Financial Development and Economic Growth: New evidence from Algeria

Bendahmane Amina, Ayad sidi Mohamed, Medjahed Kenza, Benbouziane Mohamed

Abstract— **This paper aims to reexamine the relationship between financial development and economic growth in Algeria over the period of 1980–2014. We employ three different measures of financial development to build an indicator of financial development using principal component analysis (PCA). Using the Autoregressive Distributed Lag (ARDL) Bounds test technique, the empirical results show that financial development index has a negative and significant effect on economic growth in Algeria**

Index Terms— **Financial development, Economic growth, Autoregressive Distributed Lag (ARDL) method, Algeria**

I. INTRODUCTION

The relationship between financial development and economic growth has received a great deal of attention in recent years, and has become one important area of discussion among economists who disagreed about the direction of the relationship between them .For several decades , Many of the theoretical and empirical literature tried to explain the relationship between financial development and economic growth. At the beginning of the 19th century , many authors have defended the idea of the beneficial effect of financial development of the economy. Schumpeter (1911) explains that banks play an important role in economic growth through the efficiency of capital accumulation thus through increasing the marginal productivity of capital and its contribution to the financing of technological innovation . McKinnon and Shaw (1973) emphasize the negative effect of financial repression (Interest Rate Ceilings, policy of selective allocation of credit, financial protectionism) that reduces capital formation. They argue that financial development involves not only an increase in the productivity of capital, but also an increase in the savings rate, and consequently a greater volume of investment.

At the beginning of the nineties, analysis of the role of the financial system in the growth process has been enhanced by the development of theoretical models of endogenous growth that integrates the financial sphere in their analysis, where it confirmed that capital accumulation and technological changes are not the only factors that explain differences in the level of development between countries. The recent literature on growth well emphasizes the role of financial development and institutions as fundamental determinants of growth.

Since the pioneering work of Schumpeter (1911), financial development has become an important subject for economists. In particular, the link between financial deepening and growth led to the emergence of many empirical studies in the second half of the twentieth century. Gurley and Shaw (1955), Goldsmith (1969), King and Levine (1993). In recent years, using different types of data , econometric methods, and financial development indicators , many empirical studies have been prepared . Despite the conflicting results obtained, but most studies have emphasized the positive role of financial intermediaries and financial markets in mobilizing savings, and improve capital allocation which reflect positively on the efficiency of investment and promotes economic growth and an inadequate development of the financial system is an obstacle to growth.

In this paper, we examine the relationship between financial development and economic growth in Algeria over the period of 1980-2014, using an Autoregressive Distributed Lag method (ARDL) and we use principal component analysis (PCA) to build an indicator of financial development using three indicators (Domestic credit to private sector as percentage of GDP , M2/GDP , the ratio of commercial bank assets to the sum of commercial bank assets and central bank assets).

The rest of the paper is organized as follows. In Section 2 we present the theoretical framework of financial development and economic growth . In section 3 We summarize the most important empirical studies. In section 4 we present a brief discussion about Algeria's financial development. In Section 5, we describe the data. In Section 6 the methodology used is discussed . Section 7 analyzes the empirical results. In the final section we provide concluding remarks.

II. THEORETICAL FRAMEWORK

The theoretical literature on the link between financial development and economic growth can be traced back to the late 19th century and specifically to the work of Bagehot (1873) who argued that the financial system played a critical role in igniting industrialization and accelerating growth in England by facilitating the mobilization of capital in the mid-to-late 19th century. Schumpeter (1911) also pointed out the role of banks in fostering technological innovation and promoting economic development by mobilizing savings, evaluating and selecting projects, managing risk, monitoring entrepreneurs and facilitating transactions. Gurley and Shaw (1955) criticized Keynesians because of the neglect of the financial aspect in their analysis. They argued that the evolution of financial markets is an essential factor in the process of economic growth.

