

Causality Between Economic Growth And Bank Deposit: Evidence From Algeria

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Abstract:

This study aims to investigate either growth-led deposits or deposit-led growth. Therefore, the purpose of this research is to investigate the direction of the relationship between economic growth and bank deposits. Granger causality is employed by using time series data of Algeria from 1964- 2020.

The results show that there is no co-integration between economic growth and bank deposits, and there is no causality relationship running from deposit to economic growth. While there is a unidirectional causality running from growth to bank deposits, which means that the demand-following hypothesis for Algeria is true.

Keywords: Economic Growth; Bank Deposit; Granger Causality; Algeria.

Jel Classification Codes: F43, G21, C22, C32

1. INTRODUCTION

Banks extremely contribute to economic growth through their intermediating function of linking surplus and deficit fund sectors. This function makes deposits the most important tool of success for the banking sector, and also the major part of any economic performance; deposits largely dictate how much funds are available for lending activities. Hence, the role of deposits within the economy cannot be overemphasized.

If we define deposits then it is the amount of money that a costumer of bank keeps in his account either in form of cash, cheque or sent through

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a wire transfer (saba & Danish, 2017); deposit can be broadly categorized into demand deposits, savings deposits, and term or fixed deposits.

The size of deposits collected by commercial banks, are a major part and determinant of financial sector development ; this in turn will lead to economic growth; according to (sellami, bentafat, & rahmane, 2020) economic growth means change with a steady increase in national output in general and in GDP per capita output in particular.

The nature of the relationship between finance and economic growth has been one of the most debated in the recent past, yet with little consensus. This debate is about whether strong economic performance is finance-led or growth driven. Thus this study seeks to investigate the causal direction relationship between economic growth and bank deposit growth in the case of Algeria.

The next section outlines the literature review. Section 3 is about analyzing the evolution of economic growth and bank deposits in Algeria for the period (1964- 2020). Section 4 explains our data and estimation approach. Section 5 discusses the empirical findings, and section 6 is for the conclusion.

2. Literature review

Theoretically, the supply-leading hypothesis (Schumpeter,1911), the demand-following hypothesis (Robinson, 1952), the bidirectional causality hypothesis (Patric,1966), and the independent hypothesis (Lucas,1988) provide the most plausible explanation to causal relationship between economic growth and financial sector development.

The supply-leading suggests that causality flows from finance to economic growth with no feedback response from economic growth. A well-developed financial sector is a pre-condition for economic growth. Mckinnon (1973) and Shaw (1973) argue that a well-developed financial sector minimizes transaction and monitoring costs and asymmetric information. Thus, the economic growth responds to growth in the real sector facilitated by financial development (Patrick , Oladapo , olufemi, & Stephen, 2015, p. 31).

A contradictory view on the supply-leading hypothesis was pointed by Robinson (1952), who set the demand-following hypothesis. According to this hypothesis the development of real economy induces increased demand for financial services, which in turn generate the introduction of new financial institutions and markets to satisfy that increased demand for financial services (Songul , Ilhan , & Ali , 2009, p. 12).

Another dimension to the link between financial development and economic growth was provided by Patrick (1966). This is referred to as « bidirectional » hypothesis, which incorporates the supply-leading and demand-following hypothesis. It posits that the causal link between financial development and economic growth alternates as the economy develops. Therefore, the supply-leading hypothesis holds in an economy in the early developmental stage, and the economy grows, it fades away and demand-following hypothesis prevails (Patrick , Oladapo , Olufemi, & Stephen, 2015, p. 31).

For the independent hypothesis, Lucas (1988) asserts that the financial development on one hand and economic growth on the other hand, which means that there is no causal relationship between them (eric , muazu, & yakubu, 2019, p. 2).

On the empirical front, researchers concluded different results for different countries. Some research concluded that there is no relationship between bank's deposits and economic growth. Such as (Mushtaq, 2016) did a study in Pakistan by using Johansen test of co-integration and Granger Causality and concluded that bank deposit does not granger cause economic growth in Pakistan.

