DETERMINANTS OF BANK PROFITABILITY IN CROATIA

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Abstract

The research objective of this study is twofold. It aims to provide a synthesis of relevant empirical researches on the determinants of commercial banks' profitability and to establish empirical verification of profitability determinants of banks in the Republic of Croatia using an econometric method of dynamic panel analysis. The empirical analysis is carried out on a data sample of 28 commercial banks in the period 2003-2008 which continuously refers to more than 95 % of assets of the overall banking intermediation. Return on assets (ROA) is profitability indicator used in the analysis. The presented research results and their economic interpretation may serve as a valuable foundation for the general assessment of commercial bank management in Croatia as well as for identifying several sources of potential improvement and impairment of their financial performance in the future. Thus, corrective actions could be planned and implemented in advance.

Key words: *bank profitability, microeconomic determinants, banking industry's determinants, dynamic panel analysis, Croatia.*

1. INTRODUCTION

Drivers of bank performance and origins of its modification are generally twofold and like elsewhere encompass either price or quantity effects or both of them, simultaneously in their dynamic interdependence. Further to this, the economic theory of production decomposes quantity changes as the results of productivity effects and activity effects (Grifell-Tatjé and Lovell, 1997). In addition, price changes are determined by production costs and adjusted to the market conditions. Altogether, profitability is a function of controllable

and uncontrollable factors. In a broader sense, Harker and Zenios (1998) report that bank performance is a function of its strategic choices, strategy execution or quality of services and the environment. Taking into consideration the fundamentals of the economic theory of profit, empirical findings on the building blocks of banking industry performance achieved consensus on several aspects of bank-specific features that reflect price, productivity and activity effects. Bank size, market share, credit quality, cost control, employee productivity, financial leverage or equity financing, income from fees and commissions, assets, loan or deposit growth, liquidity management, structure of deposits and ownership structure are some of the aforementioned microeconomic variables (Rose, 2003, pp. 172-173). External variables that affect the price and quantity changes are usually grouped into market attributes and macroeconomic characteristics. Banking industry's determinants that are usually included into the analysis are concentration index, interest rate spread and regulatory determinants, while the macroeconomic indicators are inflation, interest rates, exchange rates, unemployment rate, GDP growth, and stock market capitalization as a share in gross domestic product. In addition, Demirgüç-Kunt and Huizinga (2000) report on the relevance of financial system development for the level of before tax ROA and net interest margin of banks worldwide. Again, ROA and return on equity (ROE) are commonly used indicators of bank profitability. According to the International Monetary Fund (IMF), ROA is the key ratio for the evaluation of bank profitability (Anthanasoglou, Brissimis and Delis, 2005, p. 13). Along with ROA some authors use the net interest margin (NIM) as a proxy of bank profitability (Abreu and Mendes, 2002: Demirgüç-Kunt and Huizinga, 1998 and 2000: Kosmidou, Tanna and Pasiouras, 2005).

Nonetheless, the purpose of this paper is not to report on the influence of the macroeconomic environment on banks' performance, but rather to point out how the selected business strategy that incorporates and adjusts to the conditions of the economic environment affects its performance. Therefore, management decisions or internal variables and industry variables are taken into consideration for this study, while macroeconomic effects are expected to be captured in selected ratios of bank performance. With reference to this, the impact of macroeconomic determinants is expected to be visible in average interest expenses and the average interest income (price and quantity effects). Thus, Grifell-Tatjé and Lovell's (1997) logic and conclusions on the sources of profit change are adopted as well as research conclusions on the prevalent relevance of business management decisions likewise proved in Mamatzakis and Remoundos (2003) and Sufian and Razali Chong (2008).

