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To cite this article: Ana Knezevic & Dusan Dobromirov (2016) The determinants of Serbian banking industry profitability, Economic Research-Ekonomska Istraživanja, 29:1, 459-474, DOI: [10.1080/1331677X.2016.1174390](https://doi.org/10.1080/1331677X.2016.1174390)

To link to this article: <http://dx.doi.org/10.1080/1331677X.2016.1174390>



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Published online: 13 May 2016.



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The determinants of Serbian banking industry profitability

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ABSTRACT

This article investigates the impact of bank-specific, market-specific and macroeconomic factors on the profitability of the banking sector in Serbia in the period 2004–2011. We use three panel datasets: for all banks in a sample and for domestic and foreign banks. The Hausman test was performed in order to test whether a fixed or a random effects model should be used in the regression analysis. The results are compared to the findings of previous research which was focused on EU countries. Moreover, the crisis effect on the profitability of banks in Serbia has been considered. The results show that bank-specific and market-specific factors have influence on bank profitability, but macroeconomic factors do not. We find that influence of liquidity ratio and a measure of financial development on profitability of banks are in contrast in Serbia compared to EU countries. The results also show that different factors influence profitability of domestic and foreign banks and that crisis has an opposite effect on profitability of domestic and foreign banks.

ARTICLE HISTORY

Received 4 December 2012

Accepted 22 September 2014

KEYWORDS

Bank profitability; domestic banks; foreign banks; financial crisis; fixed and random effects; Serbia

JEL CLASSIFICATIONS

G21; C23; E44; G01

1. Introduction

Beginning from the 1980s onward, banking sectors of many transition economies faced numerous problems which were usually related to macroeconomic decline and turbulence accompanied by repeated bank crises. The late 1990s and early 2000s were the years of rapid progress in bank privatisation and consolidation. This period was also characterised by the increasing number of foreign banks in transition countries. By 2005, the banking sectors in many transition countries developed sufficiently to provide a wide range of services with solid bank performance. However, the banking sectors of transition countries are not immune to problems and do not always provide sufficient impetus for economic development, which is problematic because of the banks' dominance in the financial sectors of most transition economies (Bonin, Hasan, & Wachtel, 2008).

Similarly, as in other transition countries, the banking sector in Serbia has undergone remarkable changes and reforms since 2000. During the decade that preceded the reform

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of the banking sector, banks have lost their primary function – mobilisation of available resources and their placement in profitable projects. The characteristics of the banking sector were a high degree of illiquidity and insolvency of the largest banks, high percentage of non-performing loans, poor asset quality, unregulated relations with the London Club, Paris Club and World Bank and low profitability. Since December 2000, the National Bank of Serbia has started a number of actions in order to determine the financial state of the banking sector and to prepare the Strategy of banking sector restructuring. The authorities in Serbia decided on the closure of the four largest state-owned banks and initiated bankruptcy proceedings in 2000 (Mamatzakis, Staikouras, & Koutsomanoli-Fillipaki, 2005). The Serbian banking sector experienced a remarkable transformation over a five-year period and foreign ownership increased from a negligible amount in 2000 (0.5%) to 66% in 2005 (Bonin et al., 2008). At the end of the first phase of reforms, banks in Serbia began again with their key activities – credit and deposit operations. After only a few years, credit activities, as in other countries, started to grow rapidly. In the last few years, the banking sector in Serbia was affected by the global economic crisis, which was noticeable from 2008. Due to relatively undeveloped business with complex financial instruments, the effects of crisis were indirect, but still significantly affected the Serbian financial sector, real sector and population.

During the last 10 years, it has been easy to see the similar trend of banks' profitability and the level of economic development in Serbia. In the period from 2004 to 2008, banks in Serbia were able to gain very high levels of profits. The same period was characterised by fast economic development, stable macroeconomic indicators, public confidence in the financial sector and overall faith in the economic progress and prosperity. From 2008 onward, it was much harder for the banks to keep high profitability levels, and for some, even to have positive financial results. During the same period, the characteristics of Serbian economic environment were stagnation or decline of economic activity and the reduction of the investments in development of the public and real sector.

It can be concluded that both the transition period and the period of financial crisis brought diverse environmental influences on the Serbian banking sector. Apart from those external influences, the financial result of banks depends on many internal factors. The motivation for this study lies in the importance of knowing which internal and external factors influence profitability, and therefore financial stability, of banks in Serbia. According to Athanasoglou, Brissimis, and Delis (2005), a sound and profitable banking sector is better able to withstand negative shocks and contribute to the stability of the financial system. For that reason, the determinants of bank performance have attracted the huge interest of academic researchers, as well as of bank management and bank supervisors.

The purpose of this article is to examine the influence of different internal and external factors on the profitability of banks in Serbia in the period from 2004 to 2011.

The starting point of this research is a study of Pasiouras and Kosmidou (2007) due to the several reasons. First, the research of these authors covers an interesting set of bank-specific, market and macroeconomic variables. Second, data for all of these variables are available from the bank's financial statement reports or from the other official statistical publications. Third, by choosing the same variables, we are able to check if the results that show the influences on profitability of banking sector in Serbia are in line with the results for the EU banking sector.