Other research found unidirectional causal relationship running from economic growth to banks deposit. (Awdeh, 2012) Did study in Lebanon and concluded that there is one way causality running from economic growth to banking sector.

Following studies concluded that economic growth is one of the most factors determine bank deposit growth.

(Ibrahim & Aziza, 2020) Did study in Turkey by using ARDL model and concluded that economic growth proxies by real GDP determine deposit growth in the long term.

(Fisnik & Rofi, 2019) Did study about the impact of macroeconomic factors on the level of deposit in the banking sector of Western Balkan countries and concluded that economic growth has positive effect on deposit performance.

In the context of Algeria, (Brahim Bounab & Belhadj, 2020) investigate the direction of causality between financial development proxy by ($m2/GDP$, credit to private sector as a percentage of GDP) and economic growth for the period 1980-2018 using Toda and Yamamoto approach for granger non-causality test in the context of VAR model. The study concluded that there is a unidirectional causality relationship running from economic growth to $m2/GDP$, while there is non-causality between credit to GDP and economic growth. Also (Bendahmane & Kerrouche , 2021) examined the impact of domestic credit to the private sector by banks on economic growth during (1970- 2018); results showed that there is a positive impact on economic growth.

We can conclude from the literature review that studies on the causality between bank deposits and economic growth are limited, and mostly dwell on the causality between financial development proxy by credits and economic growth. The same goes for the context of Algeria, where scanty attempts have been made, as the empirical studies are concentrated on the causality between credit to the private sector and economic growth. The present study seeks to fill this lacuna in the literature by modeling causality between economic growth and bank deposit growth in Algeria.

3. Analyzing the evolution of economic growth and bank deposits in Algeria for the period (1964- 2020)

3.1 Analysis of the evolution of economic growth in Algeria

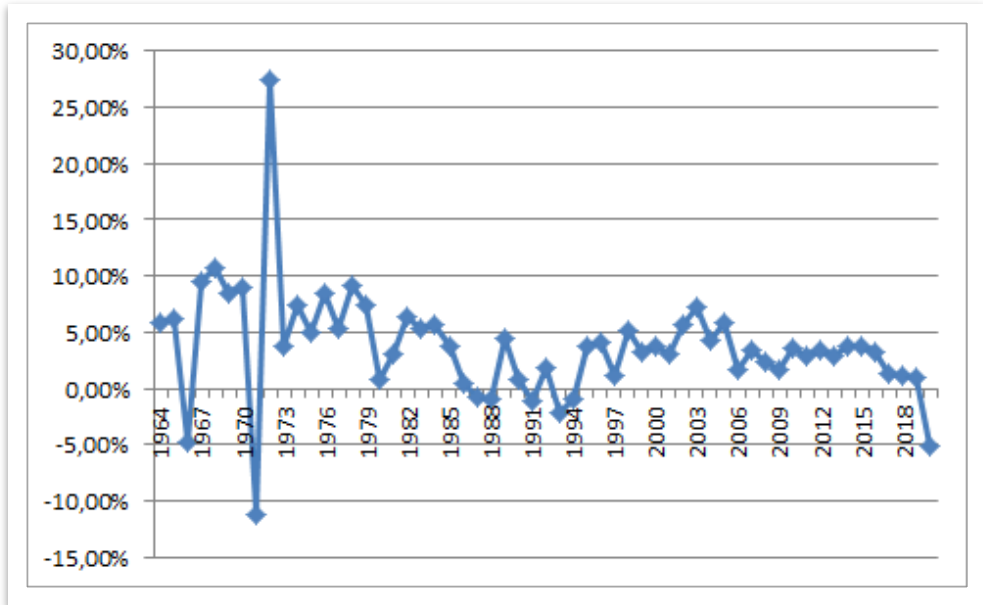
Figure 1 shows a clear fluctuation in economic growth rate over the period (1964- 2020), during this period the growth rate ranged from -11.3% the lowest rate in 1971 to the highest rate of 27.4% in 1972. This fluctuation is mainly due to the steady growth of the added value of the hydrocarbon sector, especially since the Algerian economy is highly dependent on hydrocarbon exports, it is estimated that hydrocarbons account for roughly 22.4% in 2018, which is the highest rate compared to the contribution of other sectors (Bank of Algeria, 2019).