Related studies on the research problem of this paper are either oriented to an individual banking sector (Anthanasoglou, Brissimis and Delis, 2005: Kosmidou, Tanna and Pasiouras, 2005: Mamatzakis and Remoundos, 2003: Ramlall, 2009: Sufian and Razali Chong, 2008: Sayilgan and Yildirim, 2009) or cross-country banking sectors (Abreu and Mendes, 2002: Anthanasoglou, Delis and Staikouras, 2006: Demirgüç-Kunt and Huizinga, 1998: Fries, Neven and Seabright, 2002: Goddard, Molyneux and Wilson, 2004: Grigorian and Manole, 2002: Košak and Čok, 2008). Although, the first mentioned papers are more appropriate for our analysis, the research results of others are not omitted. Whatever may be the case,

empirical examinations of bank profitability determinants are numerous for developed financial systems and rare for developing, post-transitional countries. Selected data from Croatian banking sector, mainly from the period prior to its restructuring toward modern banking, was enclosed in some of them (Anthanasoglou, Delis and Staikouras, 2006: Fries, Neven and Seabright, 2002: Grigorian and Manole, 2002: Košak and Čok, 2008), but an extensive analysis that included long-term and short-term criterion variables, as well as contemporary panel data methodology was not carried out. Thus, Pejić Bach, Posedel and Stojanović (2009) examined the determinants of bank profitability in Croatia on average bank data from 1999-2005. In addition, several studies on banks in Croatia have focused on other aspects of bank performance (Jemrić and Vujčić: Kraft, Hofler and Payne, 2002). However, profitability is a prerequisite for bank stability as it protects and builds up own funds through the auto-financing process. Therefore, empirical evidence that follows should be a useful contribution in discussions on Croatian's banking sector stability among academicians as well as practitioners. Thus, the financial stability issue is indirectly underlined due to the dominance of banks in Croatian financial system[1]. For all the aforementioned reasons, the paper is expected to be useful to policy makers, whether they are prudential authorities or bank managers.

2. EMPIRICAL FINDINGS ON BANKS' COMPARATIVE ADVANTAGES

Bank profitability is a result of continuous interdependency of adopted bank strategy and its economic surrounding. Therefore, numerous empirical researches combine both of these aspects, contrary to our study that focuses exclusively on detecting comparative advantages of banks in the chosen banking sector. Comparative advantages may arise from the bank's size, asset growth and quality of risk management (financial risks and operating efficiency indicators) and/or market share, ownership structure and concentration index. These commonly used explanatory variables of banks' performance in empirical researches are extracted from more or less doubtful and confronted theoretical propositions. However, the purpose of this paper is not to review and discuss numerous theoretic areas that address questions on selected bank characteristics, but rather to report on the research results on some of them.

Lagged dependent variables are used in the analysis in order to test the phenomenon of persistence in profitability. They proved to be statistically significant explanatory variables in a research by Anthanasoglou, Brissimis and Delis (2005) with approximate coefficient value of 0.35 for ROA, and in that by Mamatzakis and Remoundos (2003) with approximate value of 0.18 for ROA and 0.19 for ROE, both for the Greek banking industry, in the period 1985-2001 and 1989-2000 respectively, as well as in Goddard, Molyneux and Wilson (2004) for six major European banking sectors in the period 1992-1998 where persistence is estimated at 0.26 value. In addition, "a value close to 0 means that the industry is fairly competitive (high

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[1] Bank assets represent approximately 80 % of the total assets of the overall financial intermediation (at the end of 2008).

speed of adjustment), while a value close to 1 implies less competitive structure (very slow adjustment)" (Anthanasoglou, Brissimis and Delis, 2005, p. 13).

Bank size and profitability nexus could be explained by its profit and cost efficiency. Standard or alternative profit efficiency is either a consequence of market share (Structure-Conduct-Performance hypothesis) and of the level of competition (Quite-Life hypothesis) or is attributed to the most efficient market participants (Efficient-Structure hypothesis). Likewise, Goddard, Molyneux and Wilson (2004, p. 365) summarize that "it is therefore uncertain whether the high profits of large banks are a consequence of concentrated market structures and collusion, or superior production and management techniques that reduce costs, creating high returns". Whatever may be the case, stronger reputation and too big to fail protection remain exclusive features of large banks. Furthermore, bank size in relation to profitability indicates its cost (in)efficiency or (dis)economies of scale. Although "the size-profitability relationship may be expected to be non-linear" (Anthanasoglou, Delis and Staikouras, 2006, p. 10) identification of an optimal bank size remains a challenge. In addition, the results of empirical researches are quite diverse. The level of bank assets proved to be positively statistically significant in Anthanasoglou, Delis and Staikouras (2006), Demirgüç-Kunt and Huizinga (1998), Grigorian and Manole (2002), Košak and Čok (2008) and Mamatzakis and Remoundos (2003) while systematic size-profitability relationship was not empirically verified in Anthanasoglou, Brissimis and Delis (2005) and Goddard, Molyneux and Wilson (2004). Kosmidou, Tanna and Pasiouras (2005), and Sufian and Razali Chong (2008) reported an inverse relationship between bank size and profitability, and concluded on the existence of the diseconomies of scale.