Similarly, as in the research of Pasiouras and Kosmidou (2007), we are going to check the differences between the influence of all analysed factors on the profitability of domestic and

foreign banks. Furthermore, a new question has been added to this research: How does the financial crisis affect the profitability of domestic banks, foreign banks and entire Serbian banking sector in general?

The article is structured as follows: Section 2 considers the previous related studies. Section 3 describes the dependent and independent variables, while Section 4 shows the methodology used in this research. In Section 5 the empirical results are presented. Concluding remarks are given in Section 6.

2. Literature review

The determinants of bank profitability have been widely studied, with the studies usually characterised as those that have their focus on a specific country or those that have their focus on a panel of countries. A distinction in the previous studies can be made based on the countries on which these studies focused on.

Some of the first studies that analysed the determinants of bank's performances considered banking sector of the US (Angbazo, 1997; Berger, 1995; Neely & Wheelock, 1997). Berger (1995) showed that bank capital ratios are positively related to returns on equity in the 1980s. The study of Angbazo (1997) found that the net interest margins of commercial banks reflect both default and interest-rate risk premium. Neely and Wheelock (1997) proved that differences in state banking laws and the presence of money centres in certain states have caused bank earnings to vary from state to state.

With the increase of economic activity and development of financial market, the banking sectors of emerging countries have become more interesting for researchers whose research interests were related to the banking sector's performances. Afanasieff, Lhacer, and Nakane (2002) found that macroeconomic variables are the most relevant factors to explain the behaviour of bank interest spread in Brazil. The study of Ben Naceur and Goaid (2001) investigated the Tunisian banking industry and found that individual bank characteristics explain a substantial part of the within-country variation in bank interest margins and net profitability. Similar research was conducted by Gul, Irshad, and Zaman (2011) for the Pakistan banking sector. The results showed that banks with more equity capital, total assets, loans, deposits and macro factors, i.e., economic growth, inflation and stock market capitalisation can expect higher profitability. Furthermore, the banking sector of Taiwan was analysed by Ramlall (2009) and showed that the main determinant of profitability for the Taiwanese banks rests on credit risk.

Considering European banking sectors, we can say that, with the exception of Molyneux and Thornton (1992) and Molyneux and Forbes (1995), there have been a small number of studies that investigated bank performances in the period of 1990s. The study of Molyneux and Thornton (1992) was one of the first to examine the determinants of banks' profitability in several countries. The results indicate a positive association between the return on equity and the level of interest rates, bank concentration and the government ownership. Molyneux and Forbes (1995) explained market structure and performance of 18 European countries in the period 1986–1989 and showed that increase of concentration in banking markets should not be restricted by antitrust or regulatory measures.

In a more recent study, Abreu and Mendes (2002) investigated the determinants of bank's interest margins and profitability for some European countries. They reported that well capitalised banks face lower expected bankruptcy costs and this advantage 'translates' into

a better profitability. They also found that the unemployment rate and inflation are relevant factors of banks' profitability. The positive relation between levels of equity and return on average assets (ROA) are also proved in the study of Staikouras and Wood (2004). Turning to the macroeconomic factors, the results of this research showed a negative impact of GDP growth and a positive effect of the level of interest rates on the ROA. Goddard, Molyneux, and Wilson (2004a) studied the performance of European banks across six countries (France, Germany, Spain, Denmark, Italy and England) in the period of 1992–1998. They found a relatively weak relationship between size and profitability. The results supported positive relationship between capital adequacy ratio and ROE. The research of Pasiouras and Kosmidou (2007) covered both bank-specific and environmental factors influencing the profitability of domestic and foreign commercial banks in 15 EU countries in the period 1995–2001. Their results indicated that profitability of both domestic and foreign banks was affected not only by the bank-specific characteristics but also by the financial market structure and macroeconomic conditions.

Transition processes in South-Eastern European (SEE) economies and the revitalisation of their banking sectors have influenced the growing attention of researchers in investigating the banking sector performances in this region. Furthermore, the new regulatory framework in the SEE countries significantly increased the attractiveness of their banking systems for the foreign investors. After 2000, there was a notable entry of foreign banks, which were looking for acquisition opportunities in the still underdeveloped, but with high potential, SEE region.

Most of the studies that analyse the profitability of banking sectors in SEE countries have been conducted as a panel country analyses that cover several countries in this region. The profitability of 'new' EU member states have been analysed by Havrylchuk and Jurzyk (2006). The authors concluded that the macroeconomic conditions in the foreign banks' home countries have no impact on the profitability of foreign-owned banks in Central and Eastern European markets. Considering the relationship between market concentration and bank profitability, their results showed that profits of foreign banks are not affected by market concentration, whereas domestic banks find it more profitable to operate in such markets. Kosak and Cok (2008) analysed determinants of bank's profitability in six SEE countries – Croatia, Bulgaria, Romania, Serbia, FYR Macedonia and Albania. The authors found that bank specific factors reflecting capital strength, cost efficiency and credit risk exposure proved to be associated with performance measures. Moreover, the results of this study did not reveal any substantial statistically significant differences between profitability measures of domestic and foreign owned banks. Athanasoglou et al. (2006) also focused their research on some SEE countries (Albania, Bosnia Herzegovina, Bulgaria, Croatia, Romania and Serbia-Montenegro), in the period between 1998 and 2002. The study revealed that ROA was affected positively by total assets and ratio of equity-to-total assets (EQAS), and affected negatively by ratios of provisions to total credits and operational cost to total assets.

