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The Effect of Economic Variables on Banking Credits: An Empirical Study of Algerian Commercial Banks (1997-2017)

Abderzag Fouzi

Professor at Bicha of Univesity –Kingdom of saudi Arabia

Abstract

The study aimed to test the effect of deposits, real interest rate, population and economic reforms on the Banking credit from Algerian commercial banks represented by the size of credit facilities. The study used annual data for the period from 1997 to 2017. Where the Multi regression model was estimated using a method of Ordinary Least Squares OLS. Results of the analysis showed that there is a positive relationship with a statistically significant between the credit facilities and the deposits and the variable of economic reforms, while the real interest rate and population size have been linked by significant negative relationship.

Keywords: Credit, Credit Facilities, Deposits, Real Interest Rate, Population, Economic Reforms, Commercial Banks, OLS, Algeria.

Introduction

Funding is a key element in the composition of capital to developing countries in general, and the funding process depends primarily on the policies used to fill it and direct it to areas of economic development. The banks and financial institutions to block essential and important in the funding process, as the banking sector a major role cannot be ignored in the process of economic development, as it is the most important portals that exercised by the State in which its economic policy, especially in light of economies that are based on bank financing, which is known leveraged economies such as Algeria.

The evolution of the banking sector, a key indicator of the vitality of the economic situation. Reflected the role of banks in the business sector clearly through their banking services are many and varied greatly help in promoting economic and financial operations and business. However, the real role of commercial banks, measured by the performance of its primary function of financial intermediation, accepting deposits and granting loans, which are determined in the context of the credit policy of the Bank.

And parallel with it was the duty of the Commercial Bank to maintain a balance between lending and borrowing to maintain continuous liquidity. This balance is difficult to provide, because of the risk of non-payment, which assumes control at each stage of the process of credit.

The fact that all countries place restrictions on the credit activity of commercial banks in order to limit the scope of freedom in the creation of credit, since a credit policy that is consistent with the objectives of economic policy may hinder the development policy, particularly through the inflationary pressures or deflationary, which may caused, which adversely affect those goals.

It is here shows the influence of monetary policy on credit policy. This effect is different to varying degrees, from one country to another and from time to time, in the ability of monetary authorities to control credit through the various tools included in the monetary policy (both quantitative and qualitative).

Based on the importance given to the activity of the financial system and banking has emerged the need to identify the most important core activity of granting credit facilities, and the policy governing this activity and it can be summarized as the problem of the study the following question:

What is the impact of each of the volume of total deposits, the real interest rate, the population and reforms in the economic and monetary policy on bank Credit granted by the Algerian banks for the period (1997-2017).

A-Importance of the study:

Importance of the study lies in its treatment of a topic of great importance in the Algerian economy, through the important role that is characterized by the Algerian commercial banks to finance investments and accelerate growth. The significance of the study in the time period, characterized by the recourse of public authorities in Algeria in an effort to activate finance market in general, and market banks, especially, to the reform measures are important in the financial and banking sector, taking into account the profound changes taking place in the national economy and international alike. The main objective behind this is to develop the effectiveness of banks and their adaptation to the new economic reality. After the issuance of the Code of Money and the loan is known that phase shifts, at least from the regulatory and legislative, where he became the Bank of Algeria imposes stringent larger, either in the financing of public expenditure(financing the treasury deficit, public), or in the refinancing of commercial banks with liquidity, as well as in apply the rules of caution, and therefore emphasis in bankingsupervision, anxious to conduct credit controls reduce the impact of the volume of loans granted on the rates of inflation.

B- Objectives of the study:

The study aimed to:

- 1 - Track the evolution of the volume of credit facilities granted by commercial banks for the period (1997-2017).
- 2 - To analyze and measure the impact of economic variables represented in each of the total volume of deposits, the real interest rate on lending, the number of people, circumstances and economic reforms on bank credit provided by commercial banks represented by the size of the Algerian credit facilities.
- 3 - Access to a standard form for expressing the determinants of bank credit in the Algerian banks.
- 4-To shed light on some aspects of relevant research.

C- Hypotheses of the study:

To achieve the objectives of the study, make the theoretical concepts and studies relevant formulation of hypotheses of the study are as follows:

1. There is a positive impact for each of the total volume of deposits, the number of population and economic reforms pursued by Algeria in the banking sector, bank credit extended by commercial banks in Algeria.
2. No negative impact to the real interest rate on bank credit granted by commercial banks in Algeria.

