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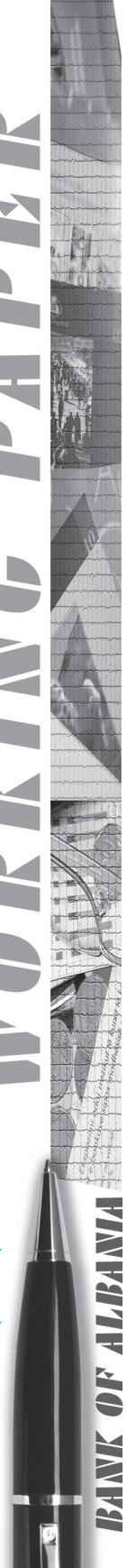

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MICRO AND MACROECONOMIC DETERMINANTS OF NET INTEREST MARGIN IN THE ALBANIAN BANKING SYSTEM (2002-2014)

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Note: The views expressed herein are of the author and do not necessarily reflect the views of the Bank of Albania.

CONTENT

ABSTRACT

Including for the first time macroeconomic variables in the empirical analysis with panel data for commercial banks, this paper aims to shed light on the determinants of net interest margin in the Albanian banking sector. Considered as a good indicator of banking intermediation efficiency level, interest margin size helps to perceive asymmetries in the banking market and the costs transmitted to the clients. The issue is important in the context of monetary policy, since the higher are the asymmetries in the market, the more difficult the transmission of its signals. Using an OLS-based PCSE procedure to estimate the econometric model, this study suggests that bank specific factors such as overhead costs, capital adequacy ratio, current liquidity ratio and non-performing loans ratio are the most important determinants of interest margins in Albania. Macroeconomic factors such as growth, exchange rate and domestic debt have a significant impact, even though the main contribution is attributed to bank's specific factors. The information about banking variables may have implications mainly in the banking supervision areas of market efficiency and regulation, but the new information about macroeconomic variables is of relevance to policymakers who, with their economic policies, can contribute to the stability of the banking market.

Key words: interest margin, efficiency, macroeconomic factors
JEL Classification Numbers: E43; E44; D43

INTRODUCTION

Financial intermediation is crucial for economic growth. The wider and deeper financial markets, the bigger the benefits of financial intermediation. Levine and Zervos (1998) have identified the existence of a significant causality relationship between financial intermediation and economic growth. A sound and stable financial market is able to healthily fund the financial needs of the private and public sector by promoting investment growth. In Albania the financial market is dominated from banking institutions and a good indicator of its efficiency level is the net banking margin. Stiglitz and Weiss (1981) have argued that the higher the market inefficiencies and information asymmetry in the market, the higher will the margin required from banks be. This indicator is commonly defined as the difference between the interest income and interest expense divided by total assets [Ho and Saunders (1981), Wong (1997), Demirguc-Kunt and Huizinga (1999), Maudos and Guevara (2004)].

This paper aims to identify the main determinants of the net banking margin in the Albanian market considering microeconomic as well as macroeconomic variables. The first and only study on this topic for Albania belongs to Kalluci (2010) covering the 2002-2007 period and it suggests that the margin's main determinants are the fluctuations of market interest rates[1] (especially in euro), operational expenses and the opportunity cost of obligatory reserve at the central bank. However, the characteristics of the banking market have significantly changed since 2014 and this study aims to empirically analyze the net margin's determinants not only at the banking and market level, but also to introduce variables with macroeconomic character like inflation, exchange rate, economic growth and public debt burden. The results of the paper shed light not only in the context of the efficiency level of the Albanian banking market, but unveil also the significance of macroeconomic stability on the subject. Empirical results have shown that in some countries like Czech Republic, Turkey and Brazil, the macroeconomic framework has a significant impact on banking margins. While

[1] The market interest rates used from Kalluci (2010) are Euribor 3-months for euro, Libor 3-months for USD and the T-Bills 3-months rate has been used for the domestic currency ALL. These variables have been used as proxies for market risk.

information about banking variables may have implications mainly in the banking supervision areas of market efficiency and regulation, the new information about macroeconomic variables is of relevance to policymakers who, with their economic policies, can contribute to the stability of the banking market. The estimation model used in this paper is an OLS-based PCSE procedure, which accounts for issues like autocorrelation, residual correlation between equations and cross-sectional heteroskedasticity, by improving parameters efficiency and generating more accurate t-statistics.

The paper continues as follows. Section 2 provides a review of the theoretical approaches used to analyze net interest margins and presents empirical results of previous research regarding main margin determinants in various countries. Section 3 describes the main developments in the Albanian banking market, and it is followed by Section 4 which presents the methodology and data and discusses the empirical results. Conclusions and policy implications are presented in Section 5.

2. LITERATURE REVIEW

2.1 THEORETICAL APPROACHES FOR THE NET INTEREST MARGIN ANALYSIS

Net interest margin is commonly defined as the difference between interest income and interest expense divided by total assets [Ho and Saunders (1981), Wong (1997), Demirguc-Kunt and Huizinga (1999), Maudos and Guevara (2004)]. There is also a narrower definition of the concept, where interest earning and expenses is calculated as a ratio to interest earning assets. However, this definition has two main shortcomings: (i) it does not consider bank revenues from fees and commissions and (ii) it significantly deviates from the marginal spread (Brock and Suarez, 2000). Usually, net interest margin is considered as a measurement of the realized bank interest spread or ex-post spread. According to Demirguc-Kunt and Huizinga (1999), these spreads are preferred

to the ex-ante[2] ones because they are usually available periodically at a consolidated level which also makes them comparable.

