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EXPLORING BANK-SPECIFIC PROFITABILITY DETERMINANTS: A SINGLE COUNTRY STUDY

The paper tests which variables have contributed to the profitability of Serbian commercial banks in the last decade by employing multiple linear regressions. The study focuses on a bank-specific determinant and explores statistical importance of various financial ratios for reported return of average assets (ROAA), as well as return on average equity (ROAE). The variable that proved able to explain most of variability in reported profitability is loan loss provisions to net interest income. Slightly less informative is cost to income ratio. Other tested variables: equity to total assets, bank size proxy, net interest margin, liquid to total asset as well as ownership dummy, appear to have modest effect on chosen bank profitability indicators.

Keywords: *commercial banks; return on equity; Serbian banking industry; financial ratios.*

JEL classifications: *G21, P34.*

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ВИВЧЕННЯ ФАКТОРІВ ПРИБУТКОВОСТІ У БАНКІВСЬКОМУ СЕКТОРІ: НА ПРИКЛАДІ ОДНІЄЇ КРАЇНИ

У статті перевірено з використанням множинних лінійних регресій, які фактори визначають прибутковість сербських комерційних банків в останнє десятиліття. Увагу зосереджено на специфічних для банківського сектору факторах, досліджено статистичну значущість різних фінансових коефіцієнтів для звітної рентабельності середніх активів (ROAA), а також рентабельності середнього власного капіталу (ROAE). Змінна, завдяки якій стало можливим пояснити найбільший відсоток мінливості в прибутковості, — це співвідношення резерву на можливі втрати за позиками і чистого процентного доходу. Менш інформативний показник — співвідношення адміністративних витрат і операційного прибутку. Інші перевірені змінні: співвідношення власного капіталу і сукупних активів, показник розміру банку, чиста процентна маржа, ліквідні/сукупні активи, а також фіктивна змінна власності — очевидно, мають невеликий вплив на обрані показники прибутковості банку.

Ключові слова: *комерційні банки; рентабельність власного капіталу; сербська банківська галузь; фінансові показники.*

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ИЗУЧЕНИЕ ФАКТОРОВ ДОХОДНОСТИ В БАНКОВСКОЙ СФЕРЕ: НА ПРИМЕРЕ ОДНОЙ СТРАНЫ

В статье проверено с использованием множественных линейных регрессий, какие факторы определяют прибыльность сербских коммерческих банков в последнее десятилетие. Внимание сосредоточено на факторах, характерных для банковской сферы, исследована статистическая значимость различных финансовых коэффициентов для отчетной рентабельности средних активов (ROAA), а также рентабельности среднего собственного капитала (ROAE). Переменная, которая оказалась в состоянии объяснить больший процент изменчивости в прибыльности, — это соотношение резерва на возможные потери по ссудам и чистого процентного дохода. Чуть менее информативен

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показатель соотношения административных расходов и операционной прибыли. Другие проверенные переменные: соотношение собственного капитала и совокупных активов, показатель размера банка, чистая процентная маржа, ликвидные/совокупные активы, а также фиктивная переменная собственности — по всей видимости, имеют небольшое влияние на выбранные показатели прибыльности банка.

Ключевые слова: *коммерческие банки; рентабельность собственного капитала; сербская банковская отрасль; финансовые показатели.*

1. Introduction. A prime concern of this empirical analysis is to test which variables have contributed mostly to the profitability of Serbian banks during the recent 8 years. It is well accepted that a bank could act in different ways to increase its profitability. Cost management, pricing policy, liability management, asset management, risk management and size policy, all are the alternative actions, oriented at the same purpose. Any comprehensive study of bank profitability must simultaneously address all those areas. For each of those areas we include at least one proxy. The list of proxies is not exhaustive, but it happens to be limited to that most amendable to measurement. This analysis focuses solely on bank-specific determinants. Overall profitability of banking sector is also under influence of various industry-specific determinants (e.g., market concentration or industry size) and macroeconomic determinants (e.g., inflation or economic growth). Here we rather ignore those determinants, since a single-country study is not suitable for testing industry-specific and macroeconomic determinants.

