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Financial determinants of credit to the private sector

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Abstract

This article aims to empirically investigate the financial determinants of bank credit to the private sector by using a large data set, including 15 countries at Southeast and Central Europe over the period of 1994-2013. The study is focused only on finance, including 11 variables factors that may affect the dependent variable and the loan to the private sector. It was found that the bank deposits are a traditional source of credit creation which were presented to us as the most important and significant variables with a higher real interest rate constricting credits to the private sector, as well as a large concentration of banking providing monopolistic positions negatively affecting the loan.

Keywords: Credit to the private sector, deposits, real interest rate, bank's concentration

1. Introduction

The role of the credit for the economic growth has been discussed many times (see Goldsmith 1969, McKinnon 1973, King and Levine, 1993, Rousseau and Wachtel, 1998). Although it may be rigid to say that the literature has found common ground, it seems that most of the studies show that credit has a positive effect on growth.

The solution of the bank credit growth as an indicator of bank performance is justified by a large number of works of authors, emphasizing that the important role of credit has increased economic growth. Rajan & Zingales (1998), showed that US industries that were dependent on external financing, rose more than industries that were less dependent on these funds. A general interpretation of all findings is that, countries with a more developed financial system can grow more than those developing countries with distinctive deficiency in their development.

On the other hand, as discussed by several studies (e.g. Mendoza and Terrones, 2008, Obstfeld and Rogoff, 2010), a rapid growth of domestic credit supply could play a significant role in predicting subsequent financial or 'economic crises, while a deep decline in domestic credit in a recession can result in economic activity and financial instability. According to Mishkin (2010), the recent global recession of 2007 also reflected one type of asset price spur, which can be considered as a "credit-driven incentive."

Due to the crucial role of credit in the 'economic activity of a country, there is a growing empirical literature examining the determinants of domestic credit to the private sector, which may be demand-side or supply-side factors. Some studies consider both kinds of factors in the

same model, while others try to tell the differences of these separate models. Our goal in this study is to mention only the financial factors that are introduced in the model as explanatory variables and by presenting them as they are related to the credit of the private sector.

An empirical study of 38 countries (among those few countries in SEE) including the period before and after the financial crisis, came up with some results, that domestic deposits and liabilities to nonresidents contribute positively to the growth of credit to the private sector. A monetary unit of saving the bank from domestic or foreign sources led to the crediting of half unit credit flowing in the private sector. A GDP growth led to an increase demand for loans and as a result a higher loan, while a higher rate of interest for deposits implied a more restrictive monetary policy and consequently a lower credit (K.Guo & V.Stepanyan, 2011).

A study on factors that affect crediting to the private sector is conducted in Albania as well (G.Shijaku & I.Kalluci, 2013), for the period of 2001Q1 to 2011Q4. And as explanatory variables were revealed the; bad debts, deposits, loan interest rates and deposits, real effective exchange foreign currency, inflation, GDP growth, net wages and government domestic debt. From this study we get a conclusion that a higher level of GDP increased the confidence in the economic agents that they can pay for loans and as a result an increase in the demand for them. The growth in the bank deposits and generally the increase in the level of banking itermediation, caused a growth of bank crediting just as expected, where a 1% growth of deposits causes increase of 1.68% of loans to the private sector.

Another study regarding the bank credit factors (H.H.Pham, 2015) including data from a panel of 146 countries with different levels of development for the period of 1990-2013, finds out that bank deposits are not an important factor for the bank loans and in return the real interest rate is significant and its increased influences positively on the growth of the credit.

From the second half of the 90s, in the countries of Central and Eastern Europe as well as in Macedonia began the process of huge credit giving to the private sector. This wave of intensive growth of bank crediting over the years was interrupted by the global financial crisis in Macedonia although the loans still recorded growth but at slower pace, also the post-crisis period marking the slowest pace of growth of credit giving. Our study has in fact itself included 15 countries of Central and Eastern Europe, but we try to do a deeper analysis for Macedonia.

