports of NBS were based on International Financial Reporting Standards (IFRS) and International Accounting Standards (IAS) so there were no issues of analytical differences in financial data.

In Table 3 summarized definitions of variables to be used in our analysis and expected relationships between dependent and explanatory variables are presented. Even though there are several dimensions in which banking sector profitability could be observed and thus a vast number of internal and external factors of profitability, the number of variables that have been used are limited due to data availability and the considerations based on previous research reported in the literature. To determine the main forces that underpin profitability in the Serbian banking sector we used the following variables: return on equity ratio, deposits, cost on income ratio, equity to assets ratio, assets to employees ratio, real gross domestic product growth and annual inflation rate.

Table 3. Definition of variables

Name	Definition	Expected sign
ROE	Return on equity ratio	
DEP	Deposits to assets ratio	+/-
COI	Cost on income ratio	-
ETA	Equity to assets ratio	+
A/L	Assets to number of employees ratio	+/-
GDP	Real GDP growth rate	+
CPI	Annual rate of inflation	+

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1 Agrobanka, Razvojna Banka Vojvodine, Privredna Banka Beograd and Univerzal Banka Beograd have lost their licenses in June 2012, April 2013, October 2013 and February 2014 respectively, after which NBS have excluded their positions from the annual statistical report of the banking sector in Serbia.

Return on equity (ROE) is the ratio of net income to total average book value of equity. It measures the rate of return on the ownership interest. In our analysis ROE has been used as the proxy for the evaluation of bank profitability. This variable shows how efficiently banks use investment to generate earnings growth.

Deposits (DEP) represent the ratio of total deposits to total assets which is used as an indicator of liquidity of banks but is observed as a liability. In theory, deposits are the main source of funding and as such they should influence the level of the bank's profitability. In the case of the Serbian banking sector, lending activity in not necessarily based on deposits (wheather in foreign or domestic currency). Commercial banks in Serbia are mostly owned by the foreign banks so they financed lending with capital from their headquarters abroad, due to large spread between domestic and interest rates in rest of the Europe. Hence, even though one could expect a positive connection between deposits and profit, the increase of the level of deposits could actually have a negative effect on banks performance if the increase of deposits is not accompanied by a rise in credit activity.

Cost on income (COI) is a cost efficiency variable and represents the ratio of operating expenses (salaries, employee benefits, office space rents etc.) to income. The role of this variable is to show cost efficiency of the management and as such it is expected to be in a negative relation with overall profit. If the management is efficient in reducing these cost, it should be reflected in the bank's business results.

Equity to assets (ETA) in our model is used as a proxy for capital. By capital we refer to long-term funds contributed to a bank, mostly by its owners. It comprises from common and preferred equity, reserves and retained earnings. The level of capital in the bank should influence a bank's relative profitability so we would expect a positive relation between our proxy and the ROE.

Asset to employees (A/L) is used to capture the productivity dimension and internal efficiency of the banks. Increasing competition and expansion of branches due to reorganization in the Serbian banking sector after the 2002 reforms could have alarge impact on bank profitability in the aftermath of the financial crises. Under normal conditions we would expect this ratio to have a positive impact on profitability as the increase of the asset over personnel would indicate better efficiency of labor. However, in the crisis period limited flexibility of inherited operating capacity could distort this relationship.

Real gross domestic product growth (GDP) is included as a control variable in our model. We used this variable in order to capture the cyclical nature of bank-

ing activities. Demirguc–Kunt & Huzing (1999) showed that economic growth can affect profitability for a large number of countries. Economic growth should enhance bank profits through increased demand for households and business loans. In the case of our time period, we expect that financial crisis and recession that occurred would have a negative influence, but essentially there should be a positive connection between this variable and profit of the bank.

Annual rate of inflation (CPI) is another control variable. Channels of inflation impact on the performance of banks are through effects on sources and users of banks' financial resources. Inflation affects enterprises pricing behavior, if firms expect an increase in the general price level they will compensate by indexation for the expected rate of inflation. In the scenario where expected inflation is equal to actual, there will be no decrease in business activities and no negative effect on banks' performance. In the case of dual money market as is in Serbia this relationship can be more complex, and highly dependent on exchange rate stability ,as well as, the accuracy of inflationary expectations.

