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Economic Research-Ekonomska Istraživanja

ISSN: 1331-677X (Print) 1848-9664 (Online) Journal homepage: http://www.tandfonline.com/loi/rero20

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To cite this article: Maja Pervan, Iva Pelivan & Josip Arnerić (2015) Profit persistence and determinants of bank profitability in Croatia, Economic Research-Ekonomska Istraživanja, 28:1, 284-298, DOI: 10.1080/1331677X.2015.1041778

To link to this article: http://dx.doi.org/10.1080/1331677X.2015.1041778

Published online: 12 May 2015.

Economic Research-Ekonomska Istraživanja, 2015
Vol. 28, No. 1, 284–298, http://dx.doi.org/10.1080/1331677X.2015.1041778

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Profit persistence and determinants of bank profitability in Croatia

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(*Received 11 December 2013; accepted 11 March 2015*)

The aim of this research was to determine the persistence of profit in an emerging banking sector of the Republic of Croatia. Most developing countries have experienced common changes within restructuring of the banking system and therefore, this issue has become crucial, especially after comparing poor empirical findings in these countries to the findings of developed countries. However, research related to this issue is non-existent in the Croatian banking sector. Moreover, among the few studies that were carried out on the territory of the Central and Eastern European banking markets, none of the studies have analysed the persistence of profit in terms of the Markov Chain stochastic process. In addition to the profit persistence analysis, authors defined and estimated a model that would enable the identification of the profitability determinants of Croatian banks. In this sense, the model incorporated three groups of profitability determinants: bank-specific, industry-specific and macroeconomic. The variables with a statistically significant impact on the profitability of banks were identified using a dynamic panel model, while the application of the Markov Chains stochastic process revealed that profit persistence was less likely to occur in banks with higher profit.

Keywords: profit persistence; profitability determinants; dynamic panel model; Markov chain; banks; Croatia

JEL classifications: L25, G21, C33

1. Introduction

The Croatian banking sector has undergone substantial changes over the last two decades, becoming a more propulsive and competitive sector with a significant contribution to social stability and economic development. Inherited problems with roots in the socialist legacy have mostly been resolved, privatisation has occurred and most of the bank's assets are nowadays foreign-owned (Pojatina, 2000; Galac & Kraft, 2001). Consolidation and acquisitions, growing competition, integration of the financial markets, changes in regulations and deregulation, permanent innovation in information technology and automatization were the changes that contributed to the fact that the Croatian banking sector is becoming one of the core sectors in the Croatian economy (CBA, 2009). Taking into consideration previous issues, the importance of identifying factors with a crucial impact on the business performance of Croatian banks and the examination of the persistence of bank profitability is becoming evident.

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A number of studies tested profitability determinants (Ito & Fukao, 2010; Papadogonas, 2007; Pervan & Mlikota, 2013) and profit persistence (Aslan, Kula, & Kaplan, 2010; Droucopoulos & Lianos, 1993; Glen, Lee, & Singh, 2003; McGahan & Porter, 1999; Mueller, 1986) for the (non-bank) manufacturing industry. In the banking sector, greater attention has been given to these issues mainly during the last two decades. When compared with the issue of profit persistence, research related to the determinants of bank profitability is much more common; therefore resulting in a great number of researches focused on the latter. While some authors placed their attention on solely bank-specific and/or industry-specific variables (see for example Javaid, Anwar, Zaman, & Ghafoor, 2011; Kundid, Skrabic, & Ercegovac, 2011), some other researchers (Aburime, 2008; Athanasoglou, Brissimis, & Delis, 2008; Awdeh, 2011; Flamini, McDonald, & Schumacher, 2009; Pejić Bach, Posedel, & Stojanović, 2009; Ramlall, 2009) additionally took into consideration the influence of macro-economic factors on bank profitability. A comprehensive review of literature and theories on the determinants of bank profitability can be found in Rasiah (2010).

As noted by Goddard, Liu, Molyneux, and Wilson (2011), most empirical research on competition and its influence on bank performance are based on static theoretical models (Dick & Hannan, 2010; Goddard & Wilson, 2009; Shaffer, 2004). However, since many of the economic relations are dynamic in their nature, and given that the past bank performance may affect future business decisions, in this paper, a dynamic component (in the form of a lagged dependent variable) was introduced into the profitability model and a GMM estimator was applied. The analysis covered the period from 2002 to 2010 and the research results indicated factors (i.e. size, solvency and credit risk, intermediation, operating expenses management, market concentration and growth, GDP growth and inflation) that have contributed most to the success of Croatian banks.

