

# Financial Sector Development and Economic Growth in Algeria: An ARDL Bounds Testing Approach 1980-2017

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## Abstract:

This study empirically examines the relationship between financial sector development and economic growth in Algeria over the period 1980–2017, using the auto-regressive distributed lag approach to co-integration analysis, depending on real gross domestic product per capita as a dependent variable, broad money and domestic credit to private sector as a measure of financial development. Our results reveal that the relationship between financial development and economic growth in Algeria is not significantly different from what has been observed generally in oil-dependent economies. The finance-growth relation in Algeria is found to be insignificantly positive. These findings suggest a dire need for financial reforms in Algeria in order to improve efficiency in the financial sector so as to stimulate investment and saving and thus, long-term economic growth.

**Keywords:** Financial Development, Economic Growth, ARDL Method, Algeria.

**JEL classification:** O11, O16, O47, C22, O55

## I. Introduction:

The importance of financial sector development in promoting economic growth has been studied extensively in the literature (e.g., Robinson 1952; Gurley & Shaw 1955, 1960; Patrick 1966; Porter 1966; Goldsmith 1966, 1969; Khatkhate 1972; McKinnon 1973; and Bhatia & Khatkhate 1975; Meier & Seers 1984; Lucas 1988).

In theoretical literature, there are four different views on the direction of the causality between economic growth and financial development. The first view states that financial development is a precondition for economic growth; this is known as “supply leading” notion and emerged due to Schumpeter (1911) and Patrick (1966). The second view of the relationship between the two variables advocates that real economic growth leads financial development and this view is known as “demand-following” gave by Robinson (1952). The third view gave by Demetriades and Hussein (1996); Greenwood and Smith (1997) argues that there exists bidirectional causality between these two variables. The fourth view gave by Meier and Seers (1984) and Lucas (1988) says that there is no link between growth and financial development.

And much of the subsequent literature has focused attention on the empirical aspects of this relationship by considering various data-sets, country groupings, time periods, etc., and different indicators of financial development, and using a whole host of econometric techniques. Thus, the debate over the causal relationship between the evolution of means of finance and economic growth has become the focus of many applied studies that have given mixed results.

As the rest of the Third World countries, Algeria has implemented many financial reforms (financial liberalization) aimed at deepening and improving the efficiency of the financial sector in order to become a main channel of contributing to the economic process and reducing the dependence of the economy on the income of the oil sector, since the 1990’s to moving from a planned market economy to an open market economy.

Therefore, the aim of this paper is to examine the link between financial sector development and economic growth in Algeria over the period 1980–2017, using the auto-regressive distributed lag approach to co-integration analysis; in order to confirm whether reforms in the financial sector have had a positive impact on economic growth or not.

The remainder of this paper is organized as follows: Section 1 provides a literature review on the financial development-growth relation. Section 2 discusses the data and the methodology. Section 3 presents the empirical results. Finally, Section 4 concludes the paper.

### 1. The Theoretical Framework: The Finance-Growth Nexus

Economic history contains many examples of linkages between financial sector development and economic growth; there are a priori four possibilities concerning the causal relationship between financial development and economic growth.

#### 1.1. The demand-following approach:

Financial development follows economic development. Economic growth causes financial institutions to change and develop and financial as well as credit markets to grow. Financial development is thus demand-driven; (Graff, Michael, 2001) we may term as demand-following the phenomenon in which the creation of modern financial institutions, their financial assets and liabilities, and related financial services is in response to the demand for these services by investors and savers in the real economy. In this case, the evolutionary development of the financial system is

a continuing consequence of the pervasive, sweeping process of economic development. (Patrick, H. T. 1966)

### **1.2. The supply-leading approach:**

Financial development is a determinant of economic growth. The line of causation runs from financial development to real development; (Graff, Michael) we may term as supply-leading the phenomenon in which the creation of financial institutions and the supply of their financial assets, liabilities, and related financial services in advance of demand for them, especially the demand of entrepreneurs in the modern, growth-inducing sectors. "Supply-leading" has two functions, to transfer resources from traditional (non-growth) sectors to modern sectors (where are dominated by internationally modern technology, rationality and modern institutions and other forms of economic organization), and to promote and stimulate an entrepreneurial response in these modern sectors. (Patrick, H. T)

