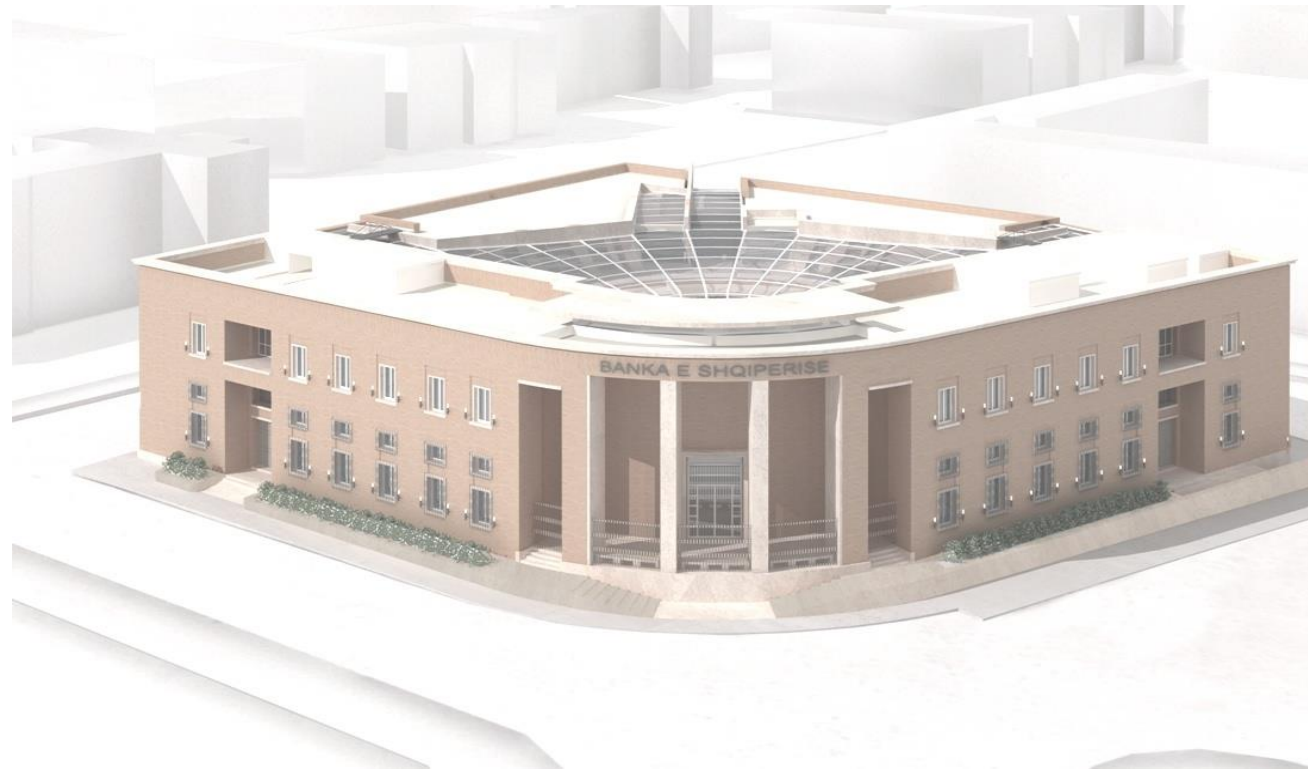# THE INFLUENCE OF MONETARY POLICY ON NET INTEREST MARGINS

EVIDENCE FROM ALBANIA

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BANK OF ALBANIA

BCC Conference, Geneva, Switzerland, 27-28 September 2018

OUTLINE

- MOTIVATION & AIM

- LITERATURE REVIEW

- RECENT DEVELOPMENTS IN THE ALBANIAN BANKING SECTOR

- EMPIRICAL ANALYSIS AND ESTIMATED RESULTS

- CONCLUDING REMARKS

MOTIVATION

- Understanding the link between interest rates and bank profitability is essential in evaluating the effects of monetary policy on the soundness of the financial sector.

- It takes a greater importance in the context of the continuosly eased monetary conditions by Bank of Albania during the recent years.

- The link between monetary policy and bank profitability in Albania is an under-researched area.

  - There are two previous studies on net interest margins in the Albanian banking sector [Kalluci (2010), Papavangjeli and Leka (2016)].

  - In this paper, we focus specifically on the relation between monetary policy rate and banks' net interest margin by allowing also for non-linearities in this relation.

  - We use the latest available banks' data and we split the analysis into three bank groups according to their share in the total assets of the banking sector.

Aim: To analyze the impact of monetary policy rate on Albanian banks' net interest margin and to investigate the existence of a possible non-linear relationship which would explain why the impact of monetary policy differs depending on the level of interest rates.

Research question:

"Controlling for selected bank characteristics and macroeconomic variables, is there any non-linear relation between monetary policy rate and banks net interest margin, as the main component of banks profitability?"

Methodology: application of an Ordinary Least Squares (OLS)-based Panel Corrected Standard Errors (PCSE) procedure, which accounts for issues like autocorrelation, residual correlation between equations and cross-sectional heteroskedasticity.

- There are various theoretical frameworks in which the behaviour of net interest margins is modelled (e.g. Zarruk, 1989; Wong, 1997).

- Model developed by Ho and Sounders (1981) as a starting point.

- Extended versions of this model by incorporating:

  - different types of loans and deposits (Allen, 1988).
  - credit risk and interest rate risk (Angbazo, 1997)
  - operating costs (Maudos and Fernández de Guevara, 2004)
  - non-interest income (Carbó and Rodríguez, 2007)

- Monti-Klein model (Borio et al., 2015): oligopolistic competition between N banks, incorporating the cost of maturity transformation, the capital requirements coefficient and an equation for provisions for possible loans losses.