In the 1970s and 1980s, Algerian economic performance was linked to boom cycles, but quickly the boom session faded and turned into deflation (Dahmani & Rekrak, 2015). Thus, the economic growth rate recorded during the period 1990-1994 a steady and sustained decline by reaching negative rates, as consequence of the decline of oil prices in 1986. But after 1995, as oil prices gradually improved Algeria's economy was able to return to a positive growth rate.

The third millennium was marked by launching of several development programs; the Economic Recovery Support Programme (2001- 2004), which aimed to achieve economic growth of at least 5%, and it actually reached in 2002 and 2003 by 5.6% and 7.2% ; the Complementary Plan for Support to Growth (Economic growth support programme) (2005- 2009) ; and then the National Program for Agricultural Development was applied (2010- 2014), during this programme the economic growth achieved average rates. After that economic growth has started to slow since 2015, due to the sharp decline in oil prices, especially in 2015 and 2016 (Bank of Algeria, 2019), the reduction of expenditure, and the inertia of the hydrocarbon sector and non-oil activities. This slowdown will intensify in 2020, when Algeria's economy recorded a very low growth rate at -5.6%, as a result of the COVID-19 pandemic's

lockdown of economic activities, reduced oil production under Algeria's commitment to the Agreement « OPEC+ », which led to a 12% decline in crude oil production levels falling from 1023 bpd in 2019 to 899 bpd in 2020 (ESCWA, 2019).

Fig. 1. Evolution of economic growth in Algeria for the period (1964- 2020)



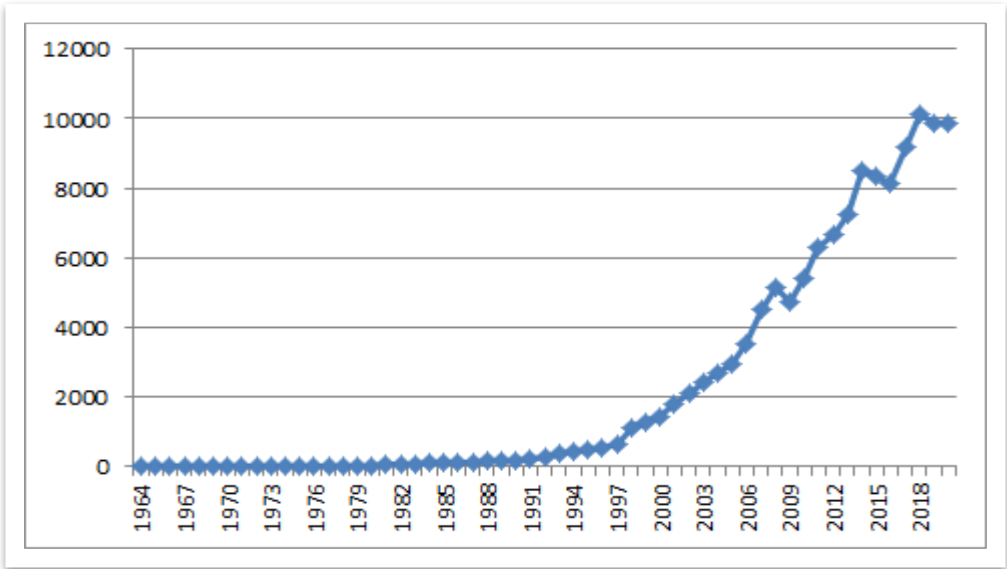
Source: World Bank

3.2 Analysis of the evolution of bank deposits in Algeria:

Before 1990, Bank deposits in Algeria recorded very weak growth, with an estimated average of 49.1 billion dinars in accumulated deposits during the period 1964-1989. This decrease is mainly attributable to the nature of the banking system, which was based on the principle of central planning for all investment and financing decisions, the weakness of the commercial bank network, and the general character of the banking system, which eliminated banking competition during that period. This situation persisted until the introduction of reforms in the Algerian banking system. Foremost among these were the reforms of 1986 and 1988, and the most important was the reform of 1990 in the monetary and loan act 90-10, which brought about radical changes in the nature of the banking system in line with Algeria's transition to a market economy. Therefore, we can see