4. EMPIRICAL TESTING AND RESULTS

In order to test the significance of independent variables, we used static panel data analysis. The advantage of panel data technique which we implemented is that it can control for the biases generated by potential heterogeneity and omitted variable problems. Our analysis is based on the following model:

$$(1) \quad ROE_{it} = a_{0it} + \beta_1 DEP_{it} + \beta_2 ETA_{it} + \beta_3 COI_{it} + \beta_3 A/L_{it} + \beta_4 CPI_{it} + \beta_5 GDP_{it} + \varepsilon_{it}$$

The most common approach in panel data models is to use one of three cases for regression: pooled model, fixed effects model or random effects model. To determine which of these three estimations produces better results, we conducted a series of tests to check the presence of individual or time-effects in our model. Before that, in Table 4 summary statistics for all variables used in the model are reported. For our dependent variable ROE given in the overall row we can see that the average mean in the observed period is negative (-0.0134) which is in line with the consequences of the financial crises on the banking sector. In later columns we report the standard deviation, minimal and maximal value, and also number of observation (168). The rows between report the same type of data but when look-

ing between banks in the sample, and rows within are only looking the data of a single bank within tame period of six years.

Table 4. Summary statistics of variables used in the model

Variable		Mean	Std. Dev.	Min	Max	Observations
ROE	overall	-0.0134	0.183	-1.303	0.410	N = 168
	between		0.134	-0.339	0.148	n = 28
	within		0.127	-0.977	0.367	T = 6
DEP	overall	0.542	0.173	0.020	0.852	N = 168
	between		0.155	0.058	0.758	n = 28
	within		0.080	0.211	0.778	T = 6
ETA	overall	0.231	0.113	0.075	0.854	N = 168
	between		0.083	0.152	0.532	n = 28
	within		0.079	0.001	0.756	T = 6
COI	overall	0.946	0.454	0.210	3.395	N = 168
	between		0.393	0.308	2.017	n = 28
	within		0.239	0.032	2.325	T = 6
A/L	overall	84869.08	60437.78	5867.416	320652.8	N = 168
	between		54202.5	23020.72	261622.8	n = 28
	within		28333.29	-3555.273	298928.9	T = 6
CPI	overall	7.802	3.153	2.195	12.184	N = 168
	between		0	7.802	7.802	n = 28
	within		3.153	2.195	12.184	T = 6
GDP	overall	0.966	2.681	-3.116	5.367	N = 168
	between		0.001	0.966	0.966	n = 28
	within		2.681	-3.116	5.367	T = 6

Source: Stata output of authors' calculation

The first step before performing regression is to check whether our data set violates some of the assumptions of linear regression. We checked the correlation matrix in order to determine presence of significant correlation between independent variables which could lead to a problem of multicolinearity. In Table 5 the correlation matrix is presented and the highest reported coefficients of -0.433 are between A/L and COI. Since none of coefficients are larger than 0.5 we shouldn't encounter the problem of multicollinearity.

Table 5. Correlation matrix of independent variables

	DEP	COI	CPI	ETA	A/L	GDP
DEP	1					
COI	0.0199	1				
CPI	-0.0853	-0.0347	1			
ETA	-0.3049	-0.031	0.0152	1		
A/L	-0.0818	-0.433	-0.0537	-0.0618	1	
GDP	-0.0036	-0.0588	-0.2107	0.0931	-0.0529	1

Source: Stata output of authors' calculation

Another element that we need to check is stationarity of variables in our panel. We test it with a Fisher-type Phillips-Perron (PP) unit root test for panel data. The advantage of the PP test is that it is robust in the case of presence of serial correlation in data which will be confirmed later. The null hypothesis of this test is that all panels contain a unit root. Given the results of the PP unit root test, null hypothesis of non-stationarity can be rejected for all variables that we used in our model at a 1% level of significance.

Table 6. Fisher-type Phillips-Perron test for presence of unit root

	PP-Fisher Chi square	
	Statistic	Probability
ROE	191.585	0.000
DEP	104.189	0.000
COI	180.014	0.000
ETA	186.031	0.000
A/L	74.397	0.056
CPI	1234.243	0.000
GDP	942.354	0.000

Source: Stata output of authors' calculation

Additional assumption that also needs to be tested is presence of serial correlation in the data. For that purpose, we have implemented the Wooldridge test of autocorrelation in panel data and the results are presented in Table 7. The calculated F-statistics is 8,94 and the null hypothesis of no serial correlation is strongly rejected (p>F 0.0059). In the presence of serial correlation in the idiosyncratic error term, it is advised by Baltagi (1999) to perform clustering at the panel level | **79**

in order to acquire consistent estimates of the standard errors. Even though the Wooldrige test is mostly used in panel data models with longer time dimension, we confirm presence of autocorrelation with an additional test reported in panel AR(1) model (xtregar) with modified Bhargava et al (1982). Durbin-Watson statistic of 0.999 indicates presence of positive autocorrelation, considering the rule of the thumb when DW statistic is lower than 2.

