Credit growth and non-performing loans: evidence from Turkey and some Balkan countries

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Abstract

In this paper, endogenous and exogenous factors that affect the credit growth rate of some Western Balkan countries (Bosnia and Herzegovina, Croatia and Serbia) and the credit policy in Turkey will be investigated through a multiple regression analysis. The credit growth rate will be used as the dependent variable while the rate of the non-performing loans along with the growth rate of the deposit, the return of equity and the real growth rate of the gross domestic product will be used as independent variables. In this paper the STATA 13.0 software package will be used. This data analysis will include a quarterly basis data for the period: 2007q1 – 2017q2 due to its higher significance. The result of the regression analysis showed that there is a reverse relationship between the rate of the non-performing loans and the credit growth rate for all the observed countries. The high share of problematic loans in total loans relatively reflects in a negative way the overall tendency of the banks towards taking risks and credit growth. It reduces the profitability of the banking sector and increases the systemic risk as well. The basic results of the regression analysis also showed a positive relationship between economic growth and the credit growth of banks. On the one hand, the economic growth of the region insufficiently follows the credit growth due to the stagnation of the real sector, and the recovery of the economy on the other hand. Similarly, there is a positive relationship between the growth rate of the deposits and credit growth, since the deposits sources are the basis for performing credit nomination. Except for Croatia where a negative correlation was recorded, there is a positive relationship in terms of the return on equity and credit growth.

Keywords: economic growth, credit growth, non-performing loans

Introduction

Financial markets have a key role because they facilitate risk sharing and allocate assets among investors efficiently. Additionally, banks are almost the most

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important institutions on the financial markets. Bank lending is an important source of funding for borrowers (e.g., households and firms). However, compared to a developed capital market, a country with an underdeveloped capital market relies less on external funding. The external source of funding in financial based economies, for example, is bank credits (Kashif *et al*., 2016). It is a fact that banking loans have a significant importance for households and companies.

The most important factor in bank credit is the economic situation of the countries. The 10% increase in bank nomination for the private sector refers to a growth of 0.6-1% of real GDP growth just as it happens real growth of private investment up to 2% - $2^{1/2}$% (Antoshin *et al*., 2017). Generally, these amounts have not been spectacularly changed during and after the post-crisis period. For example, credit expansion in the EU member states was slow after the post-crisis period. That reflects a moderate credit growth.

Another important factor of the bank credit is the quality of the credits. Rapid credit growth may lead to an adverse selection, and may be associated with reduced credit quality as risk taking intensifies during such periods, adversely affecting the level of non-performing loans (Erdinç and Abazi, 2014). The quality of loans, deposit clients and the banks cost index are closely correlated with the bank loans. Over the past decade, the credit quality of the loan portfolios among most of the countries in the world remained relatively stable until the financial crisis hit the global economy in 2007-2008. Since then, the average bank wealth quality has deteriorated sharply due to the global economic recession. Recession caused a decrease in the quality of credits and an increase in non-performing loans (NPLs). However, after 2007–2008, almost all countries in the world faced with the rapid growth of non-performing loans (henceforth NPLs). The growth significantly varied among different groups of countries, particularly among countries within the same group (Kjosevski and Petkovski, 2017). Furthermore, NPLs represent ex input risk at an aggregate level. It is also accepted as a signal for forthcoming losses of the banking system (Vouldis and Lousiz, 2016). From this point of view, the reduction of non-performing loans is a necessary condition to improve the economic status. If non-performing loans are kept and continuously rolled over, resources are locked up in unprofitable sectors thus hindering economic growth and impairing the economic efficiency (Jolevska and Andovski, 2015).

In this paper, we try to correlate the credit growth with the NPLs. Hopefully, it will make a contribution to the banking and finance literature. Although a lot of studies on credit growth and non-performing loan have been carried out, this study will be the first to compare them in Turkey and some Balkan countries as a banking application. Actually, we aim to provide policymakers with new ideas related to the banking application.

1. A brief overview of the literature

Credit growth is considered to be a good indicator of the banking sector's stability. So, investors, academics and central banks alike are interested in the credit growth rates (Jakubik and Moinescu, 2015). In the literature, there are a lot of papers written on bank credit because of its relationship with economic conditions. The above mentioned papers mostly focused on the relationships between the crises and bank credits. The trend of bank credit enables us to predict future economic conditions, where a rapid growth of credit supply could participate in subsequent financial or economic crises, whereas a significant decline in credit could result in a recession in economic activities (Awdeh, 2017). There is abundant empirical literature documenting that many financial crises were preceded by abnormal credit growth which led to the development of asset price bubbles (Amador *et al*., 2013). Domestic credit growth has been noted as one of the most important alerts of a financial crisis. It is therefore crucial for policymakers to know the determinants of credit growth in order to proactively protect their economies (Frömmel and Midilic, 2016). To avoid the financial crises originated in credit growth, it is important to determine the reasons of credit growth. There are also several studies based on the determinants of credit growth, considering both demand and credit supply effects. Some of these studies can be summarized as follows:

Table 1. Summary of literature

Authors	**Region**	**Results**
Ivanovic (2016)	Montenegro	Positive economic developments and an increase in deposit potential lead to higher credit growth
Shijaku and Kalluci (2013)	Albania	Lending is positively linked to economic growth
Guo and Stepanyan (2011)	38 emerging Market	Domestic deposits contribute positively and symmetrically to credit growth
Cucinelli (2015)	Italy	GDP growth rate shows a positive impact on
		the bank lending
Tahir *et al.* (2015)	Pakistan	Bank lending has an adverse impact on economic growth
Imran and Nishat (2013)	Pakistan	Domestic deposits, economic growth are significantly associated with bank lending particularly in the long run
Awdeh (2017)	Lebanon	Deposit growth and GDP growth all boost bank lending to the resident private sector

Source: own representation.

In addition to the above studies, some researchers found significant relationships between balance sheet and bank lending (Amidu, 2014; Miyajima, 2017). The last financial crisis and recession have made NPLs one of the major concerns for both bank managers and regulatory authorities. At this point, it is worth mentioning the studies on NPLs in the literature. Thus, by reviewing the literature studies about NPLs, bank lending determinants could be seen. These studies about NPLs investigate the comprising macroeconomic and microeconomic variables, internal variables, assets, equity and balance sheet management. In some studies, a positive relationship has been observed between NPLs and bank lending (Salas and Saurina 2002; Beck *et al*., 2015; Djiogap and Ngomsi, 2012; Amador *et al*., 2013; Kashif *et al*., 2016). At the same time, a negative relationship between NPLs and bank lending has been observed by some researchers (Awdeh 2017; Shingjergj and Hyseni 2015; Rabab'ah 2015; Ivanovic, 2016). On the other hand, some could not find any relationship between NPLs and bank lending (Accornero *et al*., 2017).

2. Banking in the analysed countries

In this study, Turkey and some Balkan countries such as Bosnia and Herzegovina, Serbia and Croatia were investigated. The investigated Western Balkan countries have some common features which can be seen below:

- The financial structure of their economies is bank-based and mainly foreign owned. The NPL remains the main risk as they tend to increase (Varesi, 2015);
- Important developments have been observed in terms of financial markets in these countries since the 1980's (Şahin, 2015). Although the reform processes began at the beginning of the 1990s, the sectors continued to improve and implement restructuring processes after 2000 (Bucevska and Misheva, 2017);
- Before declaring their independence, Serbia, Croatia and Bosnia and Herzegovina were part of Yugoslavia. They could not decide about the growth of their economies, as most state institutions and the banking sector were underdeveloped (Kubiszewska, 2017).

Since the Western Balkan countries are candidates for EU membership, their economic development are dependent on the regional development of Europe. Considering that banking regulations are tightening, the demand for loans decreases because of the economic situation, the NPL increases for the same reasons (Varesi, 2015).

The analysed countries, namely Turkey and the Balkan States, have got a rather similar history of economy and historically strong ties. And there are also many important Turkish economic investments in the Balkan countries with respect to either quantitative aspects or volume (Şahin, 2015). In addition to size, the structure of the financial system varies considerably across the observed countries. Banking sector assets represent between 80 and 92 percent of the financial sector

assets in the observed countries (The Banks Association of Turkey, 2015; WB, 2016). Some indicators for all these countries are given below:

Table 2. Some macroeconomic and banking indicators for observed countries

Country	Series Name	2008	2009	2010	2011	2012	2013	2014	2015	2016
Bosnia	GDP growth (annual %)	5.58	-2.99	0.87	0.96	-0.82	2.35	1.15	3.07	3.06
	Domestic credit to private sector (% of GDP)	53.11	52.79	52.78	53.13	54.71	54.85	54.66	53.62	53.18
Croatia	GDP growth (annual %)	2.05	-7.38	-1.70	-0.28	-2.19	-1.06	-0.49	2.25	2.98
	Domestic credit to private sector (% of GDP)	63.90	66.70	68.43	70.27	67.94	69.96	69.32	65.21	61.26
Serbia	GDP growth (annual %)	5.37	-3.12	0.58	1.40	-1.02	2.57	-1.83	0.76	2.80
	Domestic credit to private sector (% of GDP)	38.94	42.46	49.90	47.49	49.44	43.51	43.40	43.35	43.42
Turkey	GDP growth (annual %)	0.85	-4.70	8.49	11.11	4.79	8.49	5.17	6.09	3.18
	Domestic credit to private sector (% of GDP)	31.14	34.78	41.87	46.51	49.10	57.15	59.94	62.93	65.74

Source: World bank[1].

