

The impact of financial development indicators on real GDP in Algeria A standard study during the period 1990-2017

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Summary : The study aims to analyse the influence of financial development indicators on real GDP in Algeria during the period 1990-2017. The ARDL approach was employed to estimate the model, in the long-run the results showed that only the ratio of private sector credit to GDP was significant and negative, meaning that the influence of the private sector on real GDP is very weak. And the error correction model results showed that the real GDP converges on its long-run equilibrium by 113.8% in one period (a year), so the equilibrium in the long-run will be attained before one year.

Keywords: Financial system; Financial development; Economic growth; Algeria; ARDL approach.
Jel Classification Codes : C51, G00.

I- Introduction :

Economic growth is one of the most important economic indicators that reflects the economic performance of all economies, and increasing growth rates is the key objective of all countries over the world even if their economic structures are different. In another side the financial sector is one of the vital sectors of the economy and it plays a major role in increasing growth rates because it transfers savings from savers to investors so it directs money towards high-value investment projects that serve the national economy, it also provides the necessary information on the profitability of investment projects and facilitates the exchange of goods and services by reducing the costs associated with exchanges. Therefore, the Financial development has become increasingly important in recent decades due to the important role played by the financial sector in promoting balanced and sustainable economic growth, as well as improving economic efficiency and stability, because an efficient financial sector is the optimal channel for transferring savings towards more efficient and profitable economic sectors as well as attracting foreign investment to contribute to the economic development.

Based on the above, the problem of this study can be formulated in the following question:
What is the impact of financial development on economic growth in Algeria?

To answer this question, we made the following hypothesis:
Indicators of financial development do not cause economic growth in the case of the Algerian economy.

I.1. The concept of financial development:

According to the world bank report (2018), the financial system in a country is defined to include financial institutions (banks, insurance companies, and other nonbank financial institutions) and financial markets (such as those in stocks, bonds, and financial derivatives). It also includes the financial infrastructure (which includes, for example, credit information-sharing systems and payment and settlement systems)¹. It can also be defined as the system which allocates funds from surplus economic units to deficient economic units within the economy.

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The financial system provides multiple services to the government, the business sector and the family sector, the government regulates and controls the operations of the financial system and uses it in return as a source of expenditure and financing of its budget deficit, while the business sector uses it to finance its investments and it is used by families to obtain loans, and these services aimed to achieve equitable distribution of national income and support economic growth as well as maintain the stability of the economy.

According to Asli Demirguc and Rose Levine (2008), in a World Bank's working paper, the five key of a financial system are²:

- Producing information ex-ante about possible investments and allocate capital.
- Monitoring investments and exerting corporate governance after providing finance.
- Facilitating the trading, diversification and management of risk.
- Mobilizing and pooling savings.
- Easing the exchange of goods and services.

Since financial markets are imperfect and acquiring and processing information about investments is costly, we can define financial development as "The process of reducing the costs of acquiring information, enforcing contracts and making transactions"³. It can also be defined as the improvements in the quality of the five key financial functions above. And here comes the role of people in creating financial products and institutions for getting profits, and also government in providing the appropriate system.

Measuring the financial development directly is a major challenge due to its vastity, but the world bank's Global financial development developed several measures of four characteristics of both financial institutions and financial markets, for each of the four characteristics there are measures building on a review of empirical literature on financial system from previous research. These four characteristics according to the world bank's working paper (2012) are⁴:

- The size of financial institutions and markets (financial depth).
- The degree to which individuals can use financial institutions and markets (access).
- The efficiency of financial institutions and markets in providing financial services (efficiency).
- The stability of financial institutions and markets (stability).

These measures might not fully capture all features of financial systems but they are proxies of the services provided by the financial system and strongly associated with financial sector policies, that is why they are used to characterize and compare financial systems across countries.

The comparisons of financial development measures often lead to the erosion of the performance of African countries, that is why the AFD (French Agency for Development) has developed six dimensions and the most popular indicators for each of them.

The dimensions and the selected indicators for Africa according to the French Agency of Development (2007) are as follow⁵:

* **Depth:** The financial depth refers to the importance of the financial sector in directing saving to profitable investments. Among the indicators used to measure financial depth we find:

- Total financial assets / GDP.
- Private sector credit / GDP.
- Deposits of the financial system / GDP.
- Share capitalization / GDP.

* **Access:** It is the ability of various economic agents to access and obtain various financial services. Many indicators can be used to measure financial access:

- Private sector credit / GDP.
- Number of wickets for 100 000 inhabitants.
- Borrower rate.
- Risk premium of bank loans.