The effects of bank's interest margin on the level of welfare of a country can be twofold. In cases when the margin is low, it usually indicates a competitive market with low intermediation costs for their clients. On the other hand, a high interest margin might reflect that banks are well-capitalized and stronger towards market shocks, benefiting high profit levels but this causes the clients to bear higher costs (Saunders and Schumacher, 2000). Considering the price of loans and deposits is crucial when estimating the bank's margin. The decision-making process, through which the bank defines not only the price, but also the volumes of these products, relies closely on the structure of the market where it operates (Santomero, 1984). The Industrial Organization approach is considered as one of the pillars of microeconomic banking theory and it is a widely used method to analyze the banking market (Freixas and Rochet, 1997). It considers the bank like any other type of business and analyzes its behavior considering some banking specifics like the risk level or managing strategies, as any other commercial business. The model assumes[3] that the bank operates in a purely competitive market and the focus of its activity is intermediation by "selling loans" and "purchasing deposits". Among its main conclusions is that the bank will choose to operate with the amount of loans and deposits that will make the intermediation margin equal[4] to the marginal cost.

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[2] The ex-ante spread is the difference between contractual interest rates charged from the bank on loans and deposits. Usually, these rates are higher because they do not account for the lost interest on non-performing loans.

[3] Also, the model assumes that: 1) the bank operates in an economy composed of the government, businesses and individuals, 2) there is a defined percentage of bank deposits held in the form of cash not remunerated at the central bank, 3) the only instrument used as monetary policy tool is the rate of compulsory reserve placements.

[4] The relationship would be defined as follows:

$$r_L - r = r(1 - \alpha) - r_D \quad (1)$$

where r_L is loans interest rate, r is the interbank rate, α is the monetary policy tool for compulsory reserve rate and r_D is the deposits interest rate (Freixas and Rochet, 1997).

In the real world, the pure competition assumption is not fulfilled and as a result the Monti – Klein [Klein (1971), Monti (1972)] model introduces a new assumption about a monopolistic market with only one banking business. In this model, acknowledged as one of the most representative in the Industrial Organization framework, the banking activity relies on a cost function which depends from the total value of assets owned from the bank as well as other factors like capital and labor. The results suggest that the optimal rate level for loans is independent from the optimal rate level for deposits. The independence between the optimal interest rate for loans and deposits has been a widely debated conclusion among other authors who claim that these rates do depend from each-other. Among them is Dermine (1986) who suggests that when the risk of failure is introduced in the model, the interest rate independence is lost.

The determination process about the interest rate of loans and deposits directly affects the size of the banking margin. There are two main types of models that analyze specifically the determinants of banking margin in this context: the intermediation approach and the theoretical micro-model of the banking firm. In the first model, the bank has an active intermediation role and it decides its interest rates by taking into account the volumes for the products offered and demanded in the market. However, considering that the demand and offer of market agents are not simultaneous in time, the risk-adverse bank decides its interest rates aiming to gain a margin that covers for market risk. The predominant study in this field belongs to Ho and Saunders (1981) who rely on the risk-adverse behavior of banks.

The main purpose of the intermediation model is to define the interest rates of loans and deposits so as to find a balance between the asymmetric timing of receiving demands for loans and offering deposits. Assuming that the bank is risk-adverse is crucial in the model, while the main risk arises from interest rate fluctuations. Ho and Saunders (1981) have divided the model in two phases: first, by estimating the "pure margin" and second, how it is related to other risk factors in the market. The authors explain that the margin between interest rates of loans and deposits is always positive

because market uncertainties never disappear and the bank aims to minimize them. The "banking margin" represents the margin level needed by the bank to cover market uncertainty. The asymmetrical timing between receiving demands for loans and offering deposits expose the bank towards the refinancing and reinvesting risks. Whenever a demand for loan arises and the bank does not have available funds at that moment, it will be forced to borrow money in the interbank market. On the other hand, in case the bank accepts deposits while it has no loans to disburse, it will be forced to invest the excess money in the interbank market. In both cases, the bank faces the risk of a change in interbank rates which it aims to cover by charging commissions to its customers. According to Ho and Saunders (1981), the "pure margin"[5] will result high when demand and offer for banking products are inelastic because of increased benefits of the bank with a monopolistic behavior. The opposite would happen in a competitive market where the demand and offer are highly elastic and the bank is forced to keep lower margins. Saunders and Schumacher (2000) have stressed out that the above definition of the margin is among the foundations of the financial intermediation theory because it underlines the fact that as long as banks are risk-adverse and uncertainties exist in the market, the banks will always aim at positive margins in order to be able to provide loans and deposits at the time when they are requested. Other authors like Angbazo (1997), Demirguç-Kunt (1998) and Maudos and De Guevara (2004) have further developed the model by introducing other variables in it like credit risk or management quality.

The second method differs from the "intermediation model" not only because it considers the bank as passive, but is also assumes that demand and offer for loans and deposits in the market are

[5] By assuming the margin s so that $s = (a+b)^3$ where a and b represent the commissions and after a few mathematical transformations, the authors arrive at the relationship below:

$$s = (a+b) = \frac{\alpha}{\beta} + \frac{1}{2} R\sigma^2 Q \quad (2)$$

where $\frac{\alpha}{\beta}$ represents the "pure margin" and is derived from the bank's demand and offer functions for loans and deposits, R quantifies the bank's risk aversion, Q is the size of bank transactions while σ^2 measures interest rate risk. The equation can be divided in two parts: in the first, is the "pure margin" while in the second are the variables that account for risk in the model.

simultaneous and their volumes fully compensate each other. Zarruck (1988) explains that in this model the bank defines the margin from the beginning of the decision-making process by defining interest rates of loans and deposits. After these rates become public, market uncertainty declines as demand and offer levels become known. In a second moment, the bank adapts the volumes according to its needs by using Central Bank funds at the rate and by keeping the margin level unchanged. Wong (1997) has also studied banking margin determinants relying on this type of model, by developing Zarruck's (1988) work with the introduction of interest rate risk in the model.