It can be easily seen that the 2008-2009 global crisis had an effect on the observed countries in terms of GDP. All countries' GDP growth rates were negative until 2009. Beginning with 2009, the GDP growth rate of these countries began to rise. In addition to this, private sector credits in these countries were very high in those times. So, the firms of the observed countries were dependent on bank credits.

3. Non-performing loans and banks performance

The literature is full of discussions on various macro-economic and bank-specific determinants of NPLs. The macroeconomic determinants covered in the literature can be divided into four major categories as follows (Chavan and Gambacorta, 2016):

- Economic activity (GDP growth, gross capital formation, exports, unemployment rate).
- Cost of credit (real lending rate or policy rate).
- Collateral (stock or housing prices).
- Vulnerability of external sector shocks (exchange rate, foreign currency borrowings)

The relevance of macroeconomic dynamics highlight endogeneity as an issue that undermines any attempt to identify a causal impact of the NPLs on credit supply: NPLs rise in countries during periods when economic activity stagnates.

[1] Data retrieved from http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators# (Accessed on: January 22, 2018).

Consequently, credit worthiness is deteriorated and the demand for credit also tends to decline. Bank lending is the major output provided by banks, but it is risky because there is always an ex ante risk for a loan to become nonperforming. NPLs can be treated as undesirable outputs or costs which can jeopardize a bank's performance (Hu *et al*., 2004). The role of the bank-specific factors, on the other hand, backs up the idea that NPLs might also act as a signal for (idiosyncratic) weakness or misbehaviour of the fundamental banks. Frequently, increases in NPLs are indeed anticipated by credit expansions and a loosening of lending standards (Accornero *et al*., 2017).

4. Data and methodology

4.1. Data

This analysis focuses on the following variables: dependent variables such as the Credit Growth Rate (CGR); the Real Growth Rate of Gross Domestic Product (RGRGDP), the Deposit Growth Rate (DGR), the Growth Rate of Non-Performing Loans according to Total Loans (GRNPL) and The Growth Rate of Return on Equity (GRROE) as independent variable. The choice of these variables was motivated by the great problems that have affected the investigated countries. And it is obvious that these variables were used frequently in the literature (Awdeh 2017; Tahir *et al*., 2015). The research covers the period from the first quarter of 2007 to the second quarter of 2017. The analysis will use these quarterly data, because the number of annual data is insufficient for an econometric evaluation. The data for further regression analysis of Turkey have been taken from the Central Bank and Banking Regulation and Supervision Agency. Other countries data have been obtained from the official pages of the Croatian National Bank, the National Bank of Serbia and the Central Bank of Bosnia and Herzegovina. The variable, notation and expected effect of the dependent and independent variables are given below:

Table 3. A brief description of the dependent and independent variables in the model

Variable	Notation	Expected effect
The growth rate of non-performing loans, according to total loans	GRNPL	Negative
The growth rate of return on equity	GRROE	Positive
The growth rate of total deposits	GRTD	Positive
The real growth rate of gross domestic product	RGRGDP	Positive

Source: own representation

Deposit growth - represents a funding source. This variable is used for financial sector deepening. The low growth of deposits to GDP in many countries should not be interpreted as a slowdown of financial deepening (Crowley, 2008). It

is expected that higher deposit growth leads to higher credit growth as banks have more available funds. Thus, on the supply side, deposit growth should be a significant driver of credit growth. This study took the advantage of this variable to detect the impact of deposit flows on bank lending supply capacity. In the literature, the relationship between deposits and bank lending could be seen (Awdeh, 2017; Ivanovic, 2016; Frömmel and Mıdılıc, 2016; Allen *et al*., 2017; Antoshin *et al*., 2017; Egert *et al*., 2006).

NPLs ratio - represents a proxy for the loan quality. An increase in NPLs encourages banks to reconsider their long-term strategies concerning their assets. The relationship between NPL and credit growth is investigated in some papers such as Salas and Saurina, 2002; Kraft and Jankov, 2005; Koong *et al*., 2017; Erdinç and Abazi, 2014). Rapid credit growth enhances bank fragility and serves as a precursor to a severe deterioration in the quality of loan portfolios (Erdinç and Abazi, 2014).