* **Efficiency:** The efficiency of the financial system reflects the ability of the financial system to provide products and services with high quality and lowest costs. We can measure it by:

- Concentration of the banking system.

- Liquidity of the stock market.
- Monetary liquidity (M2/PIB).
- Interest rate spread.
- Bank overheads.

* **Stability:** The stability of the financial system indicates the ability of financial institutions to withstand macroeconomic shocks, and we can use these indicators to measure it:

- Central bank assets / GDP.
- Currency reserves in month of importation.
- Transparency and financial reporting.
- Total public debt / GDP.
- Inflation.

* **Openness:** It refers to the possibility of sending and receiving financial flows without restrictions, and also to the entry of foreign financial institutions into the financial sector. It can be measured by:

- Foreign direct investment.
- Loans granted by foreign banks.
- Migrants remittances.

* **Institutions of support and regulation:** It refers to the existence of rules and organizations that allow the settlement of financial contracts. And it is measured by:

- Financial information index.
- Development index of banking laws, balance sheet facilities and credit register.
- Contract penalty index.

1.2. The concept of economic growth:

Economic growth is one of the most important economic indicators, and improving economic growth rates is the goal of all governments over the world. Over the years, economists have developed several definitions of economic growth.

Usually they use the term growth to mean a significant increase in something: more economic activity, more production, more consumption. In this century, growth has also assumed unmistakable connotations of technology, industrialism, materialism and consumerism⁶. But generally, they defined economic growth by the increasing of nation's total wealth or more precisely it is defined as an increase in the production of economic goods and services, compared from one period of the time to another (normally a year). It is measured by the increase of real gross domestic product (GDP) which is the total value of all final goods and services produced within a country over a period of time. And the concept of economic growth must include the following conditions:

- An increase in GDP should result to an increase in per capita income, so the GDP growth rate should exceed population growth rate.
- The increase of per capita income should be real.
- The increase in real per capita income must be sustained in the long term.

There are two ways of calculating GDP according the World Bank Learning resources series (2004)⁷:

- By adding together all the incomes in the economy (wages, interest, profits and rents).
- By adding together all the expenditures in the economy (consumption, investment, government purchases of goods and services, and net exports).

and the results of both calculations should be the same because one person's expenditure is always another person's income.

A growing GDP is not just about making money but it is an evidence that society becomes more tightly organized, more densely interwoven, energies are better directed, resources better deployed and techniques mastered⁸, and the importance of a positive economic growth appears in the level of employment which increases the standard of living and reduces poverty, its also reduce the fiscal deficit in the financial budget and support the balance of payments through the development of economic plans that contribute to its improvement, and finally it achieve economic stability of the state.

I. 3. The relation between financial development and economic growth:

Based on empirical and theoretical framework, economists hold different views on the relationship between financial development and economic growth. These views are:

- **Supply-leading view:** this view postulates that financial development has a positive effect on economic growth and the causal effect runs from financial development to economic growth, this effect is caused by an improvement in the efficiency of capital accumulation, an increase in the rate of savings or an increase in the rate of investment⁹.
- **Demand following view:** according to this view an increase in real economic growth causes a rise in the demand for financial services which results in the financial sector expansion, this means that financial development responds to economic growth¹⁰.
- **Mutual impact of finance and growth:** it supports the fact that growth in the financial sector could be followed by an equal response of the economy¹¹.
- **Null relationship view:** this view postulates that there is no relationship between financial development and economic growth.

I.4. The previous research:

Economists have long debated the role of financial sector in economic growth, some studies suggest that there is a positive relationship between financial development and economic growth and other studies found that financial system adversely effects economic growth.

There are some of recent literature reviews:

- Musharavati Ephraim Munyanyi (2017), “**The dynamic relationship between financial development and economic growth: New evidence from Zimbabwe**”¹²: This study seeks to examine the causal relationship between financial development and economic growth in Zimbabwe during the period 1965-2015, using the real gross domestic product per capita to represent economic growth, the ratio of bank deposit liabilities to nominal national income to present financial intermediation, and the ratio of bank’s financing to nominal national income to represent financial deepening. The results of Toda and Yamamoto Granger Causality Test showed that there is no causality between bank financing and economic growth which means that bank financing is not a significant driver of economic growth in the economy of Zimbabwe, the results also showed that there is a unidirectional causal relationship running from economic growth to bank deposits.
- Betul Mutlugun (2014), “**The relationship between financial development and economic growth for Turkey**”¹³: this study aims to clarify the controversial relationship between financial development and economic growth for Turkey. The author used natural logarithms of private credit and private credit as a share of domestic credit as proxies of financial development, and natural logarithms of real GDP as a proxy of economic growth. Quarterly time series data between 1988-2012 period were used, and according to Granger causality test, the direction of causality runs from economic growth to financial development, and the result of Vector Auto Regression (VAR) model showed that there is a short run relationship between financial development and economic growth and there is no long run relationship between these variables.
- Rodjers A.Musamali, Esman M.Nyamongo and Eliud D.Moyi (2014), “**The relationship between financial development and economic growth in Africa**”: this study examines the relationship between financial development and economic growth using a cross section of 50 African countries for the period 1980-2008. Two proxies of financial development were employed: the ratio of credit to the private sector to total GDP and the ratio of broad money (M2) to total GDP. The results showed that there is a positive relationship between financial development and economic growth, but the relationship

between private sector and economic growth is much stronger than the relationship between money supply and economic growth. The result from causality test showed that the relationship between financial development and economic growth is bi-directional.

II- Methods and Materials:

II.1. The study variables and their sources:

As a dependent variable real GDP growth rate is employed to measure the economic growth because it is a much better index for expressing long-term national economic performance and it is more useful measure than the nominal GDP growth rate because it considers the effect of inflation on economic data.

The control variables include:

- The ratio of gross domestic saving to GDP (GDS), as a measure of financial depth
- The ratio of private sector credit to GDP (PSC), which measures financial access.
- The ratio of broad money to GDP (m2), as a measure of financial efficiency.
- Inflation rates (INF) as a measure of financial stability.
- The ratio of foreign direct investment to GDP (FDI) as a measure of openness.

All data were collected from The World Bank database, except the series of the ratio of broad money to GDP (m2) which was collected from the reports of the bank of Algeria.

II.2. Statistical and standard tools used:

To investigate the impact of financial development on economic growth in Algeria during the period 1990-2017, the Augmented Dickey Fuller test (ADF) will be used to examine the time series properties, then, the long and short-run parameters of the model will be estimated by the Autoregressive Distributed Lag approach (ARDL) developed by Pesaran et Al (2001) using the EViews 9 program.

III- Results and discussion :

III.1. Analysis of the evolution of the variables during the study period:

A. The evolution of real economic growth:

Figure 1 shows that the development of real GDP in Algeria during the period from 1990-1998 has fluctuated between positive and negative rates due to the oil crisis in 1986 and the economic reforms through the structural stabilization program and the structural adjustment program adopted by Algeria to break the pattern of socialist economy. During the next period the real GDP increased considerably due to the adoption of capitalist system and of course the rise in oil prices which is the main resource of the state.

B. The evolution of the financial development indicators:

Based on (Figure 2) which illustrates the evolution of the financial development indicators in Algeria during the period from 1990 to 2017, we can note that:

- The inflation rate (INF) rose from 9.3% in 1990 to 29.8% in 1995, this rise is due to the devaluation of national currency under the IMF-supported programs. Then, it fell to 0.3% in 2000 due to the restrictive fiscal and monetary policy under the application of structural

correction program. After that, the inflation rate increased to 8.9 % in 2012 due to the expansionary fiscal policy to finally reach 5.6% in 2017.

- We can note that the ratio of gross domestic saving to GDP (GDS) was positive during the study period, but it was stable at about 25% which is not considered as great rates.
- The ratio of private sector credit to GDP (PSC) decreased from 56.14% in 1990 to 3.91% in 1997 which is the lowest rate during this period, after that, this percentage knew a continuous rise until it reached 24.77% in 2017, this increase is due to the institutions of investment loan guarantee funds that contributed to the development of SMEs by facilitating their access to loans in order to enhance the spirit of entrepreneurship and give greater importance to the private sector.
- The ratio of broad money to GDP (m2) was high during the early years of the 1990s due to the devaluation of the Algerian Dinar, after that it rose rapidly from 37.83% in 2000 to 56.84% in 2001, and this rise lasted up to 79.11% in 2017 these can be attributes to the economic recovery programs and the increased cash balances.
- The ratio of foreign direct investment to GDP (FDI) was almost non-existent during the period from 1990 to 1995 and this is due to the specific ceiling for the contribution of the foreign party in the investment projects, from 1996 to 2009 the (FDI) rose due to the development of investment and granting several facilities but it was directed to the hydrocarbons sector, however, after restricting the (FDI) by the rule of (49%-51%, the (FDI) inflows have fallen again.