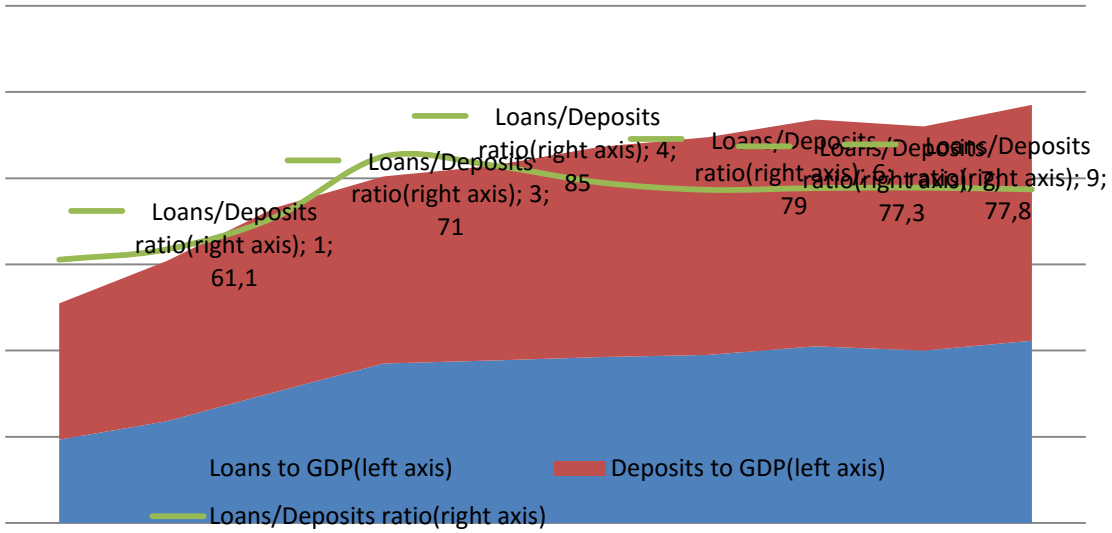
In Macedonia 3.6 billion Euro was the credit portfolio to the private sector in 2014, or 42% of the GDP, where the average growth for the past 6 years is 200 million Euros per year. On the other hand, deposits are at the level of 4.67 billion Euros, or 54% of the GDP, where during the recent years we have an average increase of deposits for 280-300 million Euros.

This paper is divided two parts; the first part of the paper deals with the theoretical aspect of the problem as its main focus and in the second part is presented the empirical model by presenting the findings and conclusions emerging from this model**.**

2. Theoretical Model

The banking credit, especially the one oriented towards the private sector, day by day is enormously being taken as an indicator of the bank performance. According to this claim, all the studies that measured the development of the banking sector and significant impact on macroeconomic factors, such as variables, receive bank loans. It is therefore important to define the main determinants of this indicator in the financial environment where this is operating.

Figure1: Loans, deposit, and Loans to Deposits radio, Macedonia.

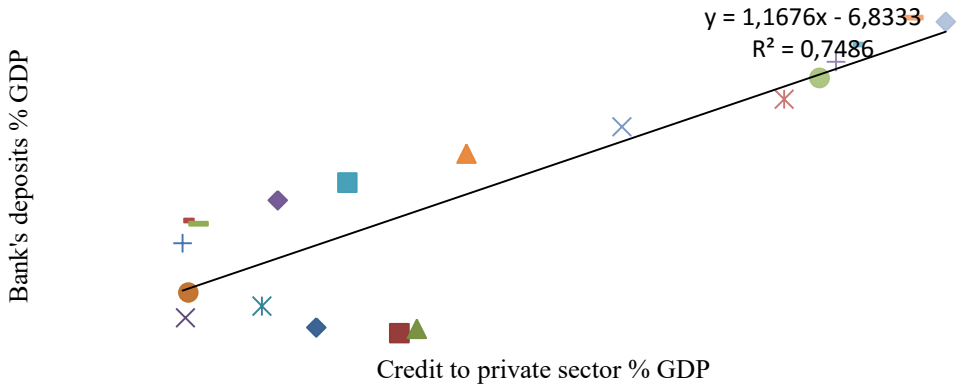


Source: Reports on the banking system in Macedonia, NBRM.

