Bank credit to the private sector: VECM approach for Albania

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Abstract. This study evaluates the determinants of bank credit to the private sector in Albania from 2000 to 2017 using a Vector Error Correction Model which includes both demand and supply-side factors. We perform Augmented Dickey Fuller Test, Phillips-Perron test and Johansen cointegration test to ensure the stationarity and long-run relation between explanatory variables. The results show that credit to the private sector is positively related to economic growth. A higher lending rate will decrease the bank credit to the private sector. Further, the decrease of non-performing loans and domestic government debt will increase the funds available for the private sector. The negative sign of error correction term and the diagnostic tests for autocorrelation, normality and ARCH effects ensure that our model is properly defined.

Keywords. Bank credit, Vector error eorrection, Albania.
JEL. C32, C53, E44, G21.

1. Introduction

Lending is a crucial function of a banking system of a country in order to supply and fulfill the needs for credit of the private sector. The vast majority of the papers define the determinants of the credit growth and the equilibrium level such as Kiss *et al.,* (2006) or Égert *et al.,* (2006) Existing literature on credit to the private sector focus on demand-side or supply-side, but the studies which consider both seem to be scant so far. However, there is no agreement still among economists if the factors affect the demand or the supply side. Calza *et al.,* (2003) states that this is due informational asymmetries between lenders and borrowers. Other studies consider a panel of countries defining if the states are below, above or close to the equilibrium level. Nevertheless, the economists have reached to certain agreement that the growth of credit in Central and Eastern European Countries has seen a "pervasive development". Albulescu (2009) Indeed, credit growth is tough to deal with because of the heterogenous features of the country which might induce the impact on the demand and the supply of the credit. Zdzienicka (2009) states that this difficulty comes from the non-ability to quantify a level, in which beyond, the increase is considered "excessive". Brzoza-Brzezina (2005) considered financial liberalization index, Cottarelli *et al.,* (2005) entry restrictions and German

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origin of legal system or other exogenous factors such as privatization, liberalization and competition Clarke (2003), De Haas & Van Lelyveld (2006), Aydin *et al.,* (2008). Moreover, due to the structural changes in the past, in some countries is difficult to find data on certain variables that might influence the credit to the private sector such as the survey that Central Bank of Albania has started since 2010 on the financial situation of the households and enterprises. Another research topic discussed among academics is the equilibrium level of credit to the private sector. On one hand, when the credit growth increases, is an indicator that that the banking sector is improved. On the other hand, an excessive credit to the private sector, can collapse the banking system of a country. Kiss *et al.,* (2006) The main concern among researchers now days should not be if the credit growth is beyond or above the level, but if this current growth fits to the nature of the economy. Despite the financial and economic ties among countries, there are endogenous factors which are related to a macro-stabilization process that might influence growth (Albulescu, 2009). For instance, supply side can be used when the inflation is strong, or the central bank is losing its foreign reserves or when the economy is weak. Johnson (2018) Hence, it is strongly advisable to develop studies which focus particularly on a country rather than a set of countries. We follow the work of Calza *et al.,* (2003) in order to define a model which includes factors from both demand-side and supply-side. We extended it including non-performing loans based on McGuire & Tarashev (2008) and we add domestic government debt as Cottarelli *et al.,* (2005). VEC results indicate that there is one cointegrated equation which gives evidence to the long-run relation between the dependent variable and the explanatory variables. The speed of adjustment is negative and together with the variables are highly significant which support our estimation. The paper is structured as follows. Section 2 gives some insight of the credit growth in Albania. Section 3 is dedicated to the literature review. Section 4 presents the methodology, estimation and results. Section 5 draws some concluding remarks.

2. Credit growth in Albania: Stylized facts

Banking system in Albania has undergone significant structural changes in these 20 years such as the crisis and the civil war of 1997-1998 and the shift from direct to indirect monetary policy instruments. Albanian banking system is composed of 13 banks with domestic and foreign capital, 31 non-bank financial institutions, 14 savings and loan associations and 1 union. [1]Banks with foreign capital count around 78 % of the share of the total assets of the banking sector [2] while banks with Albanian capital 22 % of the total assets of the banking sector.