For that, the study tested the effect of a range of economic variables reflect the determinants of bank credit to banks, where it should be noted that the study was limited to test the effect of four economic variables without addressing the determinants of particular characteristics of each Algerian banks separately, owing to the lack of data in this regard. To achieve this, it addressed in the first part of the study of the theoretical framework, while the remainder consists of the study of four parts, Part II contains a description of the data and methodology of the study, and the third part presents the results reached. The last part includes conclusion and some recommendations.

C-Theoretical framework and previous studies

- 1 - Definition of credit policy, and bank credit

Reflect the policy of credit (Credit Policy) of the bank for collection, but SOS, standards and conditions that are taken into account in the framework of credit policy the public to be determined by the central bank does not management credit portfolios in order to achieve economic growth target and to provide adequate returns to the banks the lowest cost and lowest risk possible (www.cbl.gov.ly). The bank credit (Banking credit) Fisher (Lloyd, 1986) that is synonymous with the word religion, religion's commitment to pay in the future, and credit is a claim to receive payments in the future. And considered (Vaish, 1979) in the definition referred to in (Abdullah, cruiser, 2006.167) that the purchasing power of non-

expendable income, but created by the banks of the income of the depositors is the exploiter and the applicant. Thus Valatman a loans and cash and non-monetary, which are awarded to individuals and legal entities of public and private for the provision of adequate safeguards and pledged to the borrower to pay that the funds and benefits, commissions and expenses due from it at once or in installments on due dates,

2 - an overview of the evolution of the Algerian banking system and the reforms

In an effort to activate finance market in general, the market, especially banks, public authorities have in Algeria to an important reform measures related to the economy in general and procedures related to financial and banking sector in particular, have over the development process in two stages Algeria witnessed a lot of attempts to reform: The first phase (from 1997 to 2007): This phase is characterized by moving from a planned to organize an economic organization of another economic subject to market forces, as defined by Algeria during this period a number of fundamental reforms and has resorted to international financial institutions in order to achieve economic stability. Standby credit agreements marked between 1989 and 1994 with the World Bank. (Bouzaydh, 2006)

Phase II: (after 2007), which saw the start of Algeria out of the security crisis that gripped the country during the nineties, and saw the continuation of reforms and complete the transition to a market economy. Algeria has seen the so-called Economic Recovery Programmed (2001-2004), which focuses on institutions and agricultural production activities and the other, also dedicated to promoting the public interest in the field of irrigation, transport and facilities, improving the standard of living, local development and human resource development. (Bouzaydh, 2006), in addition to the program of support for economic growth in 2005 marked the revitalization of intensive economic development was accompanied by the restoration of security.

The Algerian banking system saw many of the reforms represent the most important reform that is touching and a lot of his work and his way to adapt to new economic reforms, which is guaranteed by Law (No. 90-10) on the cash and loan, one of the basic legislative acts, which included all matters relating to cash and the loan whether it's legal form of banks, the activities of banks, banking supervision, and standards of management ... etc.

The law includes three levels of authority to regulate the job bank, the Monetary Council and the loan, which has the broadest powers to manage the affairs of the Central Bank and the issuance of banking systems related to, inter alia, the issuance of money and the terms and conditions of banks and financial institutions and private coverage and distribution of risk and the liquidity and solvency to the other. Bank of Algeria, select this law, the Directorate of the Central Bank, which consists of a governor and three deputies and the Central Bank has a number of powers including the issuance of securities and the conduct of monetary gold reserves and foreign currency and can use monetary policy tools such as restoring the discount, the compulsory reserve and money market ...etc.(Bahloul, 1993) and the Banking Committee, to monitor the implementation of rules and regulations governing banks and financial institutions and to punish violations installed.

The impact of Money and Credit to the Algerian banking system appears in the status conditioning and public banks with this law, and to complete the conditions for the adoption of the Bank of Algeria, and between these conditions: a minimum of social capital that must be provided by banks. Emerged as a financial and banking institutions, including many new Khalifa Bank, Arab Bank, Rayyan Bank upgrade and Real Estate Fund and the establishment of the National Fund for the establishment of housing and mortgage finance company, etc. ...