Macedonia in general is a country which only a little is crediting the economy, around 43-45% of the GDP in the recent years, which in the region is positioned in the last places as regards its deploy of the crediting level in the economy (R.Ademi, 2015). But, that as such is followed with impulses in the economy, which are sometimes strong and sometimes weak. Some of the studies suggest that it has a positive impact on the economic development, and few other studies find it as insignificant. However, from figure 1 we can see that the upward trends are found at two banking indicators, that of the loan and deposit to the GDP, although during the global financial crisis there is noticed a decrease of these upward trends for these indicators. The ratio of the loan/deposit, which is an indicator of the bank liquidity, shows that deposits are a real source of loan funding. If the ratio is high, it means that the banks may not have sufficient liquidity to cover the unexpected liquidity withdrawals. If the ratio is small, it shows that banks do not earn as much as they could.

Figure 2: Correlation between the deposits and the loans to the private sector from 1995 to 2013

a) Macedonia

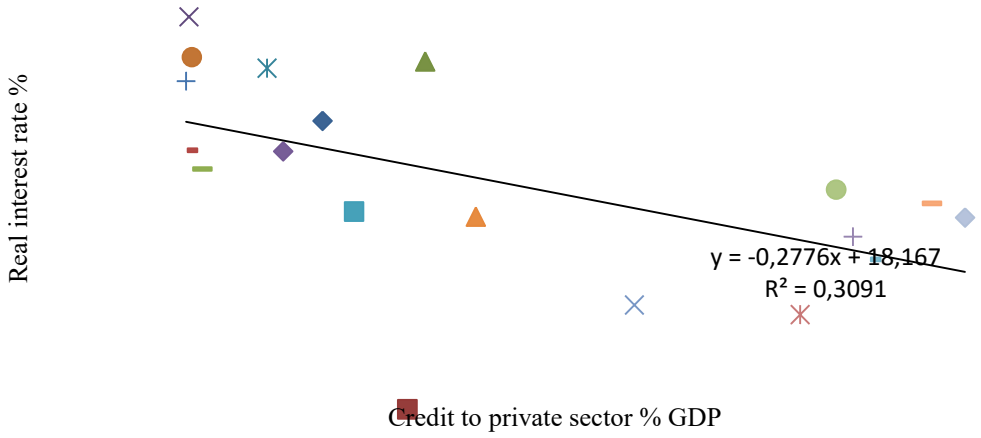


b) 15 Central European and SEE countries

Source: International Finance Statistics, IMF

The average ratio loans/deposits for Macedonia in the past 6 years is at the level of 75,2%, which indicates that loans are actually created just by deposits. In line with this report, we expect deposits to play an important role for the bank loan, as shown in figure 2a, where in Macedonia, these two indicators have a positive correlation. The same it is confirmed in figure 2b, whereas basis for analysis were taken 15 states (Central European and Southeast European States) that have been chosen during the construction of the empirical model, and there it turns out to be drawn a line with an emphasized positive trend, by implying that, the increase in deposits grows the loans too.

Figure 3: The correlation between the real interest rate and the crediting to the private sector from 1995-2013 a)Macedonia



b) 15 Central European and SEE countries

Source: World Bank, IMF International Financial Statistics-.IMF

A very important determinant of bank lending to the private sector is the dynamic of the real interest rates in the credit market. As outlined in the theory, an increase in the interest rates causes a costly borrowing and consequently its contraction out of it, although on the other hand, is often argued that the rise in interest rates increases the bank deposits base by default making them "freer " in launching loans. In Macedonia from figure 3a we can see that the interest rates rise and the credit to the private sector are negatively correlated, i.e the reduction in interest rates has increased the launching of loans in the market. In accordance with this study are also found the determinants of the credit (A. Mitrevska, 2006), where there is a weak correlation between these two variables and it is claimed that 1% increase in real interest rates causes a decrease of