An alternative model to study the determinants of banking margin is the accounting approach which is based on the use of financial data taken from the balance sheet and income statements of banks (Hanson and Rocha, 1986). However, this method has been contested by Schmalensee (1989) and Bresnahan (1989) which have argued that the utilization of accounting data may cause potential estimation bias. While the leading paper on this topic remains that of Ho and Saunders (1981), other authors like Angbazo (1997), Demirguç-Kunt (1998) and Maudos and De Guevara (2004) have further developed their work by introducing new variables in the model and considering also other types of risk.

2.1 THEORETICAL ANALYSIS AND EMPIRICAL RESULTS OF MARGIN'S DETERMINANTS

The individual banks' characteristics are among the most important determinants of banks profitability and financing costs for their clients. Bank-specific variables most commonly used for this purpose include measures of operational efficiency, management quality, income and balance-sheet structure, credit activity, capital adequacy, liquidity, risk aversion, credit risk, interest risk, opportunity cost of bank reserves, bank size etc.

Operating costs and operational efficiency are generally found to have a significant effect on net interest margin (Kasman et al, 2010). Banks with high unit costs require higher margins in order to

cover their higher operating expenses (Maudos and de Guevara, 2004), while a higher operational efficiency allows banks to lower interest margins through lower loan rates or higher deposit rates (Claeys and Vander Vennet, 2008).

Credit risk also, is among the factors with the highest impact on banks' interest margins (Schweiger and Liebeg, 2009; Saad and el Moussawi, 2012). Banks are expected to charge higher interest rates in order to compensate for covering anticipated and unanticipated credit risk, as stated by Kasman et al. (2010). However, analysis of Latin American banking systems, have showed a negative correlation between the two variables (Brock and Rojas-Suárez, 2000). The decrease of loan rates or increase of deposit interest rates, besides the increase of non-performing loans share on total credit is a strategy pursued by commercial banks aiming to increase the market share.

Another important determinant is capital adequacy ratio, commonly used as a proxy for creditworthiness of the bank. Capital adequacy rules aim at preventing banks from accepting too much risk and ensuring banking sector stability (Claeys and Vander Vennet, 2008). The relationship between net interest margin and capital adequacy ratio can be positive or negative, depending on the magnitude of transfer of these factors to clients. Higher capital adequacy ratio implies that banks hold more capital compared to total assets. If competition on the market does not allow the bank to transfer the cost of excessive capital to the clients, the more capitalized banks would have lower net interest margins. On the other hand, it might also be expected that less capitalized banks are inclined to accept more risk seeking for higher returns, what might result in moral hazard behavior (Schweiger and Liebeg, 2009).

The literature suggests an ambiguous effect of non-interest income on interest margins. In a market with a high level of competition, where banks can hardly affect interest rates, banks tend to lower the margins if they compensate the lower interest income by charging higher non-interest income. In this case, commission income and other non-interest income are expected to be a substitute of interest income and the relation will be negative. On the contrary, if banks

operate in a highly concentrated market and they have some market power, non-interest and interest income will be complementary to each other. The correlation between the variables in this case will be positive (Estrada et al. 2006).

Bank size may be an important determinant of net interest margins. Bigger banks can have lower costs per unit of income and therefore higher net interest margins. However, empirical findings in CEE countries show that the gain in efficiency by increasing the size is limited and is related mostly to very small banks. Staikouras et al. (2008) show that, if there are economies of scale in banking, a bank becomes more efficient when it transforms from small to medium size and less efficient when it changes from medium to big size.

The influence of banking market structure on net interest margins is usually proxied by Herfindahl Hirschman index[6] or Lerner index[7]. Specific features of the banking markets influence the market power of each specific bank and impact the pricing policy, and therefore can pressure net interest margins. The literature suggests two opposite hypotheses related to the effect of concentration on banks price behavior. The first one is the so called Structure-Conduct- Performance (SCP) hypothesis which argues that a more concentrated banking sector will have an oligopolistic behavior and a higher concentration will cause higher interest margin for the banks. The second one, the Efficient-Structure (ES) hypothesis confirms that concentration produces efficiency gains (because of cost reductions) causing interest margins decrease. Rodriguez (2003) investigates both market power and efficiency hypotheses for the Mexican banking industry, by analyzing 16 banks during the period 1995-2000. He finds that bank margins were positively related with market concentration and interprets this finding as supporting evidence in favor of the SCP hypothesis. Claeys and Vennet (2008) also find a positive relation between margins and concentration of the banking industry in Central and Eastern European countries. From the other hand, Schweiger and Liebeg (2009) provide evidence that higher competition influences lower interest margins.

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[6] Sum squares of the market shares in total assets of individual banks

[7] Proxy of market power = (Total revenue – Total cost)/Total revenue

Other authors have introduced macroeconomic variables in their models in order to capture their effects on the net interest margin of banks. Macroeconomic variables have resulted to be the most important determinants of the margin's behavior in Turkey. Türker-Kaya (2002) and Aysan et al. (2010) have concluded that Turkish banks can hardly impact margins because they cannot affect macroeconomic conditions, so the responsibility for the banking market efficiency stands with the regulatory authorities. Their results rely on the important relationship between the margin with inflation, economic growth and interbank interest rate.