The other part of the empirical analysis, which refers to the estimation of the persistence of bank profitability, was carried out using the Markov Chain methodology. As emphasised by Goddard et al. (2011), the evidence of profit persistence in the banking sector is relatively scant. Previous studies, which were related to the issue of profit persistence in the bank industry (e.g. Agostino, Leonida, & Trivieri, 2005; Goddard et al., 2011; Kaplan & Çelik, 2008; Knapp, Gart, & Chaudhry, 2006) were focused on a relatively small number of predominantly developed countries. Since Croatia belongs to the group of developing countries, an additional incentive to explore the dimensions of profit persistence in the Croatian banking sector was created.

Having in mind the above, this paper attempts to achieve several goals. First, the research includes various factors that can influence bank performance and which are presented in this paper through three basic dimensions: bank-specific, industry-specific and macro-economic factors. In this way, the analysis becomes more comprehensive and the obtained results become more credible in comparison to previous researches that were focused only on the internal factors. Secondly, since the research is being conducted for Croatia, which per se falls into the category of developing countries, the obtained results should shed more light upon the issue of banks' performance within the economy, which still expects its further and 'complete' development in the future. Thirdly, among the few studies (focused on profit persistence) that were carried out on the territory of the Central and Eastern European banking markets, this study (to the best of our knowledge) is the first that analysed the persistence of profit in terms of the Markov Chain stochastic process. The additional aim of this paper was to explore and discuss the issue of the degree of profit persistence in the banking sector, which has

been extremely rarely studied (regardless of it being related to developed or developing countries), whereas the analysis of this kind is non-existent for the Croatian banking sector.

2. Variables, model specification and definition of classes of profitability

The analysis encompassed all Croatian banks that were active during the 2002–2010 period. As a result of mergers, acquisitions and liquidations, the total number of analysed banks has changed over the years and therefore our panel is unbalanced. The data on banks used in the empirical analysis were collected from the annual editions of the *Banks Bulletin* which is published on the official website of the Croatian National Bank. For the information on macroeconomic indicators, publications of the Croatian Bureau of Statistics (CBS 2010) and of the Croatian National Bank (CNB 2011) were used. The data for all variables were collected on an annual basis.

In order to estimate the influence of different variables on bank profitability (presented by ROA indicator), three groups of profitability determinants were formulated and integrated in the analysis. To control the differences among banks, a series of variables representing the banks' characteristics were included. This group (bank-specific) comprised bank size, market share, solvency risk, credit risk, intermediation and operating expenses management. The second group of determinants (industry-specific) had the task of capturing the industry structure in which banks operate. This group included industry concentration and market growth variables. Finally, in order to account for a macro environment within which the banking sector operates, inflation and the annual growth rate of GDP were included as macroeconomic variables.

Aiming to capture the impact of different influential factors, as well as to account for the dynamic nature of the bank profitability, we formulated a model that comprises a dynamic specification, i.e. which contains a lagged dependent variable as an explanatory factor. However, with this dynamic specification, estimators such as ordinary least square (OLS), fixed effect (FE) and random effects (RE) become biased and, therefore, in order to overcome this problem, we applied a Generalised Method of Moment estimation (GMM) proposed by Arellano and Bond (1991) on the following model (1):

$$\pi_{it} = \alpha + \delta\pi_{i,t-1} + \sum_{b=1}^{B} \beta_b X_{it}^b + \sum_{s=1}^{S} \beta_s X_{it}^s + \sum_{m=1}^{M} \beta_m X_{it}^m + \varepsilon_{it} \quad \varepsilon_{it} = v_i + u_{it} \tag{1}$$

where π_{it} is the profitability of bank i at time t, with $i = 1, ..., N$, $t = 1, ..., T$; α is a constant term, $\pi_{i,t-1}$ is the one-period lagged profitability, δ is the speed of adjustment to equilibrium, $x_{it}^{'}$'s are the explanatory variables (namely, X_{it}^b denotes bank-specific variables; X_{it}^s denotes structure, i.e. banking industry-specific variables and X_{it}^m stands for macroeconomic variables), ε_{it} is the disturbance, with v_i the unobserved insurance-specific effect and u_{it} the idiosyncratic error.