### **1.3. The bidirectional causality :**

Financial development may at least occasionally and in the short run turn out to be an impediment to economic growth. Here, as in second hypothesis, the line of causation runs from financial development to real development, but the focus lies on potentially destabilizing effects of financial overtrading and crises rather than on the smooth functioning of the financial system. This view conceives the financial system as inherently unstable. While some theoreticians are ready to include commercial banks into the sources of financial distress, most proponents direct their attention towards stock markets or international capital flows. (Patrick, H. T)

### **1.4. Lack of causal relationship :**

Financial development and economic growth are not causally related. Neither of the two has considerable effects on the other, and the observable (and empirically firmly established) correlation between them is merely the result of a historical peculiarity: economies grew, and so did their financial sectors, but the two followed their own logic. (Patrick, H. T)

## **2. Literature review**

Many developing economies have recently implemented a wide variety of financial liberalization measures that have led to significant changes in their financial structures. At the same time, some of these economies have managed to achieve high rates of economic growth, while others have lagged behind. Although differences in their economic performance can be attributed to many factors, there is a growing belief among economists that financial development has played an important role in promoting this high rate of economic growth.

Financial development is generally defined as the improvement in quantity, quality and efficiency of financial intermediary services. Whilst theoretical economists were trying to model the hypothetical relationship between financial development and economic growth, empirical researchers were examining the appropriateness of the different indicators for financial intermediation.

Singh (1997), concluded that financial development may be not beneficial to growth for several reasons, the inherent volatility and arbitrariness of the stock market pricing process under development countries conditions make it a poor guide to efficient investment allocation, the interactions between the stock and currency markets in the wake of unfavorable economic shocks may exacerbate macroeconomic instability and reduce long-term growth, stock market development is likely undermine the existing industry group-banking systems in development countries, which,

despite their many difficulties, have not been without merit in several countries, not least in the successful East Asian economies.

Sala-i-Martin and Artadi (2003), analyzed the economic growth performance in the Arab world over the last forty years. The Arab world has managed to reduce poverty performance despite its relatively disappointing growth performance. They related this poor performance of both oil and non-oil producers to investment. Contrary to widespread belief, there was no evidence that low quantity of investment is the main of low growth. The decline in the investment rate followed rather than preceded the reduction in the aggregate growth rate. The results concluded that the low quality of investment is the key determinant of growth. The excessive reliance on public investment, the low quality of financial institutions, the bad business environment (due to political and social instability and to excessive public intervention) and the low quality of human capital are important determinants of systematically unproductive investment decisions and, thus, low economic growth.

Al-Awad and Harb (2005), investigated the relationship between financial development and economic growth in the middle east countries using methods of panel co-integration and Granger causality, the results indicate that in the long-run term financial development and economic growth may be related to some level, in the short-run term, the panel causality points to real economic growth as the force that drives changes in financial development while individual countries causality fail to give a clear evidence of the direction of causations.

Nili and Rastad (2007), provided an explanation for the observed puzzle of high investment rate and low economic growth for the oil economies. According to their findings, the quality of investment is lower in the oil economies and this comes from the lower quality of financial institutions which is translated into the poor performance of economic growth. The low quality of financial institutions might be associated with the dominant role of government in total investment and also the weakness of the private sector in these countries.

Caporale, Rault, Sova, and Sova (2009), examined the relationship between financial development and growth in 10 new European Union members by estimating a dynamic panel model over the period 1994-2007. According to their findings stock and credit markets are still underdeveloped in these economies, and their contribution to economic growth is limited owing to a lack of financial depth. On the other hand, they find that a more efficient banking sector is accelerating growth, and the causality test indicate that causality runs from financial development to economic growth, but not in the opposite direction.

Hassan and al. (2011), examined panel regressions with cross-sectional countries and time-series proxy measures to study linkages between financial development and economic growth in low, middle and high-income countries over the period 1980-2007, found that there has been a positive association between finance and economic growth for developing countries but contradictory results for high-income countries, while financial development may be necessary, it is not sufficient to attain a steady economic growth rate in developing countries.