Conclusions on the impact of macroeconomic conditions on interest margins and the efficiency are ambiguous. According to Bernanke and Gertler (1989), the relationship between real GDP growth and net interest margins can be negative because in times of recession borrowers' creditworthiness and net worth deteriorates and so loan rates increase to cover for possible arising risks. Tan (2012) further supports this inverse relationship arguing that in times of economic boom, the good economic performance of firms lowers bank defaults thus decreasing risks. On the other hand, there can be a positive effect of real GDP growth on interest margins due to the fact that demand for loans increases (as a result higher investments) during cyclical upswings. Brock and Suarez (2000) show that uncertainty and deterioration in macroeconomic conditions increase interest margins. Schweiger and Liebeg (2009) and Kasman et al. (2010) have also found a negative relation between positive macroeconomic developments and interest margins for the consolidation period in selected CEE countries, while the link disappeared in the post-consolidation period. In contrast, Claeys and Vander Vennet (2004) find that higher economic growth in Western Europe is associated with higher interest margins, attributing that to the more intense credit activity and better loan quality, while for Eastern European countries, GDP growth resulted insignificant.

The Inflation rate is another important environmental condition which may affect banking interest margin. Greater inflation increases the risk of default and thus banks will charge a higher lending price that increases the interest rate margins. On the other hand, banks

can often be constrained by regulatory, institutional, and market factors so that are unable to keep up raising rates when inflation rates are high and variable. Moreover, inflation affects asymmetrically lenders and borrowers and thus its net effect on NIMs depends on the structure of the asset side of banks' balance sheet. The study of Horvàth (2009) for Czech Republic has suggested that price stability is an important determinant of the margin and contributes to maintain low margin levels on the long term. Afanasieff et al. (2002), Cardoso (2002) and Naceur and Kandil (2009) find evidence that inflation rate negatively affects interest margins. They suggest that the margin has a positive relationship with the base interest rate and economic growth, but a negative one with inflation. If inflation is not anticipated and banks are sluggish in adjusting their interest rates, then there is a possibility that banks costs may increase faster than bank revenues and hence adversely affect bank margin.

Brock and Franken (2002) include interest rate uncertainty and exchange rate volatility, and Randall (1998) also includes the share of commercial bank public sector loans in her list of determinants of spreads in the Caribbean. Randall's inclusion is similar to the additional variables suggested by stakeholders in Jamaica, as Tennant (2006) showed that macro policy variables, such as public sector domestic borrowing, discount rates and Treasury bill rates, are commonly perceived to impact on commercial bank spreads.

3. DEVELOPMENTS OF THE BANKING MARKET IN ALBANIA

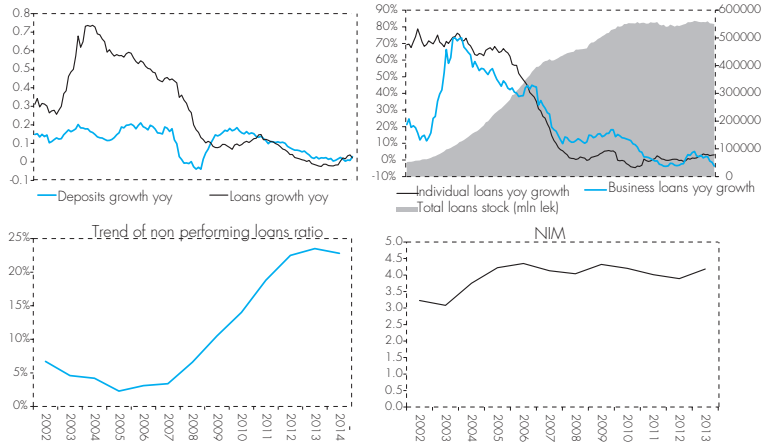
Despite the dominance of banks in the South Eastern European financial market, its development in terms of products and services offered has been quite scarce compared to other developing European countries. According to Mamatzakis et al (2005), this has been a result of deep market fragmentation and weak macroeconomic policies that in many countries lead to financial and economic crises (Albania and Bulgaria in 1997, Romania in 1998, Macedonia in 1999). Later on, these countries underwent structural reforms by privatizing state-owned banks and by strengthening their regulatory and reporting framework allowing their markets to open to foreign banks.

These trends surfaced also in Albania after 2004, with the privatization of the largest state-owned bank and when foreign banks accessed the domestic financial market. Later on, two banks merged into a bigger banking institution as part of an important western banking group marking new structural changes, promoting lending and deepening the competition level. The Albanian banking market is dominated from foreign banks subsidiaries who own about 87% of total assets.

Figure 1 presents the development over time of some banking sector indicators during the 2002-2014 period. The net banking margin has fluctuated around an average value of 3.5%. While it has been reflecting an upward trend until 2007, the financial crises of 2008 marked a downturn which dominated until the recent years. A straightforward way to interpret the margin's dynamics is to analyze its main components by considering the main sources of income and costs. The main sources of income are from the loan rates as well as from commissions and fees, while the main cost components are from financing costs, risks costs and operational costs. While the credit boom has supported the margin growth in the first years, the contracting trend that began after 2005 contributed to a decline of income from loan interests that became stronger after 2008. On the other hand, expenses have been increasing steadily mainly due to the rise of credit risk costs for provision expenses. However, in the last two years these costs have declined due to a slowdown of the loan portfolio deterioration, early loan restructuring procedures to hamper transformation into non-performing loans as well as the write-offs of lost loans.