Hand the credit after the issuance of the Code of Money and Credit knew the process of granting credit some shifts, at least from the regulatory and legislative, where he became the Bank of Algeria imposes stringent larger, either in the field of financing public expenditure (financing deficit Treasury public), or in the field of refinancing of commercial banks liquidity, as well as in the application of the rules of caution, and therefore emphasis in banking supervision, anxious to conduct credit controls reduce the impact of the volume of loans granted on the rates of inflation.

Economic factors affecting the bank credit provided by commercial banks:

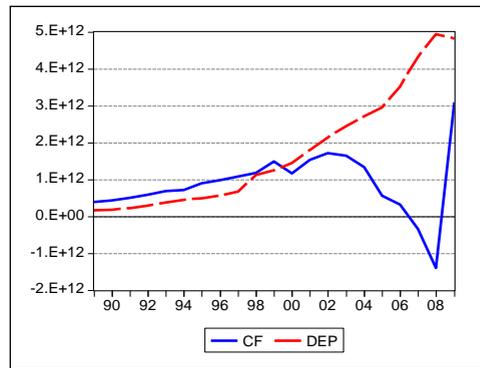
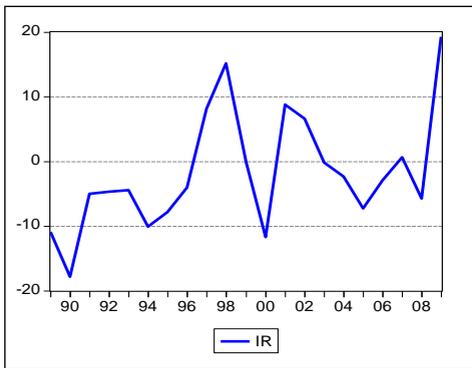
The proportion of bank credit to GDP indicator of the evolution of the banking system (see the study Colombage, 2006) and study (Liang and Teng, 2006). Where the affected bank credit provided by commercial banks represented a net domestic credit (the sum of net credit to the public sector is not Financial and directed credit to the private sector, and other accounts (www.worldbank.org)) a number of economic factors, among them what the study tested the degree of impact as follows:

1. Total volume of deposits (Deposit): Index is one of the most important deposits of indicators that reflect the evolution of the banking system, this indicator also reflects the capacity and effectiveness of the banks to attract deposits. And expresses the ratio of total deposits to GDP on the degree of financial deepening ((Christopoulos and Tsionas, 2004, is also considered as an indicator of financial development (Liang and Teng, 2006). Is associated positively with the size of the credit. (Ameri, 2003)

2. The real interest rate on lending (Real Interest Rate): the real interest rate is the interest rate loan that is adjusted for inflation as measured by the GDP deflator ((www.worldbank.org. Where affected by Algerian banks in the process of granting credit through its cost tool the interest rate on lending, where used as a tool of commercial banks within the parameters of monetary policy to reduce or increase the size of the credit. and negatively associated with the size of credit. (Ameri, 2003)

3. Population (Popolarion): The level of aggregate demand for domestic credit, and positively associated with credit. (Atoum, 2002)

Shown in Figure (1) represents the evolution of the volume of credit facilities and the volume of bank deposits, and figure (2) the development of the real interest rate on the ticks for the period ten years.



Appears from Figure (1) and Figure (2) that the volume of credit facilities to banks Algerian than the size of bank deposits during the same period where marked this period, economic growth is weak as well as the deterioration of the situation of politics and security in Algeria, where the banks in that period were not the most appropriate solution to direct savings to it, and fit this type of credit facility with the fluctuation of interest rates both on deposits, or which loans and which has seen high levels during the nineties, so removed the Central Bank of the roof 20%) of the rates of interest on loans for the year ((1994. as I knew years (1995) the largest interest rates on loans (18.41%), and the back of this surge in interest rates on the results of financial liberalization policies.