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Table 1. *Financial System in Albania: Weight of Assets to GDP (%*

Licencing and supervising authority	Financial system	2011	2012	2013	2014	2015	2016	2017	2018
	Banking Sector	88.1	92.1	94.8	97.6	97.3	100.5	99.4	96.8
Bank of Albania	Non-bankInstitutions	2.7	2.7	2.7	3.0	2.9	3.0	3.1	3.3
	SLAs and theirUnions	0.8	0.8	0.7	0.8	0.8	0.6	0.6	0.6
Albanian Financial	Insurance Companies	1.5	1.6	1.7	1.9	2.1	2.1	2.1	2.2
Supervision	Pension Funds	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Authority	Investment Funds		1.2	3.9	4.8	5.0	4.7	5.0	4.5
Financial Intermediation		93.1	98.6	103.8	108.2	108.0	111.0	110.3	107.6

Source: Central Bank of Albania.

The ratio of assets to GDP of the financial system for 2018 is 107.6 %. At the end of 2018, the share of banking sector assets to GDP was 96.8 %. The share of non-banking institutions assets increased slightly whereas the share of investment funds decreased 0.5 %. The performance of banking and non-banking sector is defined as "stable". The indicators of performance such as capitalization, profitability, liquidity and assets quality are in good levels. Non-performing loans decreased at 11.08 % as percentage to total loans compared to 13.23 % in the previous year. This reduction was due to loan repayments, write off of lost loans and the reclassification of non-performing loans because of restructuring. Deposits cover almost 81 % of liabilities as the main source of funding for the banking activity, by covering almost twice the volume of the loans of the banking system. Liquidity risk is low and the ratio of liquid assets in domestic and foreign currency is beyond the minimum level. The exposure of the sector to the market risks, though not significant in the last few years is still present. Restructuring process increased the share of the banks with domestic capital in Albania. The quality of the credit is increased due to larger banks however is still low for enterprises, in foreign currency and for medium-term loans (BOA, 2018).

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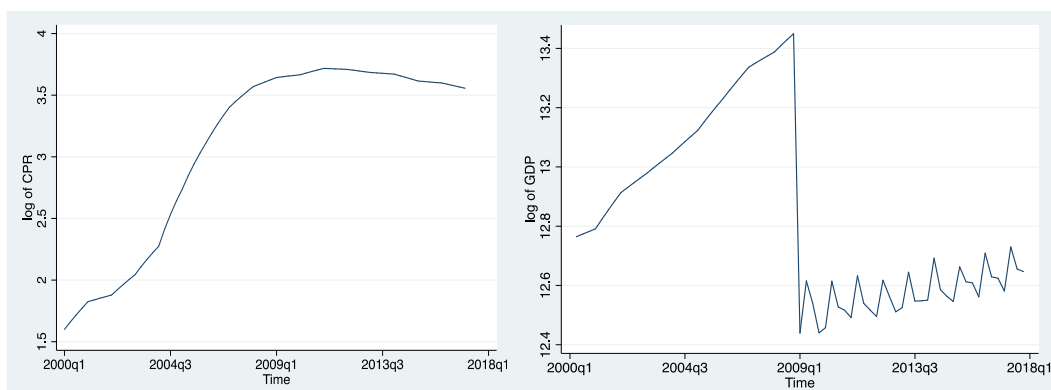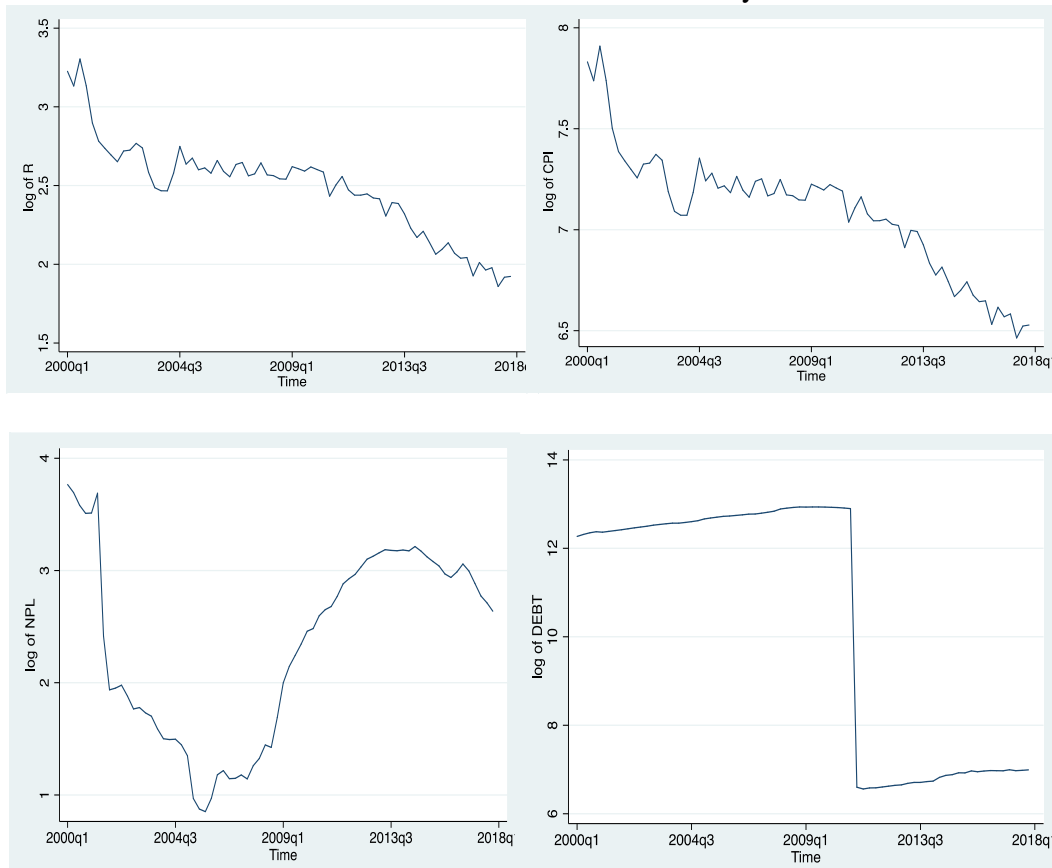
Graph 1. *Levels of the variables 2000-2017*