Each of the variables used in the model (1) is described below along with the motivation for its inclusion.

The variable of bank size (SIZE) is considered to have a positive impact on bank profitability, i.e. larger banks should make larger profits because they exploit the economies of scale. This would mean that, based on the economies of scale, larger banks can obtain cost advantages, achieve greater operational efficiency and consequently realise higher profits. For example, banks can adopt new methods and technologies in their operations and/or may hire more qualified staff and therefore become more efficient and

competitive in comparison to their rivals. The size of the bank also has a positive impact on its reputation, thus facilitating the sales of high-quality products and services at higher prices, which in turn lead to higher profits. However, for those banks that have become extremely large, this impact could also be negative. The SIZE variable is measured as the natural logarithm of total assets. The assumption that the largest banks usually make the largest profitability rates is associated with the market share (MSd) variable. Therefore, many banks try to increase market share, i.e. their own sales, in order to make higher profits. Reasons for that can be found in economies of scale and scope and the resulting cost advantages. Furthermore, large firms may have more capital and may be more innovative than their smaller competitors. In addition, high market shares are usually related to market power, i.e. firm's ability to raise the market price of a good or service and consequently achieve greater profitability. As the basis for the calculation of the market share indicator, deposits are used. Thus, market share represents deposit share of the bank in the overall deposits in the banking sector. Solvency risk (SLRISK) of banks exists when the banks are unable to meet their outstanding obligations in due time. This variable is calculated as the ratio of one's own capital in overall assets. The high share of capital in total assets can be part of prudent business policy of the bank, however, a lower risk is usually related with lower earnings and therefore a negative relationship between bank capitalization and profitability may occur. On the other hand, a high share of capital in total assets reduces the need for external funding, which reduces interest expense and results in greater profitability. In this case, the relationship between the bank's capital to asset ratio and profitability is positive. Credit risk (CRISK) is calculated as the ratio of reserves and total loans. It is a possibility for banks to find themselves in a situation where a client, who had borrowed funds from them, becomes unable to fulfil his obligations, i.e. he cannot pay the whole or part amount of the principal or interests, which then has a negative effect on the earnings and the weakening of the bank capital. In accordance with this assertion, it can also be assumed that credit risk should have a negative impact on the profitability of banks. The increase of bank profitability and the predictions of future levels of credit risk arise from an improvement in the management of credit risks and an adequate credit policy. Intermediation (INTER) as one of the bank-specific factors is expressed as the ratio of total loans to total liabilities. Intermediation is the accumulation and allocation of savings by banks and other financial institutions (Pojatina, 2000). The assumption is that the intermediation variable will be positively associated with profitability. The operating expenses management (OEM) indicator is the share of operating costs (general administrative expenses and depreciation) in the overall assets of banks. It is expected that the impact of Operating Costs Management indicators on the profitability of banks will be negative. The lowering of operative expenses, which derives from improved management, will result in the increase of the efficiency of bank operations and, subsequently, in the increase of the bank's profitability.

Concentration ratio CR4d is the industry-specific variable that indicates the share of the deposits of the four largest banks in the overall deposits. Proportional representation of the four biggest banks should provide adequate information on the degree of concentration in the Croatian banking sector. The larger the value of this indicator, the larger the concentration of industry. The economic theory suggests that there is a possibility of the existence of either a positive (SCP hypothesis) or a negative (efficiency hypothesis) relationship between the concentration of banks and their profitability. Market growth (MG) shows the annual growth of deposits in the form of a percentage. The greatest

challenge of any bank is to build and maintain a sustainable business on a rapidly changing market and business environment. Market growth can be slow in cases where there is no high demand for banking products and services. On the contrary, when demand rises due to a better quality of products and services as well as an acceptable price, a rapid market growth ensues. It is anticipated that market growth will have a positive impact on banks' profitability.