III.2. The results of the stability test and model selection:

A. Stability test:

To determine the stability level of time series used in the study Augmented Dickey-Fuller test (ADF) was employed and the results are presented in the table 1.

As it is shown in (Table 1), the data Series of the ratio of private sector credit to GDP (PSC) is stationary in its original level but the series of the other variables of the study are stationary after the first difference.

B. The model selection:

Since the series used in this study are integrated in both orders zero I (0) and one I (1), we will apply the Auto Regressive Distributed Lag approach (ARDL) to estimate the model. The first step is to select the best model from the top 20 different ARDL models evaluated using the Akaike Information Criterion (AIC) and as it is shown in (Figure 3), the best model is ARDL (1.2.3.2.3.0).

The second step is the ARDL cointegration test which is based on the Wald test (F statistic), as we can see in (Table 2) the computed F-statistic is greater than the upper bound critical values, then we reject the null hypothesis (H_0), meaning that the variables used in the model are cointegrated.

III. 3. The model estimation:

Since the bounds testing has shown that there is a long-run relationship between the variables, we can now estimate the parameters of the best selected model.

A. The long-run ARDL model:

Based on the findings in (Table 3) which contains the results of the long-run ARDL model, all the parameters are statically non-significant except the parameter of the ratio of private sector credit to GDP (PSC) which is statically significant at 10%, so the elasticity of the real GDP for the (PSC) is (-0.4528), hence a 1% increase in (PSC) will lead to a decrease of 0.45% in the real GDP, and this is evidence of the weak contribution of the private sector on real GDP and the disregard for the Algerian economy for the diversity of sources of income. Finally, since the (PSC) is a used to measure financial access we can say that there is no ability of various economic agents to access and obtain various financial services.

B. Cointegrating form:

Through the results of the short-run model which are summarized on (Table 4) we conclude:

- There is a positive relationship between the lagged ratio of private sector credit to GDP (PSC(-2)) and the real GDP, the coefficient is significant at 10%, 5% and 1%, meaning that a 1% increase in (PSC(-2)) will lead to a 0.2620% increase in real GDP, which means that the private sector credits take two years to influence the real GDP.
- Real GDP is negatively and significantly related to the second lag of inflation at 10%, suggesting that 1% appreciation of (INF(-2)) will lead to a 0.2352 % decrease in real GDP.
- The third lag of inflation (INF(-3)) is positively related to real GDP at 10% level of significance, this reveals that 1% increase in (INF(-3)) will lead to a 0.1321% increase in real GDP .
- The coefficient of (ECT) is negative and statically significant in all levels, this result reveals that the real GDP converges on its long-run equilibrium by 113.8%, in another way we can say that the speed of adjustment for the long-run equilibrium is approximately 113.8% in one period (a year), so the equilibrium in the long-run will be attained before one year.

III.4. Diagnostic test results:

In this last step we applied some diagnostic tests to valid the results of the estimated model. And as it is shown in (Table 5) all probabilities are upper than the levels of significance (10%, 5%,1%), we conclude that:

- Lagrange Multiplier test evidenced shows that there is no correlation in the model.
- Jack-Berra test evidenced that the residuals are normally distributed.
- Breusch-Pagan-Godfrey test confirmed that the model is not heteroscedastic.

The Cumulative sum (CUSUM) test based on the recursive regression residuals (Figure 4) confirms that the coefficients of the regression are stable because the plot of these statistics fall inside the critical bounds of 5 % significance. Thus, the model estimated pass all diagnostic tests.

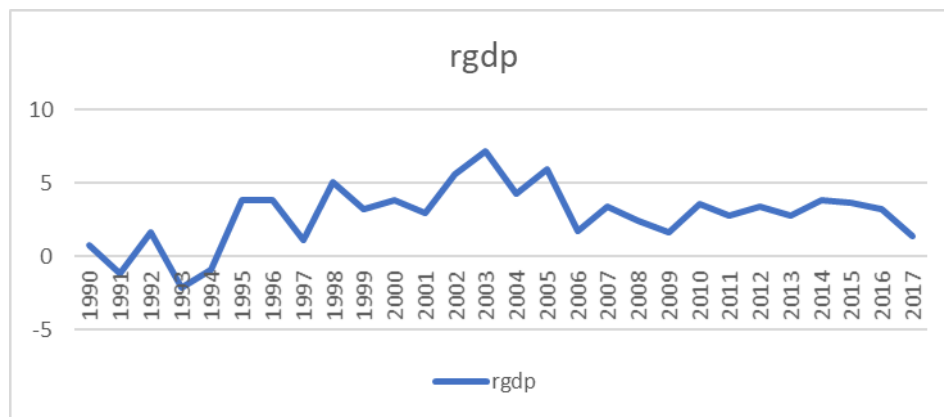
IV -Conclusion:

Through this study which aimed to determine the effect of financial development indicators on real GDP in Algeria during the period from 1990 to 2017, we have reached the following conclusions:

- The results of Augmented Dickey-Fuller test (ADF) showed that the time series used in the study are integrated in order zero and order one.
- The bounds test results showed that the variables used in the model are cointegrated.
- The estimation of the long-run ARDL model showed that only the parameter of the ratio of private sector credit to GDP (PSC) is significant.
- The results of the cointegrating form showed that the ratio of private sector credit to GDP (PSC) and the inflation rate affect the real GDP in the short-run.
- Finally, the coefficient of (ECT) showed that the speed of adjustment of the real GDP for the long-run equilibrium is 113.8% in one year, so the equilibrium in the long-run will be attained before one year

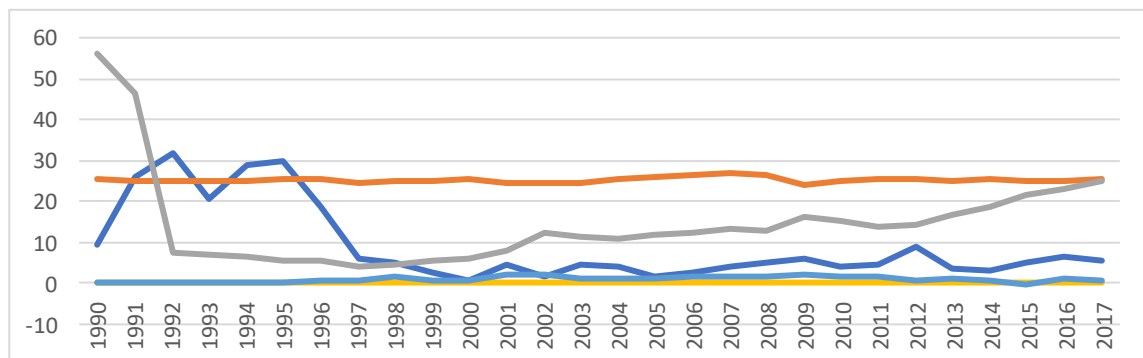
- Appendices:

Figure(1) : Algerian real GDP during the period 1990-2017.



The source: Based on the World Bank data.

Figure (2): Financial development indicators during the period 1990-2017.



The source: Based on the World Bank and the reports of the bank of Algeria data.

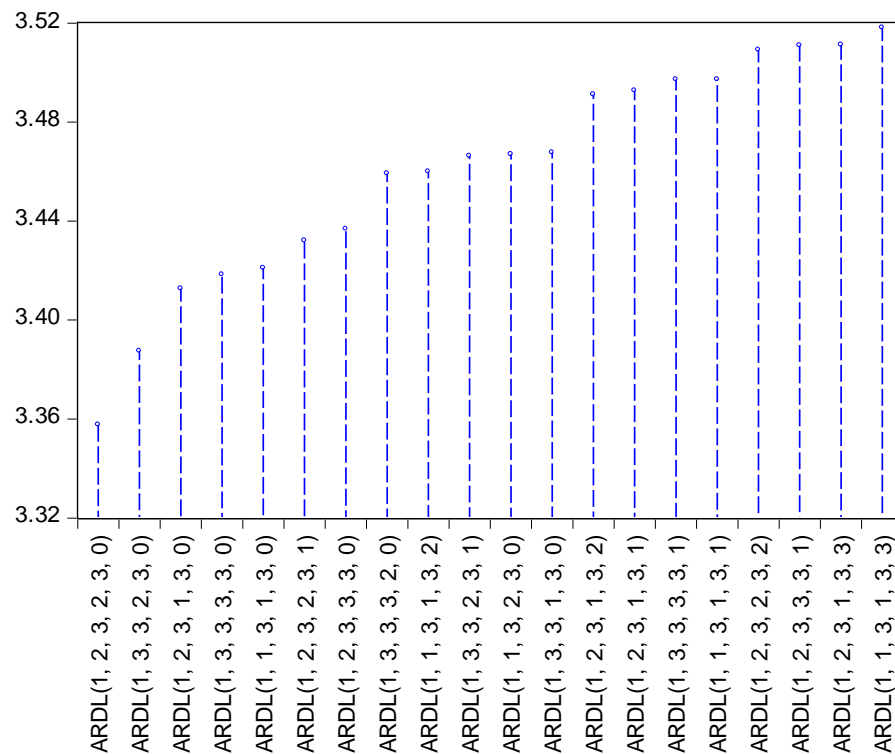
Table (1): Unit root test results (ADF)