0.0014% of loans. Another study conducted for 52 countries (V.Coudert & C.Pouvelle, 2010) among which the countries of Eastern Europe, for an analysis of the credit is also presented as a factor the real interest rate, accordingly to which there is a negative bond with the credit towards the GDP, and it is stressed out that the growth of real interest rate of 1%, the credit as a ratio towards the GDP will be decreased by 0.002%. When we analyze the 15 countries as one model, there isn't any clear and conclusive connection between the real interest rate and the credit towars the private sector (figure 3b), as it seems one linear and right line, which makes us think that the real interest rate is not a variable that has one determinant impact on the bank loan. However, we still cannot draw conclusions on causality through this chart, but the econometric model at the bottom will enable us to come out with the clear effect of the interest rate over the loan.

3. Econometric Model

The present paper aims to explain the dynamics of bank credit supply across countries through an analysis of its potential financial determinants by OLS model working through SPSS 20. Given this aim, we make an effort to make maximum use of my both time and cross-country and dimensions of available annual data sets. It is for us clear that not only financial indicators have an impact on the credit to the private sector, but also the macroeconomic indicators of real sector have a great impact on the dependant indicator, but as a result of one deeper analysis of its own financial environment where the banks operate, for us it is important to do an analysis only of the banking-financial indicators that we believe have a great impact on determination of the credit to the private sector.

The study includes 15 countries of SEE and CE (Albania, Macedonia, Serbia, Montenegro, Croatia, Bosnia and Herzegovina, Slovenia, Slovakia, Poland, Hungary, Romania, Bulgaria, Czech Republic, Moldova, Ukraine), for the period 1994-2013. The data were put together from the various presented reports of the financial institutions such as World Bank, IMF, EBRD, the European Statistics Office, the Federal Reserve of St. Louis, Unstats, Government Finance Statistics Yearbook, the Central Bank from different countries etc. The model includes as a dependent variable the credit to the private sector expressed as% of the GDP as well other variables listed below.

Variable	Description	Source
Domestic credit to private sector % GDP	**Depedent variable** Domestic credit to private sector refers to financiar resources provided to the private sektor by financiar corporations.	EBRD,WB
Bank deposits % GDP (+++)	A greater deposits base means more money to lend.	World Bank, IFS
Real interest rate (---)	A higher real interest rate is expected to lower loan and vice versa.	WB
Foreign ownership share (+++)	An increase of foreign capital to bank sector has contributed to an increase in the reliability of the banking system by increasing the loan portfolio.	EBRD
ROA ROE	Banks Return on Assets and Banks Return on Equity, these indicators of bank profitability, means that the most profitable banks as they are, tend to lend more, but it also can mean even more risky position. Signs not clear, positive expected.	WB,Federal Reserve Bank of St. Louis
Bank's concetration (---)	This is a ratio of total assets of the five largest banks in the assets of the total banking system. A more concentrated banking system means a credit monopoly and a lower credit.	WB
Bank nonperforming loans/to total loans (---)	Bad loans brings risk and negatively affect credit, signs expect negative.	WB
Bank capital to assets (Signs unclear)	Bank capital to assets is the ratio of bank capital and reserves to total assets. Capital and reserves include fund contributed by owners, retained earnings, general and special reserves, provisions and valuation adjustments. Signs is unclear	International Monetary Fund, Global Financial Stability Report.
Risk premium on lending (---)	Represents the "risk free", or that banks perceive the risk to the private sector versus public sector. The higher it is, the banks perceive that there is a greater risk in lending to the private sector.	IMF, International Financial Statistics database.
Banking sector reform (+++)	An index of the EBRD in the banking sector reforms (from 1 to 4+). A higher score means greater reform and possibly higher credit.	EBRD
Banking crisis (---)	Presented a dummy variable that when different countries have taken the banking crisis.. It takes the value 1 when the country has a banking crisis and takes the value 0 when there has not a banking crisis in the country. In times of crisis, it is expected to decrease the level of credit in the economy.	Luc Laeven and Fabian Valencia (2012):"Systemic Banking Crises Database: An update"