Return on equity – a measure of banks` profitability. Normally, one would expect high rates of credit growth to be associated with higher profitability. Higher profitability would increase the incentive for banks to extend credit. There would also be reverse causality linking higher profitability to higher private sector credit growth since lending has a higher expected return than safer investments, so higher private sector credit growth would, on average, result in higher profitability (Crowley, 2008). Banks are more capable to perform their lending activities with better profitability. Here, a positive correlation between bank profitability and credit growth is anticipated. ROE has been chosen. It has been decided to choose ROE due to the observed increase in the equity capital of banks in the global market and higher capital requirements for banks. It is the fact that many of the bank's operations are off-balance sheet rather than on-balance sheet (Drozdowska and Witkowski, 2016). While Allen *et al*. (2017), Antoshin *et al*. (2017), Rappoport (2016) found significant relationships among bank lending and profitability, Awdeh (2017) however, could not relate them.

GDP growth reflects the direction of economic progress. By and large, credit plays a significant role in promoting economic growth through the credit channel (Koong *et al*., 2017). Promising economic growth enhances the income of households and other businesses. Favorable market activity encourages lending, then borrowers have sufficient reserves to facilitate their debts. Almost all studies (Miyajima, 2017; Cucinelli, 2015; Tomak, 2013; Shingjergji and Hyseni, 2015; Djiogap and Ngomsi, 2012) found a significant relationship between economic growth and bank lending. A positive effect of credit on growth after attaining a certain level of credit is suggested (Jakubik and Moinescu, 2015; Drozdowska and Witkowski, 2016).

4.2. Methodology

Modeling credit growth and stability of the banking system are determinants of certain selected macroeconomic indicators as well as internal banking factors. The research is based on research plans and procedures, as well as on the collection and analysis of data (Creswell, 2009). Therefore, empirical research is based on the application of regression analysis that examines the relationships and tests the hypotheses set by the F- test between dependent and independent variables.

Credit growth in this study is measured as the quarterly percentage change in total loans compared to the previous period. The dependent variable is included in the model in the context of enabling credit growth and distance from non-execution. Macroeconomic variables affect the demand for credit growth and determine the effects on the stability of the banking system.

According to Dell' Ariccia *et al*. (2005) and Neir and Zicchino (2006) determining the rate of credit placements and reflecting the credit growth function on the supply side are surely decisive for the bank. Similarly, according to Maechler *et al.* (2010), the measures of profitability of the bank, the liquidity of the bank, the size of the bank and the ownership of the bank represent significant variables of credit growth (De Nicoló, G. *et al.*, 2005). The basic regression model specification for all observed countries can be expressed as follows:

$$CGR = \beta_0 + \beta_1 GRNPL_t + \beta_2 GRROE_t + \beta_3 GRTD_t + \beta_4 RGRGDP_t + U_t \qquad (1)$$

The significance of the model will be carried out by the calculation of the coefficient of correlation (r), the coefficient of determination R^2 and the adjusted coefficient of determination ($\bar{R}^2$). The following hypotheses will be tested:

I) Independent variables do not significantly affect the dependent ones.
II) Independent variables significantly affect the dependent ones.

Also, we will test the strength and effects of all independent variables to the dependent variables with on the ANOVA test.

4.3. Results

Before hypotheses are tested, basic statistic indicators, correlations and VIF values are given in Tables 4, 5 and 6.

Table 4. Basic statistics of dependent and independent variables for the banking sector of all observed countries for the period: 2007 q1 – 2017 q2

Turkey				
Variables	**Mean**	**Std. Dev.**	**Min**	**Max**
CGR	105.32	2.99	99.17	112.01
GRNPL	107.17	10.73	87.29	139.14
GRROE	11.51	6.19	3.01	26.63
GRTD	104.00	2.51	97.92	109.53
RGRGDP	102.28	13.16	75.59	120.33
Serbia				
Variables	**Mean**	**Std. Dev.**	**Min**	**Max**
CGR	3.583	5.436	-3.697	23.544
GRNPL	16.821	5.692	4.37	23.01
GRROE	6.311	3.420	-0.350	14.68
GRTD	3.672	6.450	-6.612	36.498
RGRGDP	1.360	3.061	-4.665	9.016
Bosnia and Herzegovina				
Variables	**Mean**	**Std. Dev.**	**Min**	**Max**
CGR	101.63	2.370	97.581	108.093
GRNPL	10.121	4.509	2.968	16.079
GRROE	5.081	4.290	-5.491	13.557
GRTD	101.631	3.426	94.948	113.024
RGRGDP	0.570	5.372	-20.06	17.78
Croatia				
Variables	Mean	Std. Dev.	Min	Max
CGR	0.752	2.111	-3.044	5.63
GRNPL	11.495	4.434	4.8	17.1
GRROE	8.176	5.501	-10.9	16.4
GRTD	0.883	3.003	-2.892	11.838
RGRGDP	0.178	3.465	-8.6	6.8

Source: own representation (STATA 13.0)

The volatility observation measured by standard deviation clearly shows that Bosnia and Herzegovina (5.37%) and Turkey (13.16%) had the most volatile trend in terms of changes in the value of gross domestic product. The term "correlation" could be explained as the relationship between two or more variables for an observation in a specific era, region or limited period. In this regard, Table 5 is needed for checking the partial and semi-partial correlation of both dependent and independent variables of those countries.

