

EMPIRICAL ANALYSIS OF BASEL III EFFECTS IN INTEREST RATE ON THE KOSOVO BANKING SYSTEM

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Abstract

The purpose of this working paper is to investigate effects of potential implementation of Basel III on an average interest rate of loans in banking system of Kosovo by using times series data aggregating for all commercial banks in the period from 2006 to 2013, in quarterly basis. The study used quantitative and qualitative research approach and is analyzed by using linear regression model for average interest rate on loans. Linear regression model was applied to investigate the new requirements of Basel III framework for the banks and their effects on average interest rate on loans. To investigate new requirements of Basel III and its impact on average interest rate of loans we use in our analysis *capital adequacy ratio (quick ratio)*, *management efficiency ratio*, *asset quality ratio*, *liquidity ratio*, *investment to asset ratio*, *loans to asset ratio* and *deposits to asset ratio*. The results of regression model summary statistics for average interest rate on loans shows that interest rate of loans has a strong correlation with explanatory variables that we used in our model, that explanatory variables explain 76.5 percent of dependent variable and we can conclude that a model is a proper and fit. The empirical result shows that the ratio that we mentioned above has a significant influence on the average interest rate on loans in the Kosovo Banking System.

Keywords: Basel III, Interest rate on loans, Industry specific variables, Time series

Introduction

From the establishment of the Basel Committee for Bank Supervision (BCBS) till up to now the main focus has been working on a revised Capital Accord and promoting a new accord which financial institution should maintain regulatory capital requirements with actual risk associated and these risks should be calculated with modern risk management techniques. The new requirements from the Basel Accord will increase regulatory capital and as a consequence, many authors feared that bank lending would decline and will have impact on increase of interest rate (Taylor, 2006). Based on the (Diamond and Rajan, 2000); (Brunnermeier, *et al*, 2009) studies the standards on minimum capital ratio play an important role in banking system regulation. The financial crisis has evidenced some weaknesses in the existing capital regulation and changes are under way (new regulation for European Banks and under Basel III) aimed at increasing the minimum equity capital ratio for banks⁵⁷. Capital adequacy is the most effective loss-absorption financial instruments at banking system. Thus, the social benefits of higher equity capital are in the form of financial stability and more sustained economic growth. However, higher equity capital requirements can also have social costs if, for example, banks meet the new equity capital requirements by issuing less credit and charge higher interest rates in the loans they do grant. (Miles *at al*, 2011); (BIS, 2010a, 2010b and 2010c) of the optimum regulatory capital for banks, while Adamati, De Marzo, Hellwing and Pfleiderer (2010) focused their research separately on the costs of benefits of the regulatory initiatives. These working papers addresses the potential costs arising from the Basel III requirements on capital adequacy and liquidity and provide an empirical analysis and its changes over the time in capital effect the interest rate of loans in the Kosovo banking system. The Kosovo, financial system is focused on commercial banks, which have a main role in financing the real economy and ensuring the financial stability. If the banking industry does not offer the sound and safe stability, the impact on the economy would be negative. Due to the fact that the banks are a critical part of the financial system, they play a pivotal role in contributing to a country's economic development (Rasidah and Mohd, 2011).

⁵⁷ Under Basel II, the minimum core equity capital (retained earnings and shares issues) is 2% of the risk weighted assets of the bank. Under Basel III, the minimum ratio is 7% or 8.5% under certain conditions. Regulations sets a time schedule of progressive compliance with the new standards, for the new rules in banks' regulatory capital see: www.bis.org/press/p100912.pdf?noframes=1.

Our paper is based on studies of Keyshap *et al* (2010) and Hanson *et al* (2011) that make a distinction between what they call the *flow* and the *stock* costs of higher equity capital regulation. Based on these studies and other related studies focused on average interest rate of loans, econometric model is used based on analysis of linear regression that allow to investigate the relationship between average interest rate and some internal determinants. Apart from the introduction, this paper is divided into four other sections: theoretical framework, methodology and findings and the last section concluding remarks.