GDP growth (gGDP) and inflation (INFL) are the macroeconomic variables included in the model of banks' profitability. Since GDP is the principal source of individual and joint consumption investment decisions, the deposit formation of the population and legal entities, etc, it is expected that GDP growth resulting from an increased financial monitoring of ongoing operations, crediting of the economy and the positive effects of credit and deposit multiplication, will influence the increased financial potential of banks and thus positively impact bank profitability (Jurman, 2008). The impact of inflation measured by the Consumer Price Index on banks profitability can be positive as well as negative. The economic theory suggests that inflation has a decisive role in the structure of interest rates. Accordingly, a higher inflation rate leads to higher interest rates on loans, and also higher profitability of banks. However, in the case of an increase in interest rates on loans, the risk of loan repayment also increases, because high inflation rates have an impact on households' and firms' budgets, which in turn threatens their liquidity and reduces their ability to settle debts. In this case, the impact of inflation would have a negative effect on the profits of banks.

The time-discrete Markov Chain with finite state space allows the determination of profit persistence within the Croatian banking system. The transition probability matrix provides useful information on profit persistence, which is estimated based on the probability of bank transition from one profitability class to another, thereby taking into account the Markov dependence (Faming, Chuanhai, & Raymond, 2011). In order to meet all the requirements of the Markov process, based on the structure of available data, the bank profitability classes were defined. Profitability classes were formulated based on the changes of ROA (return on assets) indicators for the period from 2002 to 2010 for 46 Croatian banks. Depending on the transition from one class of bank profitability to some of the other profitability classes, the persistence of bank profitability for the aforementioned period was determined. Four basic classes/groups were formulated: unprofitable banks (those who have a negative value of ROA indicator), low-profitable banks (ROA indicator takes the value up to 1%), moderately profitable banks (ROA indicator is in the range between 1% and 2%) and profitable banks (ROA is higher than 2%). Each class of profitability presents one state of Markov Chain. The Markov Chain approach has proved to be suitable in the analysis of the transition between different states, i.e. classes of profitability, according to the Markov property. The Markov property means that next state of the process (profitability class in the current year) depends only on the current state of the process (profitability class in the previous year). If the process is in the same state (profitability class) most of the time then there is a high probability that it will remain in that state (the level of profitability will not change). Therefore, this approach in a certain way describes the autoregressive process of the first-order, which is the basis for profit persistence analysis. Because of this feature, the Markov Chain approach has the advantage in comparison with other approaches that do not take into account memorylessness. Table 1 shows the classes of profitability (four states of the Markov Chain).

Table 1. Classes of profitability.

Profitability classes	ROA
Non-profitable banks	ROA < 0%
Low-profitable banks	0% < ROA < 1%
Moderately profitable bans	1% < ROA < 2%
Profitable banks	ROA > 2%

Source: Authors' conclusion.

3. Research results

3.1. Determinants of bank profitability

Table 2 presents the results of the profitability model for Croatian banks estimated by using the first-differenced GMM estimator proposed by Arellano and Bond (1991). The results of the conducted dynamic-panel analysis refer to the period from 2002 to 2010 and comprise 321 observations. The validity of the dynamic-panel model (Baltagi, 2008) was tested by the Sargan test, which tests the endogenous instrumental variables. The value of the Sargan test for over-identifying restrictions should exceed 0.05, so that the possibility of endogenous instrumental variables could be excluded, i.e. it does not reject the null hypothesis that there is no correlation between the instrumental variables and the residuals (Cameron & Trivedi, 2010). By introducing additional instrumental variables, we obtain the efficiency of estimators, or the estimation becomes one-sided. Therefore, we should choose an optimal number of instruments in order to prove the null hypothesis of the test to be true, and to show that the partiality of the estimator does not increase significantly. In our case, the Sargan test shows that there is no proof of over-identifying restrictions, because the value of the test is 0.3385. In that case, the null hypothesis will not be rejected, meaning that all conditions for the moments are met and all mentioned instruments are accepted. Apart from the Sargan test, the test of

Table 2. Dynamic-panel analysis of bank profitability determinants.