A year later (1996) interest rates began to decline, due economists, however, that high initial interest rate was exaggerated, so that the interest rates on loans year ((1994 reduced the demand for loans to the investment and stabilized during the last decade at levels 8)%). And the result that real interest rates fluctuate characterized in most years registered negative rates. The first positive value was 8.14%) in 1997)) and after the highest positive value of the interest rate was (% 15.10 Year 1998)), due mainly to the low rate of inflation (as measured by contraction in gross domestic product), which decreased from (29.8 %) and% (18.7%) years (1995) and (1996), respectively, to (% 5.7) years (1997), as well as important reforms in the context of the policy of financial liberalization brought about by structural adjustment program which has been applied from the beginning of the year (1994), until (1996). Back then real interest rates to fluctuate between negative values and positive values during the last ten years

While the volume of deposits went to the continuous rise in the period (2000 - 2009) to coincide with the continuous decline as well as to the size of credit facilities for the same period except in 2009, which saw a big increase. 2009.

2- Previous studies:

There were many studies on bank credit and factors specific to him, where (Chamie, 1989) he study the credit and productivity in Jordanian economy for the period (1968-1986) through the analysis of the impact of bank credit on the productivity of various economic sectors, as measured by the amount of influence on the added value achieved in each sector of the dinar spending in the form of credit. The study showed medium and low productivity marginal productivity of the dinar from bank credit at the level of the Jordanian economy as a whole.

While the study found (McKinnon, 1973) and (Shaw, 1973) that the liberal policies in developing countries related to the banking sector that would mitigate the restrictions on the ceiling interest rate, and reserves the legal high, and bias of some credit programs, and others, stimulate growth economic by improving the quality and quantity of investment, while the imposition of quantitative restrictions on the banking regulations to restrict the amount of investment and productivity, and impede economic growth. Although the policies liberal contributed to raise interest rates to higher rates, the P that it would lead to stimulate private savings and promote financial intermediation and the optimal allocation of resources, thereby increasing the supply of credit to the private sector, which in turn leads to increased investment and higher growth rate.

The econometric studies like (Khatib and forearm, 1996) determined factors affecting the banking credit on the industry sector in the following equation:

$$CR = b0 + b1G + b2I + b3R + b4F + b5Dum \dots (1)$$

Where:

CR: the volume of bank credit to industry.

G: rate of growth of gross domestic product.

I: investment.

F: the expected inflation rate.

Dum: dummy variable which takes into account the conditions of instability experienced by the Jordan, and had a negative impact on bank credit, and the method is used (OLS) to estimate both equations separately, and the results showed that the positive relationship between the growth rate of GDP and the total volume of investment on the one hand, and between the volume of credit provided to industry on the other hand, while the inverse relationship between bank credit and other variables.

D- Results

Preliminary tests of the study data:

Descriptive statistics and natural distribution test

Table (1) shows the descriptive statistics of the variables of the study model for the period 1997-2017. The descriptive results shown in the table indicate that the calculation of the volume of deposits and the volume of credit facilities was positive, as the volume of credit facilities was larger than the volume of deposits. While the highest percentage of credit facilities amounted to 99.35% of GDP, while the highest value of bank deposits accounted for 47.10% of GDP. The smallest deviation of the deposit size variable was recorded, followed by the real interest rate variable on lending, while the highest standard deviation of the credit facility variable was recorded. While there were no significant differences between the arithmetic mean and the highest value and lowest value for the population variable. While the standard deviation was somewhat higher (10.35%) than other study variables.

Table (1): Descriptive Statistics and Normal Distribution Test

Population size LOG(POP)	The real interest rate on lending Population size IR	Bank deposits DEP	Credit facilities CF	
21	21	21	21	Number of views
17.211	-0.0176	0.3648	0.4054	The arithmetic average
17.367	0.1924	0.4710	0.9935	Above
17.020	-0.1790	0.2179	-0.1221	The lowest
0.1035	0.0906	0.0835	0.2839	Standard Deviation
-0.2438	0.6668	-0.3188	0.1728	Sprain

1.9877	3.0634	1.7499	2.8322	Flattening
1.1047	1.5600	1.7232	0.1292	Jarque-Bera
0.5755	0.4583	0.4224	0.9374	Probability

Source: Prepared by the researcher

As shown in Table 1, the variables of bank deposits and the number of population show a negative spike, which means distortion to the left, while the torsion coefficient of the credit facility variables and the real interest rate is positive. All the variables of the study model except for the real interest rate variable show less inflation than in the normal distribution (3), while the flattening coefficient exceeds the real interest rate variable (3) which means that it is a little flattened.