Theoretical Framework

The analysis of the literature emphasized the existence of a significant number of theoretical and empirical studies focused on investigating of new regulations, known as Basel III. Studying the bank industries is very useful as they often are major proclamations' of business and financial cycles. As emphasized by Adrian and Shin (2010, 2014), banks' risk appetite is inherently procyclical. Banks tend to manage the size of their loan book so as to maintain their (risk-weighted) assets as a constant ratio to capital. About implementation of Basel III regulatory framework and its effects on the creation of financial stability debates are developed between different studies. We will focus on two groups of opinions who give their reasoning on the Basel III regulation and its effects on financial institution. One stand of literature argues that the implementation of Basel III regulation and new requirements according to it has an important macroeconomic benefit. Higher capital requirements means lower leverage and reduce the risk of bank bankruptcies (see e.g. Adamati, DeMarzo, Hellwing, 2010). One stand of the literature emphasizes that there can be significant cost of implementing a regime with higher requirements of capital (e.g. BIS, 2010b, and Angelini, 2011). Higher capital requirements according to Basel III will increase the marginal cost of bank loans if, contrary to the Modigliani-Miller (1958) theorem of capital marginal cost is greater than marginal cost of deposits, i.e. if there is a net cost capital growth. In this case, a higher cost of equity financing in connection with debt financing will lead banks to increase their lending price and can have effects on decline credit growth.

Several studies have examined the impact of higher capital requirements on bank lending rates and lending volume. Kashyap, Stein, and Hanson (2010) calibrate key parameters of the banking system of the United States to identify the impact of an increase in the equity to assets ratio. It finds an upper bound of 6 basis points for the increase in U.S. banks' lending spreads following an increase in the capital to asset ratio in line with that required under Basel III. Angelini et.al (2011) on their empirical analysis

find the similar results. Using aggregate banking data from accounting department, (Slovik and Cournede, 2011) find that lending spreads could be expected to increase by about 15 basis points. The main points of this paper is to analyze in detail and to understand the impact of the new capital requirements, introduced under the Basel III framework, on loan interest rates and loan growth. The literature review reflects the existence of some weaknesses in knowing the determining factors that have impact on increasing or decreasing loans interest rate for the banks that operate in Kosovo, the existence of a relatively reduced number of studies being noticed in our country, especially of the recent time. Our working paper will contribute to the literature providing empirical evidence regarding some key factors that influence of interest rate on loans of the commercial banks from Kosovo.

Data and Methodology

The data used in our empirical analysis were collected from relevant institutions, published by the Central Bank of Kosovo, in the aggregate for the entire banking system and these data are published according to the format introduced of the International Monetary Fund (IMF). In this working paper there is a period from December 2006 to December 2013, which is in total 32 observations. In the context of our analysis we determined dependent variable and independent variable which will be tested in the econometric model. The dependent variable is ***Interest rate of loans (IRL)***, while the independent selected variables are: *capital adequacy ratio, management efficiency ratio, asset quality ratio, liquidity ratio, investments to asset ratio, loans to asset ratio and deposit to asset ratio*. The interest rate of loans is calculated as the ratio between the interests from loans charged by the individual banks in year t and the average of the outstanding loans at the end of year t . Our paper uses time series data due to the advantage that it has, and it helps to analyze the behavior of banking system over time (Baltagi, 2005); (Gurajati, 2003). Linear regression model is issued in order to determine the relative importance of each independent variable in affecting the average interest rate of loans on the Kosovo banking system. Starting from the general model, the empirical model used in our study is:

$$r_t = C + \beta_1 \text{Capital adequacy}_t + \beta_2 \text{Management efficiency}_t + \beta_3 \text{Asset quality}_t + \beta_4 \text{Liquidity}_t + \beta_5 \text{Investment to assets}_t + \beta_6 \text{Loans to assets}_t + \beta_7 \text{Deposits to assets}_t + \varepsilon \dots \dots \dots (1)$$

Where:

r_t = interest rate of loans of banking system in period t

ε = error term of the model t , where $t= 2006-2013$, C = is constant term

Table 1 Descriptive statistics

Variables description	N	Minimum	Maximum	Mean	Std. Deviation
Interest Rate	32	.1110	.1610	.140844	.0107226
Capital Adequacy	32	.1050	.1600	.125553	.0149964
Management Efficiency	32	.6047	.8519	.710834	.0609420
Asset Quality	32	.0190	.0870	.049187	.0185289
Liquid Ratio	32	.1686	.3258	.237350	.0411041
Investments to Assets	32	.0069	.0972	.062691	.0268843
Loan to Assets	32	.5409	.6812	.620756	.0362412
Deposits Ratio	32	.7850	.8122	.799238	.0073675
Valid N (list wise)	32				