Interest rates affect banks' net interest income through the following mechanisms:

- Liabilities are likely to be more interest rate sensitive than assets: banks typically "lend long and borrow short". When market interest rates <u>fall</u>, banks' funding costs usually fall more quickly than their interest income, and net interest income <u>rise</u>.

   o The demand for loans increases and the supply of deposits decreases with the <u>decrease</u> of interest rate, which can lead to larger lending volumes and lower deposit volumes, and thus <u>improve</u> interest income.

- Over time, net interest margins fall as loans are renewed at lower interest rates. As interest rates have become extraordinarily low, a <u>decrease</u> of interest rates will decrease loan interest more than the decrease on deposit rates, because the deposit rate cannot fall below zero, causing a <u>decrease</u> on net interest income.

The effects of these mechanisms indicate that the relationship between net interest margin and policy rate is non-linear.

- Borio et al. (2015), analyzing a sample of 108 large internationally banks in 14 major advanced economies, over the period 1995-2012, support the negative effects of lower interest rates on net interest margins, with effects found to be greater in low interest rate environments.

- The Bundesbank's Financial Stability Review (2015), analysing 1,500 banks, finds that persistently low interest rates are one of the main risk factors weighting on German banks' profitability. Genay and Podjasek (2014) also find that persistently low interest rates depress US banks' profitability, particularly for small institutions.

- Claessens et al. (2016) confirm the non-linear relation between interest rates and net interest margins, using a sample of 3,418 banks from 47 countries for the period 2005–2013.

- Kerbl and Sigmund (2016) study the effects of prolonged low interest rates on banks in Austria, estimating a panel model. It shows that the profitability of banks declines in times of low interest rate environments and small regional banks are hit hardest.

Other recent studies on this topic: Busch and Memmel (2015), Alessandri and Nelson (2015), Jobst and Lin (2016), Blot et al. (2016), Gros (2016), Borio and Gambacorta (2017).
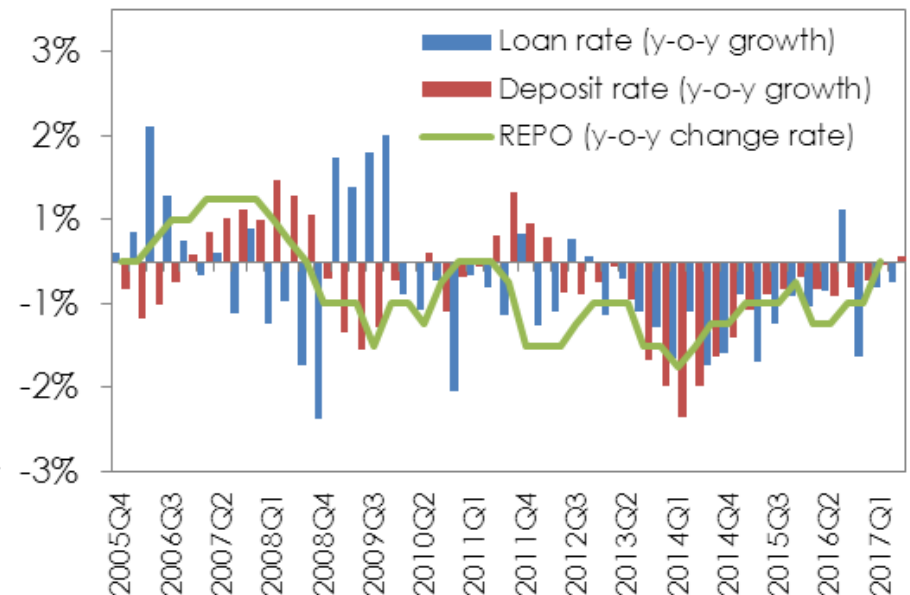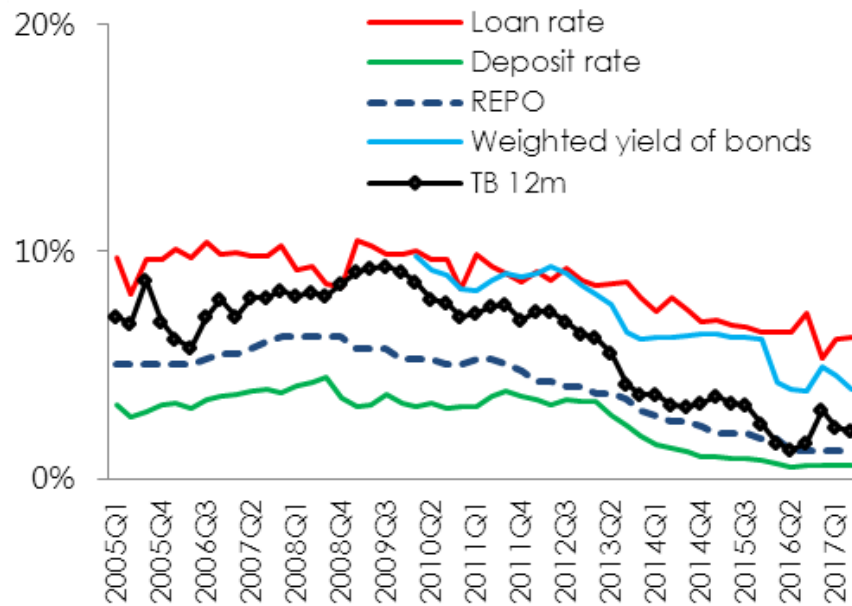
1. MONETARY POLICY

  - Monetary instrument: (reverse) repurchase agreement with a maturity of 7-days.

  - Expansionary monetary policy through the continuous repo rate decline during the recent years.