Table 7. Wooldridge test for autocorrelation

F(1, 27)=8.940
Prob > F = 0.0059
Nuber of obs = 140
F(6, 27) = 11.3
Prob > F = 0.000
R-squared = 0.3709
Root MSE = 0.1124

Source: Stata output of authors' calculation

The next step is to determine which of the panel modeling approaches is best for our analysis. For this purpose, we will first test for presence of a fixed effect in our model with the F-test. The null hypothesis states that observed and unobserved fixed effects are equal to zero. In Table 8 adequate values of F-test statistics and p-values are reported upon which we can strongly reject the null hypothesis.

Table 8. F-test for presence of fixed effects

F test that all u_i =0: F(27, 134) = 3.47 , Prob>F = 0.000

Source: Stata output of authors calculation

We continue with the Breusch and Pagan Lagrangian multiplier test to check for the possibility of conducting our regression with random effect specification of the panel model. Again the null hypothesis is that Var(ui)=0 which we reject based on the LM test statistics and p-values presented in Table 9. Because of this we now need to decide between the FE and RE panel data model. Our next step is to carry out a Hausman test whose null hypothesis states no significant differences between coefficients obtained from the FE and RE model. If this is to true, then the RE model specification is efficient.

Table 9. Breusch and Pagan Lagrangian multiplier test for random effects

	Var	sd = sqrt(Var)
ROE	0.0333323	0.1825714
e	0.0131471	0.1146609
u	0.0052671	0.0725746
Test: Var(u)=0, Chibar2(01) = 22.98, Prob > Chibar2 = 0.000		

Source: Stata output of authors' calculation

In table 10 we report the Hausman test Chi square statistic with p-values so that we can reject the null hypothesis at 10% level in favor of the FE model because RE is inconsistent due to the assumption that random effects are orthogonal to the repressors. Based on this, we choose to continue our analysis with the FE panel data model with robust standard errors to control for the presence of autocorrelation and heteroscedasticity.

Table 10. Hausman test for model specification

	FE	RE	Difference	S.E.
DEP	-0.229	-0.154	-0.075	0.853
COI	-0.278	-0.272	-0.006	0.023
CPI	0.004	0.006	-0.001	.
ETA	-0.272	0.021	-0.292	0.091
A/L	-1.21	-4.41	-7.69	3.01
GDP	0.002	0.002	-0.001	0.000
Chi2(5)=10.54 Prob>Chi2 =0.0613				

Source: Stata output of authors' calculation

The results of our model estimation are presented in the Table 11. The model seems to fit panel data reasonably well if we use the measure of within R^2 which is 0.34, or adjusted R^2 from *areg* regression with value of 0.61. Keeping in mind that some variables that certainly are relevant for profitably of the banks could not be included in regression due to data unavailability, levels of R^2 are at the level expected. From six estimated parameters of the model five of them pass the t-test, while real growth rate turns out to be insignificant as one of the banks' profitability drivers in crisis period. Anticipated signs of estimated parameters are mostly in line with those calculated in the model. Real growth rate shows positive but not a

significant relationship with banks' profitability measured by ROE. There are other papers (Alexiou & Sofoklis, 2009) that have similar results concerning the connection of bank profits and business cycle. The second control variable - inflation is showing a significant positive relationship with ROE in the case of Serbian banks. This can be explained by the ability of banks' management to relatively accurately predict future inflation and sufficiently adjust the interest rate so there are no negative effects on profit. Also, interest rates on savings usually decrease at a faster rate than those on loans which could also explain this positive relationship.

Table 11. Estimation results of FE regression with robust S.E.