Sources: Author's calculations

Descriptive statistics presented in table above show the results for number of observation, minimum, maximum, mean value and standard deviation for the total period of data. As we can see from the table above, interest rate of loans has mean value of .1408 or 14.1 percent which is ranked as a very high average compared by the SEE⁵⁸ countries. The standard deviation is .0107 or 1.1 percent which is on a very low level compared to the mean average and shows a low variability. Capital adequacy ratio has the mean value of .1255 or 12.6 percent and with the moderate standard deviation of .0149 or 1.5 percent. This statistical description shows that banking system is well capitalized according to the Basel III requirements. This shows that the data are consistent because the standard deviation value is not much far from the mean value.

The liquid ratio has a mean value of .237 or 23.7 percent. The minimum and maximum value is .169, respectively .326 (16.9 percent respectively 32.6 percent) which shows that banking system of Kosovo is liquid Durguti *et al* (2014). Asset quality ratio has a mean value .049 or 4.9 percent with standard deviation of .0185 or 1.9 percent. These descriptive statistics result shows that asset quality of banking system in Kosovo is currently at the lowest level compared with countries in the region, although regulatory authority and banks should pay attention to monitor non-performing loans, because in recent years non-performing loans have a significant increase. Investment to asset ratio has a mean value of .0627 or 6.3 percent of total assets, with standard deviation of .0269 or 2.7%. There is a minimum and a maximum value .0069 and .0972 respectively. Loan to asset ratio has a mean value of .541 or 54.1% of total assets, with standard deviation of .036 or 3.6 percent. According to these result we can conclude that loans contribute to total interest income in average of 54.1% of total income.

⁵⁸ SEE Countries: - South and East Europe

The ratio with the high mean value is efficiency ratio (*which is ratio between operating cost and operating income*) of .710 or 71.1 percent with the largest variability. Whereas, the maximum and minimum value of .852 and .604 respectively. The net interest margin reflects the ability of banks' management to generate profits from the banks' assets and this profitability measure is correlated with other explanatory variables either positively or negatively. Deposit to asset ratio has the largest mean value of .799 or 79.9% of total assets of banking system, with standard deviation .007 or 0.7 percent. In table 2 below, we present the correlation analysis between the dependent and explanatory variables to see what intercommunication between them exists.

Table 2 Correlation results of the model

	IR ⁵⁹	CA	ME	AQ	LR	IA	LA	DR
IR	1							
CA	.617**	1						
ME	.019	-.193	1					
AQ	-.746**	-.662**	-.395*	1				
LR	-.692**	-.611**	.177	.666**	1			
IA	-.475**	-.523**	.181	.540**	.882**	1		
LA	-.062	.095	-.676**	.249	-.426*	-.385*	1	
DR	-.285	-.384*	.219	.250	.511**	.554**	-.257	1

*Correlation is significant at the 0.05 level (1-tailed) * Correlation is significant at the 0.01 level (1-tailed); Sources: Author's calculations

As we can see in table above, the correlation coefficient between interest rate of loans and explanatory variables shows that only capital adequacy and management efficiency have a positive coefficient .617 respectively .019. Whereas, negative correlations to the interest rate of loans have: asset quality, liquidity, investment to assets, loans to assets and deposits to assets coefficient of -.746, -.692, -.475, -.062 and -.285. From the result we can see that capital adequacy has a negative correlation with explanatory variable, except loan to asset have a positive correlation of .095, this mean that capital adequacy has a small association with profitability which supports argument that banks have a weak lending practices. The highest negative correlation with interest rate of loans has asset quality which is -.746, with significant interval of 99.9%. Whereas, the highest positive correlation has liquidity with investment on assets which is .882, with significant interval of 99.9%.