Variables	ROA	Coefficients
Constant	−0.4518475***	(0.0114246)
ROA_{t-1}	0.1305063***	(0.0137798)
SIZE	1.761768***	(0.132776)
MSd	0.0347896	(0.0681295)
SLRISK	0.2011112***	(0.005774)
CRISK	−0.1900219***	(0.0059782)
INTER	0.0299779***	(0.0003028)
OEM	−0.2276288***	(0.049358)
CR4d	0.2037197***	(0.0160813)
gGDP	0.0283496***	(0.0044845)
INFL	−0.2146314***	(0.0046438)
MG	0.0260407***	(0.0043093)
No. of observations	321	
Sargan test (*p*-value)	0.3385	
Arellano-Bond test (m_1) (*p*-value)	0.2467	
Arellano-Bond test (m_2) (*p*-value)	0.2726	

Source: Authors' calculations.
Reference: Values in parentheses represent the standard error estimates.
***, ** and * indicate significance at the 1, 5 and 10% levels respectively.

first-order and second-order autocorrelation was conducted between the first residual differences (the so-called m1 and m2 Arellano-Bond test). In the test of first-order autocorrelation, the hypothesis of non-existence of first-order autocorrelation between first residual differences is not rejected (statistically insignificant p-value), i.e. this means that the assumption of independence of residual differences was met, and the same conclusion was reached for the second test. On the basis of the conducted tests it can be concluded that the estimated model satisfies all diagnostic tests.

The profitability of banks in the previous period (ROA_{t-1}) is statistically significant, thus confirming the dynamic character of the panel model. A low value of the coefficient of this variable (0.13) indicates that the Croatian banking sector is relatively competitive. The market share (MSd) variable is the only variable that proved to be statistically insignificant. However, an MSd indicator with a positive sign is in line with the assumption that larger banks also make larger profits. The bank size (SIZE) variable has a positive and significant impact on bank profitability, which is in accordance with the expectations and the assumption of the existence of economies of scale in the Croatian banking market. The influence of the solvency risk (SLRISK) variable on bank profitability is positive and significant, meaning that those banks that hold more capital compared with their assets achieve a higher level of profitability. Credit risk (CRISK) proved to be a negative and significant variable, confirming the defined expectations. Those banks that have a larger amount of reservations compared with the overall size of the loan also experience lower rates of profitability, i.e. an increased inability or the refusal of client's payment reduces their profitability. In particular, a lower level of profitability will be accomplished by banks that did not reasonably implement the policy of identifying, specifying, measuring and managing of credit risk, i.e. they did not implement such a policy that would have, to some extent, reduced the credit risk. A negative and significant impact of the operating expenses management (OEM) is in line with the statement that the reduction in operative expenses (derived from the improved management) will increase the efficiency of bank operations and subsequently bank profitability. The intermediation (INTER) variable has a significant and positive impact on bank profitability, suggesting that those banks that hold more deposits are more profitable. These banks also have a higher ability to settle all outstanding debts that arise from issued loans. A positive and statistically significant influence of the concentration ratio (CR4d) variable on bank profitability indicates that the higher the concentration on the market, the greater the profitability of banks. One of the most popular paradigms, which advocate this point of view, is the Structure Conduct Performance (SCP) paradigm, which can therefore be accepted for the Croatian banking sector. Furthermore, the impact of the market growth (MG) variable is also positive and significant, which means that the growth of bank deposits in the Croatian banking market had a positive influence on profitability. GDP growth (gGDP), as a macroeconomic variable, which was included in the model, showed a positive and statistically significant influence on the profitability of Croatian banks. This variable, arising from increased consumption of the households and firms, from their overall lending and degree of multiplication of credits and deposits, positively influenced the deposit base of banks, which positively reflected on the financial results of Croatian banks. The impact of inflation (INFL), measured by the CPI, is negative and significant, suggesting that high inflation rates impact households' and firms' budgets, threaten their liquidity and reducing their ability to settle loan debts which, in turn, negatively affects bank profitability. In addition, according to Athanasoglou, Brissimis, and Delis (2008), if the inflation rate is not fully anticipated by the banks management, then banks cannot appropriately adjust interest rates in order

to eliminate the possibility that costs increase faster than bank revenues, which consequently decreases bank profitability.

3.2. Degree of profit persistence in Croatian banks

The application of the Markov Chain methodology, together with the defined classes (states) of profitability, allowed us to obtain the results shown below. The marginal homogeneity test (Table 3) shows that the number of banks transitioning from one profit class to another (from year to year) was the highest in the period from 2002 to 2003 (when there were 17 of them) and from 2005 to 2006 (when there were 12 transitions). Although the number of total transitions was the highest in the first transitional period, these transitions were not significant because banks changed their position for only one profitability class, whereas, for example, in the fourth transitional period (from 2005 to 2006) these transitions were more significant because banks changed their profitability class for more than one level. In the latter case, banks generally transited from the current profitability class to one of the lower classes. Specifically, 11 out of 12 transitions, which happened in the aforementioned period, were toward the lower profitability classes, whereas only one transition was to a higher class. Possible reasons for such changes (reduction) of bank profitability in 2006 could be found in an increasingly stronger competition, higher regulatory restrictions and unfavourable movements on world markets.