In the same lines of Bagehot , Hicks (1969) argued that the development of the financial sector was promoted the industrialization process in England in eighteenth century. He believed that the products manufactured during the first decades of the Industrial Revolution had been invented much earlier. But It was not possible implemented because of no availability sufficient finance. Thus, the critical innovation that ignited growth was capital market liquidity, which made it possible to realize projects that require large capital

Manuscript received Sep 26, 2016

injections for long periods. Gerschenkron (1962) also argued that banks are more effective in the promotion of growth during the early stages of economic development when institutions are weak. Based on the historical evidence of the UK, Russia, Germany and Italy , Gerschenkrom shows that in the early stages of development banks played a key role in promoting economic development in developing countries. But when economic growth takes off, indirect finance gradually replaced by direct finance. Later, Cameron (1972) notes that industrial banking originated in nineteenth-century in Europe, played an important role in consolidating the Industrial Revolution and promoting economic growth.

The supply-leading view, has been confirmed by several studies and endogenous growth models , the Most notably : Levine (1991) , Pagano (1993) , McKinnon and Shaw (1973) , King and Levine (1993) , Atje and Jovanovic (1993) , Neusser and Kugler (1998) , Levine et al. (2000), Xu (2000) , Christopoulos and Tsionas (2004) , Khan and Senhadji (2003) , Rioja and Valev (2004) , among others .

In contrast, some literature considered that financial development is not a cause of growth, but it is a consequence of this growth. this view was affirmed by Robinson (1952) who argues that "where enterprise leads finance follows" . Kuznets (1955) supports this view and noted that financial markets start to grow as the economy approaches the intermediate stage of the growth , Kuznets pointed out also that « the financial system develop once the economy becomes matured » . according to Robinson and Kuznets the direction of the causal relationship is reversed, when an economy expands, more financial institutions , products and services emerge to satisfy demand for these financial products , so economic growth creates demands for particular types of financial services and instruments and financial sector responds automatically to these demands , this means that , financial development is only the result of economic growth. the empirical studies provided by [Ireland (1994) , Demetrides & Hussein (1996) , Friedman & Schwartz (1963) , Al-Yousif (2002) , Ang and McKibbin (2007)] supported this view.

While others considered that there is bidirectional causal relationship between finance and growth, Lewis (1955) one of the early pioneers of development economics postulated that the relationship between financial development and economic growth was not unidirectional, rather, there exists a two-way relationship . First, economic growth contributes to the development of the financial markets and institutions, and then, financial system stimulates growth. Patrick (1966) also identified two possible patterns in the causal relationship finance-growth .The supply-leading hypothesis posits a causal relationship from financial development to economic growth. On the other hand, the demand-following hypothesis postulates a causal relationship from economic growth to financial development. Thus, according to this view ; the relationship between financial development and economic growth varies according to the stage of development, where in the first stage of development, financial development induces economic growth through the increase in supply of its services; but when the growth exceeds a certain level, it becomes that stimulates financial development through the increase in demand for financial services. Many studies and endogenous growth literature such as [Greenwood and Jovanovic (1990), Berthelemy and Varoudakis (1996) Greenwood and Bruce (1997) Demetriades and Hussein (1996), Greenwood & Smith (1997), Blackburn and Huang (1998), Luintel and Khan (1999), Khan (2001)], have reinforced this point of view.

On the other hand, some economists do not believe that the finance-growth relationship is important. Lucas (1988), argues that financial development and economic growth are not causally related, and he said that ‘‘economists badly overstress the role of financial factors in economic growth’’. Like Lucas, Stern (1989) ignores and does not discuss the role of financial development in growth in his review. At the end of his review, he also presented a long list of various issues that he did not have sufficient space to cover; Finance did not mention on this list. Chandavarkar (1992) noted that “none of the pioneers of the development economics….even list finance as a factor of development”. Singh (1997) claims also that stock markets are not necessary for achieving high levels of economic development , and financial development may be harmful for growth Because of the violent volatility that occurs in these markets, particularly in developing countries.

In the early 1990s , many economists used endogenous growth models to discuss the financial development such as Greenwood and Jouvanovic (1990) , King and Levine (1993) , Pagano (1993) Blackburn and Hung (1998) , Berthélemy and Varoudakis (1998) , Deiddaa and Fattouh (2002) among others.