In order to perform a proper regression analysis there have been analyzed several diagnostic tests. The diagnostic testing process should answer the question whether or not the conditions for testing the authenticity of hypotheses due to conceptualizing research are met. The applied diagnostic tests can be categorized as follows:

a. The multi-correlative diagnostics (Annex Table 2)

From the applied correlation analysis we can see that relatively the most important condition for the implementation of the regression analysis it is met and that is multi-correlativity. In other words, the correlative analysis shows that between the predictors (although between some predictors is high again) the critical height of multi-correlativity cannot be reached, respectively, there is no limitation in assessing the relative value of the determined predictors in elucidation of the private credit as a dependent variable (Table 2, Annex).

Additional tests also suggest that all the preconditions to the critical realization of regression analysis are met.

a.a.The multiplier test for the existence or non existence of the serial correlation of errors. Height coefficient of Lagragn (2.12; p> 0.104) suggests that there is no serial correlation of errors.

b. The diagnosis on the dependence error level

The following conducted diagnostic test which gives information about the degree of the independence of the error, as one of the conditions to implement correctly the regression analysis. The calculated value of 1.591 by Durbin Watson suggests that the same is in its framework of the specified values for its acceptance as a normal one. Even in this case the pre-condition on the degree of independence error level is accomplished.

c. Diagnosis on homoscedaticity

From the distribution of the residual results for the predictive values of the criteria (dependent variables) we can figure out that the same is equal along the continuum of the outcomes from the dependent variables. In other words, the condition on the equitable distribution of retained results is met or the condition on homoscedasticitetin (Chart 2 in the Annex).

d. The test on normality

The basic condition is that the residual values have a normal distribution around the predictive variables in the criterion value (Figure 1, Annex) provides an information on the form of the distribution of residual values over the values of criterion variables (dependent variables). The values for Skjunes and Curtozis show that residual values shape one normal distribution, and that is of 1.79 for Skjune and 1.38 for Curtozis, but still the critical values do not exceed 0.05 and 0, 01.

4. Main findings

After conditions were met for the continuation of the regression analysis due to the methodological setting it is continued with the testing of variables.

From the results presented in (Table 3, Appendix) it can be realized that the panel which in itself integrates the determinants of the banking crisis, banks concetration, reforms in the banking sector, the real interest rate, ROA, ROE, the risk premium on lending, the foreign capital

in banking, nonperforming loan, bank deposits and the bank capital to assets in the anticipation of the variables criteria the growth of the private credits is statistically significant.

The results of the regression claim that the model which includes determinants panel has a great explanatory impact on the credit in the private sector as% of GDP (R^2 = 0,917). The value of F = 18,082, p> 0.01 implies that the coefficient of determination is statistically significant, i.e. the information provided by the model which in itself includes variables is high and from statistical point of view is significant.

From the regression table which includes all the explanatory variables (Table 4, Annex) can be seen that the bank deposits are a crucial variable and a "traditional source" of credit allocations. In 1% increase of deposit base in proportion to the GDP there is 1.6% increase of the credit to the private sector as % of the GDP. 1% increase in real interest rates is with negative impact by reducing the credit to the private sector for 1.98% as a ratio towards the GDP.

One increase of the indicator of the bank profitability (ROA) by default decreases the loans. ROA is profitability that measures the net income produced by the total assets during a period by comparing net income to the average total assets. In other words, the return on assets or ROA ratio measures how efficiently a company can manage its assets to produce profits in a certain period. Initially, the idea about the impact of this report was not enough clear, but it is reasonable to assert that the greater the ratio is, the profits are higher and therefore by default an increase in credit placements appears. But on the other hand the greater this ratio is, that implies greater banking risk and as a result banks may intervene to reduce the level of credit allocations.