Financial leverage points out bank's risk profile, potential financial distress and bankruptcy costs, and affects the financial funds' type, size and price, and thus business activity in the near future. Banks with higher equity financing are expected to have lower ROE and higher ROA. Most of the empirical researches proved that well-capitalized banks have higher ROA or/and NIM (Abreu and Mendes, 2002: Anthanasoglou, Brissimis and Delis, 2005: Anthanasoglou, Delis and Staikouras, 2006: Demirgüç-Kunt and Huizinga, 1998: Kosmidou, Tanna and Pasiouras, 2005: Košak and Čok, 2008: Mamatzakis and Remoundos, 2003: Ramlall, 2009: Sufian and Razali Chong, 2008) and some of them proved the same for ROE (Abreu and Mendes, 2002: Goddard, Molyneux and Wilson, 2004). Furthermore, Grigorian and Manole (2002) proved for 17 transitional countries from 1995-1998 that well capitalized banks, foreign owned banks as well as banks with higher market share, attract more deposits at lower costs due to their reputation and too big to fail attributions. Although propositions on the irrelevance of bank capital structure (Modigliani and Miller, 1958) are long time ago abandoned, an optimal capital structure is still slippery ground.

Loan-loss provisions over total loans, total loans over total assets and provisions over total assets are commonly used indicators of a bank's portfolio credit risk. It is anticipated that loan-loss provisions to loans as well as provisions over total assets will have a negative impact on bank profitability (likewise in Anthanasoglou, Brissimis and Delis, 2005: Anthanasoglou, Delis and Staikouras, 2006, Košak and Čok,

2008: Ramlall, 2009: Sufian and Razali Chong, 2008). This is consistent with the credit rationing theory (Stiglitz and Weiss, 1981) in which the anticipated adverse effects of interest rates that reflect the risk level are explained. Thus, a usual liner risk-return hypothesis is here replaced with optimal risk-return relations. However, Kosmidou, Tanna and Pasiouras's (2005) findings for the UK banks are in line with linear risk-return relations, i.e. they conclude that higher credit risk positively affects NIM.

Ownership structure (domestic and foreign or private and state-owned) might also explain the differences in bank profitability i.e. home advantage hypothesis is often being tested. However, the level of economic development of the countries should be taken into consideration in hypothesis formulation. Demirgüç-Kunt and Huizinga (1998), for example, report that in developing countries foreign-owned banks have greater NIM and ROA than domestic banks, while the opposite holds for the developed countries. Anthanasoglou, Delis and Staikouras (2006) findings are in line with the aforementioned authors. On the contrary, Košak and Čok (2008) confirm ownership irrelevance for south-eastern European countries out of which foreign-owned banks outperformed the domestic ones in ROA, only in Croatia and in Bulgaria. Finally, Grigorian and Manole (2002) findings also do not support the home advantage hypothesis in transitional countries due to foreign banks' equity financing opportunities, better risk management techniques, selection of the best borrowers available on the market, and favorable public opinion that contributes to deposit attraction at reduced costs.

Other explanatory variables of bank profitability found in literature are indicators of liquidity risk (total loans over short term funds, liquid assets over total assets, loans over total assets), ratios of cost management efficiency (operative expenses over total assets, non-interest expense over total assets, overheads over total assets, net non-interest income over total assets, cost to income ratio), net interest margin, diversification and business mix indicators (non-interest income over total assets), regulatory variables, concentration indicators (the Herfindahl-Hirschman Index – HHI), and market interest rate spread. Due to inconsistency of appearance of these variables in previous empirical analyses their theoretical explanation and empirical verification in relation to bank profitability is not intended to be discussed here due to exhaustive bank management principles and paper volume restrictions. Nevertheless, some of these variables will be selected in the empirical model and will thus be economically interpreted together with other research results.