Jedidia and all (2014), examined an empirical investigation of whether financial development can boost economic growth in Tunisia, using an Autoregressive Distributed Lag method to assess the finance-growth relation, the empirical results showed that the domestic credit to private sector has a positive effect on the economic growth suggesting that the financial development is a driver of a long

term economic growth, but subject to a financial fragility at the short run. Moreover, this study confirmed the view of bidirectional relationship between credit and economic growth.

Law and Singh (2014), considered a panel of 87 developed and developing countries over the period 1980-2010, using dynamic panel threshold technique, the results indicated that there is a threshold effect in the finance–growth relationship; beyond the threshold level further development of finance tends to adversely affect growth. The findings suggest that more finance is definitely not always better and it tends to harm economic growth after a point. Therefore, knowing the optimal level and efficient channeling of financial resources to productive activities is important in ensuring the effectiveness of financial development.

Karagiannis and Kvedaras (2016), examined empirically the association between financial development and economic growth in several regions, emphasizing the European Union (EU) and the Euro area (EMU) context, the results obtained indicate that an economy’s financial structure has a central role in the association between financial development and economic growth, it is shown that credit provided by banks (as a % of GDP) has a non-linear effect on growth and, given the actual financing structure, the peak of the positive impact (turning point) is close to 50% of the GDP. Therefore most of the European countries would have benefited in terms of economic growth rates if bank credit penetration relative to the gross domestic product were smaller during the analyzed period.

Coulibaly (2018), investigated the impact of financial development on economic growth in seven West African Economic and Monetary Union (WAEMU) countries from 1970 to 2014. Specifically, they have tested the effect of financial development on growth as countries develop financially and economically and tend towards the respective levels of rich countries such as the USA, France and Japan. Estimated results indicate on the one hand that the effect of financial development on growth is declining in WAEMU countries as they grow economically to reach USA, France and Japan levels. On the other hand, the effect of financial development on growth is improving when the financial system of WAEMU countries converges to those of USA, France and Japan’s levels. The results also show a strong impact of financial development in the case of convergence of financial systems relative to the convergence of incomes.

## II .METHODS AND MATERIALS

### 1. Data Description :

The data we have employed for Algerian economy are annual figures covering the period 1980–2017. Using the auto-regressive distributed lag (ARDL) approach to co-integration analysis proposed by Pesaran and al. (2001). The data was collected from the World Development Indicators (WDI) data base. Where RGDPPC is the dependent variable and PRIV, M2, INV, TRAD and INF are the explanatory variables.

#### 1.1. Multicollinearity (Correlation Matrix between the independent variables)

It is clear from the graphs of the original time series that there is a fluctuation in these series indicating that they contain a time trend, and therefore may be not stationary at the level, and to study the stationarity of these series, stationarity tests are used.

#### 1.2. Stationarity test « Unite Root Test »:

The order of integration of the variables is investigated first. The stationarity tests is performed first in levels and then in first difference to establish the presence of unit roots and the order of

integration in all the variables. The results of the Augmented Dickey-Fuller (ADF) stationarity test in the table 3 show that the variables are integrated of order one I(1). It means that all variables are stationary in the 1st difference.

$H_0$  (Null Hypothesis): dependent variable has a unit root

## 2. Empirical Methodology :

This study links economic growth financial development controlling for the influence of, trade openness, investment and inflation.

### 2.1. The empirical model:

This relationship is given in the long-linear empirical model below:

$$RGDPPC = a_0 + a_1M2 + a_2PRIV + a_3INV + a_4TRAD + a_5INF + \varepsilon_t \quad (1)$$

Where  $\varepsilon_t$  is the error term, RGDPPC represents real GDP per capita for economic growth, M2 and PRIV represent financial development indicators, TRAD is for trade openness; INV is for the rate of investment represented by the ratio of gross fixed capital formation to GDP and INF is for inflation.