In this study it was determined that an increase in ROA affects negatively the credit, as a result of a greater perception risk.

A larger concentration of credit means a monopoly in the credits and a lower credit is anticipated. There are several indexes that explain the banking concentration, such as the Herfindahl index, CR5, CR3 etc. We've taken for granted the CR5 index which consists of five largest banks in the total banking assets in the country. From the regression results that a greater banking concentration adversely affects the banking credit to the private sector and 1% increase in the level of loan concentration reduces credit to private sector by 0.8%.

Other factors are statistically irrelevant and therefore are also economically irrelevant to be interpreted.

5. Concluding remarks

The present paper aims to explain the dynamics of bank credit to private sector across countries through an analysis of its potential financial determinants. Given this aim, we endeavor to make maximum use of both time and cross-country dimensions of available annual data sets, which consist of 15 countries of SEE and CE for the period of 1994-2013. We draw out several empirical findings.

We find out that the most significant financial factor and influential on the credit towards the private sector are the deposits as % of GDP. It is obvious that the "traditional sources" of credit creation are precisely the savings of the citizens and businesses. Perhaps though still in development and therefore from a banking sector which is less developed, less access to foreign funds in the international banking market, this independence is clearly seen on depository base created in the country.

The factors that are important and that are negatively correlated with the loan are, the real interest rate which with its rise causes the contraction of the credit, and in return increase of the banking concentration, where with the growth of the percentage level of concentration the credit level gets low too. Also the return on the is a variable which is negatively related to the loan, and the explanation is due to the increase of ROA, where the exposure to the risk is also increased and consequently there is reduction of the levels of credit.

We should be clear that the model itself includes only banking-financial factors, where it operates, and in addition to these factors there are others which are believed to affect the dependent variable but are not the focus of this analytical study.

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ANNEX

Table 1. Descriptive Statistics on the dependent variable and independent variables

Descriptive Statistics

	Mean	Std. Deviation	N
Private_credit	51,828960 0	21,95693999	30
Banks deposits	45,744960 3	11,95345566	30
Real interest rate	4,8851566	3,66935907	30
Foreign_ownership_share	,7016456	,24576959	30
ROA	,8761243	1,12404807	30
ROE	8,8715023	9,38862981	30
Banks_concentraton	71,971188 3	13,25161900	30
Bank_nonperf_loan	8,2300000	6,72423050	30
Bank_capital to assets	11,399212 4	5,07541055	30
Risk_premium	5,4789601	3,00127674	30
Banking_sector_reform	3,120000	,4046284	30
Banking_crisis	,06666667	,253708132	30

Table 2: The correlation matrix which from the descriptive analysis between the panel of the independent variables and credit to private sector

Correlations

		Private_credit	Banks deposits	Real interest rate	Foreign owne. share	ROA	ROE	Banks conc.	Bank nonp. loan	Bank capital_assets	Risk prem.	Bank. sector reform	Bank. crisis
Pearson Correlation	Private_credit	1,000	,505	-,226	-,354	-,219	-,110	-,230	-,125	-,224	,106	,596	,460
	Banks deposits		1,000	,419	,063	,088	,298	,595	-,350	-,676	,463	,550	,150
	Real interest rate			1,000	,289	-,074	-,049	,376	,216	-,071	,107	-,094	-,178
	Foreign_ownership				1,000	,090	,063	,227	,127	,020	,579	-,131	-,441
	ROA					1,000	,710	,190	-,535	-,061	,340	,376	-,106
	ROE						1,000	,391	-,717	-,340	,304	,360	-,104
	Banks_concentraton							1,000	-,414	-,760	,351	,047	-,093
	Bank_nonperf_loan								1,000	,569	-,395	-,325	-,131
	Bank_capital_assets									1,000	-,354	-,362	-,163
	Risk_premium										1,000	,280	-,152
	Bank_sector_reform											1,000	,121
	Banking_crisis												1,000