2. BANKING SECTOR DEVELOPMENTS

3. DEEPER ANALYSIS BY MATURITIES AND BANK GROUPS
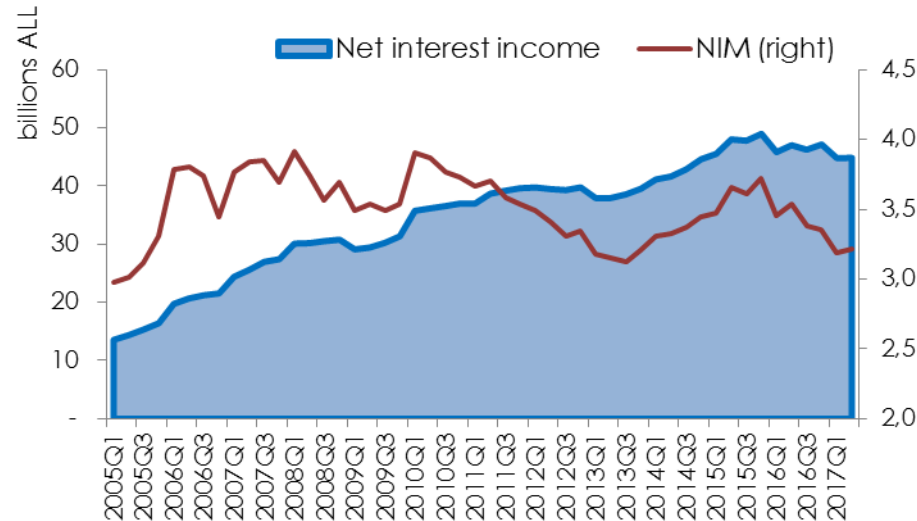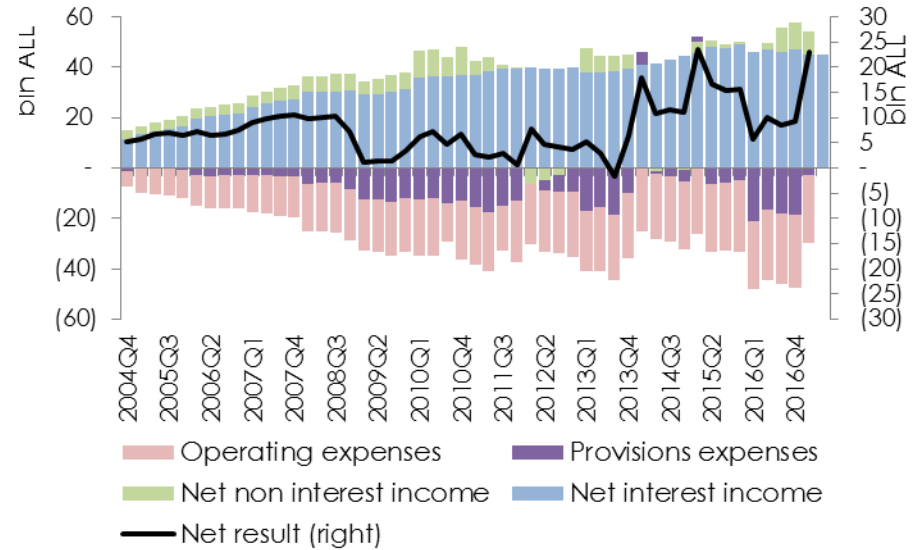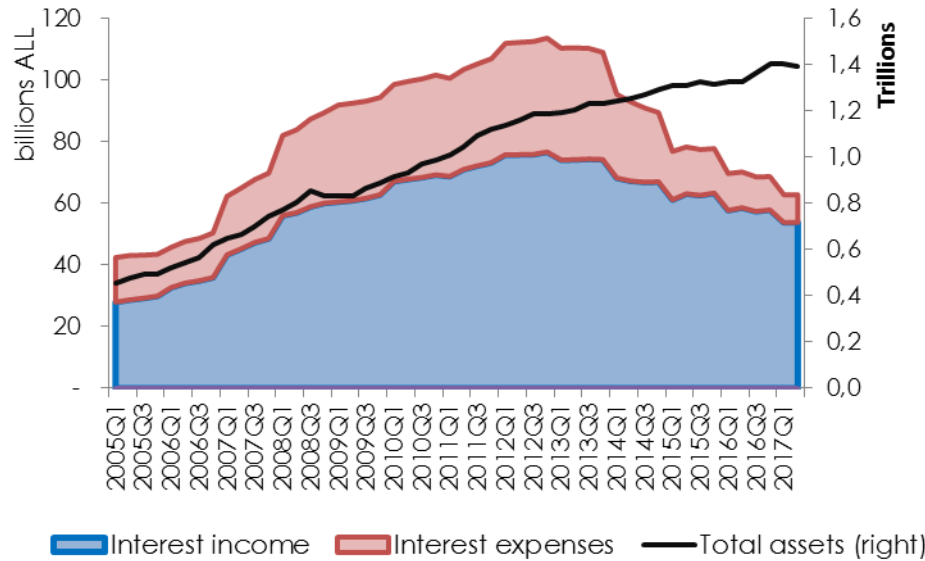
  - *Small banks (G1)*: sharing 0-2% of total banking sector assets;
  - *Medium banks (G2)*: 2%-7% of total banking sector assets;
  - *Large banks (G3)*: over 7% of total banking sector assets.

Source: Bank of Albania and authors' calculations.