The results of the Jarque-Bera test indicate acceptance of the normal distribution hypothesis for all study variables at a significant level of 1%. Based on the natural distribution test results, the use of the lower-squares method was used to estimate the parameters of the study model.

Brayman and Cramer (2001) point out that the problem of multiple correlations between variables is shown if an independent variable correlation coefficient exceeds 80%, while Kennedy (1998) points to an 80-90% correlation between two or more independent variables that makes it Variable independent of dependent variable. Thus, the model of the study does not suffer from the problem of multicollinearity. Table (2) shows the correlation matrix between the study variables.

The above table shows that there is no problem of multiple correlations between independent study variables of more than 70%.

2 - Analysis of the results of the study:

$$E = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \epsilon \dots\dots(2)$$

+ 58.93	+ 0.99	- 0.49	- 3.43	+ 0.14
(13.694*)	(2.229)**) -13.529)*	(2.731)**	(-3.401)*

$$R^2 = 0.96 \text{ Fstatistik}$$

Before analyzing the results of the regression model, it is necessary to ensure that there is no change in the data model during the study period, based on the stability test, In this area, the Cumulative Sum Test, whose results are shown in Figure 3, will be used. Where the residual curve is located between the standard deviation lines from the beginning of the period, which proves that the stability of the parameters of the model, and therefore will depend on the fragmented .

Equation (2) shows the estimation of the parameters of the study model. The value between the brackets represents the statistical value (t) and the degree of its significance. ** (**) indicates a significance of 1% and 5%, respectively.

Before analyzing the results of the multiple regression model, reference should be made to the interpretation of the R² value and the value and value of the DW, F-Statistic. The first value refers to the explanatory power of the model. The independent variables explain 96.69% of the changes in the dependent variable, while the value of the Durbin-Watson (DW) test indicates that (1.5-2.5) (Eviews 4 Users Guide I). The value of the F statistic is 117.07 at a level of 1%, which is higher than the value of the table F. Therefore, the hypothesis that there is a statistically significant effect of the independent variables combined on the dependent variable is accepted.

The previous methodology in estimating the model of the study may suffer from two problems that may lead to misleading results. The first is that the random errors obtained from the previous regression model may be interrelated, which is known as the Autocorrelation Problem. The second is that the variation in random error may not be constant over time as assumed by the OLS method, which is known as the problem of Heteroskedasticity Problem (Gujarati et al., 2003, 387).

Residuals were tested to determine the suitability of the OLS method to estimate the model. It will be tested whether random errors follow a normal distribution, not self-related, and whether their variation is constant over time.

Test the normal distribution of the model's Randoms:

The normal distribution of the regression model is determined by the JarqueBera statistic shown in Fig. 4. It is shown that the slope of the regression model is naturally distributed and complies with the conditions of the application of the lower squares method.

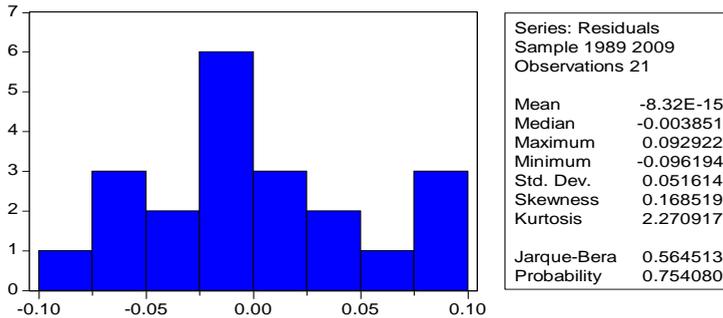


Figure (4): Test the normal distribution of the model

Test self-bonding of model:

The purpose of this test is to investigate the extent to which a random correlation between random errors will be achieved by applying the Ljung-Box test to random errors. This test comes to examine the null hypothesis that there is no self-association between random errors until the lag period. Table (3) shows the results of the Ljung-Box test represented in Q-Stat and Prob.

The table shows that the probability of the statistical test was always greater than 1%, indicating that there is no self-correlation between the regression model locks.