The upper part of Figure 1 illustrates the trend of loans and deposits in the domestic market. Lending has experienced an important growth in 2004-2005, reaching a growth rate of 75% in the second half of 2005, while the growth of deposits has been more gradual. The significant lending growth rate is mainly a result of the aggressive lending strategies applied by banks and is focused in the business category. By the end of 2014, the total share of loans towards businesses compared to that towards individuals amounted at 67%: 33% of the total and were concentrated in the sectors of trade, construction and the processing industry. Following the end

Figure 1 Trend of banking indicators 2002-2014



Source: Bank of Albania, 2015.

of 2005, the lending portfolios for both individuals and businesses contracted by reflecting significantly lower growing rates, falling also to negative levels in the recent years. The current situation is a clear illustration of the difficult and slower dynamics faced by banks[8], which are forced to adapt their managing strategies to the market conditions.

In the lower part of Figure 1 the graphs illustrate the trend of non-performing loans. While at the time of the "lending boom" there was a very low level of non-performing loans (less than 5%), the later period shows a steadily growing trend to the level of 25%. However, there has been a slowing pace in the last years which is not only a result of the declining demand for loans, but also due to the strengthening of regulatory banking procedures[9] in relation to lending and risk. By the end of 2014, the ratio of non-performing

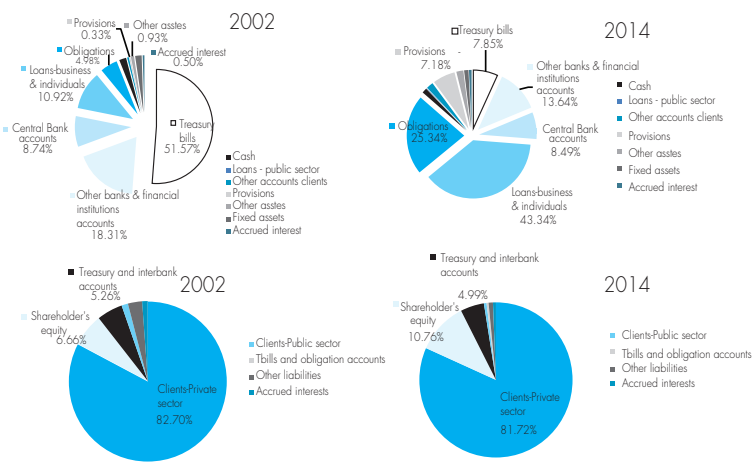
[8] In the last two years, subsidiaries of European banking groups have adopted a more cautious stance concerning lending exposures as a result of instructions received from European banking authorities on risk regulations.

[9] Improvements have been made by strengthening regulatory banking procedures that include the execution/administration of collateral, banking taxation following write-offs, the restructuring process of non-performing loans as well as the treatment of borrowing companies in liquidation process and the transferring of deteriorating loan portfolios towards bailiff offices.

loans was 22.8%[10], lower than in the two previous years.

The various developments of the banking market through time have induced changes in the structure of the assets and liabilities of the banks. Figure 2 below illustrates the structure of the assets and liabilities at the end of the years 2002 and 2014. Among assets, the category that has changed the most as weight to total assets is the treasury bills category which in 2002 represented more than half the assets portfolio, while in 2014 amounted just 8% of it. In addition, the categories of loans towards business and individuals and investments in obligations have increased significantly. While in 2002, the bank's main investing area was in treasury bills and return generated from them, in 2014 most return was generated from loan and obligation portfolios. Furthermore, an important change is the increase of the provision category which accounted for almost zero in 2002 but reached 7% in 2014. The liabilities side reflects fewer changes, where the most important concerns the increase of the shareholder's equity that came as a result of the deepening of banking activity and their returns. Funding relies heavily on customer deposits as the main funding source. All the changes described and illustrated above have affected their corresponding categories of income and expense by affecting thus the size of the banking margin.

Figure 2 The structure of assets and liabilities of banks in year end 2002 and 2014



Source: Bank of Albania, 2015.

[10] Non-performing loans are mainly concentrated in the foreign currency loans portfolio with a ratio of 26%, while in domestic currency it is 17.5%.

4. METHODOLOGY AND DATA

4.1 MODEL SPECIFICATION AND SELECTED VARIABLES

This section explains the econometric model used to describe the determinants of the banking margin's behavior. The paper uses a panel dataset of 16 commercial banks, to investigate which of the bank-specific, market structure, and macroeconomic factors are the main determinants of net interest margin in the Albanian banking sector. If explanatory variables are grouped in three categories, the equation would be written:

$$NIM_{i,t} = a_0 + a_1 * NIM_{i,t-1} + a_2 * B_{i,t} + a_3 * C_t + a_4 * M_t + \varepsilon_{i,t} \qquad (3)$$

where $NIM_{i,t}$ is the dependent variable (net interest margin) for bank i at time t; $NIM_{i,t-1}$ is the first lag of the dependent variable; $B_{i,t}$ is a vector of bank specific variables for bank i and time t; C_t is a vector of time-varying, industry specific variables; M_t is a vector of time-varying macroeconomic variables and $\varepsilon_{i,t}$ is the residual term.

Because of the persistency of bank profitability (Carbó and Rodríguez, 2007), we have included the first lag of net interest margin in the right-hand side of the equation. Banks that have been profitable in the previous period tend to be profitable even in the current period. In the first category we have included 6 variables: overhead costs refer to the ratio of administrative expenses to total bank assets; capital adequacy is defined as the ratio of regulatory capital to risk-weighted assets; current liquidity is the ratio of highly liquid assets to demand liabilities; non-performing loans to total credit ratio is used as an indicator of credit risk; bank size is calculated as a logarithm of total bank assets; non-interest income equals non-operating income divided by total assets.