⁵⁹ *Note:IR- Interest rate; CA- Capital adequacy; ME- Mngement efficiency; LR- Liquidity ratio; LA- Loan to assets; IA- Investment to assets; LA- Loans to assets and DR- Deposits to assets

This result shows that managerial efficiency of banking system have a significant relationship with asset quality in significant interval of 95% of -.395 and loan to asset ratio in significance level of 99.9% of -.676.

Table 3 Breusch – Pagan test for heteroscedasticity

Description	Interest rate of loans
Number of observation	32
F-statistic	9.76
Prob. F (8, 23)	9.32
Prob. Chi(2) square	9.02
R – squared	0.7652
Prob. Chi square	0.3408

Sources: Authors calculations

If the residuals of the regression have a systematically changing variability over the sample, that is a sign of heteroscedasticity. Breusch-Pagan test was used for general test of heteroscedasticity. From the table presented above the test result for regression analysis's *p-values* is considerably in excess of 0.05, we can say that there is no evidence for the presence of heteroscedasticity.

To examine the relationship between average interest rate and explanatory variables we run linear regression model. In the following table coefficients, we present R, R square, Adjusted R square and standard error, Durguti *et al* (2014).

Table 4 Linear regression Model Summary for average interest rate and explanatory variables

Model Summary				
Model	R	R Square	Adjusted R Square	Standard Error of the Estimate
1	.875 ^a	.765	.697	.0059067

a. Predictors: (Constant), CA, ME, AQ,IA,LA, LR and DA

b. Dependent variable: Interest Rate

Source: Authors calculations

The results from the model show that dependent variable has a strong correlation with explanatory R in level of .875, R square of .765, which shows 76.5 percent of dependent variable is explained from independent variables. Adjusted R Square is coefficient of determination which tell us the variation in the dependent variable due to changes in the independent variable, from the findings presented in table 4 the value of adjusted R square is .697 which mean that explanatory variable have a variation on average interest rate of 69.7 percent at significance level of 95%.

Table 5 Linear regression ANOVA results

ANOVA ^a					
Model	Sum of Squares	Difference	Mean Square	F	Sig.
Regression	.003	7	.000	9.766	.000 ^b
Residual	.001	24	.000		
Total	.004	31			

a. Dependent Variable: Interest Rate

b. Predictors: (Constant): CA, ME, AQ,IA,LA, LR and DA

Sources: Author's calculations

The statistical results from ANOVA presented in table above, the processed data, which is the population parameters, had a significance level of 1% which shows that the data are ideal for making a conclusion for variables as the value of significance (p-value) is less than 1%. Before starting to comment the results we will give some interpretation of diagnostic test results. F-test is equal .000^b which shows that all coefficients are statistically significant and different from *zero*. The general rule of thumb is when any VIF is greater than 10 there is multicollinearity problem Stevens (2009). Before the regression, the model was tested for multicollinearity. The result from empirical analysis show that all variables have a variance inflation factor that is between 1.539 and 9.762. The result indicates that independent variables are weakly correlated with each other, and there is a no need to change any of the variables in the regression model.

Table 6 Variance influence factor F- test

Collinearity Statistics		
	Tolerance	VIF
Capital adequacy ratio	.292	3.428
Management efficiency ratio	.280	3.570
Asset quality ratio	.100	8.015
Liquidity ratio	.085	9.762
Investment to asset ratio	.202	4.960
Loan s to asset ratio	.277	3.611
Deposits to asset ratio	.650	1.539
Mean VIF		4.983

Sources: Author's calculations

Whereas, collinearity statistics show that mean VIF factor is in value of 4.983, which means that all variables are smaller than ten (VIF<10), which mean that multicollinearity of data on regression are fit and proper. Different empirical studies about multicollinearity give different arguments. Mahorta (2007) stated that multicollinearity problems exist if correlation coefficients between variables are more than 0.75.