While the study also aimed (Abu Muammar, 2001) to determine the size of deposits and facilities in Palestinian banks for the period (1990-2000), as well as to identify the reasons for the weak role of banks in providing credit and contribute to the investment. The researcher in the study on a series of interviews with the directors of banks in addition to the presentation and analysis of statistics was in the proportion of facilities to deposits in commercial banks, investment banks and specialized banks for the period (1993-1999). The size of the facilities offered by banks, the Palestinian, Jordanian banks and banks operating in Palestine for the sectors of the economy as a whole by each bank, in addition to the distribution of credit facilities to the direct economic sectors for the period (1997-2017).

Descriptive findings of this study that the volume of credit facilities provided by the Jordanian banks operating in Palestine, higher than those offered by the Palestinian or Egyptian banks operating in Palestine. The study also showed that the political conditions affect the size of the facilities provided for the economic sectors, the inexperience of banks, there are no guarantees it for the granting of such facilities in addition to the weakness of the economic sector in general.

Like the study (Al-Khatib and forearm, 1996), the (Atoum, 2002) measured the role of credit granted by the Jordanian banking sector in economic growth during the period 2000-1985 AD. By estimating the model simultaneously consisting of equations first production function, while the second equation is a function of credit and to show that bank credit depends on the size of the population (POP) and the volume of total deposits with the banking system (TDEP) in addition to the interest rate (RI), and after assessing the form simultaneously using a two-stage least squares (2SLS). The results revealed for the function of credit and a positive relationship between bank credit and the size of the population (POP) at the level of the economy and the level of sectors except the construction sector's total deposits (Tdp) was associated positively with the size of credit facilities, but were not her teacher morale statistically not on the level of the economy not at the level of sectors, finally, the interest rate has been associated with the inverse relationship between bank credit and proved to her teacher on the moral level of the economy and the sectoral level.

The aim of the study (Ameri, 2003) in Yemen to measure the impact of bank credit granted by commercial banks on Yemen's economic growth, representing a rate of GDP at the level of the economy as a whole and at the level of economic sectors were made quarterly for the period 1990 to 2001, based on the Standard Model estimated features,

The error contrast homogeneity test:

In order to examine homogeneity or stability of homoskedasticity, the White Heteroskedasticity Test, shown in Appendix 2, will be applied. The results of the test showed the instability of the random error variation. Thus, the parameters of the model were implicitly recalculated with these The problem, according to E-views. (White Heteroskedasticity-Consistent Standard Errors & Covariance)

Therefore, given the compatibility of the conditions of the use of the method of ordinary squares with no problems in data and repair of what was found, the model expresses the relationship between the dependent variable and independent variables, where the fixed part of the equation and its value (+ 58.93) to the lowest credit facilities Provided by commercial banks in the absence of any impact representing 58.93% of the value of GDP.

There is a significant positive relationship between the size of the credit facilities and the total deposits and the variable economic terms, while the real interest rate and the size of the population were associated with a significant inverse relationship.

Thus, there is an effect on all the previous variables on bank credit provided by commercial banks, so that the positive effect of both the size of bank deposits and the economic theory and the study of (Al-Atoum, 2000) on the Jordan and the study of (Amiri, 2003) on Yemen. As well as the negative relationship of the rate of interest on lending with the economic theory and study (Atom, 2000) and (Ameri, 2003). The volume of deposits accounts for 99% of the changes in the volume of credit facilities. It is considered to be the most important variable affecting the bank credit provided by commercial banks in light of the results of the model analysis, which was consistent with the findings of the study (Amiri, 2003) on Yemen.

While the effect of the size of the population differed from what was expected by showing a negative relationship of statistical significance. In the opinion of the researcher, the population does not necessarily necessarily reflect the size of the credit facilities to the extent that it reflects the size of the bank deposits. Investment fund and investment support fund that require bank financing, the Algerian individual or public institutions tend to self-finance investment and population increase does not necessarily correspond to the increase in the volume of credit facilities granted to them. The increase in the population does not necessarily mean the increase in the number of bank customers with deposits and borrowings. Al-Amiri (2003) showed that the ratio of population size to the size of bank credit is positive but not statistically significant, and in line with the findings of the study that increasing population counts does not necessitate an increase in credit facilities.

As for the variable economic and monetary reforms during the period of study, it showed a positive positive effect through the positive relationship as 14% of the changes in credit facilities are explained by the reforms guaranteed in the Algerian economic.