In the contemporary banking literature, which is dealing with bank performance measurement, two measures are used interchangeably to represent a bank goal: profit efficiency and cost efficiency. The former one responds to what is also known as profitability, while the latter belongs to the pure efficiency measures. The definitions of cost efficiency and profit efficiency correspond to two important economic goals: cost minimization and profit maximization, respectively. Profit efficiency is a broader concept since it takes into account the effects of the choice of vector of production on both costs and revenues (Maudos et al., 2002).

There is a vast literature that addresses the issue of bank efficiency and profitability. Papers differ in both methodology they use, and the variables that are tested for its explanatory power. Research methodology differs in a number of ways. Most often, the choice of researchers were multiple linear regressions (Angbazo, 1997; Bonin et al., 2005b). Nevertheless, even very sophisticated approaches do not return significance better than 50% (Angbazo, 1997). Recently, stochastic frontier analysis is increasingly being used to investigate cost inefficiencies in banking (Rossi et al., 2005; Fries and Taci, 2005; Kondeas et al., 2008) and even data envelopment analysis (Molyneux et al., 1996; Berger and Humphrey, 1997).

Among the papers that include both bank-specific and other possible determinants are Demirguc-Kunt and Huizinga (1999), Garcia-Herrero et al. (2009), Imad et al.(2011) and many others. In some earlier studies of Serbian banking, Marinkovic and Radovic (2010) have done some tests of significance of industry-specific and macroeconomic variables. The results confirmed assumed direction of causality, but returned no model able to predict accurately the chosen proxy for bank efficiency.

The studies also differ in their choice of a dependent variable. The ultimate profitability ratio is return on equity. Some papers (Mathuva, 2009; Chen and Liao, 2010; Imad et al., 2011; Iskenderoglu et al., 2011) dealt simultaneously with return on assets and return on equity, and failed to find statistically significant difference between theirs determinants. It is an expected result, because the return on equity is a simply return on assets multiplied by equity multiplier. Equity multiplier is an indicator of financial structure. The influence of financial structure on return on equity is what is not necessary to test, because the relationship stays obvious. However, testing a relationship between financial structure and return on assets is the one which might be worth undergoing. Some papers were interested in testing relationship between commercial banks' net interest margin and various determinants (Angbazo, 1997; Demirguc-Kunt and Huizinga, 1999, Ljumovic et al., 2011). Despite the undisputable importance of net interest margin, it presents only a part of the whole story of bank profitability. Net interest margin is not an ultimate profitability ratio but rather an input for profitability equation. Our analysis uses multiple linear regressions to test relationship between selected bank-specific determinants and two alternative measures of bank profitability.

2. Research methodology and data set. Data set completely comes from BankScope (Bureau van Dijk) database. The data are ratios directly selected from the database or recalculated from annual financial statements. The data concern majority of banks that operate in Serbian banking industry. The sample contains the data for 29 out of total 33 banks that operated at the end of 2011. Time horizon is spanning 8 most recent years. Many banks do not operate for that long, so for those banks time series are a bit shorter. Moreover, for some banks data on the chosen variables are not available for all the years. The data set we used to feed multiple regressions counts at most 158 bank-year observations.

2.1 Selection of variables and definition. The wider list of determinants is selected as suggested by the financial theory, but the final set of explanatory variables is purified according to results given by regression analysis itself. There are different ways researchers can follow to choose a set of independent variables or predictors. One can simultaneously (direct method) choose a set of variables starting with theory suggestions, or apply a kind of blind procedure, known as stepwise selection procedure (Back et al., 1996). We here combine both approaches. We start with a set built on theoretical grounds. However, in choosing set of independent variables, we were restricted to those that are available from the data set. Thus, we did not begin with an empty model, which is usual in stepwise selection procedure. Nevertheless, the initial set of variables was further subjected to stepwise selection procedure. If the variable contributes insignificantly to the explanatory power of the model, it is removed, while a new variable that contributes to statistical significance enters the model.