III. Summary of the Studies on the Direction of Causality Between Finance and Growth

because of the ambiguity and the absence of consensus about the direction of the causal relationship between financial development and economic growth and the importance of the finance in growth, recently, many empirical studies has emerged to clarify the relationship between financial development and economic growth .

Using a panel dataset of 74 countries during the period 1960-1995, Levine, Loayza and Beck (2000) found that the exogenous components of financial intermediary development is positively associated with economic growth and that legal and accounting reforms can boost financial development and accelerate economic growth. While, Calderon and Liu (2003) employed the Geweke decomposition test on pooled data of 109 developing and industrial countries from 1960 to 1994 to examine the direction of causality between financial development and economic growth. Thier paper finds that financial development generally leads to economic growth. Rousseau and Vuthipadadorn (2005) also examined whether the intensity of financial intermediation promoted investment and growth in 10 Asian economies over the 1950–2000 period. using (VARs) models and (VECMs), the results indicate that finance did, on the whole, act as a driving force behind investment.

Liang and Teng (2006) investigated the relationship between financial development and economic growth for the case of China over the period 1952–2001. Using a multivariate vector autoregressive (VAR) framework, their results suggested that there exists a unidirectional causality from economic growth to financial development. Ben Naceur and Ghazouani (2007) examined the causal relationship between financial development and economic growth, using an unbalanced panel data from 11 MENA region countries

and dynamic panel model with GMM estimators. Their empirical results reinforced the idea of no significant relationship between banking and stock market development, and growth. Abu-Bader and Abu-Qarn (2008) also examined the causal relationship between financial development and economic growth in Egypt during the period 1960–2001. They employed four different measures of financial development and apply Granger causality tests using the cointegration and vector error-correction (VEC) methodology. The results strongly supported the view that there is bidirectional causality relationship between financial development and economic growth.

Using a panel of 65 developing countries, Narayan and Narayan (2013) concluded that bank credit has a negative effect on economic growth. Adu, Marbuah and Mensah (2013) investigated the long-run growth effects of financial development in Ghana. They found that the growth effect of financial development is sensitive to the choice of proxy. Both the credit to the private sector as ratios to GDP and total domestic credit are conducive for growth, while broad money stock to GDP ratio is not growth-inducing. Chen, Wu and Wen (2013) examined the non-linearity between financial development and economic growth in China, using cross-provincial data from 1978 to 2010, and a threshold model. The authors showed that finance has a strong positive influence on growth in high-income provinces, but a strong negative impact on growth in low-income provinces.

Ben Jedidia et al (2014) examined whether financial development can boost economic growth in Tunisia, using private credit, value traded and issuing bank's securities on the financial market as financial development indicators and ARDL method. The empirical results showed that there is bidirectional relationship between credit and growth. However, neither the stock market development nor the intervention of banks in the stock market had robust and positive effects on the growth. Samargandi et al (2014) also investigated the effect of financial development on economic growth in Saudi Arabia. Using ARDL Bounds test technique, the authors found that financial development has a positive impact on the growth of the non-oil sector. In contrast, its impact on the oil-sector growth and total GDP growth is either negative or insignificant.

Peia and Roszbach (2015) studied the cointegration and causality between finance and growth for 22 advanced economies. Using three indicators of financial development: stock market capitalization to GDP, the turnover ratio, domestic credit to the private credit to GDP, their empirical evidence indicated that stock market development tends to cause economic development, while a reverse causality is mostly present between banking sector development and output growth. Samargandi et al (2015) also examined the relationship between financial development and growth in a panel of 52 middle-income countries over the 1980–2008 period. Using pooled mean group estimations in a dynamic heterogeneous panel setting, they showed that there is an inverted U-shaped relationship between finance and growth in the long run. In the short run, the relationship is insignificant.

Despite the conflicting results, however, the most of them Confirm that there is a positive correlation between financial development and economic growth and provide evidence supports supply leading view.