II Conclusion

The study aimed to test the effect of deposits size, real interest rate, population, and economic terms on bank credit provided by commercial banks represented by the size of credit facilities granted by them. Using annual data for the period from 1997 to 2017. The study provided a standard analysis of the effect of each variable. The study found results related to descriptive analysis and outcomes associated with standard analysis. whereas:

1. The volume of credit facilities (bank credit) went through two stages, from 1997 to 2009, during which growth was characterized by positive growth rates and a period characterized by decline and negative growth during the period (2001-2008).
- 2 - The size of bank deposits characterized by continuous growth and growth at increasing rates during the study period (1997-2017).
- 3 - The fluctuation of real interest rates, before and after the economic reforms pursued by Algeria.
4. Bank credit provided by commercial banks is positively influenced by the size of deposits (Dep), economic reforms (Dum), and is negatively affected by the real interest rate on lending (IR) and population size (Pop).

Therefore, the study presents some recommendations that can contribute to the role of the Algerian banking system in achieving the desired social and economic objective of economic growth.

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Appendix (1): Variables of the study model

Log(Pop)	Real Interest rate %	Deposits % of GDP	Domestic Credit Facilities % of GDP	Years Variables
17.19	8.14	23.91	38.59	1997
17.20	15.10	39.34	41.38	1998
17.22	-0.10	38.68	45.82	1999
17.23	-11.72	34.97	28.27	2000
17.25	8.73	42.01	36.22	2001
17.26	6.55	46.80	37.95	2002
17.28	-0.18	46.41	31.65	2003
17.29	-2.38	44.16	22.11	2004
17.31	-7.26	39.27	7.71	2005
17.32	-2.95	41.31	4.08	2006
17.34	0.62	45.92	-3.14	2007
17.35	-5.76	44.72	-12.21	2008
17.37	19.24	47.10	30.21	2009
17.02	-10.90	37.80	90.63	2010
17.05	-17.90	32.11	78.43	2011
17.07	-5.04	26.45	59.63	2012
17.09	-4.75	27.38	55.45	2013
17.12	-4.45	31.69	59.03	2014
17.14	-10.13	29.78	47.23	2015
17.16	-7.90	24.68	45.04	2016
17.17	-4.05	21.79	38.32	2017

Appendix(2)

Test the homogeneity of the error variation of the study model

)White Heteroskedasticity Test(

White Heteroskedasticity Test:				
F-statistic	4.099202	Probability		0.034565
Obs*R-squared	18.56177	Probability		0.137330
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 07/02/11 Time: 00:12				
Sample: 1989 2009				
Included observations: 21				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-91.68235	80.40597	-1.140243	0.2917
DEP	-3.004965	3.166120	-0.949100	0.3742
DEP^2	0.154129	0.159478	0.966455	0.3660
DEP*RIR	-1.038608	0.299883	-3.463383	0.0105

DEP*(LOG(POP))	0.166588	0.186654	0.892497	0.4018
DEP*DUM	0.114591	0.049757	2.303001	0.0547
RIR	-3.700279	3.018110	-1.226025	0.2598
RIR^2	0.330076	0.115179	2.865754	0.0241
RIR*(LOG(POP))	0.240940	0.181185	1.329801	0.2253
RIR*DUM	-0.084230	0.032947	-2.556520	0.0377
LOG(POP)	10.73407	9.375271	1.144935	0.2899
(LOG(POP))^2	-0.314044	0.273275	-1.149189	0.2882
(LOG(POP))*DUM	0.018128	0.115967	0.156321	0.8802
DUM	-0.362184	1.994020	-0.181635	0.8610
R-squared	0.883894	Mean dependent var		0.002537
Adjusted R-squared	0.668268	S.D. dependent var		0.002931
S.E. of regression	0.001688	Akaike info criterion		-9.695760
Sum squared resid	1.99E-05	Schwarz criterion		-8.999412
Log likelihood	115.8055	F-statistic		4.099202
Durbin-Watson stat	3.086812	Prob(F-statistic)		0.034565

Lag=12

Lag	Q-Stat	Prob
1	2.2402	0.134
2	2.4327	0.296
3	4.9145	0.178
4	8.8105	0.066
5	10.216	0.069
6	10.535	0.104
7	11.351	0.124
8	12.048	0.149
9	13.049	0.160
10	14.992	0.132
11	16.242	0.132
12	19.685	0.073

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