Turning to the Serbian banking sector, it is easily noticeable that, apart from several panel country studies of SEE region which included Serbia, the determinants of the Serbian banking sector profitability have not been studied in a large number of studies. Therefore, we can say that there is a lack of literature that analyses the profitability of banking sector in Serbia as a single country in a study. The research of Marinkovic and Radovic (2010) dealt with Serbian banking sector in the period from July 2000 to August 2003 and revealed positive and significant correlation between bank interest margins and proxies of interest-rate

risk, negative correlation with risk averseness and positive but slightly lower correlation with credit risk variable. Also, the results did not show the strong influence of foreign bank entry. Vukovic, Kozetinac, and Kostic (2009) analysed the profitability of banking sector in Serbia and the influence of financial crisis in the period from 2005 to 2008. They found that high profitability of banks in Serbia was achieved despite the relatively small volume of loans and that domestic banks achieved the faster growth of ROA in Serbia during 2008 than foreign banks. Filipovic and Hadzic (2012) examined the influence of the late transition and global crisis on the banking sector in Serbia. The conclusion of their paper stated that the Serbian banking sector developed very fast during the transition period before the global economic crisis and that, thanks to high capitalisation, the Serbian banking sector did not suffer during crisis as some other countries in the region.

In the following part, we are going to analyse the findings of the previous studies related to the explanatory variables which were analysed in the study of Pasiouras and Kosmidou (2007) and which are in the focus of this research.

In a large number of studies, one can find that authors used total assets of an individual bank as a measure of size. Some studies showed a positive influence of size on a banks' profitability (Athanasoglou, Delis, & Staikouras, 2006; Athanasoglou et al., 2006; Demirguc-Kunt & Maksimovic, 1998; Gul et al., 2011; Staikouras & Wood, 2004, etc.), while Pasiouras and Kosmidou (2007) and Kosak and Cok (2008) found negative influence. The effect of a bank's size on its profitability depends on the extent in which a bank is able to increase the profitability through economies of scale. Diverse results related to the influence of size on bank's profitability let us conclude that either positive or negative relation can be expected in our research.

Cost-to-income ratio (COINC) is used for measuring a bank's efficiency. This ratio is obtained by dividing the overhead costs with a sum of net interest income and other operating income. This ratio is usually negatively related to profitability (Azam & Siddiqui, 2012; Kosak & Cok, 2008; Pasiouras & Kosmidou, 2007). On the other hand, Molyneux (1999) showed a positive relationship between the staff expenses (as a largest part of operating costs) and the profitability of a bank.

Capital strength of a bank is usually measured by the EQAS ratio and most of the previous studies showed a positive relation between overall capital strength and profitability (Athanasoglou et al., 2006; Atasoy, 2007; Havrylychuk & Jurzyk, 2006; Kosak & Cok, 2008; Pasiouras & Kosmidou, 2007; Ramlall, 2009; Staikouras & Wood, 2004). Pejic Bach, Posedel, and Stajanovic (2009) found that in the short-term and stable macroeconomic conditions, higher profitability is accomplished by the well-capitalised banks with larger market share.

Loans to deposits ratio is a measure of liquidity. Some of the previous studies showed its positive influence on profitability (Flamini, McDonald, & Schumacher, 2009; Kosak & Cok, 2008; Pasiouras & Kosmidou, 2007). In contrast, Miller and Noulas (1997) found a negative relation between loans to deposits ratio and profitability of banks in the US. Therefore, we can expect that influence of this factor is either positive or negative.

Inflation rate is considered as one of the main macroeconomic factors that can affect the profitability of banks. Extent to which the inflation affects bank profitability depends on whether the level of inflation is fully anticipated. If the inflation is fully anticipated by the bank's management, the bank can adjust interest rates appropriately to increase revenues faster than costs, which should have a positive impact on profitability (Perry, 1992). Gul et al. (2011) and Atasoy (2007) found positive influence of inflation on the profitability of

banks, while Pasiouras and Kosmidou (2007) showed different influence of inflation in the case of foreign and domestic banks.

GDP growth is a measure of total economic activity and it is also one of the most commonly used macroeconomic indicators. Demirguc-Kunt and Huizinga (1999) show that rapid economic growth increases profitability for a large number of countries. However, according to Golberg and Rai (1996) and Staikouras and Wood (2004), GDP coefficient may also be negative because countries with higher GDP are assumed to have a banking system that operates in the environment with more competitive interest and profit margins. Pasiouras and Kosmidou (2007) showed different relationships between GDP growth and bank's profitability in EU area in the case of foreign and domestic banks.

Market concentration in studies of Molyneux and Thornton (1992), Claeys and Vander Vennet (2008), Goddard, Molyneux and Wilson (2004) and Maudos and De Guevara (2004) showed to have a positive influence on bank's profitability. Havrylchuk and Jurzyk (2006) found a positive relationship between market concentration of domestic banks and profitability while foreign banks are not affected by this factor. On the other hand, Pasiouras and Kosmidou (2007) revealed a positive relationship between concentration and profitability of all banks in the sample, but negative relationship in the case of domestic banks. Atasoy (2007) proved the negative relationship between market concentration in Turkish banking sector and ROA. Based on these opposite results, we can expect either positive or negative influence of this factor.