The ARDL approach offers some desirable statistical advantages over other co-integration techniques. While other co-integration techniques require all the variables to be integrated of the same order, ARDL test procedure provides valid results whether the variables are I(0) or I(1) or mutually co-integrated and provides very efficient and consistent test results in small and large sample sizes (see Pesaran et al., 2001). The small number of observations and the order of integration make ARDL the preferred approach in this study.

### 2.2. The ARDL model :

The lag order of model based on Akaike Information Criterion (AIC) is :ARDL(1, 1, 0, 0, 0, 0);

The ARDL model can be specified as:

$$\begin{aligned} (RGDPPC)_t = & 362.1498 + 0.7872(RGDPPC)_{t-1} - 0.2958(M2)_t + 2.9708(M2)_{t-1} \\ & - 1.4013(PRIV)_t + 7.49(INV)_t + 4.4512(TRAD)_t - 7.404(INF)_t \end{aligned} \quad (2)$$

## III .RESULTS AND DISCUSSION

### 1. Co-integration test :

The results in the table 6 indicate that the F-statistic is greater than the upper critical bound at all significance levels. This study therefore rejects the null hypothesis of no co-integration. This shows that there is a long-run causal relationship among the variables.

### 2. Long-Run Estimates:

The estimated long-run coefficients presented in the table 7 shows that the (M2) broad money who is a coefficient of financial intermediary development is positive and insignificant and (PRIV) domestic credit to private sector is negative and insignificant at 5% significance level, the result shows that (M2) broad money has a big influence on economic growth compared by (PRIV) domestic credit to private sector, its represents about 12% of changes in growth but (PRIV) represents just 6% of changes in growth. This indicates that financial intermediary development has a positive but insignificant long-run effect on economic growth, suggesting that financial development does not stimulate economic growth in Algeria. The empirical results found that the coefficient of inflation (INF) is negative and significant at 1% level, the coefficient of gross fixed capital (INV) and trade openness (TRAD) are all found to be positive and significant at 5% level, indicating that export of oil and hydrocarbon investment are the long-run driver of economic growth in Algeria. The long-run

coefficients in this table create a picture of an economy significantly dominated by activities in the oil sector.

### 3. Short-run error correction estimates:

The coefficient of the error correction model is negative and highly significant at 1% level, suggesting that short-run disequilibrium is corrected in the long-run equilibrium.

The short-run coefficients of financial intermediary development are negative and insignificant at 5% level. This is because the relationship was very weak, especially for the private sector. It can be explained that the Algerian economy witnessed a marked acceleration in the decline in credit to the private sector beginning in the 1990s, especially after the decline of Algeria's foreign currency incomes after the 1986 oil crisis. The results confirm the dominant role of the oil sector on economic activities in Algeria.

### 4. CUSUM and CUSUMSQ stability tests:

We also performed the CUSUM and CUSUMSQ stability test for estimated long-run and short-run models based on the estimates of equation.

It can be seen from the figures that the plots of CUSUM and CUSUMSQ statistics are well within critical bounds, implying that all the coefficients in the error correction model are stable.

## IV- Conclusion:

This paper has examined the empirical relationship between financial development and economic growth in Algeria over the period 1980–2017, using the auto-regressive distributed lag approach to co-integration analysis. The result shows that, in the long-run financial intermediary development has a positive but insignificant effect on economic growth, suggesting that financial development does not stimulate economic growth. The short-run coefficients of financial intermediary development are negative and insignificant, because of the weakness relationship especially for the private sector. The coefficient of the error correction model is negative and highly significant at all significance levels. The CUSUM and CUSUMSQ stability tests indicate that there is a stable long-run relationship between economic growth and financial development.

Based on the above findings, we can conclude that. First, the creation economic conditions in oil-dependent economies has a negative impact on the ability of financial intermediaries to allocate their resources effectively, these economic conditions have been specified to include the general inefficiency of financial institutions, the dominant role of the public sector in resource allocation and the weakness of the private sector. Second, the dominance of oil prices in economic activities calls for the urgent need to diversify the Algerian economy. Diversified economies are less vulnerable to external and financial shocks. Developing the financial system may be the right strategy to achieve this goal by linking the financial sector to the private sector. Finally, reinforcement the role of financial intermediaries in the Algerian economy by developing an institutional structure to channel the financial resources of the economy towards productive investment projects through the financial system that can stimulate economic activities of the private sector; reduce the encumbrance of the public sector and the domination of the oil sector in the economy.