3. Literature review

Hofmann (2001) using time series and panel data techniques estimates the interaction between the bank lending and property prices in a sample of 20 countries. The findings give evidence of a causality in both short and long-run indicating that property prices reflect economic expectations and drive credit cycles. Calza *et al.*, (2001) used a vector Error Correction Model to define the determinants of loans to the private sector in euro area. The results indicate that real loans are positively related to GDP and negatively to real interest rate.

Calza *et al.*, (2003) studies the behavior of the euro aggregate loans to the private sector for the past 20 years using a Vector Error Correction Model. A (semi) log-linear model is used to express the loans to the private sector as a function of domestic macroeconomic variables such as GDP, inflation and the cost of loans which is composed as a weighted average of bank lending rates. Following an approach similar to Hamilton & Kim (2002) the authors consider the information content on future inflation. Cottarelli *et al.*, (2005) estimates the relation between credit to the private sector and a set of economic and institutional variables linked to financial liberalization, accounting standards, entry restrictions in the banking sector and the origin of legal system while public debt is included to capture the "crowding-out effect". The study includes a set of countries from Central and Eastern Europe and the Balkans and the results show a positive impact

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of liberalization and transparency in accounting standards and negative impact of public debt.

Égert *et al.,* (2006) analyzes the equilibrium level of private credit in 11 Central and Eastern European countries using fixed effect OLS, panel dynamic OLS and the mean group estimator for 43 countries; the results obtained from an out-of-sample panel for OECD economies are used to define the equilibrium level for a panel of transition countries. The findings define that a number of countries are close or above the equilibrium level whilst others below the level and there is a high level of uncertainty when determining the equilibrium level of private credit.

Albulescu (2009) estimates the future evolution of credit developments in Romania. Based on a stochastic stimulation econometric model and on credit growth rate endogenous factors, the author shows that the Romanian economy passed from a credit boom to a severe credit crunch.

Guo & Stepanayan (2011) try to determine the factors of demand-side and supply-side of credit growth focusing on 38 emerging market economies. The authors found that domestic deposits and non-resident liabilities contribute positively to credit growth. In the existing literature for Albania, Vika (2009) investigates the determinants of credit to the private sector in domestic currency. The findings indicate for a negative correlation with REPO, bank size and the interaction term of monetary policy and size. Positive relation is evident for NEER, GDP, liquidity of the banking system and the interaction term among the monetary policy indicator and the liquidity.

Kalluci (2012) defines an equilibrium level for the lending in Albania, starting from a benchmark of 52 countries. The results show that when developed countries are used as benchmark, the gap between actual and potential lending is higher.