3. EMPIRICAL FRAMEWORK AND EVIDENCE

3.1. Data, methodology and model development

The data sample included balance sheet and income statement items of 28 commercial banks in the Republic of Croatia in the period 2003-2008. The year 2003 is generally accepted as a break point in the evolution of Croatian banking sector from an undeveloped and unstable industry towards a rehabilitated, consolidated,

privatized, liberalized, modernized and stable part of the economy which was undoubtedly fostered with the development and reform of the legal framework and prudential practice. Furthermore, some smaller banks that were present in the banking sector in the part of the observed period were excluded from the analysis in order to avoid the false impression of the larger sample. Namely, only banks that had business continuity from the 2003-2008 were took into consideration as the usage of dynamic panel model and inclusion of the instrumental variables of banks that had one or two observations in already small observed period would not significantly changed obtained results. The data was extracted from or calculated on the basis of statistical data and publications of the Croatian National Bank (CNB) and annual reports of selected banks. All indicators report annual values.

Economic relationships which are included in this research are dynamic in their nature, so it is expected that their current behaviour depends on their past behaviour. Therefore, describing economic relations requires an estimation of the dynamic panel model. These dynamic relations are characterized by the presence of lagged dependent variable among the regressors:

$$y_{it} = \mu + \gamma y_{i,t-1} + \beta_1 x_{it1} + \beta_2 x_{it2} + ... \beta_K x_{itK} + \alpha_i + \varepsilon_{it}; \ i = 1,...N, t = 1,...,T \tag{1}$$

where i denotes individual and t denotes time, μ is an intercept, γ is a parameter of lagged dependent variable and $\beta_1, \beta_2,...,\beta_K$ are the parameters of exogenous variables. It is assumed that ε_{it} are $IID(0,\sigma_\varepsilon^2)$. Unobservable individual-specific effect α_i is time-invariant and it accounts for any individual. If lagged dependent variable $y_{i,t-1}$ is included in the model then the variable is correlated with an individual-specific effect α_i. The commonly used OLS and GLS estimators are biased and inconsistent even if ε_{it} are not correlated. As a result, a new method for estimation was required. Arellano and Bond (1991) proposed a new GMM estimator for the dynamic panel model. To overcome the correlation problem, the first difference of the equation (2) was needed:

$$\begin{aligned} y_{it} - y_{i,t-1} = \gamma\left(y_{i,t-1} - y_{i,t-2}\right) + \beta_1(x_{it1} - x_{i,t-1,1}) + \beta_2(x_{it2} - x_{i,t-1,2}) + ... \\ + \beta_K(x_{itK} - x_{i,t-1,K}) + \left(\varepsilon_{it} - \varepsilon_{i,t-1}\right); \ i = 1,...N, t = 1,...,T \end{aligned} \tag{2}$$

This inconsistency is a result of the correlation between $y_{i,t-1}$ and $\varepsilon_{i,t-1}$. They argued that an additional instrument must be included in the dynamic panel data model (Arellano and Bond, 1991, pp. 277-297). The valid instruments for $\left(y_{i,t-1} - y_{i,t-2}\right)$ are lagged values of dependent variable in levels $(y_{i1}, y_{i2,...}, y_{i,t-2})$. Using those instruments for estimation, additional moment conditions are exploited. Additionally, the GMM procedure has the ability to remove the problem of endogenous variables and reverse causality by introducing instruments for independent variables. The valid instruments for values of independent variables

in first differences $\left(x_{i,t-1,k} - x_{i,t-2,k}\right), k = 1, 2, ..., K$, are lagged values of independent variables in level $(x_{i1k}, y_{i2k,...}, y_{i,t-2,k}), k = 1, 2, .., K$. It is well-known that imposing more moment conditions increases the efficiency of estimators (Verbeek, 2005, p. 341). The validity of chosen instruments for parameters estimation can be tested using the Sargan test (Huang, 2006, p. 18). If a null hypothesis is accepted by the Sargan test it means that all chosen instruments are valid, i.e. the dynamic panel model is adequately specified. The two key tests for serial correlation are derived by Arellano and Bond: test for the first-order serial correlation (usually labelled m_1) and test for the second-order serial correlation in differenced residuals (usually labelled m_2). The first-order autocorrelation in the differenced residuals does not imply that the estimates are inconsistent (Arellano and Bond, 1991, p. 282). However, the second-order autocorrelation would imply that the estimates are inconsistent. The two step Arellano and Bond GMM estimator is used for model estimation because one step estimation assumes the error terms to be independent and homoskedastic across countries and over time. The two step estimator relaxes the assumption of independence and homoscedasticity by using the residuals obtained from the first step estimation to construct a consistent estimate of the variance-covariance matrix. Thus, when the error term ε_{it} is heteroskedastic the two step estimator is more efficient (Cole, Moshirian and Wu, 2008, p. 1000).