Sig. (1-tailed)	Private_credit	.	,002	,115	,027	,123	,282	,111	,256	,118	,289	,000	,005
	Banks deposits	,002	.	,011	,371	,322	,055	,000	,029	,000	,005	,001	,214
	Real interest rate	,115	,011	.	,061	,349	,399	,020	,126	,354	,287	,311	,174
	Foreign_ownership	,027	,371	,061	.	,318	,370	,114	,252	,459	,000	,245	,007
	ROA	,123	,322	,349	,318	.	,000	,157	,001	,374	,033	,020	,289
	ROE	,282	,055	,399	,370	,000	.	,016	,000	,033	,051	,025	,292
	Banks_concentraton	,111	,000	,020	,114	,157	,016	.	,011	,000	,029	,402	,313
	Bank_nonperf_loan	,256	,029	,126	,252	,001	,000	,011	.	,001	,015	,040	,246
	Bank_capital_assets	,118	,000	,354	,459	,374	,033	,000	,001	.	,028	,025	,194
	Risk_premium	,289	,005	,287	,000	,033	,051	,029	,015	,028	.	,067	,211
	Bank_sector_reform	,000	,001	,311	,245	,020	,025	,402	,040	,025	,067	.	,262
	Banking_crisis	,005	,214	,174	,007	,289	,292	,313	,246	,194	,211	,262	.
N	Private_credit	30	30	30	30	30	30	30	30	30	30	30	30
	Banks deposits	30	30	30	30	30	30	30	30	30	30	30	30
	Real interest rate	30	30	30	30	30	30	30	30	30	30	30	30
	Foreign_ownership	30	30	30	30	30	30	30	30	30	30	30	30
	ROA	30	30	30	30	30	30	30	30	30	30	30	30
	ROE	30	30	30	30	30	30	30	30	30	30	30	30
	Banks_concentraton	30	30	30	30	30	30	30	30	30	30	30	30
	Bank_nonperf_loan	30	30	30	30	30	30	30	30	30	30	30	30
	Bank_capital_assets	30	30	30	30	30	30	30	30	30	30	30	30
	Risk_premium	30	30	30	30	30	30	30	30	30	30	30	30
	Bank_sector_reform	30	30	30	30	30	30	30	30	30	30	30	30
	Banking_crisis	30	30	30	30	30	30	30	30	30	30	30	30