The bank profitability is assessed alternatively based on two ratios: return on average assets (ROAA) and return on average equity (ROAE), while 7 other financial ratios are used to predict the nature of the dependent variables. Each explanatory variable represents specific aspect of bank performance measurement. Predicting variables are as follows:

Cost to income ratio: This variable indicates the ability of bank to cover most important part of total costs, i.e. overhead costs. In banking theory those noninterest

costs are also called "burden" (Sinkey, 2002, p. 119) what underlines their inelastic response to level of business activity. This is an efficiency ratio, which is sometimes called "quick test of efficiency" (Casu et al., 2006, p. 215). It is computed by dividing overhead costs with a sum of net interest income and other operating income. Overhead costs are noninterest costs, and exclude loan loss provisions. The most important part of the overheads are wages and fixed asset depreciation. Noninterest costs are perceived as that part of a bank's total costs, which are most controllable, and most responsive to management action. The cost to income ratio belongs to the most complex banks' financial ratios. It is not simple ratio between costs and revenues. As stated above, the numerator presents only a part of operating costs. Some other costs are included into denominator. The most important component of the denominator is net interest income, which is rather a net income item than a revenue item. The rationale for such a construction is making the ratio less sensitive to changes in interest rates, which are mostly out of management's control. Net interest income wipes-out most of fluctuations that simultaneously arise in interest revenue and interest expenses. An alternatives to this ratio is overhead costs to total assets (Fries and Taci, 2005), operating cost to total assets, or even a logarithm of the amount of overheads (Imad et al., 2011).

Net interest margin: Most frequently, this ratio is computed by dividing net interest income, which is the difference between interest revenue and interest expenses, with earning assets. Expressed as such, the ratio is able to capture most of banks' price-setting policy. When a bank quotes aggressively its loans and deposits, the margin will be narrower. Otherwise, it will stay rather wide. The role of the margin is to cover the costs of intermediation, merely to compensate a bank for risk-taking activity implied by financial intermediation. Some researchers use slightly different definition: substituting earning assets for total assets. This way the ratio is simplified, since an important management tool, share of earning to total assets, is completely ignored. This is what we consider a flaw of the latter approach. Net interest margin is an extremely important variable. Researchers describe it picturesquely as a "bread and butter" of traditional banking. An adequate interest margin should generate sufficient income to cover most of the costs, and to increase equity (solvency) as risk exposure increases.

Solvency (or leverage): Solvency depends on profitability, but is there an opposite way of influence? How is solvency related to profitability? Solvency, or capital adequacy, presents an ultimate buffer against unpredictable losses. The ultimate profitability ratio is return on equity. It is obvious that equity to asset ratio stays inversely related to the return on equity. If imposed from outside, by the regulator, leverage ratio will eventually force banks to stay prudent if only it goes with no offsetting effect from the asset side. The higher capacity a bank has available for absorbing losses the most aggressive it is expected to be on assets side. Some authors (Blum, 1999) pointed out that more stringent capital adequacy regulation lead to shifting risk from leverage (liability side) to investments (asset side). To account for leverage effect we use equity to asset ratio. This is a very rough capital adequacy ratio. Capital adequacy, or solvency, may be measured with a number of ratios, but ratios that are more complex, like Tier 1 ratio, or total capital ratio that uses risk-weighted assets as denominator, already depends on the extent to what assets are exposed to risk. The more risky bank

assets are, the lower risk-adjusted capital adequacy ratio will be. Some studies devoted to alternative testing of different capital adequacy ratios underlines opposite relation between the simplest equity to asset ratio and risk-adjusted capital adequacy ratios. Mathuva (2009), by using multiple linear regressions, found positive relationship between the risk-adjusted capital adequacy ratios and profitability expressed by both return on assets and return on equity, in spite of negative relationship between equity to asset ratio and the same profitability ratios. The positive relationship could be explained by the costs of financial distress. The lower risk-adjusted ratio means higher costs of financial distress that are mirrored in higher costs of acquiring funds. Our choice for bank capitalization (equity to total asset ratio) as a proxy for financial leverage, is further determined by the lack of available data for other capital adequacy ratios.