Among the variables of the banking industry, we have chosen Herfindahl Hirschman index for total assets, which represents the concentration of assets in the banking sector for the period under consideration. This index has an advantage of giving higher weights

to the bigger banks as compared to other concentration indices. However, concentration indices including HHI fail to capture the effects of product differentiation or geographic advantages which enable some banks to exercise monopolistic power beyond their market share.

In addition, we have included these macroeconomic variables: real economic growth rates, inflation, changes in the nominal exchange rate, repo rate, and debt to GDP ratio, which correspond respectively to these abbreviations GROWTH, INF, REPO, ALL_EUR and DEBT_GDP.

Information on these variables has been taken by the Bank of Albania (BoA) and Institute of Statistics (INSTAT). The data are quarterly for the 2002 Q1-2014 Q2 period (50 periods) and include all the commercial banks of the Albanian banking system (16 banks). The total number of observations is 374 and the panel is unbalanced. Table 1 in the Annex presents a summary of the descriptive statistics and the expected impact of explanatory variables on NIM.

4.2 MODEL ESTIMATION AND RESULTS

Following the work of Nassar, Martinez and Pineda (2014), who study the determinants of banking margin in Honduras, using a panel of banks for the period 1998-2013, we estimate the model using an OLS-based PCSE procedure, which is more appropriate for time series cross-section (TSCS) data.

The equation has the general form:

$$NIM_{i,t} = a_0 + a_1 * NIM_{i,t-1} + a_2 * OVERHEAD_{i,t} + a_3 * CAR_{i,t} + a_4 * CLR_{i,t} + a_5 * NPL_{i,t(-4)}[11] + a_6 * SIZE_{i,t} + a_7 * NII_{i,t} + a_8 * HHI_{i,t} + a_9 * GROWTH_{i,t} + a_{10} * INFLATION_{i,t} + a_{11} * REPO_{i,t} + a_{12} * ALL\_EUR_{i,t} + a_{13} * DEBT\_GDP_{i,t} + \varepsilon_{i,t}$$

Where the indexes i and t refer to bank and year respectively and the term $\varepsilon_{i,t}$ represents the model residuals.

[11] Variabli është përfshirë me 4 vonesa kohore, sepse bankës i duhet kohë që të ndërmarrë masa lidhur me rrezikun e rritur të kredisë.

In estimating equation (4), it is necessary to settle the complications associated with error terms. First, the error terms for each bank are interdependent over time (autocorrelation). Second, as banks operate in the same industry and country, there is the possibility that the error terms are correlated between banks (contemporaneous correlation). Third, the errors tend to have non-constant variances between banks (heteroskedasticity) (Beck and Katz, 1995). For these reasons, the model is estimated by using an OLS-based PCSE procedure, which improves parameters efficiency and generate more accurate t-statistics, by correcting residual correlation between equations and cross-sectional heteroskedasticity (Beck and Katz; 1995). A crucial assumption for the method of PCSEs is that the errors have low or no serial correlation, so it is necessary to test for autocorrelation before using this method. Test results suggest that the level of autocorrelation in our model is low (see Table 2 in the Annex), so we can proceed with this method. The model results are presented in Table 1. (4)

The adjusted R^2 is 88.3%, which means that nearly 88 % of the variance of net interest margin is explained by the variance of explanatory variables included in the equation. As it can be seen from the model results, the factors that determine the margin behavior among bank-specific variables are capital adequacy ratio, current liquidity ratio, non-performing loans, overhead costs and non-interest income; while among macroeconomic factors, the economic growth rate, debt to GDP ratio and the exchange rate result statistically significant.

Table 1 Estimated coefficients for OLS-based PCSE model

Dependent Variable: MNI				
Method: Panel Least Squares				
Sample (adjusted): 2003Q1 2014Q2				
Periods included: 46				
Cross-sections included: 16				
Total panel (unbalanced) observations: 691				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.220761	0.380250	-0.580568	0.5617
NIM(-1)***	0.888576	0.015940	55.74522	0.0000
OVERHEAD*	0.110057	0.060546	1.817732	0.0695
CAR***	-0.001966	0.000567	-3.467347	0.0006
CLR**	-0.000795	0.000309	-2.571490	0.0103
NPL(-4)**	-0.051956	0.021133	-2.458528	0.0142
SIZE	0.008808	0.022128	0.398058	0.6907
NII_AKTIVE*	0.275279	0.163712	1.681481	0.0931
HHI_AKTIVE	-0.244608	0.640513	-0.381894	0.7027
GROWTH***	-0.022018	0.006910	-3.186315	0.0015
INFLATION	0.014056	0.026718	0.526064	0.5990
REPO	0.006609	0.031629	0.208947	0.8346
ALL_EUR*	-0.010441	0.006252	-1.670137	0.0954
DEBT_GDP***	0.004606	0.001531	3.007356	0.0027
R-squared	0.885537		F-statistic	402.8897
Adjusted R-squared	0.883339		Prob(F-statistic)	0.000000
			Durbin-Watson stat	2.026685

Note: *significance at 10%, **significance at 5%, ***significance at 1%.
Source: Authors' calculations.

In line with Kalluci's results (2010), we find that overhead costs have a significant positive impact on the banking margin. This means that banks increase net interest margin when operating expenses increase, in order to cover the additional cost. The estimated coefficient is among the largest of all explanatory variables. This finding is also consistent with the theory and with earlier studies on net interest margins.

The model results suggest that a higher ratio of capital adequacy is associated with lower interest margins. This is inconsistent with the model of Ho and Saunders (1981), which provides a positive correlation between the two variables. Our finding is in line with the hypothesis of Brock and Franken (2003), under which less capitalized banks have reasons to accept more risk (associated

with higher margins), in order to obtain higher profits. Likewise, more capitalized banks invest more carefully, as the risk of capital is larger (Brock and Franken, 2003). They may be able to afford shocks to their balance sheets, but they also give up financial leverage, which could lead to lower margins and lower returns on capital.