In 2006, as compared with 2005, the profitability of the average assets of all banks decreased by 0.1 percentage points and amounted to 1.5%. The increase in pre-tax profit was more than three times lower than the growth of bank assets as a whole, which caused bank profitability to decline in 2006. Changes in the group of medium-sized banks had the most significant impact on the reduction in profitability of the average assets of banks, which also achieved the highest growth in assets and the lowest profit growth. Due to these changes, the realised profitability of 1.1% was lower than the profitability of other groups and banks in total, whereas reduced profitability in the group of medium-sized banks was higher than average (0.3 percentage points). The profitability of the average assets of large banks was decreased by 0.1 percentage points. Only the small banks experienced an increased profitability of their average assets, from 1.2% at the end of 2005 to 1.4% at the end of 2006, due to an increase in profits, which were higher than those of the other groups of banks and banks in total. The conducted recapitalizations and the increase of regulatory capital led to the fact that a significantly faster growth of risk-sensitive assets had a negative effect on the capital adequacy ratio. By the end of 2005, the capital adequacy ratio fell to 13.98%. The most important item in the total liabilities of banks at the end of 2006 was received deposits, which constituted 66.6% of total liabilities. The received deposits experienced an increase in medium-sized banks, which were 38.6% higher in comparison at the end of 2005 and thus led to the fact that the biggest change in the share of deposits in total liabilities was achieved in medium-sized banks: it increased from 69.7% at the end of 2005, to 71.4% at the end of 2006 (CNB 2003–2011). All aforementioned changes had an impact on the lower profitability of banks in 2006 when compared with 2005 (CBA 2008), thus leading to the conclusion that, during this period, the banks did not maintain their profits on the same level.

In other words, since the number of bank transitions from one profitability class to another was statistically significant for the period from 2005 to 2006, it can be stated that, compared with other periods, the persistence of profit was non-existent in the reference period.

Table 3. Marginal homogeneity test.

	2002 & 2003	2003 & 2004	2004 & 2005	2005 & 2006	2006 & 2007	2007 & 2008	2008 & 2009	2009 & 2010
Distinct values	4	4	4	4	4	4	4	4
Off-diagonal cases	17	10	9	12	7	8	11	6
Observed MH statistic	48.0	24.0	23.0	38.0	18.0	19.0	25.0	13.0
Mean MH statistic	44.5	23.5	25.5	32.5	16.0	17.0	22.0	11.5
Std. Dev. of MH statistic	2.50	1.80	1.50	1.94	1.58	1.41	1.87	1.50
Std. MH statistic	1.40	0.27	−1.66	2.84	1.26	1.41	1.60	1.00
Asymp. Sig (2-tailed)	0.162	0.78	0.096	0.005	0.206	0.157	0.109	0.317

Source: Authors' calculations.

Table 4 shows the probabilities obtained by the stochastic transition probabilities matrix. The transition probabilities matrix shows the probability of transition from one to any other profitability class. What must be taken into account is that the transition probabilities matrix refers to a short-term period. In the case of high profit persistence, all elements on the main diagonal of the matrix should be close to one. According to the obtained results, it can be concluded that there is a moderately high persistence of profits in the Croatian banking sector. The highest probability refers to the transition from the fourth to the third profitability class and amounts to 36.5%. It becomes clear from Table 4 that, in the short term, there is a higher probability that profitable banks (4.5%), rather than moderately-profitable banks (3.6%), find themselves in a position of unprofitable business. A possible explanation for this can be found in the fact that highly-profitable operations are usually a reward to those banks that are prone to take higher risks, as the higher risks are usually associated with highly-profitable operations. However, because of the riskier operations that profitable banks are prone to, and due to an inadequate policy of risk management and uncertainties, such banks can find themselves in a situation where they operate with losses, i.e. they are more prone to significant changes in profitability classes compared with those banks from moderately-profitable classes. Some of the banks that are in the third profitability class are also the largest banks in Croatia today. The probability for transition from the first (non-profit class) to the third or fourth profit class in a short period does not exist, and neither does the probability that a bank from a low-profitability class transits to the most profitable class.