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## Appendix:

**Table (1): Variables of Study**

Variables	Indicator Name	Definition	Source
RGDPC	GDP per capita (constant 2010 US\$)	GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Data are in current U.S. dollars.	<ul style="list-style-type: none"> <li>• WB</li> <li>• OECD</li> </ul>
M2	Broad money (% of GDP)	Broad money is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper.	<ul style="list-style-type: none"> <li>• IMF</li> <li>• IFS</li> <li>• WB</li> <li>• OECD</li> </ul>
PRIV	Domestic credit to private sector (% of GDP)	Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of non equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises.	<ul style="list-style-type: none"> <li>• IMF</li> <li>• IFS</li> <li>• WB</li> <li>• OECD</li> </ul>
INV	Gross capital formation (% of GDP)	Gross capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories.	<ul style="list-style-type: none"> <li>• WB</li> <li>• OECD</li> </ul>
TRADE	Trade (% of GDP)	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	<ul style="list-style-type: none"> <li>• WB</li> <li>• OECD</li> </ul>
INF	Inflation, consumer prices (annual %)	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.	<ul style="list-style-type: none"> <li>• IMF</li> <li>• IFS</li> </ul>

**Table (2): Descriptive statistics**

	RGDPPC	PRIV	M2	INV	TRAD	INF
<b>Mean</b>	3910.929	27.37740	61.84975	34.32164	57.35786	9.167098
<b>Median</b>	3782.160	14.61677	62.90245	32.55244	59.21953	5.822939
<b>Maximum</b>	4827.724	69.31185	83.82403	50.70906	76.68452	31.66966
<b>Minimum</b>	3164.899	3.907417	33.00584	22.44697	32.68458	0.339163
<b>Std. Dev.</b>	508.3957	24.18233	14.25673	7.365281	10.49380	8.338273
<b>Skewness</b>	0.363152	0.771370	-0.395932	0.673886	-0.373634	1.497283
<b>Kurtosis</b>	1.829220	1.863420	2.148809	2.687785	2.614951	4.170593
<b>Jarque-Bera</b>	3.005554	5.813780	2.139994	3.030450	1.118896	16.36805
<b>Probability</b>	0.222511	0.054645	0.343009	0.219759	0.571524	0.000279
<b>Sum</b>	148615.3	1040.341	2350.290	1304.222	2179.599	348.3497
<b>Sum Sq. Dev.</b>	9563249.	21637.05	7520.413	2007.153	4074.431	2572.491
<b>Observations</b>	38	38	38	38	38	38

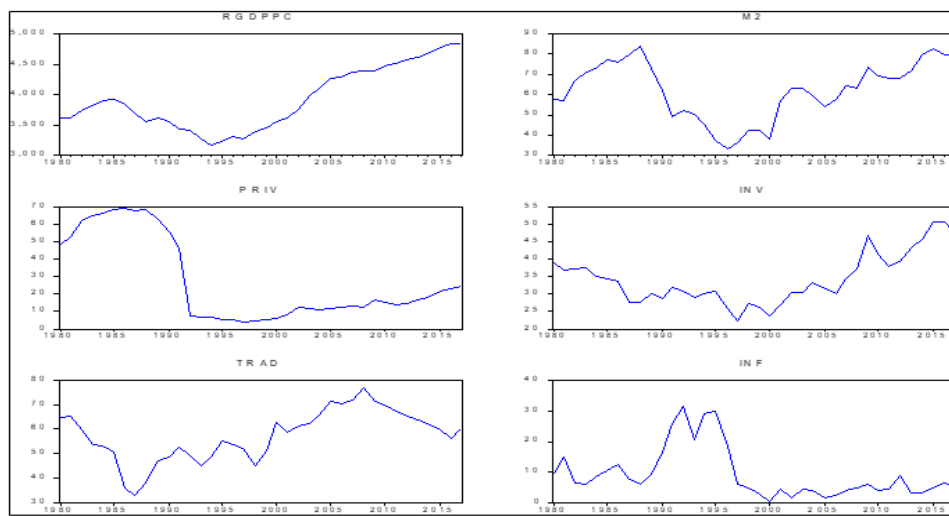
**Source:** Authors computation using Eviews10.