Apart from the market concentration, Pasiouras and Kosmidou (2007) used ratio of total assets of the commercial banks divided by GDP which showed the negative influence of this ratio on a banks' profitability. The ratio of stock market capitalisation to total assets of the commercial banks serves as a proxy for financial development as well as a measure of the size of financial market and the relationship between bank and market financing. Pasiouras and Kosmidou (2007) found a positive influence of this ratio on banks' profitability. Stock market capitalisation to GDP is used to describe the overall level of development of the market and its importance in financing the economy. The study of Pasiouras and Kosmidou (2007) showed a positive relation between this ratio and profitability of banks in EU area. Gul et al. (2011) also proved a positive relation between market capitalisation and banks' profitability, while Havrylchuk and Jurzyk (2006) found a negative influence of the market capitalisation on the profitability of banks in Central and Eastern Europe.

Previous studies showed different results regarding relationship between the ownership structure and profitability of the banking sector. Hasan and Lozano-Vivas (1998) found no significant difference in profits of foreign and domestic banks. Azam and Siddiqui (2012) showed that in the banking sector of Pakistan, foreign banks were more profitable than domestic ones. Furthermore, Chmielewski and Krzesniak (2003) found that foreign banks in Poland underperform domestic banks, in terms of return on assets. On the other hand, Kosmidou, Pasiouras, Doumpou, and Zopounidis (2004) showed that domestic banks have higher overall performance compared to foreign banks in UK. Based on the study of banks in EU area, Pasiouras and Kosmidou (2007) found different influences of some factors in the case of foreign and domestic banks. In contrary, study of Kosak and Cok (2008) did not reveal any statistically significant difference between profitability of domestic and foreign banks in SEE region. In analyses of 80 countries in the period between 1988 and 1995, Claessens, Demirgüç-Kunt, and Huizinga (2001) proved that foreign banks have higher profits than domestic banks in developing countries and that the opposite is the case for developed countries.

This research article includes one additional variable that is related to the effect of financial crisis. When it comes to the influences of financial crisis, Serbian banking sector has not been an exception. A large number of recent studies have analysed the effect of financial crisis on profitability of banking sector. In that sense, Vu and Turnell (2011) showed that the Australian banks were highly profit-efficient before crisis, they had generally a sound asset quality, moderate volume growth in key product lines and tight expense management and therefore they did not suffer from the worst effects of crisis, as some other countries did. In the analysis of the banking sector in Switzerland, Dietrich and Wanzenried (2011) found that state-owned banks were more profitable than privately owned banks during the crisis period. Based on the research which included 14 emerging European economies, Anayiotos, Toroyan, and Vamvakidis (2010) found that banks' efficiency increased during the pre-crisis boom, but fell during the crisis. In an analysis of the Croatian banking sector, Krivacic, Smederevac, and Vujnovic (2012) showed that the global financial crisis influenced slowing down of banks' business activities and decrease of their earnings.

3. Data and variables

Our sample consists of 29 banks which operated in Serbia in the period from 2004 to 2011. The bank-specific data were collected from individual financial statements of banks while the country and market specific data were obtained from the statistical publications of the National Bank of Serbia and Belgrade Stock Exchange. The data are on annual basis.

Regarding the ownership, foreign banks are considered as those with foreign ownership exceeding 50% of share capital at the end of 2011¹. We consider the period between 2008 and 2011 as the period of financial crisis in Serbia.

Following the paper by Pasiouras and Kosmidou (2007), we analyse three types of variables: bank-specific variables, market-specific variables and macroeconomic variables (Table 1).

3.1. Dependent variable

As in most of the previous studies, ROA is a dependent variable and it is used as a measure of individual bank profitability. ROA is defined as net profit² divided by total assets and it

Table 1. Description of variables.

Type of variable	Variable symbol	Description	Expected sign
Dependent variable	ROAA	Return on average assets	
Bank-specific variables	SIZE	Size of a bank (log of total assets)	+ or -
	COINC	Cost-to-income ratio	-
	EQAS	Capitalisation of a bank (equity-to-total assets)	+
	LODEP	Liquidity of a bank (loans-to-deposit ratio)	+ or -
Market-specific variables	C5	Market concentration (ratio of total assets of the five largest banks and total assets of banking sector)	+ or -
	ASSGDP	Total assets of commercial banks divided by GDP	-
	MACPASS	Market capitalisation to total assets of the commercial banks	+
	MACGDP	Market capitalisation to GDP	+ or -
Macroeconomic variables	INF	The annual inflation rate	+ or -
	GDP	Gross domestic product growth	+ or -

Source: Created by the authors.

reflects how good a bank's management is in using the bank's real investment resources in order to generate profits.

3.2. Independent variables

3.2.1. Bank-specific variables

Bank's size (SIZE), measured by total assets, has been considered as one of the most important bank's profitability determinants with either positive or negative effect on a bank's profitability. Since the effect of size on bank's profitability might be nonlinear, we use log of total assets in order to accommodate this nonlinear relationship. The COINC measures efficiency of a bank by dividing its overhead costs and net interest income and other operating incomes. It measures quality of managing expenses of a bank. Negative influence of this ratio on bank profitability is usually expected. EQAS serves as a proxy variable for the capital strength of a bank. The level of a bank's capital strength is usually very closely linked to the level of credit risk (Thakor, 1996) and banks with higher EQAS are considered to be safer in the case of losses or liquidation. From this point, the relationship between this ratio and profitability is positive. However, high EQAS ratio could mean that a bank operates over-cautiously and ignore possible profitable opportunities (Goddard, Molyneux and Wilson, 2004a). Another important variable that has to be considered is related to the liquidity of a bank (LODEP) and it is calculated as ratio of net loans to customers and total customer's deposits (transaction and other deposits). As already stated in the paper by Pasiouras and Kosmidou (2007), this ratio shows the liquidity of assets and due to the fact that liquid assets are associated with lower rates of return, we expect positive relationship between this ratio and ROA.