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The influence of monetary policy on net interest margins: Evidence from Albania
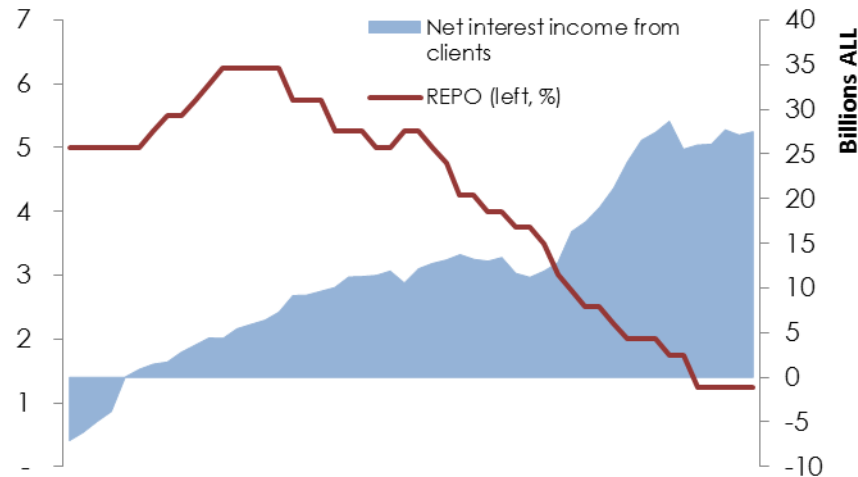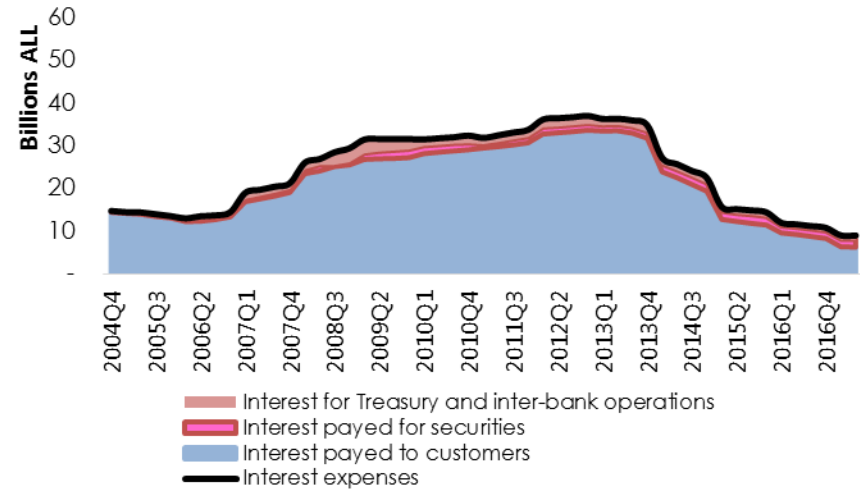