Suljoti & Hashorva (2012) show a bidirectional impact of house prices and mortgage loans from 1998 to 2010. Also, mortgage loans are related positively to income, but negatively to interest rates.

Note & Suljoti (2012) define the determinants of credit growth for a panel of 10 SEE countries. They suggest that lending in these countries is negatively affected by NPLs and interest rates while economic growth, deposits and foreign borrowings had a positive impact.

Shijaku & Kalluci (2014) determines the long run factors of bank credit to the private sector employing a VECM approach. The results show that lending is positively correlated to economic growth while the decrease of lending cost and domestic borrowing will increase the lending initiatives.

Tanku *et al.,* (2017) focus on the credit efficiency in Albania, as an application of Kernel density using pooled and panel data set. The authors investigate if the allocation of banks credit portfolio reflects the performance of credit portfolio, the expansion of sectoral developments and the banks characteristics and the results give evidence of an inefficiency to credit allocation due to general bank's initiatives.

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It is apparent from the existing literature: Firstly, the vast majority of the papers capture the impact of a set of variables on bank credit to the private sector in a panel of countries. Secondly, there is no study using current data on this topic for Albania. We contribute to the existing literature by estimating a model using current data from 2000 to 2017.

4. Methodology, estimation and results

4.1. Data

This study covers quarterly data from 2000 to 2017. Data on bank credit to the private sector, lending rate (in domestic currency) and non-performing loans are taken from the Central Bank of Albania; gross domestic product and consumer price index from INSTAT and domestic government debt from Ministry of Finance. We use quarterly data to avoid the noise in our estimation.

Table 2. *Descriptive statistics*

Variable	Mean	Std. Dev
CPR	-1.50868	.7395479
GDP	12.83575	.3085447
R	-2.119665	.3073605
CPI	1.026198	.1369879
NPL	-2.262839	.8442467
DEBT	10.38862	2.883731

Source: Author's Calculation

4.2. Estimation and results

Error correction model is appropriate for the estimation of time series and can give information for both short-run and long-run. The main condition to be satisfied is at least one main cointegration equation among variables. Engel & Granger (1987) General formula for the short-run VECM model is above:

$$\Delta LCPR = \beta_0 + \lambda_1 ECM^1_{t-1} + \sum_{l=1}^{m} \beta_{11} LGDP_{t-1} + \sum_{l=1}^{m} \beta_{12} LR_{t-1} +$$

$$\sum_{l=1}^{m} \beta_{13} LCPI_{t-1} \ \sum_{l=1}^{m} \beta_{14} LNPL_{t-1} + \sum_{l=1}^{m} LDEBT \beta_{15} + \varepsilon_{1t} \tag{1}$$

Where Δ represents the first difference operator, ECM_{t-1} is the error correction model term satisfying the condition (-1<ECM <0) and ε_{1t} represents the noise. where CPR denotes credit to the private sector as a percentage to GDP, GDP_t is Gross Domestic Product[3], R represents the lending rate in domestic currency , CPI stands for Consumers Price Index (CPI), NPL denotes non-performing loans as percentage of GDP whilst DEBT stands for domestic government debt. Considering the work of Calza *et al.,* (2003) we build a model assuming that the credit to the private sector is a function of a set of explanatory variables both from demand and supply-side as followed:

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$$CPR_t = \beta_0 + \beta_1 \cdot GDP_t + \beta_2 \cdot R_t + \beta_3 \cdot CPI_t + \beta_4 \cdot NPL_t + \beta_5 \cdot DEBT \qquad (2)$$

Following McGuire & Tarashev (2008) we add in our model non-performing loans as a percentage to gross loans. Economic agents/firms demand loan for liquidity or working capital needs. Bernake & Blinder (1988) Consistent with the work of Cottarelli *et al.,* (2005) we add domestic government debt as an explanatory variable.

Using Gross Domestic Product as an explanatory variable is a measure of the overall performance of a country (Shijaku & Kalluci, 2014). The increase of economic growth can reflect the increase of the confidence for the economic agents of the economy; the expectations of the private sector for the incomes and the profits will increase meaning a lower level of debt[4] (Kiss *et al.,* 2006). An increase of economic growth will improve the banking sector as the banks are willing to lend more (Albulescu, 2009). Therefore, we expect a positive sign for Gross Domestic Product.

As the lending rate represents the cost of the funds, we expect a negative sign in our long-run model.