Table 7 Linear regression coefficients

Model	Un standardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
	(Constant)	.320	.152		
Capital adequacy ratio	-.001	.131	-.001	-.008	.994
Management efficiency	-.057	.033	-.326	-1.742	.094
Asset quality ratio	-.192	.181	-.332	-1.061	.299
Liquidity ratio	-.286	.089	-1.098	-3.236	.004
Investment to asset ratio	.220	.088	.553	2.508	.019
Loans to asset ratio	-.134	.056	-.453	-2.407	.024
Deposits to asset ratio	.010	.179	.007	.058	.954

Sources: Author's calculations

From the table presented above, in contrast to the hypothesis, five explanatory variables, capital adequacy ratio, management efficiency ratio, asset quality ratio, liquid ratio, and loan to asset ratio have a negative relationship with interest rate of loans, with coefficient of -.001, -.057, -.192, -.286 and -.134 respectively. From the results show above means that any increase in capital adequacy, quality management efficiency, a higher quality assets, having more liquid assets and a lower loan to asset ratio leads to higher interest rate. Interest rate of loans is negatively related to capital adequacy ratio and the result is consistent with the findings of Kashyap, Stein and Hanson (2010). Capital adequacy ratio in our model results shows negative correlations with interest rate of loans. It means 1 percent decrease of capital adequacy ratio will decrease interest rate of loans of 0.1 percent. The regression result presented in table no.6 shows, that management ratio is statistically significant in level of 90% with negative impact ($P=.094$). These results show that increase of 1 percent of management efficiency ratio will have a decrease impact on interest rate of loans of 5.7 percent. Empirical analysis for liquidity ratio shows that there is a negative relationship with interest rate of loans with significant level of 99.9% or ($P=.004$). From the results we can conclude that 1 percent increase of liquidity ratio will have an increase of 28.6% of interest rate of loans. Investment to total asset ratio have a positive relationship with interest rate of loans with statically significance level of 99% or ($P=.019$). It means that 1 percent increase of investment to total asset ratio will have positive increase of 22.0% of interest rate of loans. Whereas, loans to asset ratio have a negative relationship with interest rate of loans with statistically significance level of 99% or ($P=.024$). The study found that an increase of 1 percent of loan to asset ratio will have impact in 13.4 percent decrease of interest rate of loans. Asset quality ratio and deposits to asset ratio result doesn't have any significance with dependent variable interest rate of loans. Asset quality ratio is correlated with

negative coefficient of $-.192$ and deposits to asset ratio have a positive correlation coefficient of $.001$.

Conclusion

In this empirical analysis our main object was to investigate the main factors which have positive or negative impact on interest rate of loans. The data used in this model were with time series for period of 2006-2013, or thirty-two (32) quarterly observations. With regards to secondary data analysis based on the aggregated financial statement of banking system of Kosovo, we applied the regression model for lending rate, respectively interest rate of loans (IRL).

The major findings of the working paper analysis are presented as follows:

- First, the findings of the study noticed that Kosovo's banking system has been continuously profitable as a result of high interest rates during the period analyzed, despite pressure from the recent global financial crises. Also, Kosovo banking system leads to the average interest rate on loans compared to the countries of South East Europe (SEE). Descriptive statistics analysis has shown that there is a minimum interest rate of 11.1 percent, while an average of 14.1 percent, as well as a maximum of 16.1 percent. Moreover, while the adequacy implementation of this empirical study with the observed data, the findings shows that there are differences between variables which have positive and negative impact on the average interest on loans.
- Second, the empirical results indicate that the ratio of capital adequacy ratio has insignificant negative conjunction with the interest rate of loans, where it turns out that if capital ratio adequacy is decreased by one (1) percent, then the loan interest rate will be reduced by 0.1 percent. This result is in the same direction of the study done by the Kayshap *et al* (2010).
- Third, the findings from empirical analysis variables which are set in the model have a positive impact as well as a negative on loan interest rate with different level of confidence of 10%, 5% and 1%. The variables which have the impact of reducing the loan interest rate are: management efficiency with a significance level of 90% with *P-value* ($P=.094$), the liquidity ratio with a significance level of 99.9% with *P-value* ($P=.004$), loans to asset ratio with a significance level of 95% with *P-value* ($P=.024$), while there is a positive impact on loan interest rate resulting from investment (*Securities*) to asset ratio with a significance level of 95% with *P-value* ($P=.019$).
- In the end based on literature review as well as the results came from our analyses through variables there is a potential increase of increase of

lending price (interest rate on loans) in the banking system in Kosovo if the Basel III framework is implemented and this is in accordance with findings of Modigliani-Miller (1958): a higher cost of equity financing in connection with debt financing will lead banks to increase their lending price as well as may have effects on decline credit growth.

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