Arellano Bond estimator is not a good estimator for a dynamic panel when the value of autoregressive parameter α increases towards the unit. In that case, the differenced values are weakly correlated with lagged levels of this variable. This results in weak instruments in the context of Arellano Bond estimator. Weak instruments could cause large finite-sample biases when using Arellano Bond procedure to estimate autoregressive models for moderately persistent series from moderately short panels (Blundell and Bond, 1999, p. 1). Blundell and Bond (1998) proposed an improvement of the Arellano Bond estimator. That approach imposes an additional restriction to the initial conditions process, under which all available moment conditions can be exploited by a linear GMM estimator in a system of first differenced and levels equations. The system GMM estimator can improve the performance of the usual Arellano Bond estimator when the autoregressive parameter is moderately high and the number of time-series observations is moderately small.

For the econometric model of this research, Arellano Bond estimator is good because all values of lagged dependent variable are less than 0.29. Furthermore, the GMM system is not appropriate to use with a dataset with small number of banks such as in this research where the number of banks is 28.

The value of ROA of a bank is considered to be the indicator of profitability. Taking into consideration the first order autoregressive behaviour ROA dynamic panel model is specified and given by the following equation:

$$y_{it} = \alpha + \gamma \, y_{i,t-1} + X_{it}^{'}\beta + \varepsilon_{it} \tag{7}$$

It is assumed that ε_{it} are $IID(0, \sigma_\varepsilon^2)$; identically and independently distributed error terms where dependent variable y_{it} is ROA, $y_{i,t-1}$ is a lagged dependent variable, X'_{it} is $K \times 1$ matrix of explanatory variables (K-the total number of explanatory variables) $\beta = \left[\beta_1, \beta_2, ..., \beta_K \right]^\tau$ is vector $K \times 1$ of all coefficients of independent variables. Thus, all the $\beta_1, \beta_2, ..., \beta_K$ coefficients represent short-run effects. The list of explanatory variables is given in table 1. It should be noticed that this research intends to avoid the usually accepted practice of presumption of the expected sign of interdependence between dependent and independent variables. Potentially, pursuit of the technical linkage between variables in the short period might lead to completely irrelevant or incorrect general findings on significance and direction of influence of chosen variables. This could be the case in the banking sector of the Republic of Croatia which is rather specific, due to its regulatory environment (from the extreme liberalism to restriction in capital flows from abroad), dominance of foreign ownership, presence of concentration and growth fostered by the import of capital. Further, even in less dynamic banking areas, empirical verification of selected variables, (which are often chosen and considered to be granted for in this kind of analyses) is part of wider theoretical discussions and still doubtful hypothesis on the sign of their influence to bank profitability.

Table 1: Definition of the variables used in the regression models[2]

Variable	Explanation	Group of indicators
ROA	Return on assets	Profitability indicator
GROWL	Growth of loans	Credit risk indicator and Growth indicator
PRO	Loan loss provisions / Total loans, placements and other potential obligations	Credit risk indicator
E/A	Equity / Total assets	Capital indicator
FEE/A	Net income from fees and commissions / Average assets	Business mix indicator
LIQ/A	Liquid assets / Average assets	Liquidity indicator
LOAN/DEP	Granted loans / Received deposits	Loan funding structure
RECDEP/A	Received deposits / Total assets	Financial leverage indicator and Liquidity indicator
LOAN/A	Granted loans / Total assets	Credit risk indicator and Liquidity indicator
OVERH/A	Overhead costs / Average assets	Indicator of cost management efficiency
INCEX/A	Income from net exchange rate differences / Average assets	Fx risk management efficiency
HHI	Herfindahl - Hirschman Index	Concentration indicator

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[2] HHI is calculated in the following way: $HHI = \sum_{i=1}^{N} s_i^2$, where s_i is the market share of bank i in the observed market, and N is the number of banks. Values of HHI in the period 2003-2008 are given in appendix (table 3).