3.2.2. Market-specific variables

Market concentration (C5) is measured by dividing total assets of five largest banks with total assets of the banking sector in the country. Based on the previous literature, we expect positive relationship between market concentration and a bank's profitability. Other market-specific variable that we use is ratio of total assets of the commercial banks divided by GDP (ASSGDP). In a line with the findings of Demirguc-Kunt and Huizinga (1999), we are going to test negative influence of this ratio on profitability of banks. Market capitalisation to total assets of the commercial banks (MACPASS) serves as a proxy for financial development of the country and size of financial market and we expect positive influence of this factor on the profitability of banks. Market capitalisation to GDP (MACGDP) is a measure of overall market development. Based on the previous studies, either positive or negative relationship between this factor and ROA can be expected.

3.2.3. Macroeconomic variables

The annual inflation rate (INF) is considered as one of the most important macroeconomic variables whose influence on a bank's profitability is important to analyse. The expected sign of this variable, according to previous literature, can be either positive or negative. Annual GDP annual is another macroeconomic variable that has been used in most of the studies related to the investigation of the influences on bank's profitability. Positive or negative influence of GDP on the profitability of banks is expected.

4. Methodology

This research is based on a balanced panel data-set and therefore a panel data estimation technique is the right choice. A data-set that consists of both time series and cross-sectional elements is known as a panel data-set. Balanced panel means that there are no missing observations. In panel data models, the data-set has n cross sectional units, denoted $i = 1, \dots, N$, observed at each of T time periods, $t = 1, \dots, T$. In the data-set, the total number of observations is $n \times T$.

For the purpose of testing the potential multicollinearity problems, we analysed the correlations between the variables and found high correlations between COINC and ROA (-0.63), and MACGDP and MACPASS (0.73). The high negative correlation between COINC and return on assets was expected to some extent, since the net profit was used for calculating ROA (which is a difference between total income and total expenses). However, there is a difference between the data used for these two variables – only overhead costs were included in COINC ratio while net profit was calculated by using total expenses. The more superior multicollinearity test can be conducted by examining the Variance Inflation Factor (VIF). VIF measures how much the variance of an estimated regression coefficient is increased because of the collinearity. If VIF is less than 10 and tolerance higher than 0.1, there is no reason for concern (Kutner, Nachtsheim and Neter, 2004). The results of VIF test show that the mean of VIFs are below 10 (4.96). Therefore, we can conclude that the multicollinearity is not a significant problem of our data-set.

In order to estimate the influences of bank-specific, market-specific and macroeconomic variables on the profitability of banks in Serbia, the following general model was used:

$$y_{it} = \alpha + \beta'x_{it} + u_{it} \quad (1)$$

where y_{it} is the dependent variable, α is the intercept term, β is a $k \times 1$ vector of parameters to be estimated on the explanatory variables, and x_{it} is a $1 \times k$ vector of observations on the explanatory variables, $t = 1, \dots, T$; $i = 1, \dots, N$ and u is an error term (Brooks, 2008).

By including all the variables in the equation 1, model is formulated as follows:

$$\begin{aligned} ROA_{it} = & \alpha + \beta_{it}(\text{SIZE}_{it} + \text{COINC}_{it} + \text{EQAS}_{it} + \text{LODEP}_{it}) \\ & + \beta_t(\text{C5}_t + \text{ASSGDP}_t + \text{MACPASS}_t + \text{MACGDP}_t + \text{INF}_t + \text{GDP}_t) + u_{it} \end{aligned} \quad (\text{Model 1})$$

For the purpose of testing the effect of financial crisis on the profitability of foreign banks, domestic banks and all banks in Serbia, we include dummy variable for the crisis period in Model 1³:

$$\begin{aligned} ROA_{it} = & \alpha + \beta_{it}(\text{SIZE}_{it} + \text{COINC}_{it} + \text{EQAS}_{it} + \text{LODEP}_{it}) \\ & + \beta_t(\text{C5}_t + \text{ASSGDP}_t + \text{MACPASS}_t + \text{MACGDP}_t + \text{INF}_t + \text{GDP}_t) \\ & + \text{CRISISdummy} + u_{it} \end{aligned} \quad (\text{Model 2})$$

The panel datasets are usually estimated using fixed or random effects regression models. In the fixed effects model, the individual specific effect is a random variable that is allowed to be correlated with the explanatory variables, while in random effects model the individual specific effect is a random variable that is uncorrelated with the independent variables. The appropriateness of a fixed effects model as opposed to a random effect model was tested with the Hausman test. Wooldridge test was used in order to check the first-order

autocorrelation in panel data. Tests were separately applied on the estimated results of the Model 1 and Model 2 for the three different datasets (all analysed banks, foreign banks and domestic banks).