from figure 2 that the trend of deposits collected since 1990 has started to increase, as it went from 178.469 billion dinars to 9871.1 billion dinars in 2020, which means that deposits have been multiplied by 51 times in the past three decades. This increase was due to the availability of private domestic and foreign banks to operate in Algeria, which reinforced the bank density; and the settling of oil revenues after being converted into the national currency and subsequently deposited in form of demand deposit at the Algerian Foreign Bank, which means that a large part of the changes in the size of deposits is explained by the oil prices.

Fig. 2. Evolution of bank deposits in Algeria for the period (1964-2020)



Source: Bank of Algeria Various Issues

4. Data and Methodology

Stander economic analysis was used through time series to study the causal relationship between economic growth and bank deposit growth.

4.1 Data description and variables

To investigate the causal relationship between economic growth and bank deposit growth, we use annual time series data spanning 1964- 2020 from the Bank of Algeria and the world bank development indicator's

various issues. This period is selected based on complete data availability. Bank deposit (BD) which is the total value of demand and time deposit (billion dinars), economic growth (GDP) proxy by real gross domestic product (billion dinars).

4.2 Hypothesis

To achieve the objective of this study and examine the causal relationship between economic growth and bank deposits in the case of Algeria, these hypotheses will be tested:

H1: Economic growth does not Granger cause Bank deposit growth.

H2: Bank deposit growth does not Granger cause Economic growth.

4.3 Model specification

The maximum likelihood estimation model of Johanson and Juselius (1990) was used to determine co-integration between variables. This model only describes whether there is co-integration between variables, but not the direction of causality (Saba & Danish, 2017). The co-integration between variables may not be very interesting. Moreover, co-integration cannot help in identifying the causality direction for example two series which in our case could be of interest. To this end, Granger Causality was used to determine the direction of short -term causality.

The empirical model for examining the causality relationship between economic growth and bank deposit growth, is as under:

$$\begin{aligned}BD &= \beta_0 + \beta_1 \text{ GDP} + \varepsilon_t \\ \text{GDP} &= \alpha_0 + \alpha_1 \text{ BD} + \varepsilon_t\end{aligned}$$

Where the proxies of all variables are previously defined, except ε which is the error term, t represent the sample period, β_0, α_0 refers to the intercept, β_1, α_1 are the coefficients.

5. Empirical results

5.1. Unit root test

To test the stationary of time series and determine their degree of integration, we applied the Philips Perron(PP) test at 5% level of significance. This alternative method of testing the order of integration proposed by Phillips and Perron (1988) has certain advantages over the Dickey-Fuller test. It's more powerful, especially for small samples. It is

relevant to a wider range of time series models, although it only requires the estimation of the first-order autoregression by ordinary least squares and a correction factor based on the residuals of that regression. A practical advantage of this is that there is no need to estimate the parameters of the lag difference term, resulting in missing observations (Hallam & Zanolì, 1993). The unit root test is performed at both level $I(0)$ and the first difference $I(1)$, as presented in the table below:

Table 1. Result of unit root test (PP test statistics)

Null Hypothesis: the variable has a unit root			
<u>AtLevel</u>			
With Constant	t-Statistic	BD 3.3153	GDP 0.4117
	Prob.	1.0000	0.9818
With Constant & Trend	t-Statistic	n0 -0.0190	n0 -1.6736
	Prob.	0.9951	0.7499
Without Constant & Trend	t-Statistic	n0 5.4710	n0 4.4957
	Prob.	1.0000	1.0000
<u>AtFirst Difference</u>			
With Constant	t-Statistic	d(BD) -5.5838	d(GDP) -4.7883
	Prob.	0.0000 ***	0.0002 ***
With Constant & Trend	t-Statistic	-6.8932	-4.6949
	Prob.	0.0000 ***	0.0020 ***
Without Constant & Trend	t-Statistic	-4.7597	-2.8850
	Prob.	0.0000 ***	0.0047 ***

Source: Eviews 10 output

Through the result shown in table 1, we can conclude that all the variables are non-stationary or have unit root at their levels but after the first difference they become stationary.