The coefficient before liquidity ratio has a negative sign because banks with higher levels of liquid assets may receive less interest income than banks with less liquid assets. If the deposit market is sufficiently competitive, higher liquidity tends to be negatively correlated with net interest margins.

Credit risk, which is measured by the ratio of non-performing loans to total loans, has a statistically significant negative impact on the margin. This result suggests that banks may prefer lower profit margins when the financial situation of individuals and businesses deteriorates.

Bank size which serves as a proxy for the size of the banking operations, results with a positive effect, and this is reasonable since for a given amount of credit risk and market risk more operations by the banks tend to be associated with larger potential losses. Even though, bank size coefficient is insignificant.

The significant and positive effect of non-interest income on the margin implies that even if banks generate higher income from commissions or other non-interest sources, they do not lower interest rates on loans.

The coefficient before Herfindahl-Hirschman index results negative, but statistically insignificant. According to this result, banks with a better management or more advanced production technology have lower costs and therefore can offer competitive interest rates for loans and/or deposits (Claeys and Vander Vennet, 2008).

Turning to macroeconomic variables, it seems they have a significant impact on net interest margin. The significant inverse relationship between the real economic growth and bank margin

is based on the argument that the improved financial situation of borrowing firms will improve their crediting performance, thereby reducing non-performing loans and allowing banks to cope with lower interest margins. A similar result was found by Silva et al. (2007) in Brazil.

In line with our expectations, the inflation rate and the base interest rate affect positively the margin, but their effect is insignificant.

An exchange rate increase is associated with lower margin. This result can be explained by the fact that if the domestic currency depreciates, the loan quality might deteriorate and bank margins will go down. This variable was expected to be significant as a large share of total bank loans is in euro and thus it is affected by exchange rate volatility.

The impact of domestic debt to GDP ratio on the dependent variable is positive and statistically significant, implying that government debt accumulation increases the net interest margin, probably due to increased macroeconomic risks and the potential unsustainability. There are few papers that include this fiscal variable in the net interest margin analysis, but almost all of them suggest a positive relation between the two variables.

Table 4 in the Annex gives a summary of the estimated results for different specifications of equation (4). The first column presents the regression with only bank-level explanatory variables. The next columns show the estimated coefficients after adding the macroeconomic variables successively in the regression. As it may be seen from model results, the variable coefficients are consistent: they do not change much among specifications. There is a sign change from one specification to the other in some cases, but only when the variable is statistically insignificant.

5. CONCLUDING REMARKS

In this paper, we use a bank-level panel dataset to investigate which of bank-specific, market structure, and macroeconomic factors are the main determinants of net interest margin in the Albanian banking sector for the period 2002-2014. This paper contributes to the literature on the Albanian banking sector, by introducing for the very first time the macroeconomic factors in the econometric analysis of banking margin's determinants.

First, individual bank characteristics explain a substantial part of the variation in bank interest margins. High net interest margin and profitability tend to be associated with banks that have large overhead costs and high non-interest income. On the other side, banks with high capital adequacy ratio, liquidity ratio and non-performing loans ratio have lower net interest margin. Bank size is the only one among bank-specific characteristics that is not significant. The impact of non-performing loans ratio on interest margin is negative for the Albanian banking sector. Even though the considered period has been characterized by very high NPL rates, Albanian banks have been very cautious in non-transferring the increased costs to their clients.

Second, banking market structure measured by Herfindahl-Hirschman index, has an insignificant impact on net interest margin.

Third, our results provide evidence of the important role that macroeconomic variables play in explaining the variation of interest margins. Real economic growth has a negative and statistically significant effect on interest margin. The significant inverse relationship between the real economic growth and bank margin is based on the argument that the improved financial situation of borrowing firms will improve their crediting performance, thereby reducing non-performing loans and allowing banks to cope with lower interest margins. Depreciation of domestic currency decreases banking margin, due to the deterioration of foreign currency loan quality. This effect is significant due to the considerable share of foreign currency loans in total bank loans. The impact of domestic debt

to GDP ratio on the dependent variable is positive and statistically significant, implying that government debt accumulation increases the net interest margin, probably due to increased macroeconomic risks and the potential unsustainability. Policy rate and inflation rate have a positive, but insignificant effect, which can be attributed to inefficiencies in the monetary policy transmission mechanism.

When looking at the possible maneuvering space for policymakers' actions that could affect the costs of financial intermediation, and therefore indirectly support economic activity, our results indicate that a stable macroeconomic environment support lower net interest margins. On the other hand, increasing government debt and associated macroeconomic risks are linked with higher margins. Policymakers should focus their efforts on achieving and maintaining macroeconomic stability, in order to minimize information asymmetries. This will allow banks to assess adequately the risks and to improve resource allocation efficiency. This study can be further developed by expanding the data time series, including or using other variables, splitting the analysis of net interest margins according to different economic sectors and currency composition etc.