Table 5 shows the equilibrium probabilities, i.e. the probabilities that banks will be in any profitability class in the long term, regardless of their initial profitability. In the observed table, the highest probability refers to the assumption that banks will be in the second profitability class, where the probability amounts to 51.55%. The probability that some of the banks will operate with above-average profits, i.e. that they will be in the fourth profitability class, regardless of their prior profitability status, amounts to 2.03%. The obtained probability, which is the lowest when compared with all other values, is in line with expectations, since the entry into the category of highly-profitable banks is often associated with the introduction of innovative products/services, restructuring and reorganisation of business, and so on, which requires some time, effort and investment; but which in turn usually provides higher efficiency and profitability. The calculation of reciprocal value of obtained probabilities (1/state probability) reveals the amount of time it takes to remain in a particular profitability status. The staying of banks in a non-profitable class, on average, would last 4.8197 years, meaning that it would take approximately 5 years for the banks to commence profitable business.

Table 4. Matrix of transition probabilities.

From/to	State 1	State 2	State 3	State 4
State 1	0.72	0.28	0	0
State 2	0.093	0.763	0.144	0
State 3	0.036	0.246	0.682	0.036
State 4	0.045	0.045	0.365	0.545
Initial Prob.	0.25	0.25	0.25	0.25
State Cost				

Source: Authors' calculations.

Table 5. Equilibrium probability.

	State name	State probability	Recurrence time
1	State 1	0.2075	4.8197
2	State 2	0.5155	1.9400
3	State 3	0.2567	3.8951
4	State 4	0.0203	49.2293
	Expected cost/return = 0		

Source: Authors' calculations.

Table 6a shows that the probability for a bank to stay in the first, i.e. the least profitable class, is also the highest probability and amounts to 54.44%. When the bank moves from the first to the second profitability class, this probability would decrease and amount to 41.52%, whereas in the case of a transition to the third profitability class, the probabilities significantly decreased compared with the previous two possibilities and amounted to a mere 4.03%. The probability of transition of banks from the first into the most profitable class does not exist, and even if it existed, as mentioned before, this would require a large number of years. The same pattern of interpretation can be applied to Tables 6b and 6c. When taken together, it becomes clear from Tables 6a, 6b and 6c that the highest probabilities refer to the retention of banks in the same class of profitability.

However, this is not the case in the last table (Table 6d), which shows the probability of a transition of banks from the fourth profitability class to one of the remaining

Table 6. The probability for the transition of banks from one profit class to the remaining three classes of profitability in the next year.

State	Initial state probability	Resulting state probability
(a)		
State 1	1	0.544440
State 2	0	0.415240
State 3	0	0.040320
State 4	0	0
(b)		
State 1	0	0.143103
State 2	1	0.643633
State 3	0	0.208080
State 4	0	0.005184
(c)		
State 1	0	0.074970
State 2	0	0.367170
State 3	1	0.513688
State 4	0	0.044172
(d)		
State 1	0	0.074250
State 2	0	0.161250
State 3	0	0.454335
State 4	1	0.310165

Source: Authors' calculations.

three classes of profitability in the next year. The banks in the most profitable class have to make a lot of effort in order to maintain the same profitability level; consequently, the probability to stay in the class with the highest profitability would amount to 31.02%.[1] In the case of these banks, the results show the highest possibility for a transition is into the third profitability class, i.e. a probability of 45.43%. Based on the probabilities defined for all four probability classes, we can conclude that those banks that conduct business with the highest profits also have the lowest degree of profit persistence, i.e. profit persistence is certain for those banks that generate lesser profits: the higher the ROA indicator, the lower the profit persistence probability for those banks.[2]

4. Conclusion

In order to contribute to the understanding of the profitability determinants of banks operating in developing countries and to shed new insights on the factors that may influence the success of the banking business, a model of profitability that incorporates bank-specific, industry-specific and macroeconomics variables was formulated and tested in this research by using a dynamic panel analysis. Furthermore, special attention was devoted to the examination of the profit persistence in the Croatian banking sector since studies of this kind are fairly rare for the banking sector in general and non-existent for the Croatian banking industry.