IV. FINANCIAL DEVELOPMENT IN ALGERIA

after independence, Algeria inherited an organ bank based on the liberal system that serves French interests, that made the Algerian authorities interested in creating a bank agrees to the model of economic development and ensure its financing, the beginning has been in 1966 to nationalize foreign banks, this era was characterized by: a bank sector based on a socialist and state control, monopoly of the public treasury of the financial area and its hegemony over all aspects of the financial and banking activity, the marginalization of the role of banks and charge it with administrative mandate. As a result of the oil crisis that befell on Algeria in 1986 and the results of imbalances in the macro-economic indicators, it was incumbent on the Algerian authorities to hold a series of reforms aimed at the transition to a market economy, and an attempt to reform the banking system to amend the legislative and regulatory texts, it was issued the Banking Law and loan in 86-12 dated on 08/19/1986, private at banking system and conditions, who returned to the banks their right to be informed of the financial status of the institutions before agreeing to the granting of loans, as well as the right to monitor the use of the loan and how to recover it. It was amendment to the law 88-06, dated 01.12.1988, which gave autonomy to banks and financial institutions, where he became an activity subject of trade rules and the principle of profitability and cost-effectiveness, as the text insist of the need to restore the central bank's powers to control and conduct of monetary policy.

However, the most important reform who helped to liberalize the Algerian financial sector, it has been under the law of money and credit 90-10 issued on 14 April 1990, which aimed to:

- liberate the banking sector of administrative interventions and granting independence to the public banks and amend its functions to increase its effectiveness through the abolition of specialization in the banking business and expanding the network of commercial banks and the introduction of new banking products

- rehabilitate the central bank in the manager of Monetary Affairs and the loan through a grant of an independence and considered it as a real cash authority independent of the financial authorities, manages and guiding monetary policy in the country along with its reorganization, and that by the emergence of new organism assume it managed and control.

- activate the role of the monetary market in the financing of the economy and open it in front of the local private banks and foreign, as well as recognition of the establishment of market values transmitted named Algeria Stock Exchange

- The non-discrimination between the public economic operators and the private, and re-currency and find some kind of relative flexibility in determining the interest rate by banks assess.

however, and through his application it has been showed some legal gaps, and in order to eliminate these gaps; the Algerian authorities has been proceeded to enter many of the amendments to this law through the issuance of a set of commands and laws.

In spite of all these reforms, but the Algerian banking system could not adequately develops. Among the most important reforms goals pursued by the Algerian monetary

authorities in the financial sector during the nineties, chiefly the gradual liberalization of interest rates is to get a positive real interest rates working to raise savings rates and in consequence increase the funds available for lending and investment financing. Through the table n° 01 we note that in spite of the sharp rise in the margin of interest rates but the fact that interest rates remained low and often negative during the period of 1994-2004. This is due primarily to the high rates of inflation, which form a barrier to activating the role of financial intermediation in realizing the economic development.

Table 1: **evolution of the interest rate in Algeria (1994-2014)**

	1994	1996	1998	2000	2002	2004	2006	2008	2010	2012	2014
Interest rate spread	4	4,5	2,375	2,5	3,25	4,35	6,25	6,25	6,25	6,25	**6,25**
Real interest rate	-10,13	-4,05	15,11	-11,72	7,168	-3,78	-2,30	-6,71	-6,99	2,25	**8,73**

Source: World Development Indicators (2015).

Also, the table n° 2 showed that the Algerian banking sector has not developed sufficiently compared to other countries such as Morocco, Tunisia, Jordan and Egypt. For the credit extended to the private sector, which is considered an accurate measure of the level of financial depth and the contribution of the financial sector and banks in the financing of private sector activity, and it is well known that the increase in the level of domestic credit to private sector means the rise of the level of domestic investment, which is reflected positively on growth economic, while through the graph 1 we note that the volume of the credit oriented to the private sector in Algeria is still weak and does not represent only a small proportion of GDP in terms it did not exceed the average rate of 28.04% which shows the weakness of the contribution and the bank's commitment to funding sector private and this is primarily due to the lower return on investment in Algeria and the high of degree of risk associated with these investments.