**Table (3): Multicollinearity**

Covariance					
Correlation	M2	PRIV	INV	TRAD	INF
M2	197.9056 1.000000				
PRIV	184.6856 0.550170	569.3961 1.000000			
INV	67.17288 0.657002	12.51436 0.072161	52.81981 1.000000		
TRAD	-2.933125 -0.020135	-112.0010 -0.453287	31.74490 0.421827	107.2219 1.000000	
INF	-43.64735 -0.377089	6.215587 0.031658	-12.54697 -0.209824	-34.01536 -0.399253	67.69714 1.000000

Source: Authors computation using Eviews10.

**Figure (1): Model variables**



Source: Authors, using Eviews10.

**Table (4): Augmented Dickey-Fuller (ADF) stationarity test**

Stationarity test							
	Level			1st difference			Decision
	Intercept	Trend and Intercept	None	Intercept	Trend and Intercept	None	
<b>RGDPC</b>	-0.310791 (0.9135) no	-1.415145 (0.8393) no	1.088755 (0.9249) no	-3.199938 (0.0282) **	-3.343116 (0.0756) *	-2.977463 (0.0040) ***	Stationary in I(1)
<b>M2</b>	-1.078462 (0.7140) no	-1.151357 (0.9058) no	-0.305649 (0.7689) no	-4.559825 (0.0008) ***	-4.521443 (0.0049) ***	-4.591546 (0.0000) ***	Stationary in I(1)
<b>PRIV</b>	-1.495926 (0.5242) no	-1.310812 (0.8691) no	-1.367165 (0.1562) no	-4.245962 (0.0020) ***	-4.280317 (0.0089) ***	-4.266566 (0.0001) ***	Stationary in I(1)
<b>INV</b>	-0.814457 (0.8032) no	-1.806245 (0.6814) no	-0.257773 (0.7554) no	-5.673642 (0.0000) ***	-5.780753 (0.0002) ***	-5.710161 (0.0000) ***	Stationary in I(1)
<b>TRAD</b>	-1.523243 (0.5109) no	-3.144206 (0.1119) no	-0.408227 (0.5295) no	-4.757263 (0.0005) ***	-4.740003 (0.0028) ***	-4.825653 (0.0000) ***	Stationary in I(1)
<b>INF</b>	-1.829894 (0.3607) no	-2.088382 (0.5350) no	-1.309299 (0.1726) no	-5.536736 (0.0000) ***	-5.45104 (0.0004) ***	-5.606495 (0.0000) ***	Stationary in I(1)

Note: (\*)Significant at 10%; (\*\*)Significant at 5%; (\*\*\*) Significant at 1% and (no) Not Significant

Source: Authors computation using Eviews10.

**Table (5): The lag order of ARDL model**

Selected Model: ARDL(1, 1, 0, 0, 0, 0)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
RGDPPC(-1)	0.768723	0.067847	11.33027	0.0000
M2	-0.295827	2.331806	-0.126866	0.8999
M2(-1)	2.970776	2.057870	1.443617	0.1596
PRIV	-1.401307	0.823633	-1.701373	0.0996
INV	7.490001	3.083295	2.429220	0.0216
TRAD	4.451236	1.586552	2.805603	0.0089
INF	-7.404011	1.850804	-4.000429	0.0004
C	362.1498	146.2320	2.476542	0.0193
R-squared	0.988447	Mean dependent var		3918.773
Adjusted R-squared	0.985658	S.D. dependent var		513.0719
S.E. of regression	61.44462	Akaike info criterion		11.26296
Sum squared resid	109487.8	Schwarz criterion		11.61127
Log likelihood	-200.3648	Hannan-Quinn criter.		11.38575
F-statistic	354.4430	Durbin-Watson stat		1.907568
Prob(F-statistic)	0.000000			

Source: Authors computation using Eviews10.