Table 5. Partial and semi-partial correlation between independent and dependent variables of all observed countries for the period: 2007 q1 –2017q2

			Turkey		
Variables	**Partial Corr.**	**Semi-partial Corr.**	**Partial Cor. ^ 2**	**Semi-partial Corr. ^2**	**Significant Value**
GRNPL	-0.339	-0.239	0.115	0.057	0.035
GRROE	0.217	0.148	0.047	0.022	0.184
GRTD	0.713	0.674	0.508	0.454	0.001
RGRGDP	0.356	0.253	0.127	0.064	0.026
			Serbia		
Variables	**Partial Corr.**	**Semi-partial Corr.**	**Partial Cor. ^ 2**	**Semi-partial Corr. ^2**	**Significant Value**
GRNPL	-0.1701	-0.1007	0.0289	0.0101	0.3006
GRROE	0.4804	0.3195	0.2308	0.1021	0.0020
GRTD	0.5459	0.3800	0.2980	0.1444	0.0003
RGRGDP	0.1265	0.0744	0.0160	0.0055	0.4429
			Bosnia and Herzegovina		
Variables	**Partial Corr.**	**Semi-partial Corr.**	**Partial Cor. ^ 2**	**Semi-partial Corr. ^2**	**Significant Value**
GRNPL	-0.262	-0.154	0.068	0.023	0.107
GRROE	0.389	0.239	0.151	0.057	0.014
GRTD	0.748	0.641	0.560	0.411	0.000
RGRGDP	0.155	0.089	0.024	0.008	0.345
			Croatia		
Variables	**Partial Corr.**	**Semi-partial Corr.**	**Partial Cor. ^ 2**	**Semi-partial Corr. ^2**	**Significant Value**
GRNPL	-0.608	-0.512	0.371	0.262	0.000
GRROE	-0.087	-0.058	0.007	0.003	0.596
GRTD	0.169	0.114	0.028	0.013	0.303
RGRGDP	0.326	0.230	0.107	0.053	0.042

Source: own representation (STATA 13.0)

From the previous correlation matrix (in the case of banks in Bosnia and Herzegovina), it can be seen that the strongest positive credit growth as dependent variable has influenced the following independent variables: the growth rate of total deposits (0.748), secondly, the growth rate of return on equity (0.389) and then the real growth rate of gross domestic product (0.155). On the other hand, the weakest observed causality is expressed between the growth rate of loan and the growth rate of non-performing loans (-0.262), which is also logical. Actually, with the increase of non-performing loans, banks became more careful in the context of granting new

loans, selecting debtors and rigorous monitoring, reducing the volume of loan placements and increasing their reserves. The preceding VIF cut-offs were considered to be multi-collinear, and were set at industry level. Each variable that has a higher VIF than 3 was considered multi-collinear and was dropped from the model. In the case of multi-collinearity, the coefficients of the variables became unstable and standard errors were inflated.

Table 6. Multi-collinear analysis via variance inflation factor for all observed countries (VIF)

Turkey		
Variable	**VIF**	**1/VIF**
GRNPL	1.03	0.816
GRROE	1.22	0.818
GRTD	1.06	0.941
RGRGDP	1.23	0.816
Mean VIF	**1.13**	
Serbia		
Variable	**VIF**	**1/VIF**
GRNPL	3.00	0.3333
GRROE	2.11	0.4728
GRTD	1.37	0.7300
RGRGDP	1.86	0.5362
Mean VIF	**2.085**	
Bosnia and Herzegovina		
Variable	**VIF**	**1/VIF**
GRNPL	1.42	0.703
GRROE	1.13	0.885
GRTD	1.37	0.728
RGRGDP	1.03	0.967
Mean VIF	**1.24**	
Croatia		
Variable	**VIF**	**1/VIF**
GRNPL	2.04	0.491
GRROE	1.89	0.528
GRTD	1.12	0.889
RGRGDP	1.07	0.935
Mean VIF	**1.53**	

Source: own representation (STATA 13.0)

As it can be seen in the previous table, each individual independent variable for all observed countries has a VIF coefficient value lower than 3 or 3, but not higher than 3. It is clear that there is no multi-collinearity between the variables, so the set model is valid.