5. Empirical results

This study is focused on the influence of bank-specific, market-specific and macroeconomic factors on the profitability of domestic banks, foreign banks and all analysed banks in general. Regression results for Model 1 are presented in Table 2. For testing whether we should use fixed or random effects model, Hausman test was performed. In the case of all banks in a sample, Hausman test is 263.02 (p value = 0.0000), and therefore we reject the null hypothesis that there is no systematic difference in the coefficients of two models and we use fixed effects estimation. Domestic banks subset was estimated using fixed effects model, as well. Since Hausman test in the case of foreign banks showed p value greater than 0.05, this data-set was estimated using random effects model. According to the Wooldridge test, no first-order autocorrelation is present in any of these three datasets. The overall R^2 shows that 65.59% of change in profitability of all banks in Serbia is explained by the variables that are used in this model. The overall R^2 of the domestic and foreign banks are even higher (0.7468 and 0.7093, respectively). F statistic and Wald χ^2 are significant at 1% level for all three datasets, showing that proposed model fits the data well.

Estimated results of all banks in a sample show that most of the analysed parameters have statistically significant influence on the profitability of banks. From the negative relationship between SIZE and ROA we can conclude that there is no evidence that larger banks tend to have higher profits due to the economies of scale. In other words, management of commercial banks in Serbia should be aware of the fact that higher level of total assets does not mean higher profitability for a bank. As it was proved in a large number of the previous studies, COINC shows the negative influence on profitability of banks. The very

Table 2. Regression results – Model 1.

	All banks in sample	Domestic banks	Foreign banks
SIZE	-3.951735 (-3.44)***	-1.450545 (-0.80)	-2.685173 (-4.04)***
COINC	-17.23976 (-20.58)***	-17.40953 (-15.32)***	-16.57383 (-14.78)***
EQAS	-3.187134 (-1.27)	7.129268 (1.55)	-9.519028 (-3.59)***
LODEP	-0.2954157 (-4.69)***	-0.2602072 (-4.13)***	0.5719412 (1.35)
INF	-0.1388173 (-1.02)	-0.1539467 (-0.68)	0.0628157 (0.43)
GDP	-0.073352 (0.69)	0.1678484 (0.99)	-0.1890214 (-1.48)
C5	0.614015 (1.94)*	0.4929238 (0.97)	0.2672463 (0.82)
ASSGDP	-0.000774 (-2.08)**	-0.0008881 (-1.53)	-0.00002888 (-0.67)
MACPASS	-4.454364 (-1.85)*	-5.968515 (-1.57)	-0.5332301 (-0.19)
MACGDP	0.0015942 (2.17)**	0.0016873 (1.48)	0.0006649 (0.79)
constant	18.78905 (2.04)**	8.940684 (0.60)	21.79526 (1.97)**
R^2 within	0.7104	0.8188	0.6884
R^2 between	0.5359	0.5343	0.7802
R^2 overall	0.6559	0.7468	0.7093
Number of obs	232	80	152
F value	47.35 (0.0000)	27.12 (0.0000)	
Wald χ^2			333.29 (0.0000)
Hausman test	263.02 (0.0000)	57.80 (0.0000)	9.30 (0.3178)
Wooldridge test	3.082 (0.0901)	0.031 (0.8638)	10.383 (0.2392)

***, **, * indicates significant at 1, 5 and 10% levels respectively. t values in parenthesis.

Source: Created by the authors.

high coefficient of this ratio shows that the profitability of banks strongly depends on the success of managing overhead costs compared to generated income. In order to gain higher profits, managers of banks in Serbia should decrease personnel and other operating expenses and/or increase bank's total income. Loans to deposit ratio (LODEP) shows the negative sign which implies that increase in loans to deposits ratio also means increase in liquidity risk exposure. Consequently, higher liquidity risk exposure has negative influence on the profitability. This result is in line with findings of Miller and Noulas (1997) who found the negative relation between loans to deposits ratio and the profitability of banks in the US. The conclusion is that keeping the adequate liquidity level is an important factor of bank's profitability.

Considering the macroeconomic factors, we find no significant influence of the inflation and GDP on the profitability of banks in Serbia. On the other hand, all market-specific factors show statistically significant relationship with ROA. Market concentration ratio (C5) has positive influence on the profitability of banks, which is a result proven in many of the previous studies (Molyneux and Thorton, 1992; Claeys and Vander Vennet, 2008; Goddard, Molyneux and Wilson, 2004; Maudos and De Guevara, 2004). This relation between market concentration and bank's profitability implies that, if smaller number of banks account for a relatively large percent of the market, the bank's profit would be higher. In contrary, if banking sector becomes more equable, measured by size of banks, the policy makers in central banks as well as managers in commercial banks should be aware of negative influence of this trend on the profitability of banks. Market capitalisation to GDP ratio (MACGDP) is positively related to bank's profitability. As it was expected, this result shows that overall development of the Serbian market positively affects the profitability of banks. The ratio of total assets of banking sector and GDP (ASSGDP) negatively affects bank's profitability. From this result it can be learned that if banking assets constitute a large portion of the GDP, banks have smaller margins and they are less profitable. Opposite to our expectation, the ratio of stock market capitalisation to total assets of the commercial banks (MACPASS) shows negative influence on bank's profitability. This effect can be attributed to the relatively low level of development of the Serbian stock market.