As for the sign of inflation, we cannot define it prior to the estimation. Academics share different views on inflation. When the inflation is high, we expect a depreciation of the worthiness of the money which will reduce the bank credit to the private sectors. Cuthbertson (1985) states that high inflation can increase the uncertainty about the future and discourage investments therefore decreasing the demand for credit. On the other hand, a positive relation increases the incentives of households and firms to demand more credit. However, when the bank lending rates are sticky relative to changes in price, decreases (increases) in inflation may increase (decrease) investors incentives for investment given the changing expectations of lending rate (Howells, 1999).

Following the work of McGuire & Tarashev (2008) we expect a negative sign of non-performing loans; if the non-performing loans increase the banks would have less funds to lend. We expect the sign of government domestic debt to have a negative sign as the increase of government debt will decrease the lending to the private sector. Cottarelli *et al.,* (2005) found that the stock of the public debt is more appropriate than other variables of government flows.

4.2.1 Unit Root Test

We perform Augmented Dickey-Fuller Test and Phillips-Perron Test to ensure the stationarity of the explanatory variables. If the variables are not stationary at levels, we perform the tests in the first difference. Perron (1989), Granger & Newbold (1974) state that this should be done to ensure that there is no correlation among variables.

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Table 3. *ADF and PP test for Unit Root*

Variable	ADF				PP			
	I(0)	Prob.	I(1)	Prob.	I(0)	Prob.	I(1)	Prob.
LCPR	5.554	(2.384***)	1.418	(1.295*)	2.283	(10.200)	7.300	(5.300***)
LGDP	1.440	(1.295*)	10.324	(2.612***)	5.658	(10.820)	84.025	(13.052 ***)
LR	1.686	(1.667 **)	8.860	(2.382 ***)	3.131	(10.826)	69.560	(19.260***)
LCPI	1.206	(1.294)	10.972	(2.382***)	10.511	(17.094)	65.255	(19.260***)
LNPL	1.686	(2.592)	6.070	(2.382 ***)	4.059	(10.826)	47.270	(13.060 ***)
LDEBT	1.037	(1.610)	8.258	(2.382 ***)	1.982	(10.826)	69.476	(19.260***)

Source: Author's Calculations.

Notes: *, **, *** refer to 1 %, 5 % and 10 % level of significance.

4.2.2. Lag order selection criteria

Before we estimate our VEC model we have to define the number of optimal lags.

The decision for the selection of the optimal lags is based on Likelihood Ratio Criterion, Final Prediction Error Criterion, Akaike Information Criterion, Final Prediction Error Criterion and Hannan-Quinn Information Criterion shows that the number of lags for our model is 2(two) lags.[5]

Table 4. *Lag Selection Criteria*

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-32.1977				1.3e-07	1.15751	1.23616	1.35657
1	477.137	1018.7	36	0.000	7.6e-14	-13.186	-12.6354	-11.7925*
2	529.349	104.43*	36	0.000	4.8e-14*	-13.6773*	-12.6547*	-11.0895

Source: Author'sCalculations

4.2.3. Johansen co-integration test

Johansen co-integration test is useful to check if there is any presence of long-run equilibrium among variables and in the same time, is the starting point to estimate an unrestricted VAR. Engel & Granger (1987), Johansen (1988, 1990), Pesaran *et al.*, (2001). The tables below report the results for Trace test and Max-eigen value test that confirm the presence of co-integration at 5 % critical value.

Table 5. *Trace Test for Cointegration*

Max. rank	Parms	LL	Eigenvalue	Trace Statistics	5 % Critical Value
0	36	460.50541		137.6881	102.14
1	48	483.7841	0.50610	91.1307	76.07
2	58	504.62641	0.46825	49.4461	53.12

Source: Author's Calculations

Table 6. Max-eigen value Test for Cointegration

Max. rank	Parms	LL	Eigenvalue	Max Statistics	5 % Critical Value
0	36	460.50541	.	46.5574	40.30
1	48	483.7841	0.50610	41.6846	34.40
2	58	504.62641	0.46825	17.1152	28.14

Source: Author's Calculations

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4.3. Vector error correction model

VECM is appropriate as it gives information for both short and long run as it distinguishes between stationary and non-stationary variables. Onafowora & Owoye (1998) Results for the VECM model for the long-run in the table below show that the estimated coefficients are robust, statistically significant and with the expected signs. The coefficient for GDP has the expected positive sign and it is significant. This gives evidence that a higher level of GDP growth can increase the confidence of economic agents in the economy and increase the demand for credit.