Results of the Anova test for Turkey, Croatia, Bosnia and Herzegovina and Serbia

Table 7. Bosnia and Herzegovina - the basic model of regression analysis (ANOVA test) between the independent and dependent variables for the period 2007q1 – 2017 q2

Source	SS	df	MS
Model	156.086	5	39.021
Residual	74.272	36	2.007
Total	**230.358**	**41**	**41.028**
Number of observations	41		
F (5,36)	19.44		
Prob >F	0.00		
R-squared	0.677		
Adj R-squared	0.643		
Root MSE	1.416		

Variables	Coef.	Std. Err.	t	P>[t]	[95% Conf. Interval]	
GRNPL	-0.096	0.058	-1.65	0.108	-0.215	0.022
GRROE	0.141	0.054	2.57	0.014	0.0297	0.2518
GRTD	0.519	0.075	6.87	0.000	0.3662	0.6728
RGRGDP	0.040	0.041	0.96	0.345	-0.0447	0.1249
_cons	49.066	8.010	6.13	0.000	32.835	65.297

Source: own representation (STATA 13.0)

Based on the results of regression analysis, the coefficient of determination is R^2=67%, while the adjusted coefficient of determination is $\overline{R}^2$=0.64, which means that there was 64% change from the independent variables to the dependent ones. Testing the null hypothesis of significance obtained statistically significant data which indicated that there was a significant influence of certain independent variables at a significant level of α=5% and the empirical F-ratio is 19.44. As for this study, the value of the empirical F-ratio (19.44) is greater than the theoretical value of F-ratio (2.48) for the 5-degree of freedom in the numerator and 36 in the denominator. In that case, we are allowed to reject the null hypothesis that the independent variables do not have a significant impact on the dependent variable.

The previous table illustrates that there is a positive relationship between the credit growth rate and the following independent variables: the real growth rate of the gross domestic product (0.040) and the growth rate of total deposit (0.519) and growth rate of return on equity (0.141). The increase in the growth rate of real gross domestic product by one unit leads the other factor to remain a constant increase of credit growth rate by 0.040 units. The greater exposure of banks' credit risk may lead to lower profitability due to the higher probability of the uncollected amounts owed

by bank customers. The positive relationship between return on equity and credit growth of banks in Bosnia and Herzegovina could be explained by the fact that the 5 largest banks mostly have a stable profitability but are significantly lower than it was before the recession, which was followed by secure placements. However, generally bigger banks have bigger capital multipliers, i.e., they use less capital to increase credit placements. Eventually, smaller banks have larger amounts of capital because of excessive self-transformation due to the inability to go on the required fund.

The banks in Bosnia and Herzegovina have had a volatile trend in terms of return on assets and return on equity in proportion to the movement of gross domestic product. The illustrations for the bank in BH have recorded a negative value of ROE in 2010 as a result of increased costs and increased deductions from current revenues. The positive correlation between credit growth and economic growth can be explained by increasing economic activity (accompanied by GDP growth) leading to an increase in banking assets (mainly foreign), which, under the circumstances implied by the oligopolistic position of the banks take on higher credit risk in order to achieve higher profit.

Likewise, the positive correlation between credit growth and the growth rate of the total deposits can be explained by the fact that there are no alternative forms of investment, so all the savings of the household sector and the real sector are directed to the banks due to the underdevelopment of the domestic capital market (The Central Bank of Bosnia and Herzegovina, 2017, p. 58).

Table 8. Serbia - the basic model of regression analysis (ANOVA test) between the independent and dependent variable for the period 2007q1 – 2017 q2

Number of observations	**41**		
F (5,36)	17.94		
Prob >F	0.000		
R-squared	0.659		
Root MSE	3.337		
Source	**SS**	**Df**	**MS**
Model	799.448	5	199.86
Residual	412.183	36	11.140
Total	**1.211,671**	**41**	**211**

Variables	**Coef.**	**Std. Err.**	**t**	**P>[t]**	**[95% Conf . Interval]**	
GRNPL	-0.168	0.160	1.05	0.301	-0.492	0.156
GRROE	0.738	0.221	3.33	0.002	0.289	1.187
GRTD	0.374	0.094	3.96	0.000	0.183	0.566
RGRGDP	0.180	0.232	0.78	0.443	0.651	0.291
_cons	0.622	3.892	0.16	0.874	-7.264	8.509

Source: own representation (STATA 13.0)

The credit policy of banks in Serbia in 2017 was relaxed for small and medium enterprises in terms of credit standards. The mitigation of credit standards was influenced by factors such as interest rate reductions which contributed to the increase in rivalry between banks and the fall of premium country risk. The table above shows the results of basic regression model between independent and dependent variables. In order to test the set hypothesis through the relationship between the empirical and theoretical F test, the results indicate that the value of the empirical F test is greater (17.94) than the value of the theoretical test (2.48). This leads to the conclusion that independent variables have an impact on credit growth. The determination coefficient is 0.66% and the adjusted one was 0.62. This means that this model described 62% of the variations, so the independent variables make the model relatively representative.