**Table (6): ARDL Bounds Test**

Test Statistic	Value	k
F-statistic	5.953240	5
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Source: Authors computation using Eviews10.

**Table (5): Long-run Coefficients**

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
M2	11.565999	7.898023	1.464417	0.1538
PRIV	-6.059000	2.980429	-2.032929	0.0513
INV	32.385417	11.867341	2.728953	0.0107
TRAD	19.246344	7.168397	2.684888	0.0119
INF	-32.013616	9.882864	-3.239305	0.0030
C	1565.870609	440.827010	3.552120	0.0013

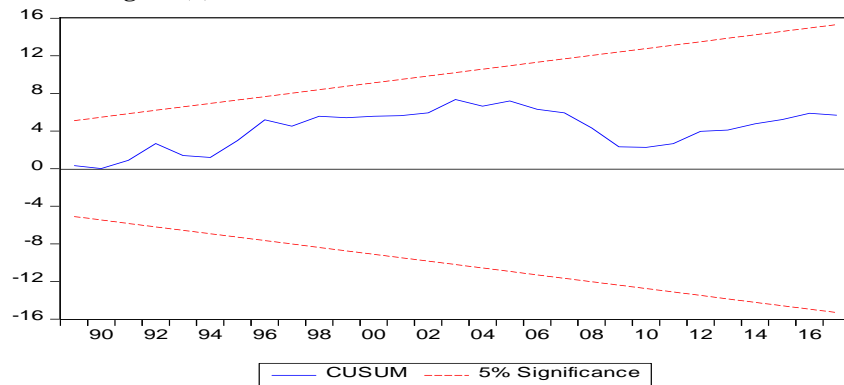
Source: Authors computation using Eviews10.

**Table (6): Short-run error correction estimates**

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(M2)	-0.295827	2.331806	-0.126866	0.8999
D(PRIV)	-1.401307	0.823633	-1.701373	0.0996
D(INV)	7.490001	3.083295	2.429220	0.0216
D(TRAD)	4.451236	1.586552	2.805603	0.0089
D(INF)	-7.404011	1.850804	-4.000429	0.0004
CoIntEq(-1)	-0.231277	0.067847	-3.408808	0.0019
CoInteq = RGDPPC - (11.5660*M2 - 6.0590*PRIV + 32.3854*INV + 19.2463				
*TRAD -32.0136*INF + 1565.8706 )				

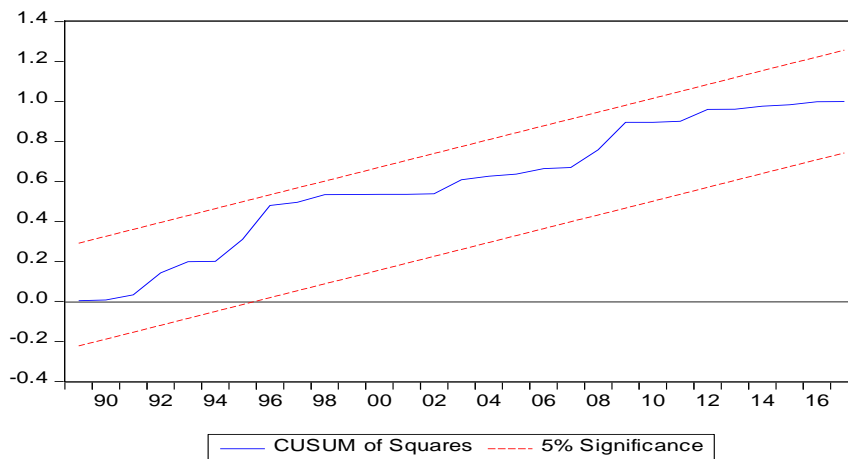
Source: Authors computation using Eviews10.

**Figure (2): Plot of Cumulative Sum of Recursive Residuals**



Source: Authors, using Eviews10.

**Figure (3): Plot of Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ)**



Source: Authors, using Eviews10.

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