3.2. Research results and model quality (reliability)

Four dynamic panel models with one lag of dependent variable have been estimated with two-step Arellano and Bond GMM estimator. Indicators of bank size and ownership structure which were both defined as dummy variables were not included in the analysis due to moderate or no changes in these categories for most of the banks during the observed period. As Arellano and Bond estimator works with first differences, the impact of ownership structure and bank size is eliminated. Furthermore, variables LOAN/DEP and RECDEP/A are not used in the same model because the correlation between these variables is relatively high (-0.8181). To avoid the problem of multicollinearity, these variables have been used separately in panel models[3].

Although the novel feature of this study (in comparison to the available and previously presented empirical literature) supposed to be the inclusion of the ratio of average interest income, and the ratio of average interest expense, as it was announced in the introduction, preliminary econometric models showed a statistically insignificant impact of both of these explanatory variables. The latter variables were excluded from further analysis due to the quality and reliability deterioration of the models in which these variables were included[4]. All in all, this implies the conclusion that although macroeconomic conditions are undoubtedly encompassed by banks' financial management strategy (at least neutral effect is evidenced), banks' business surrounding is still neither an opportunity nor a threat to their profitability, at least for the observed period. However, a threat of reducing banks' efficiency remains a challenge in the economic crisis. Furthermore, due to a potential interdependence between variables PROVISIONS and ROA, as well as between GROWL and ROA in the third and fourth model, GROWL and PROVISIONS are treated as endogenous variables. The interdependence of PROVISIONS and ROA is visible in the structure of banks' income statement where provisions are a deductible component. In addition, total granted loans approximately represent more than 50 % of banks assets on average. Thus, GROWL and ROA interdependence is also explained. With the purpose of evaluating a potential endogeneity of PROVISIONS and GROWL, the instrumental variables (the second lag of GROWL and PROVISIONS) are used. The empirical results of estimated panel models are given in table 2.

Diagnostic tests (Sargan test, m_1 and m_2 statistics) for all the estimated models in table 2 are satisfied. The results of the four presented models in Table 2 do not vary greatly. A lagged dependent variable $ROA_{i,t-1}$ has a positive sign and is statistically significant in MODEL1 and MODEL2. Variables $GROWL_{it}, E/A_{it}, LIQ/A_{it}, RECDEP/A_{it}$ and HHI_t have a positive sign and are statistically significant in all models in which they are used. The variable $LOAN/DEP_{it}$ has a negative sign and is statistically

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[3] Correlation matrix and descriptive statistics are available upon request.
[4] Empirical evidence for these variables is available upon request.

significant in all the models in which it was used. Variables $OVERH/A_{it}$ and $LOAN/A_{it}$ are not statistically significant in all the presented models. This is because of an extreme procyclicality of variable $OVERH/A_{it}$ in relation to profitability indicators. Higher values of this variable are noticed in retail-oriented banks. Corporate oriented banks and banks with project finance orientation mark extra profits in the periods of economic growth. On the other hand, the impairment of assets, in economic crisis' surrounding, is the highest in these banks, which contributes to non-persistence of this variable in its explanatory capability. The same pattern of explanatory inconsistency is attributed to the $LOAN/A_{it}$ variable, especially when borrowers significantly financially deteriorate and overdue receivables augment.