Liquidity: The forth variable represents impact of liquidity on profitability. The relationship between those performance measures is not that straightforward as it appears at first glance. Excess liquidity could undermine bank profitability, as is true that endangered liquidity could do the same. The first case leads to higher opportunity cost, while the opposite case leads to explicit costs, which are necessary to meet unpredicted liquidity needs (e.g. firefighting asset sale). We take account of liquidity by introducing liquid assets to total assets ratio, into the set of explanatory variables. The more liquid are assets of a bank the less income a bank is expected to report. Since the net interest margin includes the impact of assets structure on net interest income, the more liquid assets a bank has, the less net interest margin will be. However, this line of thinking critically rests on the assumption that liquid assets generate significantly less income than the earning assets. Assets structure is possibly to proxy with inversely related ratios, i.e. with earning assets to total assets ratio, or net loans to total assets ratio (cf. Bonin et al., 2005b; Fries and Taci, 2005; Imad et al., 2011).

Bank size: The impact of bank size on profitability ratios measures economy of scale. If the banks with total assets above the average report significantly better profitability than competitors with smaller size of total assets, it means that some extent of scale economy exists inside the industry. By their nature, total assets are rarely a normally distributed variable. By taking natural logarithm of the original data, a variable is transformed into acceptably normal one. It is regular procedure seen in many papers (Altman et al., 1977; Demirguc-Kunt and Huizinga, 1999; Imad et al., 2011).

Loan losses: None of the abovementioned predicting variables captures the impact of a peculiar bank cost, i.e. loan losses, on bank profitability. Researchers experimented with various proxies for quality of loan portfolio in terms of default risk. The first choice is net charge-offs. However, data on net charge-offs are not available for majority of banks in the sample. Thus, due to the lack of data we have naturally inclined to the other proxies for loan losses. The second best choice may be an item from income statement: loan loss provisions. The data availability does not seriously constrain analysis, but the variable is extremely volatile, since it depends mostly on managerial discretion. Moreover, this is the only variable, which may be reported even in negative figures. A loan loss reserve is an item from balance sheet. The amount of the reserves indicates how risky the loan portfolio is at the time of reporting. The

variable is significantly less prone to management "window dressing" since the managers have to reserve a share of each asset value according to rules imposed to them by the regulator. It also does not reflect bank ability to allow reserves because the reserves are included into balance sheet in the required amount. If eventually a bank is not able to allow part of required reserves, it should report missing amount as contra item on balance sheet. Deflated by gross loans, the loan loss reserves ratio indicates relative contamination of bank loan portfolio. Thus, the default risk of loan portfolio is measured alternatively by the ratio of loan loss provisions to net interest income, and loan loss reserves to gross loans.

Ownership: Finally, a variable for bank ownership enters the data set. Contrary to all previous variables, a type of ownership is not a direct result of managerial decisions, and hence it is sometimes classified into industry-specific determinants (Athanasoglou et al., 2005). We investigate the interactions between bank profitability and a dummy variable that is taken to be unity for foreign owned banks, otherwise it is zero. Domestic state and private owned banks were grouped together, since the dummy allows only binary coding. A rationale for types of ownership to enter the set of explanatory variables is empirical based, with little theory that backgrounds the empirical results.

2.2 Statistical properties of the data set. Summary statistics of the data set is presented in Table 1. All the explanatory variables, except the loan loss provision to net interest income, have reported only positive values.