	Dependent variable ROE
DEP	-0.229 (0.132)*
COI	-0.278 (0.112)**
ETA	-0.272 (0.150)*
A/L	-0.0001 (0.0004)***
CPI	0.004 (0.002)*
GDP	0.002 (0.003)
const.	0.502 (0.144)***
F (6.27) = 4.91, Prob>F = 0.0016	
R-sq: within = 0.3397	
R-sq adjusted (form areg) = 0.6056	

Notes: Coefficients and t-statistics in parentheses. Fixed Effects estimation with robust standard errors. ***, ** and * denote significance at 1%, 5% and 10% levels, respectively.

As for the bank-specific variables, deposits to total assets are showing a significant but negative relationship with profitability which is not in line with other research.Serbian specific conditions in the banking sector could somewhat explain these findings. We mentioned earlier that due to a large number of for-

eign owned banks, most of the funds used for loans are borrowed from the banks central offices abroad. Also, while lending activity of the banks starts to decline after the crisis, deposits on the other hand were already at the end of 2009 at their pre-crisis level. This two divergent trends combined with problems of large capital requirement due to an increase in NPLs could be the explanation why we see this negative relationship. The next variable, cost to income ratio is behaving as expected. The model shows a negative and significant effect of this variable on profitability. This implies that during the crisis one of the main drivers of profitability was based on efficient cost management. During this period, some parts of the operating costs were relatively rigid when compared with the downturn in activity. Some of the banks had more success in decreasing these costs than others which in turn led to positive profits regardless of the harsh economic environment. Capital proxy measured by ETA shows a negative significant relationship which is opposite of what we expected. In normal conditions well capitalized banks can withstand negative shocks more easily but our model is implying an opposite relationship. This requires further development of our model to properly test the stability of this result. Lastly,a bank-specific variable is productivity measured by the ratio of assets over personnel which shows a negative and significant effect on profitability. In normal conditions we should expect the opposite but there is evidence of in the case of Greece (Alexiou & Sofoklis, 2003) that this could be true due to a suboptimal number of employees for the assets under management. After 2002 the Serbian banking sector experienced fast growth and an increase of competition which led to a high demand for labor employment in the banks. In the observed period, problems with labor regulation in Serbia were imposing impediments on privately owned banks for faster adjustment of number of staff. This adjustment was even more difficult for the banks in which the government was a significant shareholder.

5. CONCLUSION

The paper investigates bank profitability factors in the Serbian banking sector during the period 2008–2013 using econometric panel data methodology. As a measure of the profitability level, the return to equity ratio was used, while the explanatory variables were divided into two groups, bank-specific ones and country-specific control variables. The bank-specific variables included the deposits

to assets ratio, cost on income ratio, equity to assets ratio, as well as assets per employee. On the other hand, country-specific variables included the most important macroeconomic indicators such as the real GDP growth rate and annual inflation rate.

Regarding bank-specific variables, the research results indicated:

➢ Strong significant negative correlation between deposits and profitability, which runs contrary to other research results reviewed in the economic literature. This is most probably caused by the fact that the dynamics of loans have not followed the dynamics of deposits during the observed period.

➢ Strong significant negative correlation between cost on income ration and profitability, which confirmed results available in the economic literature. In other words, efficient cost management is one of the most important determinants of bank profitability, especially during the period of market instability.

➢ Strong significant negative correlation between equity and profitability, which Aremu et al. (2013) explains by the level of risk, considering that well capitalized banks appear to be less risky and as such achieve lower profits.

Among macroeconomic control variables, the results suggest weak significant positive correlation between inflation rate and profitability level, which confirms results from the literature.

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Rezime:
DETERMINANTE PROFITABILNOSTI BANAKA: primer Srbije

Iako srpski bankarski sektor nije osetio velike posledice nedavne svetske ekonomske krize, profitabilnost većine banaka, kao i sektora u celini, na veoma je niskom nivou, posebno nakon 2011. godine. Cilj ovog rada je da se identifikuju glavni faktori koji utiču na profitabilnost poslovnih banaka u srpskom bankarskom sektoru. Takođe, predstavljene su i različite teorije profitabilnosti poslovnih banaka, kao i rezultati ostalih empirijskih istraživanja. Metodologija istraživanja zasniva se na ekonometrijskom modelu panela. Analizirani uzorak obuhvata 28 poslovnih banaka, dok se posmatrani period odnosi na 2008–2013. Zavisna promenljiva u modelu koja predstavlja profitabilnost banaka jeste stopa prinosa na sopstvena sredstva (ROE), dok objašnjavajuće promenljive uključuju čitav niz varijabli vezanih za bankarski sektor, kao i za šire makroekonomsko okruženje.