By analysing the results for the domestic and foreign banks, several conclusions can be made:

SIZE of a bank is an important factor for the profitability of foreign banks, but not for domestic banks. These results imply that the increase of total assets of foreign banks is more limitation than the stimulus for banks' profitability;

COINC is highly negatively related to ROA in the case of both domestic and foreign banks. Therefore, regardless of who owns the bank, reduction of operating costs and increase of revenues results in higher banks' profits;

Capitalisation ratio (EQAS) is not a significant factor for domestic bank's profitability, but it shows high negative influence on the profitability of foreign banks. This relationship between capitalisation ratio and bank's profitability can be especially important for the management of the foreign banks because it shows that higher level of equity does mean higher capital strength, but it also means more captured funds which are not invested. In the long-run, this brings the negative influence on the profitability, as we can see in our results;

Level of liquidity, measured by LODEP, shows the negative influence on the profitability of domestic banks, while it is not the relevant factor for the profitability of foreign banks. These

Table 3. Comparison of the results for banks in Serbia (Model 1) and for banks in the EU countries.

	Significant variables (Model 1)			Pasiouras and Kosmidou (2007)		
	All banks in sample	Domestic banks	Foreign banks	All banks in sample	Domestic banks	Foreign banks
SIZE	-3.951735 (-3.44)***		-2.685173 (-4.04)***	-0.005713 (-21.15411)***		-0.009339 (-5.378429)***
COINC	-17.23976 (-20.58)***	-17.40953 (-15.32)***	-16.57383 (-14.78)***	-0.198939 (-48.87565)***	-0.143611 (-30.10036)***	-0.309044 (-36.14324)***
EQAS			-9.519028 (-3.59)***			0.240276 (41.46373)***
LODEP	-0.2954157 (-4.69)***	-0.2602072 (-4.13)***		0.040155 (14.42604)***	0.046915 (9.738826)***	
C5	0.614015 (1.94)*			0.037344 (32.73005)***		
ASSGDP	-0.000774 (-2.08)**			-0.021273 (-45.93489)***		
MACPASS	-4.454364 (-1.85)*			0.015120 (25.77822)***		
MACGDP	0.0015942 (2.17)**			0.066306 (80.14221)***		

***, **, * indicates significant at 1, 5 and 10% levels respectively. *t* values in parenthesis.

Source: Created by the authors.

results show that domestic banks in Serbia should decrease its credit and increase deposit activity in order to keep adequate liquidity level and, consequently, gain higher profits.

In Table 3 only statistically significant variables are compared with results from the research of Pasiouras and Kosmidou (2007), which focuses on the banks in the EU countries.

When we consider results for all banks in a sample, most of our results do not differ in the sign of influence from the results of Pasiouras and Kosmidou (2007) for EU banks (SIZE, COINC, C5, ASSGDP, MACGDP). However, Serbian banking sector is different from banking sector of EU regarding the influences of the liquidity level (LODEP). The results show that, in the more developed banking sectors, higher credit compared to deposit activity positively affects the profitability of banks, which is not the case for Serbian banking sector. The coefficient for MACPASS variable is negative for banks in Serbia but positive for banks in EU. Taking into account the vast difference in the level of stock market development in Serbia and EU, such a difference was expected. In the countries with more developed stock markets, an increase of stock market means more information available and increase of potential number of customers of banks makes easier the process of identification and monitoring of borrower that increases bank activity and profitability (Ben Ben Naceur, 2003).

The profitability of domestic banks in Serbia is negatively influenced by the loans to deposit ratio, in contrast to the EU banking sector. It is obvious that management of domestic banks in Serbia should apply different policies than managers in the domestic banks in EU countries regarding liquidity risk exposure. In order to achieve higher profits, but with the respect of the appropriate liquidity level, managers in Serbian domestic banks should potentiate deposit activity while managers in domestic banks in EU countries should increase credit activity.

The main difference in the influences on the profitability of foreign banks in Serbia and foreign banks in EU countries is related to capitalisation ratio (EQAS).

It seems that higher equity compared to total assets in the case of foreign owned banks in EU means more capital strength, but in Serbia, it also means that foreign banks lose from

Table 4. Regression results – Model 2.

	All banks in sample	Domestic banks	Foreign banks
SIZE	-3.949163 (-3.38)***	-1.329691 (-0.75)	-6.845345 (-4.34)***
COINC	-17.2399 (-20.53)***	-17.4587 (-15.60)***	-16.25565 (-14.18)***
EQAS	-3.188413 (-1.27)	4.477414 (0.93)	-9.00288 (-2.97)**
LODEP	-0.2954128 (-4.67)***	-0.2705413 (-4.34)***	0.1131158 (0.23)
INF	-0.1410891 (-0.64)	-0.6550101 (-1.78)*	0.2517243 (0.98)
GDP	-0.0733204 (0.69)	0.1797452 (1.07)	-0.2319007 (-1.84)*
C5	0.6187905 (1.28)	1.548817 (1.95)*	0.0031697 (0.01)
ASSGDP	-0.0007807 (-1.23)	-0.002385 (-2.29)**	0.0004282 (0.58)
MACPASS	-4.512167 (-0.90)	-18.69059 (-2.25)**	6.587829 (1.11)
MACGDP	0.0016072 (1.30)	0.0046025 (2.26)**	-0.0006786 (-0.47)
Crisis	-0.0185477 (-0.01)	-3.952985 (-1.72)*	3.355345 (1.94)*
constant	18.64759 (1.31)	-19.45975 (-0.88)	47.63095 (2.79)**
R ² within	0.7104	0.8274	0.7098
R ² between	0.5363	0.6304	0.1083
R ² overall	0.6561	0.7763	0.5435
Number of obs	232	80	152
F value	42.83 (0.0000)	25.72 (0.0000)	27.13 (0.0000)
Hausman test	210.59 (0.0000)	59.98 (0.0000)	17.60 (0.0401)
Wooldridge test	3.071 (0.0907)	0.148 (0.7090)	10.1478 (0.2548)