Referring to the previous table, the strongest positive relationship with the credit growth rate was achieved by the following variables: the growth rate of return on equity (0.738), the growth rate of total deposits (0.374) and the real growth rate of gross domestic product (0.180). The growth rate of gross domestic product includes the period of growth and fall in the business cycle. In this regard, it affects the profitability of commercial banks in different economic conditions in different countries.

In Serbia and other Western Balkan countries, during the period of crisis, a slight downward trend in economic growth was observed. The decline in economic activity led to a decline in profitability indicators, i.e., ROE and ROA.

In the post-crisis period, there is a recovery in economic activity, which also leads to a slight stabilization of the profitability of banks. It is important to note that commercial banks in Serbia have high reserves of liquid assets, which positively affects the stability of the banking sector. However, it can also represent a limiting factor for credit activity. Therefore, a high share of liquid assets in addition to lower risk is also characterized by a lower return on this type of asset (The National Bank of Serbia, 2017, p.52). Apart from these, the strongest negative link was recorded between the credit growth rate and the growth rate of non-performing loans (-0.168). Thus, an increase of the growth rate of non-performing assets by one unit leads the other factor to remain a constant decrease of the credit growth rate of 0.168 units according to the total assets. The largest share of non-performing loans -primarily in the construction sector- in the Republic of Serbia was recorded in the real sector in 2016 with about 31% (The National Bank of Serbia, 2016). The share of non-performing loans decreased to 4.6% in the same period of the previous year. In addition to this, the calculated reserves for estimating losses decreased due to the high value of write-offs. The relationship between economic activity and the lending policy of banks in Serbia in the forthcoming period should be harmonized with the policy of economic growth (GDP fall or growth) in order to maintain the lending to the economy and free credit resources at the right time.

Table 9. Turkey - the basic model of regression analysis (ANOVA test) between the independent and dependent variable for the period 2007q1 – 2017 q2

Number of observations	**41**		
F (5,36)	11.80		
Prob >F	0.000		
R-squared	0.560		
Adj R-squared	0.513		
Root MSE	2.087		
Source	**SS**	**df**	**MS**
Model	205.66	5	51.41
Residual	161.28	36	4.36
Total	**366.94**	**41**	**55.77**

Variables	Coef.	Std. Err.	t	P>[t]	[95% Conf . Interval]	
GRNPL	-0.067	0.031	-2.19	0.035	-0.1298	-0.0050
GRROE	0.078	0.058	1.35	0.184	0.1968	0.0391
GRTD	0.827	0.134	6.18	0.000	0.5566	1.0991
RGRGDP	0.064	0.027	2.32	0.026	0.0081	0.1193
_cons	20.838	15.131	1.38	0.177	-9.8206	51.497

Source: own representation (STATA 13.0)

Based on the results of regression analysis, the determination coefficient is R^2=56%, while the adjusted one is $\overline{R}^2$=0.51. That means there is a 51% of change for the independent and dependent variables relation. As for this study, the value of the empirical F-ratio (11.80) is greater than the theoretical value of F-ratio (2.48) for the 5-degree of freedom in the numerator and 36 in the denominator. In the light of these facts, a null hypothesis is rejected as independent variables do have a significant impact on the dependent variables. In Turkey, both restructured bank credit and the rise of revenues cause low NPLs. Applied economy and promotion policies in Turkey are an effect of bank profitability (The National Bank of Turkey, 2017). Results in Turkey were similar to those of Serbia and Bosnia Herzegovina. So, profitability of equity and total deposit had a positive effect on credit growth. But, NPLs had a negative effect on credit growth.

As in the other countries, in Turkey, credit growth has been increasing exponentially depending on economic activities. NPL values can change according to currency unit and lenders. As known, asset management companies buy NPL from banks. Asset management companies have an effect on decreasing NPLs. There is a mechanism called credit guarantee fund that has been initiated in Turkey for the last couple of years. It has some role on this issue (The National Bank of Turkey, 2017).