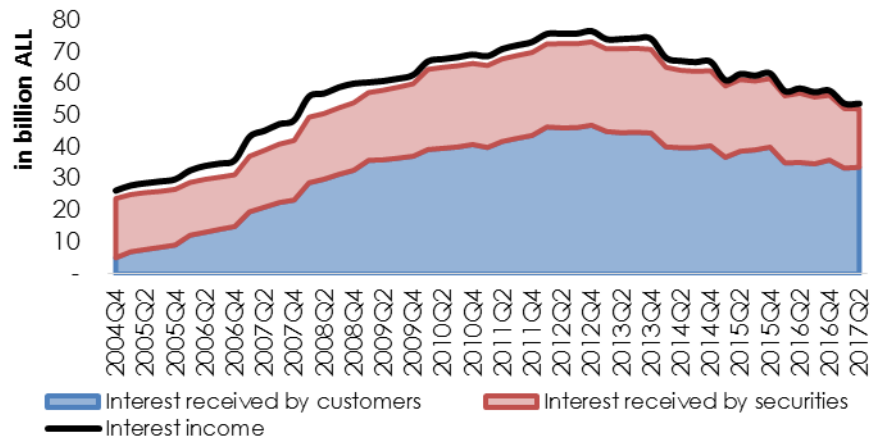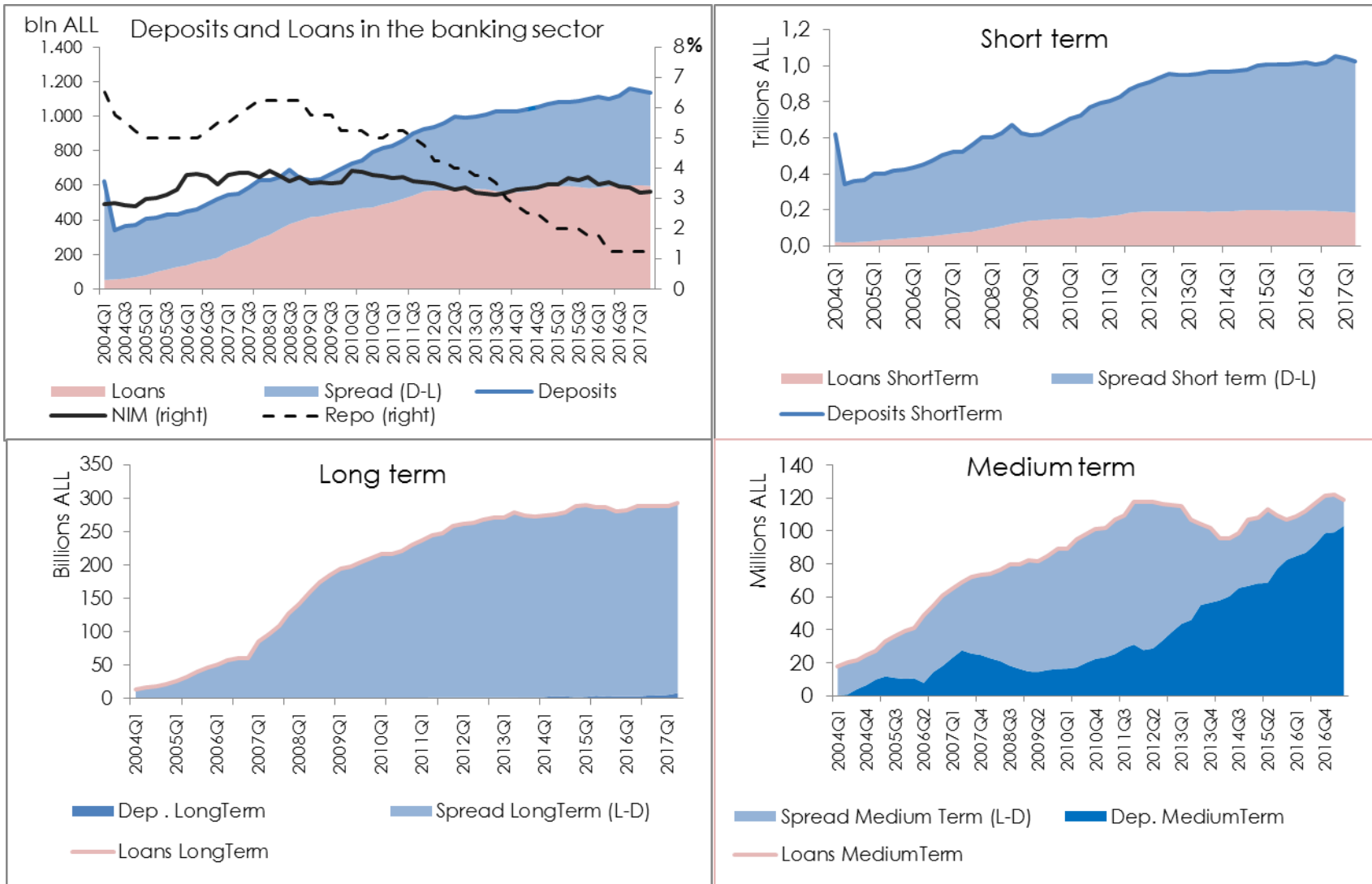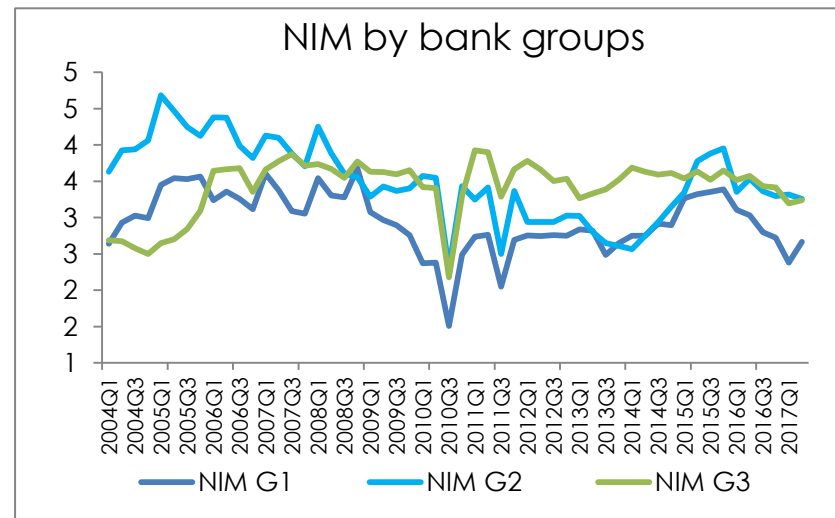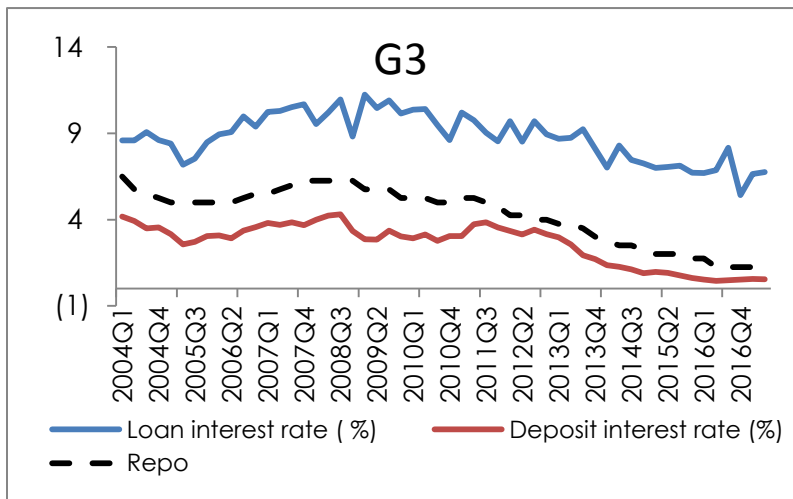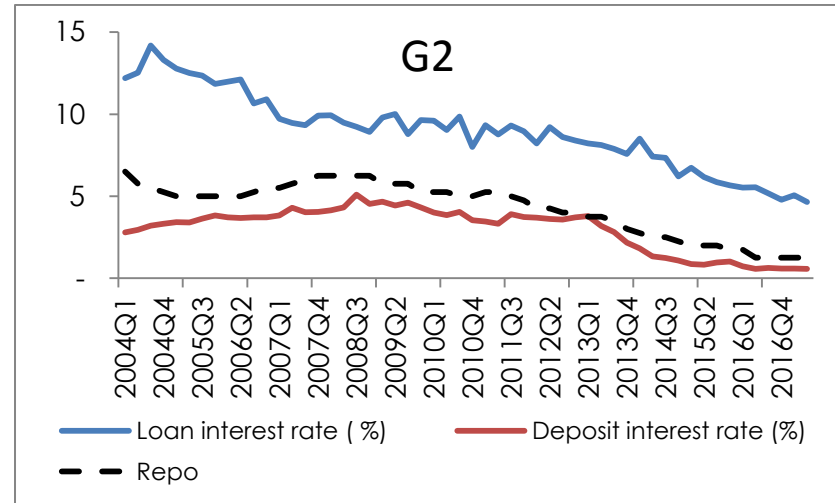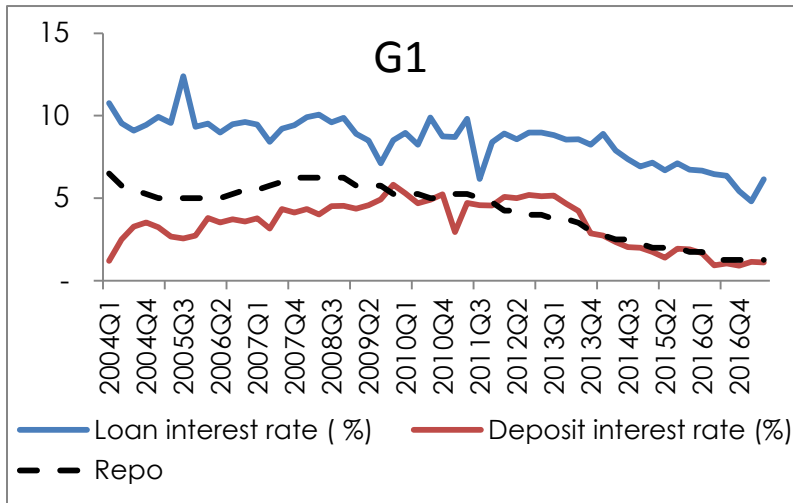