Table 2: Panel data estimation of determinants of bank profitability for the dependent variable ROA_{it}

Explanatory variables	MODEL 1	MODEL 2	MODEL 3	MODEL 4
$ROA_{i,t-1}$	0.2915*** (0.1002)	0.2856*** (0.0978)	0.0165 (0.0756)	0.0829 (0.0829)
$GROWL_{it}$	0.0060*** (0.0019)	0.0059*** (0.0019)	0.0287*** (0.0037)	0.0239*** (0.0047)
FEE/A_{it}	0.6139* (0.3250)	0.5988* (0.3251)	-0.4147 (0.8951)	0.8245*** (0.274)
E/A_{it}	0.0631*** (0.0110)	0.0584*** (0.0110	0.0792*** (0.0125)	0.0675*** (0.0160)
PRO_{it}	-0.0667 (0.0554)	-0.0749 (0.0551)	-0.2542*** (0.0227)	-0.2607*** (0.0419)
$OVERH/A_{it}$	0.0546 (0.1809)	0.0736 (0.1746)	-0.1623 (0.1374)	-0.2481 (0.2042)
LIQ/A_{it}	0.0337** (0.0145)	0.0329** (0.0147)	0.0492*** (0.0091)	0.03570*** (0.0125)
$RECDEP/A_{it}$	0.01842* (0.0110)	-	0.01827** (0.0083)	-
$LOAN/DEP_{it}$	-	-0.0103* (0.0057)	-	-0.0134** (0.0058)
$LOAN/A_{it}$	0.0164 (0.0174)	0.0303 (0.0200)	-0.0229 (0.0189)	-0.0100 (0.0247)
$INCEX/A_{it}$	-0.0212 (0.0663)	-0.0159 (0.0658)	0.0538* (0.05257)	0.1440* (0.0847)
HHI_{t}	0.0049** (0.0019)	0.0048** (0.0019)	0.0078*** (0.0011)	0.0067*** (2.387)
α	-9.5986*** (3.6494)	-8.0553 (3.1531)	-6.8852*** (2.3878)	-6.8852*** (2.3878)
Number of observations	102	102	102	102
Number of groups	28	28	28	28
Sargan test (p-value)	0.3916	0.4071	0.8809	0.8809
m_1 test (p-value)	0.1898	0.201	0.0919	0.0919
m_2 test (p-value)	0.9524	0.9316	0.9120	0.9120

*** Statistically significant at 1 % level, ** statistically significant at 5 % level, * statistically significant at 10 % level.

Source: Authors' calculation

However, Croatian banks are more oriented to universal banking, especially traditional banking activities with conservative risk management practice. In addition, data sample only partly encompassed financial crisis period i.e. its aftermath in 2008. Thus, potential explanations for $OVERH / A_{it}$ estimates are more in line with the interdependence of profit and cost efficiency which is not necessarily positively correlated. Higher profit efficiency might be a compensation for cost inefficiency caused by cost preferred behavior of managers as it is affirmed with Quite-Life hypothesis.

In MODEL3 and MODEL4 where PRO_{it} and $GROWL_{it}$ are treated like endogenous variables PRO_{it} has a positive sign and is statistically significant and the variable $GROWL_{it}$ has higher coefficient than in MODEL1 and MODEL2. Therefore, it can be concluded that the endogenity problem existed. Variable FEE / A_{it} is statistically significant in MODEL1, MODEL2 and MODEL4. In third and fourth model, $INCEX / A_{it}$ has a positive sign and is statistically significant at 10%. The latter variable proves to be the least important one as banks close their open position in fx risk because of the increased exchange rate volatility. However, an increased competition on fx market reduces banks' exchange fee in sales departments.

4. ECONOMIC INTERPRETATION OF RESEARCH RESULTS

The phenomenon of persistence in profitability (measured with ROA) is proved to exist to a moderate extent with approximate coefficient value of slightly less than 0.30 which indicates rather high speed of adjustment to profitability trends in the banking sector i.e. fairly competitive Croatian banking industry. Whatever may be the case, the analysis shows that the concentration measured with the HHI statistically significantly affects bank profitability. Although estimates on the HHI are positive, they are rather small in magnitude, indicating the oligopolistic structure of the banking industry. Furthermore, prudent credit risk management of Croatian banks is evidenced with a positive influence of loan growth on bank profitability and a statistically insignificant impact of loan loss provisions (in the first two models). Even nowadays, in the presence of economic crisis in Croatia, the increase of loan loss provisions is tolerable. Other econometric models indicate a statistically significant negative influence of provisions on profitability, what is in line with existence of optimal interest rate level. However, this conclusion based on the econometric results is somewhat simplified and requires a more extensive economic analysis of provisions' dynamism. For example, small banks usually record expected losses in one budget year in order to create profit buffers for the forthcoming crisis periods when business deterioration is expected and to preserve efficiency indicators of bank management.