Table 1. **Summary descriptive statistics**

Financial ratio	Mean	St. dev	Max	Min	Skewness	Kurtosis
Dependent variable						
ROAA	1.14	6.51	–28.11	28.74	–0.20	9.67
ROAE	2.05	28.02	–110.31	124.36	–1.18	9.76
Independent variables						
Cost to income ratio	83.62	53.65	10.54	419.84	3.25	16.97
Net interest margin	9.45	4.51	1.63	26.01	1.13	4.33
Equity to asset ratio	25.17	14.59	5.03	91.44	1.58	6.23
Liquid to total assets	36.50	13.86	7.92	75.56	0.48	3.04
Assets size (Ln)	9.97	1.19	6.70	12.54	–0.16	2.41
Loan loss provisions to NII	74.97	135.68	–237.55	839.89	2.79	13.09
Loan loss reserves to gross loans	13.06	16.71	0.68	97.95	3.15	14.33

The purpose of multiple linear regression analysis is to produce functional relationship between predicted (dependent) variable and a smallest possible set of predicting (independent) variables. For a model to operate reliably with as less as possibly variables, it is crucial to avoid overlapping variables. Simple linear regression has been used to test mutual interdependence between explanatory variables. By reviewing results we have seen not a single strong interdependence. Certain regularity appears only in a couple of cases. Namely, the banks, which are less aggressive in terms of quoted interest rate spread, if the market (both deposit and credit) is price-competitive, are expected to have the lowest market share both in deposit and credit market. Therefore, we could expect that net interest margin is inversely related to the size of the bank assets. However, the case of negative correlations between those two

predicting variables, although apparent, is not that strong. Some level of interdependence, albeit weak, is also found in case of net interest margin and equity to assets ratio. We explain this regularity by the fact that banks with a higher equity to assets ratio, ceteris paribus, will have lower interest costs, and wider net interest margin. Therefore, we can freely reject the case of overlapping in the chosen set of predicting variables.

3. Multiple linear regressions. We have tested 3 different specifications. The first and the second one are 6-variable profile, while the third one is 2-variable profile, with a set of explanatory variables reduced to those proved the most informative ones. The first two specifications differ in proxy chosen for the quality of loan portfolio.

2 linear combinations (specification 2 and specification 3) are found to have the most explanatory power. Note that R2 statistics modestly favors 6-variable profile, but F-statistics, since it depends critically on number of explanatory variables, clearly favors 2-variable profile. Several variables proved to be especially significant. The 2-variable profile specification, which contains cost to income ratio and loan loss provisions to net interest income, gives the score of significance slightly less than the equation with all 6 variables. The other variables have some predicting power, but it is rather weak. Entering and eliminating those variables changes insignificantly total significance.

Relative contribution of each variable is crucial for addressing the issue of most important profitability determinants, and the rank between them. Therefore, individual explanatory power of each variable is also tested. The t-values (Table 2) make it clear that cost to income ratio both default risk proxies, and equity to assets ratio are significant at the confidence level of 99%. Bank size proxy also appears to be significant, although with the lower level of confidence.

The regression coefficients are predicted completely in line with the theory suggestions. The results reveal that cost to income ratio, and both default risk proxies (either loan loss provisions to net interest income, or loan loss reserves to gross loans) are inversely related to the tested profitability ratios, while equity to asset ratio and asset size are positively related. The other independent variables show no clear sign of influence. None independent variable is able to solely explain difference in profitability. As stated in introductory section, banks could rely upon different strategies to boost its profitability. For some of them, cost control (cost to income ratio) would be in focus, while for others maybe not. Moreover, some ways of action are mutually excluding. If a bank follows the policy of wide net interest margin, it will probably adversely impact on the quality of asset portfolio, and credit losses will get higher. Therefore, a positive influence of wide net interest margin on average return on assets could be offset by opposite influence of high loan losses. Bearing in mind that overheads are largely fixed, if less aggressive pricing policy draws the banks out of the market, it will finally drive up cost to income ratio and restrict return on assets, or make the figures even more negative. One possible reason why net interest margin shows no strong relation with return on assets is the fact that this variable is not fully under management's control. It is partly instrumental variable and partly an outcome of a competitive market. It is well known that in banking with dominant position of leading banks the other competitors will "follow the leader" in setting deposit and credit

rates, so that variability of net interest margin will be significantly lower than variability of return on assets. When we dummy out the foreign owned banks we do not found the results that support the view of better performing foreign ownership. Statistically insignificant dummy influence could be largely attributable to the size effect, which is captured by the other variable. Indeed, the dummy influence is predominantly negative, not economically large and in most cases statistically insignificant.