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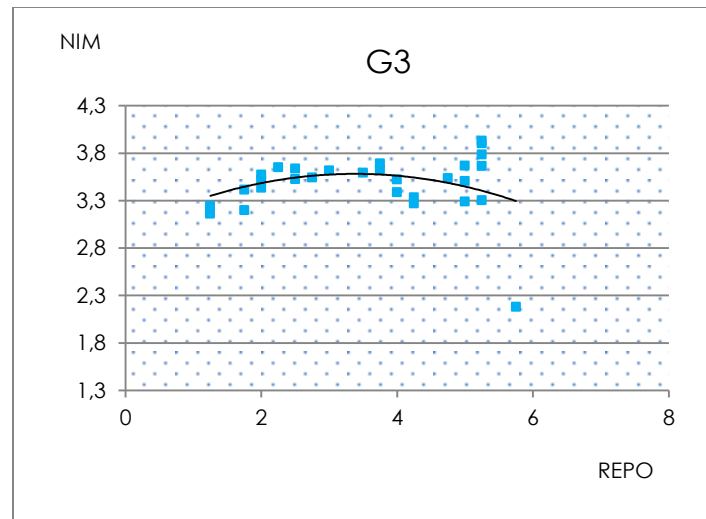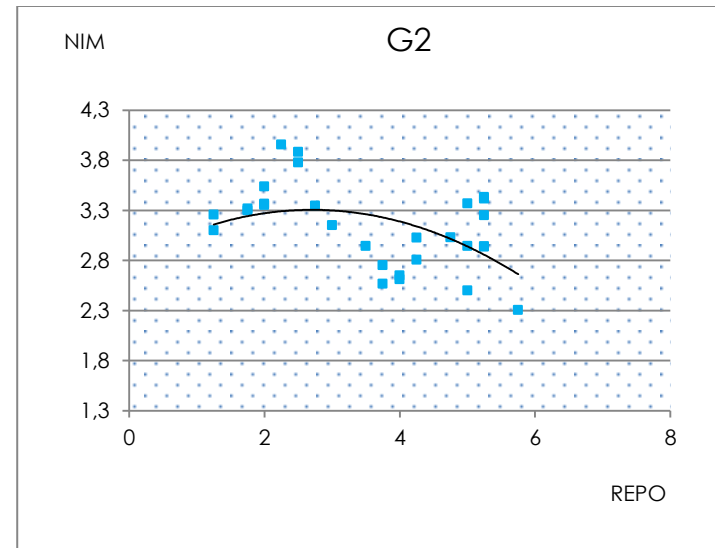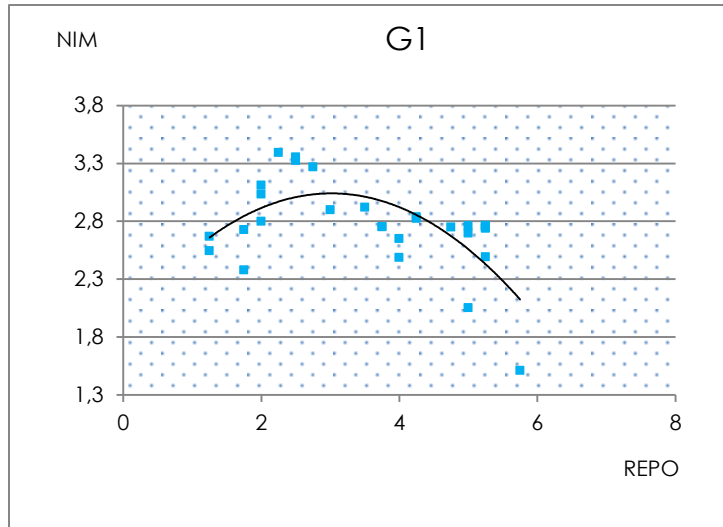
Source: Bank of Albania and authors' calculations.