The analysis was conducted for the 2002–2010 period and the ROA indicator was used as a dependent variable in the model of bank profitability. According to the estimated parameters obtained from the dynamic panel model, all analysed variables had a statistically significant influence on banks' performance. The exception was the market share variable, which didn't prove to be an important explanatory factor. Statistically significant variables with a positive influence on bank profitability were: profitability from the previous year, bank size, solvency risk, intermediation, industry concentration, market growth and GDP growth, while variables of credit risk, inflation and operating expenses management had a negative and statistically significant impact on profitability. The results of the research have implications for decision makers at both bank management level as well as at macroeconomic level. Since credit risk is recognised as an important influential factor of bank profitability, banks should ensure sound risk and capital management, giving especial importance to credit risk management through the increasing the efficiency of the process of credit analysis and debtor monitoring. Likewise, banks should ensure a sufficient level of capitalization since well-capitalised banks can deal with difficulties more efficiently and can take advantage of business opportunities, e.g. these banks might have a lower need to go for external funds (and therefore have lower interest expenses), which in turn may result in better performance. Furthermore, the research results showed that banks should utilise the benefits of their size and try to exploit cost advantages (related to scale economies) whose realisation together with improved management (and consequently reduced operative expenses) will contribute to further increases of the efficiency of bank operations and, subsequently, in the increase of their profitability. Additionally, due to the significant influence of market concentration and market growth (as sectoral variables) and GDP and inflation (as macroeconomic variables) on bank profitability, the importance is on sectoral and macroeconomic policies that ensure an adequate balance between rigid and flexible market competition legislation, as well as to promote further growth and development of the banking sector since this sector plays a key role in the wellbeing of an economy

and it is vital for the country's financial stability. Indeed, the growth of GDP positively influences numerous factors of the supply and demand for loans and deposits in the Croatian banking sector. Likewise, monetary policy that ensures price stability will reduce the households' liquidity risk and their inability to repay the loans and, at the same time, banks' credit risk, resulting in higher level of banks' profitability.

Some interesting results were also obtained regarding profit persistence. Using the transition probabilities matrix, and based on the conducted tests and obtained probabilities from formulated profitability classes, it could be concluded that persistence was present where the ROA indicator was low, i.e. when banks operated with a low rate of profitability. The higher the profit of the bank, the lower the profit persistence probability, i.e. the probability that the bank would transit to a lower-profitability class in the years to come was higher. Given the results of the transition in one step, the persistence of profit was highest for those banks that achieved a ROA of 0% to 1%; then for banks that had a negative ROA and those banks with a ROA between 1% and 2%, while for the banks with a ROA of more than 2% the persistence was the lowest. On average, profit persistence for banks with ROA of less than 1% amounted to 59%, whereas, profit persistence for banks with ROA higher than 1% amounted to 41%. These numbers suggested that profit persistence was 18% stronger for low-profitability banks than for high-profitability banks. Conducted statistical tests confirmed that this difference was statistically significant.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes

1. Namely, all the probabilities in Table 6 are the result of the transition in one step, starting from the Markov dependence (the future state of processes can be predicted solely based on the current state). This would mean, for example, that if the bank has been 'profitable' in the current year (state 4 = 1), the probability that it will remain in the same class in the next year will be 31.02%.
2. In this paper, the transition probability in one step was taken as a measure of profit persistence, starting from the classification of four profitability classes. It should be noted that the aforementioned classification proved to be representative in a manner where such a grouping eliminated the effects of atypical values (outliers), i.e. banks with extremely low or extremely high profitability, and that thereby no major discrepancies in the number of banks and between individual classes was noted. Equal classification of profitability classes was used for all research years, in order to make all results mutually comparable. Furthermore, this leads us to the conclusion that the dynamic panel could be estimated for two groups of banks: low and highly-profitable banks (a preliminary estimate would mean two dynamic panel models). However, the estimation of two panel models separately, on the same pattern of banks, would mean a significant reduction of spatial dimensions of data with the same time dimension, which is not appropriate for the dynamic panel analysis. Specifically, the goal of applying the dynamic panel analysis is to consolidate the impact of the observed independent variables of all banks in the pattern to the profitability indicator.

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