Table 7. *Long-run Results for VECM*

Variable	Coefficient	Prob.
GDP	-.1720652	0.000***
R	1.31777	0.002***
CPI	-.849361	0.000***
NPL	.0227441	0.000***
DEBT	.3369863	0.000***
ECT_{t-1}	-.14	0.000***

Source: Author's Calculations
Notes: *, **, *** refer to 1 %, 5 % and 10 % level of significance

Similar to the work of Vika (2009) and Note & Suljoti (2012) we find a negative relation between bank lending and the cost of lending. An increase of the lending rate by 1 % will decrease the credit to the private sector by 1.31.

We find a positive relation between inflation and credit to the private sector, indicating that inflation will increase the demand of the private sector for credit. Private sector will require more funds to finance its capital and working capital.

Consistent with the work of McGuire & Tarashev (2008), Guo & Stepanayan (2011) the coefficient for the non-performing loans is negative and significant that means that when a banking sector is not healthy the credit to the private sector is reduced. The estimated coefficient indicates that bank credit would diminish by 0.02 in response to 1 % increase in non-performing loans.

For domestic government debt we found that bank credit to the private sector would increase by 0.336 in response to 1 % decrease in the stock of domestic public debt.

4.3.1. Diagnostic Tests

We perform Chow test to test if there is any structural break in our time series, and the results indicate that there is a structural break in the third quarter of 2007 and in the second quarter of 2008. We use Breusch- Godfrey serial correlation LM test to check if there is any presence of serial correlation in the residuals and we accept the null hypotheses that the residuals are not serially correlated. We perform Jarque-Bera test for normality and the results indicate the acceptance of the null hypothesis that all the variables come from a normal distribution. We test for ARCH effects and we accept the null hypothesis that there is presence of

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homoskedasticity. Lastly, we test for the stability of our VEC model and our model satisfies stability condition.[6]

Table 8. *Diagnostic Tests*

Diagnostic Test	Prob
Serial Correlation	0.4
Normality	0.3
Heteroskedasticity	0.81

Source: Author's Calculations

5. Concluding remarks

This paper estimates the determinants of bank credit to the private sector in Albania through a Vector Error Correction approach from 2000 to 2017 using quarterly data. We define the number of optimal lags, we transform the variables in their log form, and then we test for the stationarity of the variables using Augmented Dickey Fuller test and Phillips-Perron test. We take the first difference of the variables, to ensure the stationarity as not all the variables are stationary at levels. Then, we perform Johansen cointegration test which indicates that there is one cointegration equation among variables. As the condition of cointegration is satisfied, we estimate an Error Correction model. The results indicate that economic growth is positively related to credit to the private sector while lending rate, non-performing loans and domestic government debt decrease lending incentives. The relation between inflation and credit to the private sector is positive indicating that banks should take precautions not to increase the inflation with the credit that is being distributed. The error term is negative and highly significant. We advocate for policies which will decrease the level of non-performing loans and increase deposit incentives. Further, the improvement of financial intermediation will contribute to reduce the stock of government debt. However, in our research we did not capture the impact of the exchange rate and the lending in foreign currency, which is left for further research.

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Notes

[1] Central Bank of Albania. 27 June, 2019. [Retrieved from].

[2] A bank can be considered with foreign capital if the foreign capital counts more than 50 % of the capital paid to the bank , Central Bank of Albania. 27 June, 2019. [Retrieved from].

[3] Gross domestic product calculated based on Expenditures Method is available from 2008 in quarterly frequency while from 2000-2008 is available on yearly frequency. For the period, 2000-2008 the data is converted in quarterly using Linear Frequency Conversion

[4] (Bernake, 1995) have suggested that this relationship may also include a counter-cyclical component related to the desire by economic agents to smooth the impact of business cycles on their spending in consumption and investment.

[v] Schwartz Information Criterion (SBIC) indicates one lag. We estimate our VEC model with one lag but we fail to accept the null hypothesis for normality, serial correlation and ARCH effects. Furthermore, we do not satisfy the stability condition of our model. Therefore, following the other criteria the number of lags used is 2 lags.

[vi] The results for Chow test and for the stability condition of our VEC model indicating the graph of eigenvalues of the companion matrix are not shown for brevity purpose but are available upon request.

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