Table 2. **Multiple linear regression results**

Independent variable	Dependent variables – profitability ratios					
	Return of average assets (ROAA)			Return on average equity (ROAE)		
	(1)	(2)	(3)	(1)	(2)	(3)
Intercept	–11.122 (–1.76)*	–8.465 (–1.96)	5.899 (8.95)**	–35.278 (–1.25)	–3.752 (–0.20)	23.478 (8.88)**
Cost to income ratio	–0.022 (–2.36)*	–0.025 (–4.11)**	–0.037 (–5.84)**	–0.121 (–2.91)**	–0.149 (–5.50)**	–0.159 (–6.31)**
Net interest margin	0.101 (0.69)	0.006 (0.06)	–	0.267 (0.41)	–0.572 (–1.28)	–
Equity to asset ratio	0.193 (4.08)**	0.114 (3.89)**	–	0.575 (2.73)**	0.261 (2.06)*	–
Liquid to total assets	0.036 (0.01)	0.023 (1.00)	–	0.114 (0.71)	0.016 (0.16)	–
Assets size (Ln)	0.873 (0.70)*	1.038 (3.04)**	–	3.210 (1.40)	2.484 (1.68)*	–
Loan loss provisions to NII	–	–0.026 (– 10.38)**	–0.027 (– 10.95)**	–	–0.128 (– 11.72)**	–0.128 (– 12.69)**
Loan loss reserves to gross loans	–0.102 (–3.13)**	–	–	–0.494 (–3.42)**	–	–
Dummy (ownership)	–0.882 (–0.752)	–1.732* (–2.147)	–	1.538 (0.294)	–0.987 (–0.282)	–
R^2	0.243	0.595	0.499	0.188	0.593	0.567
Adjusted R^2	0.208	0.574	0.493	0.151	0.572	0.560
F	6.904	28.495	70.941	4.978	28.338	92.861
N	158	144	144	158	144	144

Numbers in parenthesis are *t*-values; * Statistical significant at level of 10%; ** Statistical significant at level of 1%.

4. Conclusions. A multiple linear regression analysis is employed to address the issue of statistical importance of some financial ratios for reported bank profitability (ROAA, ROAE). We found strong dependence between loan loss indicators and profitability, as well as cost to income ratio. As expected, they are strongly negatively related to bank profitability, contrary to bank size and leverage. Other tested variables seem to have modest effect, if any, on bank profitability. In the regulated banking industry the scope for using financial leverage to increase the profitability is rather limited. The bank regulators that rely on risk-adjusted capital adequacy ratio make the leverage strongly liked to riskiness of the assets, so that boosting profitability by maneuvering leverage is business strategy more limited than in unregulated industries. This is why one could not expect equity to assets ratio to join the group of the most significant explanatory variables. Insignificance of liquidity proxy for reported profitability deserves special interest. This regularity could be explained with rather high rate of interest that banks earn on a part of their liq-

uid assets, so that opportunity costs of secondary liquidity reserves do not constrain profitability of Serbian banks.

Models gain predictability when loan loss reserves to gross loans (sixth variable in specification 1) has been substituted with alternative one, i.e. loan loss provisions to net interest income (specification 2). Obviously, loan loss provision is a type of cost subject to managerial discretion. It can be used to manipulate reported profit. Periods with high provisions are followed with periods with rather low provisions. In addition, variability of this variable is significantly higher then variability of all the other independent variables (predictors) as well dependent variable. As underlined in theory (Sinkey, 2002, p. 112): "a bank can smooth its profit judiciously. When profit goes up, the bank over-reserves and reports lower profit, while in bad times the bank under-reserves and reports profit higher than it could have without the prior over-reserving".

From the business policy perspective, it appears that in traditional banking, two main areas in searching for profitability have to be default risk management and controlling of non-interest costs, mainly wages and fixed assets' depreciation.

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