Sample:

- Time Series Cross-Sectional data

- Quarterly data for the period 2004Q1-2017Q2 (54 periods)

- All the banks of Albanian banking system (16 banks)

Selected variables:
Bank specific factors: Liquidity ratio (LR), non-performing loans (NPL), operating expenses (OP_EXP), capital adequacy ratio (CAR);
Macroeconomic variables: Monetary policy rate (REPO), the real economic growth (GROWTH), the 3-month Euribor rate (EURIBOR) and the nominal ER change of Albanian Lek to Euro (ALL/EUR)

- The dataset is split in three sub-samples according to each of the three bank categories: small, medium and large ones.

Source of information:

- Banks' balance sheets and Bank of Albania's database for bank-specific variables,

- INSTAT for economic growth; EUROSTAT for 3M-Euribor.

Liquidity: Though insufficient liquidity is one of the major reasons for bank failures, holding liquid assets imposes an opportunity cost on a bank, as they have a lower return relative to illiquid assets. Although, there are empirical studies that find a positive relation between liquidity and banks profitability as for instance Bourke (1989) for twelve countries in Europe, North America and Australia, Kosmidou, Tanna, and Pasiouras (2005) for the UK commerical banks, Kosmidou (2008) for the Greek banking sector, Olagunju, David and Samuel (2012) for Nigeria etc.

Credit risk: among the factors with 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 credit risk.

Operating costs: 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).

Capital adequacy (CAR): commonly used as a proxy for creditworthiness of the bank. The relationship between NIM and CAR can be positive or negative, depending on the magnitude of transfer of these factors to the clients.

Economic growth: ambiguous effect on NIM. In times of economic boom, the financial situation of borrowing firms will improve their crediting performance, thereby reducing NPL and allowing banks to cope with lower interest margins (Silva et al., 2007). On the other hand, there can be a positive effect of real GDP growth on interest margins due to the increase of demand for loans during cyclical upswings (Tan, 2010).

Exchange rate: ambiguous effect on NIM, depending from the balance sheet structure and appreciation/depreciation effects (Brock and Franken, 2002).

Euribor: the higher the Euribor rate, the higher the interest that the banks will charge on loans in Euro.

VARIABLE DESCRIPTION

Variables	Notation	Description	Expected effect
Monetary policy rate	REPO	Interest rate of the main monetary policy instrument	Positive
Monetary policy rate squared	$REPO^2$	The square of monetary policy rate	Negative
Liquidity Ratio	LR	Ratio of highly liquid assets to total assets	Negative
Non-Performing Loans (Credit risk)	NPL	Non-performing loans to total loans ratio	Positive
Operational expenses	OP_EXP	Operating expenses/ total bank assets	Positive
Capital adequacy ratio	CAR	Ratio of regulatory capital to risk-weighted assets	Positive/ Negative
Economic Growth	GROWTH	Annual Growth of real GDP	Positive/ Negative
Exchange rate change	ALL_EUR	Annual change of Albanian Lek to euro exchange rate	Positive/ Negative
Euribor 3-M	EURIBOR	3-Month Euribor rate	Positive

Following Borio et al. (2015), Kerbl and Sigmund (2016), we carry out the econometric analysis using the following benchmark model:

$$NIM_{i,t} = \alpha_0 + \alpha_1 {*} NIM_{i,t-1} + \alpha_2 {*} REPO_{i,t-4} + \alpha_3 {*} REPO_{i,t-4}^2 + \alpha_4 {*} LR_{i,t} + \alpha_5 {*} NPL_{i,t} +$$
$$\alpha_6 {*} OP\_EXP_{i,t} + \alpha_7 {*} CAR_{i,t} + \alpha_8 {*} GROWTH_{i,t} + \alpha_9 {*} EURIBOR_{i,t} + \alpha_{10} {*} ALL\_EUR_{i,t} + \varepsilon_{i,t} \qquad (1)$$

where individual banks are indexed with i and periods with t.

The threshold monetary policy rate is given by the partial derivative of NIM on REPO rate:

$$\frac{\partial NIM}{\partial REPO(-4)} = \alpha_2 - 2 * \alpha_3 * REPO(-4) \qquad (2)$$

In estimating equation (1), there are some complications associated with the error term:

➤ The error terms for each bank are interdependent over time (autocorrelation).

➤ As banks operate in the same industry and country, there is the possibility that the error terms are correlated between banks (contemporaneous correlation).

➤ The errors tend to have non-constant variances between banks.

For all these reasons, the model is estimated by using an OLS-based PCSE procedure, which improves parameters efficiency and generate more accurate t-statistics in such circumstances (Beck & Katz, 1995).

ESTIMATED RESULTS FOR SMALL BANKS

	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5
MNI(-1)	0.816574***	0.836612***	0.831166***	0.825524***	0.786622***
REPO(-4)	0.349354**	0.356098*	0.302838*	0.225757*	0.254776*
REPO(-4)^2	-0.050283**	-0.051643**	-0.046709*	-0.028959*	-0.039565*
LR	0.000806*	0.001717	0.002140	0.003143	0.003588
NPL	-0.009906***	-0.008983***	-0.008611***	-0.009794**	-0.009303**
OP_EXP		0.044232*	0.039982*	0.050786	0.042105
CAR					-0.003008
GROWTH	0.008696**	0.003899*	-0.001698	-0.013801	-0.001695
EURIBOR			0.029478*		0.032279*
ALL_EUR				-0.045985	
C	0.162261	0.005058	0.367298	0.255012	0.264741
Adjusted R-square	0.781887	0.785153	0.784828	0.793925	0.800019
F-statistic	127.6623	111.6786	97.6570	103.0938	90.23309
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000
N	213	213	213	213	213

Note: *significance at 10%, **significance at 5%, ***significance at 1%.