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ANNEX

Table 1. Variable description and expected impact on net interest margin

Variable	Notation	Description	Mean	Standard deviation	Banks number	Expected effect
Net interest margin	NIM	Net interest income as share of total assets	3.9%	1.47	16	
Overhead costs	OVERHEAD	Administrative expenses/ total bank assets	0.91	0.8	16	Positive
Capital adequacy ratio	CAR	ratio of regulatory capital to risk-weighted assets	40.4	51.9	16	Positive/ Negative
Liquidity ratio	LR	ratio of highly liquid assets to demand liabilities	28.3	162.9	16	Negative
Credit risk	NPL	Non-performing loans to total assets ratio	2.04	1.75	16	Positive
Bank size	SIZE	logarithm of total bank assets	9.9	1.5	16	Positive/ negative
Non-interest income	NII	non-operating income divided by total assets	0.21	0.14	16	Positive/ negative
Market concentration	HHI	Herfindahl-Hirschman Index calculated as Sum squares of the market shares in total assets of individual banks	0.19	0.07	16	Positive/ negative
Real economic growth	GROWTH	Real growth of GDP	4.34	3.05	16	Positive/ negative
Inflation	INFLATION	Consumer Price Index Changes	2.8	1.07	16	Positive/ negative
Monetary policy rate	REPO	Base interest rate	5.38	1.36	16	Positive
Exchange rate	ALL_EUR	Albanian Lek to euro exchange rate	0.85	4.31	16	Positive/ negative
Domestic debt to GDP ratio	DEBT_GDP	Domestic debt share to GDP	146,8	14.7	16	Positive

Source: Authors' calculations.

Table 2. Correlogram of residuals

Date: 11/28/15 Time: 09:30						
Sample: 2002Q1 2014Q2						
Included observations: 691						
Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
.|. |	.|. |	1	-0.009	-0.009	0.0520	0.820
.|. |	.|. |	2	0.040	0.039	1.1378	0.566
.|. |	.|. |	3	-0.056	-0.055	3.3221	0.345
.|. |	.|. |	4	-0.007	-0.010	3.3581	0.500
.|. |	.|. |	5	-0.030	-0.025	3.9664	0.554
.|. |	.|. |	6	-0.007	-0.010	3.9999	0.677
.|. |	.|. |	7	0.018	0.019	4.2177	0.754
*|. |	*|. |	8	-0.129	-0.132	15.947	0.043
.|* |	.|* |	9	0.080	0.078	20.486	0.015
.|. |	.|. |	10	-0.035	-0.025	21.361	0.019
.|. |	.|. |	11	0.002	-0.019	21.363	0.030
.|* |	.|* |	12	0.115	0.130	30.721	0.002

Source: Authors' calculations.

Table 3. Panel unit root test for residuals

Panel unit root test: Summary				
Series: RESIDUAL				
Date: 11/28/15 Time: 09:36				
Sample: 2002Q1 2014Q2				
Exogenous variables: Individual effects				
User-specified lags: 1				
Method	Statistic	Prob.**		Obs
Levin, Lin & Chu t*	-11.2076	0.0000	16	650
Im, Pesaran and Shin W-stat	-13.0360	0.0000	16	650
ADF - Fisher Chi-square	226.512	0.0000	16	650
PP - Fisher Chi-square	378.944	0.0000	16	670
** Probabilities for Fisher tests are computed using an asymptotic χ^2 distribution. All other tests assume asymptotic normality.				

Source: Authors' calculations.

Table 4. OLS-PCSE based Panel Estimation Results (Dependent variable: Banks' net interest margin)

	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5	Equation 6
NIM(-1)	0.8875*** (0.0160)	0.8890*** (0.0159)	0.8893*** (0.0159)	0.8894*** (0.0159)	0.8894*** (0.0159)	0.8886*** (0.0159)
OVERHEAD	0.1176* (0.0604	0.1154* (0.0606)	0.1143* (0.0607)	0.1165* (0.0607)	0.1116* (0.0606)	0.1101* (0.0605)
CAR	-0.0002*** (0.0006)	-0.0020*** (0.0006)	-0.0020*** (0.0006)	-0.0020*** (0.0006)	-0.0019*** 0.0006	-0.0019*** (0.0006)
CLR	-0.0008*** (0.0003)	-0.0008*** (0.0003)	-0.0008*** (0.0003)	-0.0008*** (0.0003)	-0.0008** (0.0221)	-0.0008** (0.0003)
NPL(-4)	-0.0309 (0.0196)	-0.0469** (0.0205)	-0.0477** (0.0206)	-0.0621*** (0.0226)	-0.0599*** (0.0212)	-0.0519** (0.0211)
SIZE	0.0084 (0.0222)	0.0072 (0.0221)	0.0073 (0.0222)	0.0077 (0.0222)	0.2888* (0.1684)	0.0088 (0.0221)
NII	0.2307 (0.1788)	0.2627 (0.1731)	0.2948 (0.1843)	0.3049* (0.1805)	0.2829 (0.5675)	0.2753* (0.1637)
HHI	0.8316 (0.5381)	0.7520 (0.5188)	0.8058 (0.5316)	0.9867* (0.5318)	0.2829 (0.5675)	-0.2446*** (06405)
RRITJA		-0.0135** (0.0068)	-0.0143** (0.0069)	-0.0139** (0.0068)	-0.0172*** (0.0065)	-0.0220*** (0.0069)
INFLACIONI			0.0127 (0.0249)	0.0289 (0.0271)	0.0324 (0.0253)	0.0140 (0.0267)
REPO				-0.0371 (0.0254)	-0.0301 (0.0239)	0.0066 (0.0316)
ALL_EUR					0.0044*** (0.0016)	-0.0104* (0.0062)
BORXH_ GDP						0.0046*** (0.0015)
Adjusted R-square	0.8829	0.8837	0.8819	0.8822	0.8852	0.8855
F-statistic	643.3770	574.6953	516.6827	470.6656	435.4976	402.8897
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Durbin-Watson stat	2.0420	2.0332	2.0327	2.0380	2.0237	2.0267
N	691	691	691	691	691	691

Note: *significance at 10%, **significance at 5%, ***significance at 1%.
Source: Authors' calculations.

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