Therefore, this result leads us to the co-integration test, since the co-integration condition is satisfied in the same order.

5.2. Lag length selection

Before estimating the var model, the lag length degree should be selected using the var lag order selectir criteria, which is based on Akaike, Schwarz and Hannan-quinn information crieteria.

Table 2. Lag order selection criteria

VAR Lag Order Selection Criteria
Endogenous variables: BD GDP
Exogenous variables: C
Date: 09/18/22 Time: 18:24
Sample: 1964 2020
Included observations: 55

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1013.622	NA	3.75e+13	36.93171	37.00470	36.95994
1	-781.2555	439.3839*	9.29e+09*	28.62747*	28.84645*	28.71215*
2	-777.3484	7.103720	9.33e+09	28.63085	28.99582	28.77199

Source: EvIEWS 10 output

Through table 2 it is clear that the optimal lag that gives the lowest value to AIC, SC, and HQ is lag 1.

5.3. co-integration test

Since time series are stationary at the first difference, we can apply Engel and Granger for co-integration. The null (H_0) and the alternative (H_1) hypotheses formulated for the test are:

H_0 : No co-integrating equation.

H_1 : There is co-integrating equation.

Table 3. Result of co-integration

Dependent Variable: BD
Method: Least Squares
Date: 09/18/22 Time: 18:40
Sample: 1964 2020
Included observations: 57

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	0.599466	0.034885	17.18406	0.0000
C	-3591.645	380.3717	-9.442461	0.0000
R-squared	0.842988	Mean dependent var		2243.582
Adjusted R-squared	0.840133	S.D. dependent var		3236.209
S.E. of regression	1293.944	Akaike info criterion		17.20323
Sum squared resid	92085989	Schwarz criterion		17.27492
Log likelihood	-488.2922	Hannan-Quinn criter.		17.23109
F-statistic	295.2921	Durbin-Watson stat		0.070731
Prob(F-statistic)	0.000000			

Source: EvIEWS 10 output

From table 3 we found that $R\text{-squared} = 0.84$ which is greater than Durbin-watson = 0.07. So, the model is considered false and unacceptable (i.e there is another variable among these variables that leads to this result). For this reason, we are studying the stability of residual series at 5% level of significance.

Table 4. Result of residual unit root test (ADF test statistic)

Null Hypothesis: RESID01 has a unit root		
Exogenous: None		
Lag Length: 6 (Automatic - based on SIC, maxlag=10)		
	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-1.580521	0.1105
Test critical values:		
1% level	-2.612033	
5% level	-1.947520	
10% level	-1.612650	

Source: EvIEWS 10 output

(Engel & Granger, 1987) explained that is wrong to rely on the critical values resulting from (ADF) test because they were incorrect (i.e the critical values resulting from the ADF test are for normal values rather than residuals). Therefore, the critical values assigned to this test prepared by Engel Robert should be used.

Hence, using appendix 1, we find that $t\text{-statistic} = -1.560521 > \text{test critical } -2.76$ which means that the residual series is non-stationary. Therefore, the null hypothesis of no-cointegration is accepted; and we conclude that there is no co-integration between economic growth and bank deposits, and there is no long-term relationship between them. So, the causation of Granger that studies the short-term relationship through the var model will be used.

5.4. Granger causality test

This test aims to investigate the causation direction between the study variables, H_0 and H_1 formulated for this test are as follows:

H_0 : there is no causal relationship between the variables

H_1 : there is causal relationship between the variables

$$\Delta GDP_t = \sum_{i=1}^n \beta_1 GDP_{t-i} + \sum_{j=1}^n \beta_2 BD_{t-j} + \varepsilon_{1t}$$

$$\Delta BD_t = \sum_{i=1}^n \beta_1 BD_{t-i} + \sum_{j=1}^n \beta_2 GDP_{t-j} + \varepsilon_{1t}$$

Where i and j is lag lengths.