***, **, * indicates significant at 1%, 5% and 10% levels respectively. *t* values in parenthesis.

Source: Created by the authors.

being over-cautious and from keeping higher level of non-invested funds. For the foreign banks in Serbia it is important to decrease the level of equity and increase investments in profitable projects, but not at the cost of violation of capital adequacy level.

In Model 2 one dummy variable for the crisis effect was added. We are interested in how the financial crisis affects the profitability of banks in Serbia and if there is a difference in the influence of crisis on the profitability of domestic and foreign banks. A dummy variable is added in all three datasets (all banks in sample, domestic banks and foreign banks). The results of Hausman test show that fixed effects model should be used for estimation of these three panel datasets. The Wooldridge test indicates no first-order serial autocorrelation. F statistics for all data-set are significant at 1% level which means that Model 2 fits the data well. Overall R² is 0.66; 0.78 and 0.54 for all banks, domestic and foreign bank datasets respectively, showing the satisfactory level of explanatory power of the model. Table 4 shows estimation results of Model 2.

The crisis dummy shows no statistically significant influence on the profitability of banking sector overall. On the other hand, results show that the crisis had clearly negative influence on the profitability of domestic banks, but positive influence on the profitability of foreign banks. Based on the previous studies, the negative influence of the crisis on the bank's profitability is usually expected. However, we find that period of crisis did not have negative influence on the profitability of foreign banks. According to Kovacevic (2012), foreign banks have much higher productivity compared to domestic, especially state-owned, banks. This can be one of the explanations for different crisis effect on the foreign and domestic banks in Serbia. Furthermore, an analysis of the individual bank's characteristics of foreign and domestic banks in Serbia during the years of crisis showed that foreign owned banks in Serbia were better capitalised and had lower ratio of liquid assets (higher credit to deposit activity) than domestic banks. Therefore, in order to prevent the negative influence of the crisis, management of domestic banks in Serbia may try to keep the higher level of capitalisation, to stimulate the credit growth and to keep the lower level of customer's deposits.

6. Conclusion

The aim of this article was to analyse how individual financial characteristics, overall financial environment and macroeconomic factors influence the profitability of banks in Serbia. This article answers four questions: Which internal and external factors influence profitability of all banks in sample? Which factors influence profitability of domestic and foreign banks? Are there differences in effects of the same factors on profitability of banks in Serbia and banks in EU? How does the financial crisis affect the profitability of domestic banks, foreign banks and all banks in Serbia, in general?

The regression results suggest that the profitability of banks in Serbia is affected by bank-individual factors (size, COINC and LODEP) and market-specific factors, but not by the macroeconomic factors. In order to achieve the higher profits, managers and supervisors of the banks in Serbia should reduce the banks' operating costs, decrease the level of total assets and keep the lower level of liquidity risk exposure. If we consider only foreign-owned banks, results show that higher profitability could be achieved if foreign banks decrease their size, reduce the overhead costs and release some part of the capital for the profitable investments. In order to be more profitable, managers of domestic banks in Serbia should try to decrease overhead costs and to keep adequate liquidity level by decreasing credit and increasing deposit activity.

The comparison of our results and the results for banking sectors in the EU countries (Pasiouras and Kosmidou, 2007) shows that loans to deposits ratio has the positive influence on the profitability of banks in EU countries, but negative on the Serbian banks. Higher loans to deposits ratio indicates higher liquidity and credit risk exposure. This result supports the fact that high level of credit risk exposure is the main problem of the banks operating in Serbia. Furthermore, the comparison of foreign banks in Serbia and foreign banks in EU countries shows that the main difference in the factors that influence the profitability of banks is related to the capitalisation ratio. The negative relation between this ratio and the profitability of foreign banks in Serbia implies that the management of these banks should try to decrease its capital and to invest these funds in possible profitable opportunities.

On the other hand, we find that, due to the higher capitalisation and higher loans to deposits ratio, the period of financial crisis did not have the negative influence on the profitability of foreign banks, as it had on the domestic banks in Serbia.

Notes

1. Seven banks were in the process of changing ownership (from domestic to foreign) in the first or second year of analysed period. However, those banks were considered as foreign, since they were foreign-owned in most of the analysed years.
2. Net profit refers to profit (or loss) before tax on profit in the reporting period.
3. It was not possible to analyse the crisis effect by splitting datasets into the data-set before and data-set after crisis. In this case, the problems with omitted variables occur (probably due to the much smaller number of observations and the same number of variables).

Disclosure statement

No potential conflict of interest was reported by the authors.

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