A positive influence of reduced financial leverage usage i.e. higher equity financing is consistent with the majority of previously cited researches in which this is explained with reduced bankruptcy costs and decreased refinancing costs.

Although increased liquidity theoretically decreases the opportunity income, an econometric analysis suggests its positive effects on banks' ROA. Increased liquidity of banking sector has several causes. First, it is the result of supervision authorities' endeavors to improve liquidity ratios of banks in order to enhance banking system stability. Second, increased liquidity of banks is partly the result of a reduction in mandatory requirements in maintaining the minimum of foreign currency liquidity (according to the Decision on the Minimum Required Amount of Foreign Currency Claims). The latter regulatory change caused a reduction of the share of securities in banks' assets in favor of interbank deposits. By maintaining a satisfying level of interbank deposits, asset-liability management (ALM) of the banks fulfils minimum requirements of bank liquidity and foreign currency liquidity without imposing additional costs. Domestic banks also exploited the advantage of relatively stable and liquid owners with sufficient credit capacity. On the level of a group, the central management of liquidity was implemented by transferring the liquidity positions among entities. All in all, the structural liquidity profile of Croatian banks improved. However, increased liquidity was not followed by a satisfactory loan demand. Thus, banks are now confronting an increase in the volume of deposits (due to a transformation from other financial assets) and a decrease of their maturity structure, which, both, reduce bank costs. For example, a vista deposits and current and giro accounts that are attributed with minimum funding costs have significantly increased.

A negative influence of increased loan to deposit ratio is in relation with the previous conclusion. This indicator is only connected with the increase of interest rates on long term deposits which remains the only mechanism of liquidity improvement in small banks. Higher interest rates and deposit insurance system attracted significant volume of deposits in small banks which had to be transferred to credit portfolio of higher risk. Additional regulatory measure of insurance of small banks is an increase of required provisions for identified and unidentified losses with the goal of banking system stability. Large banks are also not immune to cost increase of domestic funds, at least in the first years of the expected financial crisis. On the other hand, a positive influence of higher ratio of received deposits over total assets i.e. a higher usage of financial leverage that is attributed to moderate market disciplining of deponents is in line with the fact that core deposits are *conditio sine qua non* of profitable and stable banking activity due to its lower funding costs in comparison to other financial resources and increased generation of fees and commissions from the account maintaining. The latter is also verified with the estimated results on the ratio income from fees and commissions over total assets. Finally, the influence of ratio income from exchange rate differences over total assets reflects the strengths of banks' ALM in exploiting the exchange rate effects to their own benefit due to managing fx risk open position and exploitation of increase and decrease of fx rate because of eurizated structure of banks' assets and obligations. Finally, an increase of the level and forms of banking

services as well as of fee and commissions business activities are generally accepted as potential sources of an even more profitable banking sector in its entirety.

5. CONCLUDING REMARKS

The presented and interpreted empirical findings on the research problem are consistent with the expected results. A previous level of profitability, higher loan growth and equity financing, stable base of deponents, prudent credit risk and market risk management as well as the growth of fee based activities are comparative advantages of banks in Croatia (and elsewhere) in achieving extraordinary levels of return on assets. However, this research does not take into consideration other profitability indicators and macroeconomical determinants. These should be included in further researches in order to get a complete review of determinants of bank profitability in Croatia, as proxy variables that were expected to reflect macroeconomical surrounding i.e. the average interest income and the average interest expense proved to be statistically insignificant. Especially interesting are expected to be the results of the analysis in which the data from 2009 till now will be included. Finally, it can be concluded that the unity and compliance of statistical and economic significance on the determinants of bank profitability is achieved as well as consistency with some of the mentioned empirical researches.

APPENDIX

Table 3: Values of Herfindahl - Hirschman Index in the observed period

Year	HHI
2003	1270.04
2004	1363.15
2005	1357.86
2006	1296.54
2007	1277.73
2008	1308.85

Source: Croatian National Bank, http://www.hnb.hr/publikac/hpublikac.htm [Accessed 23/12/10]

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