Table 10. Croatia - the basic model of regression analysis (ANOVA test) between the independent and dependent variable for the period 2007q1 – 2017 q2

Number of observations	**41**
F (5,36)	11.53
Prob >F	0.000
R-squared	0.554
Adj R-squared	0.506
Root MSE	1.482

Source	SS	Df	MS
Model	101.38	5	25.346
Residual	81.309	36	2.197
Total	**182.689**	**41**	**27.543**

Variables	**Coef.**	**Std. Err.**	**t**	**P>[t]**	**[95% Conf . Interval]**	
GRNPL	-0.347	0.074	-4.67	0.000	-0.498	-0.196
GRROE	-0.031	0.057	-0.53	0.596	-0.148	0.086
GRTD	0.085	0.081	1.04	0.303	-0.080	0.251
RGRGDP	0.145	0.069	2.10	0.043	0.005	0.285
_cons	4.902	1.265	3.87	0.000	2.337	7.467

Source: own representation (STATA 13.0)

Credit growth in Croatia was permanent until the beginning of 2009, when the global crises occurred. Credit growth was primarily determined by factors such as privatization and remediation and foreign banks entry, the liberalization of capital flows, the growth of rivalry in the banking market, the growth in domestic demand, the gradual decline in interest rates and insignificant macroeconomic stability (Ljubaj, 2012). The driver of credit growth in Croatia was the household sector rather than the private sector to a large extent, because the companies besides loans extended their financing by foreign funds (Croatian National Bank, 2015).

The strongest positive relationship was recorded between the growth rate of gross domestic product and credit growth (0.145) and the growth rate of total deposits and the credit growth rate (0.085). The basis for credit growth is certainly deposits that in the last years in the banking sector of Croatia were substituted by domestic funds in the largest volume of demand deposits. There was a fall in time deposits due to the reduction of deposit interest rates on the one hand and the tax effect on the other. The weakest link on the other side was recorded between the credit growth rate and the return on asset (-0.031) and the growth rates of non-performing loans (-0.347). Profitability and other indicators of the banking sector of Croatia for the observed period had a volatile and even negative trend due to the problem of negative selection, which further led to high costs of write-off and provisioning (Croatian National Bank, 2017).

According to the results of the basic regression model, the empirical value of the F test (in the case of Croatia) is 11.53 and it is greater than the theoretical value which is 2.48. These numbers are available for 5 degrees of freedom in the numeration and 36 in the denomination. Therefore, it can be said that, since independent variables have an effect on the movement of credit growth rate, the alternative hypothesis is accepted and the null hypothesis rejected. The determination coefficient is 0.55% and the adjusted one is 0.51. This means that this model describes 51% of the variations, so the independent variables make the model relatively representative.

Conclusions

The credit growth rate generally shows the stability of financial markets in a country. It is also one of the most evident criteria used to measure and see the economic development performance and investment capacity of the states. There are a lot of variables affecting credit growth both in macro and micro dimensions. One of the variables is the NPLs.

In this study, endogenous and exogenous factors that affect the credit growth rate were tested. Especially, the NPL's growth is used as an endogenous variable. In addition to the NPLs, deposit growth rate and the growth rate of return on equity were used as endogenous variables. The real growth rate of gross domestic product is used as exogenous variable. For this purpose, investigation was carried out for Bosnia Herzegovina, Turkey, Serbia and Croatia due to their common characteristics for the period 2007: Q1 -2017Q2. It has been done through the basic regression model, null and alternative hypothesis testing by empirical and theoretical F test. The results showed that a zero hypothesis was rejected and that an alternative hypothesis accepted since some independent variables have a significant influence on the credit growth rate. In other words, the growth of the NPL's in the countries affect the credit growth rates negatively. These results are the same for all countries. In the literature, some papers observed a negative relationship between NPLs and bank lending (Awdeh 2017; Shingjergj and Hyseni 2015; Rabab'ah 2015; Ivanovic, 2016).

Except Croatia, ROE variables have a positive effect on credit growth in all countries. The more the profitability of the banks rises, the more bank credit growth rises. Allen *et al*. (2017), Antoshin *et al*. (2017) and Rappoport (2016) have found significant relationships between bank credits and profitability. Deposit growth as another variable has a positive effect on credit growth in all countries. This was the expected result; if deposit growth rises in a country, the credit growth also rises and it is in line with the literature. On the other hand, in terms of economic growth, the last variable - GDP has a positive effect on credit growth in all examined countries. In the literature, a statistically significant relationship between GDP and bank credit is found as well.

Through the survey of the countries, the results showed a relatively low and uneven lending activity as a determinant credit risk over the crisis period and consequently the refusal of banks to approve loans in order to preserve bank profitability and the high price of capital. Therefore, credit risk as a systematic risk measure cannot be completely reduced. Nevertheless, banks need to strengthen their capacity in terms of better monitoring, more detailed asset classification, more careful selection of debtors, and the development of problem in loan markets. The level of credit risk in the banking sector in the forthcoming period will also be under the indirect impact of interest rate risk in the household and non-financial private corporate sector. Also, in the upcoming period, bank managers will have to reconsider their lending strategies in terms of certain reversals, and from the real sector, offering long-term and high quality projects in terms of maintaining bank placements. New research by the authors on the given subject can certainly be expanded depending on the availability of the database and the longer time series. Therefore, the use of appropriate variables could provide the basis for a better analysis.

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