The influence of monetary policy on net interest margins: Evidence from Albania

ESTIMATED RESULTS FOR MEDIUM BANKS

	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5
MNI(-1)	0.797369***	0.714953***	0.714039***	0.707066***	0.715171***
REPO(-4)	0.147530	0.150590	0.141109	0.090230	0.141434
REPO(-4)^2	-0.021579	-0.023466	-0.022615	-0.012955	-0.022601
LR	0.001401	-0.000156	-0.000123	-0.001128	-0.000250
NPL	-0.005766*	-0.005581*	-0.005428*	-0.005357*	-0.005418*
OP_EXP		0.177667***	0.178376**	0.184817***	0.177030***
CAR					0.000839
GROWTH	0.015958*	0.019897*	0.018898*	0.012262	0.018926*
EURIBOR			0.005335		0.005429
ALL_EUR				-0.022106	
C	0. 523571	0.331524	0.353700	0.446969	0.342569
Adjusted R-square	0.716312	0.741865	0.741093	0.743208	0.740307
F-statistic	141.1374	137.7175	120.1469	121.4715	106.4762
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000
N	334	334	334	334	334

Note: *significance at 10%, **significance at 5%, ***significance at 1%.

ESTIMATED RESULTS FOR LARGE BANKS

	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5
MNI(-1)	0.747230***	0.752249***	0.749467***	0.757473	0.737043
REPO(-4)	0.199558	0.276017*	0.255989*	0.258854*	0.240848
REPO(-4)^2	-0.025330	-0.036779	-0.034719	-0.033457	-0.034142*
LR	0.000596	0.001130	0.000840	0.000693	-0.001959
NPL	0.001124*	0.003613	0.004277	0.003769	-0.000933
OP_EXP		0.369508***	0.366088***	0.369419***	0.382185***
CAR					0.023704
GROWTH	0.007676*	0.003823*	0.002489	0.002099	0.002639*
EURIBOR			0.010636		0.014907
ALL_EUR				-0.007257	
C	0.456921	-0.386477	-0.333359	-0.374945	-0.479712
Adjusted R-square	0.592391	0.62252	0.620728	0.621265	0.623725
F-statistic	48.23324	46.94176	40.89284	40.98398	36.91540
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000	0.0000
N	196	196	196	196	196

Note: *significance at 10%, **significance at 5%, ***significance at 1%.

- In line with the analytical discussion, net interest margin is positively correlated with the monetary policy rate for all the three bank categories. The quadratic term is negative, indicating that the functional relationship is concave in all the cases, but this relation is statistically significant <u>only for small banks.</u> These results are in line with those of Kerbl and Sigmund (2016), Genay and Podjasek (2014).

- The threshold values for monetary policy rate among equations for all the three bank groups vary within the interval 3.2 - 3.8%, but for medium and large banks, the concave relation between REPO and NIM is statistically insignificant.

- As regards to other explanatory variables, LR results to have a positive significant effect only for small banks. This may be explained with the fact that small banks have a higher share of short-term loans compared to the two other bank-groups, which means that liquid assets have a significant contribution to their interest profits.

▪ Contrary to the theoretical literature, NPLs result to have a significant negative effect on NIM for small and medium banks, which indicates that this is a strategy of these banks to increase their market share, by not increasing their interest margins. Similar results are found by Brock and Rojas Suárez (2000) for the Latin American banking systems. The effect for large banks results positive, which implies that these banks have increased their interest margins to compensate for the increased costs of NPLs, but their effect is statistically insignificant in most of the equations for this banking group.

▪ In line with Kalluci (2010) and Papavangjeli and Leka (2016), we find that *operating 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 costs. This finding is also consistent with the theory and with earlier studies on net interest margins. Meanwhile, the capital adequacy ratio results to be insignificant for all the three banking groups.

▪ As regards the macroeconomic variables, it results that real economic growth has a positive significant effect for all the three bank groups, implying that the periods of economic booms have been associated with a higher lending activity and with higher interest profits for the banks. An exchange rate increase is associated with lower margins for all the banks. 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 Euribor rate results with a statistically significant positive effect only for small banks.

This paper contributes to the literature on the Albanian banking sector by allowing for nonlinearities in the relationship between interest rates and bank profitability – an aspect that so far has been neglected in empirical work. We control for both macroeconomic conditions and bank-specific characteristics.

After the financial crisis, during the period of the continuous expansion of monetary policy, the net interest income of the banking sector has increased. However, in relative terms to total assets (NIM), although some fluctuations, it remained at stable levels during the period, manifesting the banking sector stability in terms of profitability.

The analysis by bank-group reveals that all the banks have experienced the downfall of the NIM rate after the crisis. The impact was higher on the small banks and their recover was slower, while larger banks recovered more quickly.

While small and medium banks are characterized by strong fluctuations of interest rates as they have to struggle to gain more market share, the larger ones that dominate the market, are more resistant to reflect repo movements.

The empirical analysis suggest a significant non-linear relation between the repo rate and net interest margin only for small banks, which confirms the fact that small banks are more sensitive towards monetary policy changes. Larger banks seem to have an indifferent behavior towards monetary policy changes.

These findings have implications for the possible unintended side effects of accommodative monetary policy, designed to keep repo rate low for very long periods. Of course, the overall effect of monetary policy on NIM will also depend on the impact of monetary policy on macroeconomic conditions as economic growth results to be an important determinant of net interest margins of the banks. In particular, it will crucially hinge on the efficacy of monetary policy in boosting aggregate demand at the low levels of policy rate.

FUTURE RESEARCH:

- Investigate a possible non-linear relation between monetary policy rate and overall banks' profitability (ROA) and its other components (non-interest income and loan loss provisions);

- Study these relations only for the period when the monetary policy has been continuously expansionary;

- Including additional explanatory variables in the empirical analysis.

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THANK YOU!

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