Table 5. Result of granger causality test

Pairwise Granger Causality Tests			
Date: 09/18/22 Time: 19:20			
Sample: 1964 2020			
Lags: 1			
Null Hypothesis:	Obs	F-Statistic	Prob.
GDP does not Granger Cause BD	56	6.04210	0.0173
BD does not Granger Cause GDP		0.35327	0.5548

Source: Eviews 10 output

The first line of table 5 shows that the probability is less than 5%, so we can reject the null hypothesis and accept the alternative, there is a causal relationship running from economic growth to bank deposits. While there is no causal relationship running from bank deposits to economic growth.

Based on the results presented in table 5, we conclude that economic growth affects the growth of bank deposits in Algeria. This result is consistent with the demand-following hypothesis and (Awdeh, 2012) empirical result. So, the development of the real economy in Algeria has led to increased demand for financial services, which in turn requires the introduction of new financial institutions and markets to meet this increased demand for financial services.

6. CONCLUSION

This study assessed the causality between economic growth and bank deposit growth in Algeria. To validate whether the demand-following hypothesis holds in a typical developing country. The empirical results revealed that there is no co-integration between economic growth and deposits, and there is no causal relationship running from deposit to economic growth. While there is a unidirectional causality running from

economic growth to deposits, which shows that economic prosperity will have a major impact on the saving activities of banks. That means, the demand-following hypothesis for Algeria is true, so we can say that growth led to bank deposit growth in Algeria.

This causal relationship is due to, economic growth increasing GDP per capita. Since the GDP per capita measures the community's income level, increased income will stimulate individual savings and, consequently, the growth of commercial bank deposits, depending on the theory of permanent income.

Based on the findings we recommend, policies applied by the government should be considering that there is no causality relationship running from bank deposits to economic growth in the short and long run, while economic growth affected deposit growth in the short run. So, during high economic prosperity years, commercial banks must provide facilities that help to accumulate deposits.

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6. Appendice

appendix 1. Critical values for the Engle-Granger test

Number of right-hand variables in regression, excluding trend or constant (n - 1)	Sample size (T)	Probability that $(\hat{\rho} - 1)/\hat{\sigma}_\epsilon$ is less than entry						
		0.010	0.025	0.050	0.075	0.100	0.125	0.150
Case 1								
1	500	-3.39	-3.05	-2.76	-2.58	-2.45	-2.35	-2.26
2	500	-3.84	-3.55	-3.27	-3.11	-2.99	-2.88	-2.79
3	500	-4.30	-3.99	-3.74	-3.57	-3.44	-3.35	-3.26
4	500	-4.67	-4.38	-4.13	-3.95	-3.81	-3.71	-3.61
5	500	-4.99	-4.67	-4.40	-4.25	-4.14	-4.04	-3.94
Case 2								
1	500	-3.96	-3.64	-3.37	-3.20	-3.07	-2.96	-2.86
2	500	-4.31	-4.02	-3.77	-3.58	-3.45	-3.35	-3.26
3	500	-4.73	-4.37	-4.11	-3.96	-3.83	-3.73	-3.65
4	500	-5.07	-4.71	-4.45	-4.29	-4.16	-4.05	-3.96
5	500	-5.28	-4.98	-4.71	-4.56	-4.43	-4.33	-4.24
Case 3								
1	500	-3.98	-3.68	-3.42	—	-3.13	—	—
2	500	-4.36	-4.07	-3.80	-3.65	-3.52	-3.42	-3.33
3	500	-4.65	-4.39	-4.16	-3.98	-3.84	-3.74	-3.66
4	500	-5.04	-4.77	-4.49	-4.32	-4.20	-4.08	-4.00
5	500	-5.36	-5.02	-4.74	-4.58	-4.46	-4.36	-4.28

The probability shown at the head of the column is the area in the left-hand tail.

Source: P. C. B. Phillips and S. Ouliaris, "Asymptotic Properties of Residual Based Tests for Cointegration," *Econometrica* 58 (1990), p. 190. Also Wayne A. Fuller, *Introduction to Statistical Time Series*, Wiley, New York, 1976, p. 373.