Chart 1: Histogram on the distribution of residual values

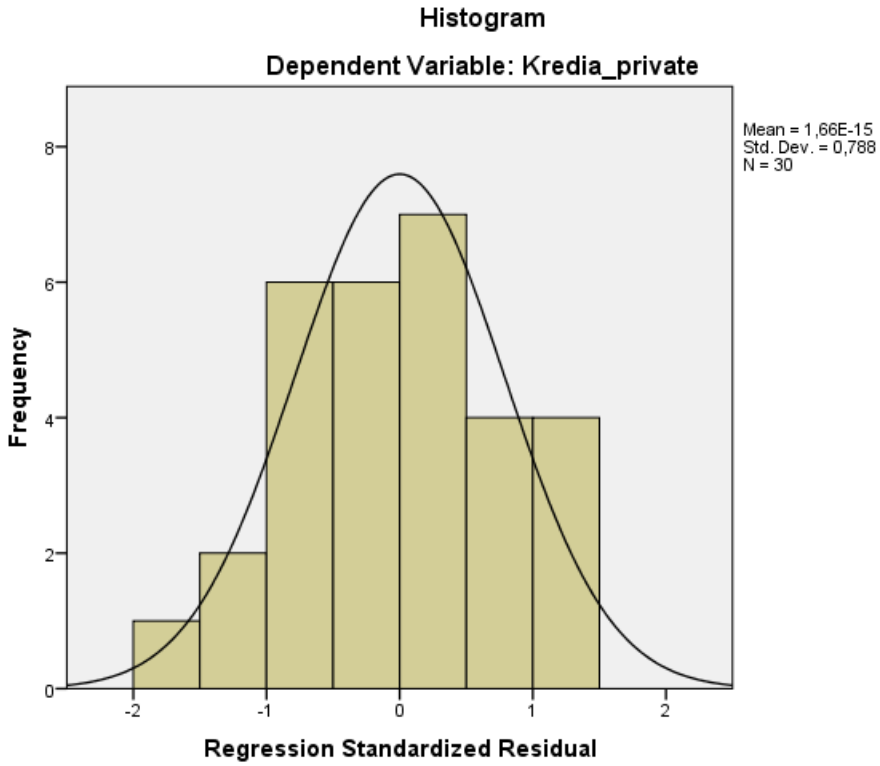

Chart 2. Distribution PP full normal standardized residual values

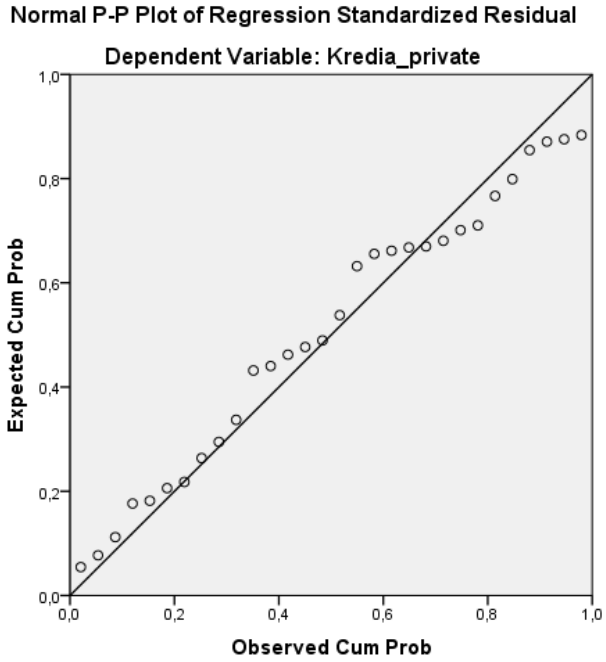

Table 3. The significance test coefficients of the variables determinants and the private credit growth

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,958[a]	,917	,866	8,02863114

a. Predictors: (Constant), banking crises, banking concetration, banking sector reform, real interest rate, ROA, risk premium on lending, foreign ownership share, ROE, nonperforming loans, Bank_capital_assets, banks deposits,

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12820,849	11	1165,532	18,082	,000[b]
	Residual	1160,261	18	64,459		
	Total	13981,109	29			

a. Dependent Variable: Credit to private sector as % of GDP

b. a. Predictors: (Constant), banking crises, banking concetration, banking sector reform, real interest rate, ROA, risk premium on lending, foreign ownership share, ROE, nonperforming loans, Bank_capital_assets, banks deposits,

Table 4. Tabular presentation of statistics through which proved determinant value of financial indicators of the bank and credit to private sector as % of GDP

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	25,712	37,133		,692	,498
	Depozitat_bankare	1,619	,303	,882	5,341	,000
	Norma_interesit_real	-1,984	,615	-,332	-3,227	,005
	Foreign_ownership_share	-8,039	10,349	-,090	-,777	,447
	ROA	-4,988	2,545	-,255	-1,960	,066
	ROE	-,333	,306	-,142	-1,088	,291
	Banks_concentraton	-,851	,282	-,513	-3,016	,007
	Bank_nonperf_loan	-,443	,470	-,136	-,942	,359
	Bank_capital to assets	,324	,761	,075	,426	,675
	Risk_premium	,213	,932	,029	,228	,822
	Banking_sector_reform	10,910	7,070	,201	1,543	,140
	Banking_crisis	9,868	7,173	,114	1,376	,186

a. Dependent Variable: Credit to private sector as % of GDP