Variables	Level			1st difference		
	T and C	C	None	T and C	C	None
Rgdp	-3.1950	-3.1866**	-0.8726	-8.4346***	-8.3317***	-8.4712***
Gds	-3.0820	-3.0427**	-0.0430	-5.4497***	-5.5635***	-5.6807***
Psc	-5.1802***	-4.5753***	-3.2490***	-	-	-
m2	-3.4177*	-0.6641	0.3556	-4.9704***	-5.0698***	-5.0083***
Inf	-2.2604	-1.5896	-1.2334	-5.6101***	-5.6510***	-5.6827***
Fdi	-2.5950	-2.6407*	-1.3292	-5.7749***	-5.4357***	-5.5351***

The source: Based on EViews 9 output.

Note: (***) and (**) and (*) denote statistical significance level at 1%,5% and 10%, respectively.

Figure 3: Model criteria graph.
Akaike Information Criteria (top 20 models)



The source: EViews 9 output.

Table (2): Bounds test results.

F-statistic	Lower critical value	Upper critical value	level of significance
6.1161	2.26	3.35	10%
	2.62	3.79	5%
	2.96	4.18	2,5%
	3.41	4.68	1%

The source: Based on EViews 9 output.

Table (3): Long run coefficient.

Variables	Coefficient	Probability
GDS	-0.5683	0.3050
PSC	-0.4528	0.0927*
M2	0.1156	0.2577
INF	0.0545	0.5142
FDI	0.1913	0.7616
C	15.519	0.3115

The source: Based on EViews 9 output.

Note: (*) denote statistical significance level at 10%.

Table (4): Cointegrating form.

Variables	Coefficient	Probability
D(GDS(-1))	0.8305	0.2326
D(PSC(-2))	0.2620	0.0050***
D(m2(-1))	0.0752	0.3135
D(INF(-1))	-0.2352	0.0718*
D(INF(-2))	0.1321	0.0944*
D(FDI)	0.2178	0.7604
CointEq(-1)	-1.1385	0.0011***

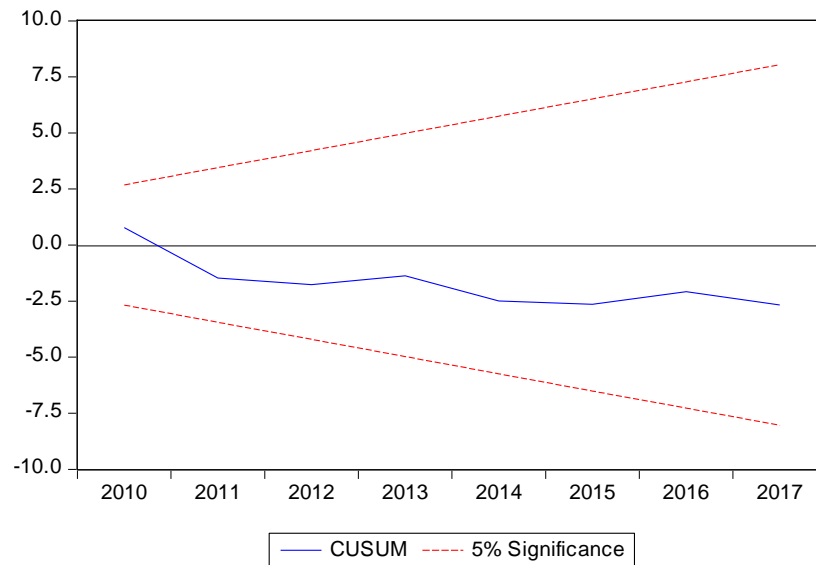
The source: Based on EViews 9 output.

Note: (***) and (**) and (*) denote statistical significance level at 1%,5% and 10%, respectively.

Table (5): Results of diagnostic tests.

Test	Value	Probability
LM test	2.1406	0.1988
Jack-Berra	1.4561	0.4828
Breusch-Pagan-Godfrey	1.8466	0.1912

The source: Based on EViews 9 output.

Figure (4): Cusum test.

The source: EViews 9 output.

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