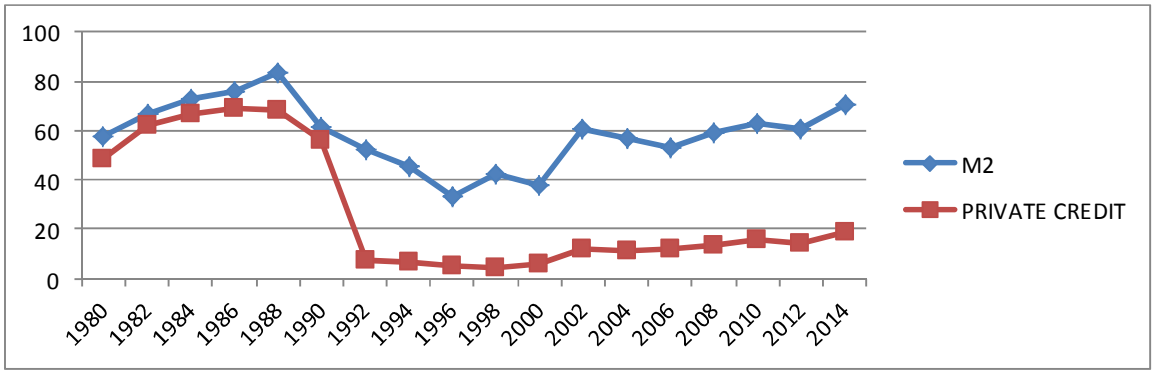
Table 2: Average of financial development indicators during the period 1980-2014

	Private credit	M2	Liquid liabilities
Algeria	27,85	58,3083684	60,2673748
Morocco	40,81	69,5024301	68,84
Tunisia	61,55	51,0031925	54,0737132
Egypt	35,48	84,7434158	79,05
Jordan	67,88	113,55746	106,09

Source: World Development Indicators (2015).

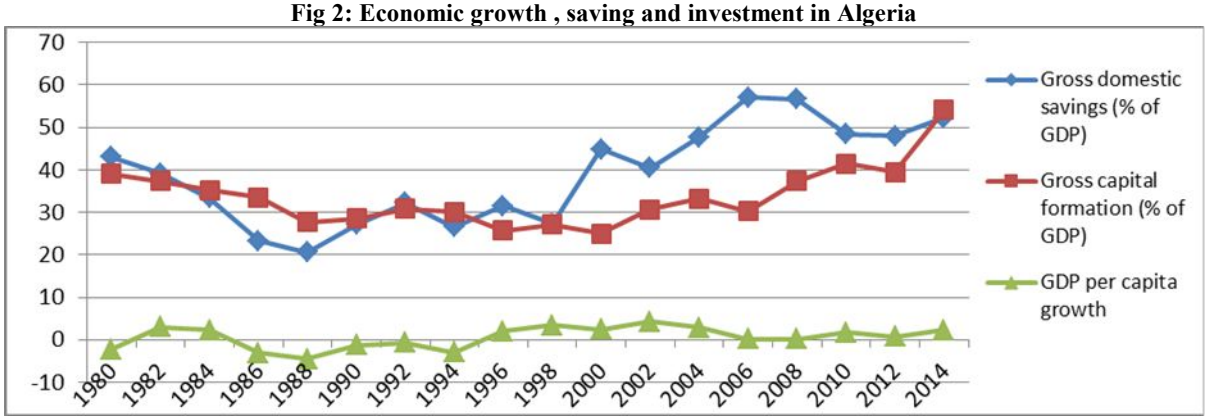
As for the M2 / GDP, which is considered as a measure of the financial depth where it measure the liquidity ratio and the cash economy and the contribution of financial intermediation in the mobilization of savings deposits and scale, It is through the curve graph, we note that this number has increased in Algeria during the period 1980-1988, and then began to decline starting from the year 1989 and this is a result of the follow of Algeria strict austerity policy in application of the agreement concluded with the International Monetary Fund (Structural Adjustment Program), which represents mainly in reducing the budget deficit, freezing wages and reducing the currency and reduce the volume of public spending, then this percentage resumed to rise starting from the year 2001 and it is a result of the application of the economic recovery program, which has been allocated 7 billion US $ (about 520 billion dinars) for three years where it was pumping a huge mass of cash in the economy and also is a result of the double government spending that resulted from the improved state revenue improvement in fuel prices in the world markets. Generally this ratio was high in Algeria, where an average of 58.13% during this period.

Fig 1: Evolution of indicators of Algeria's financial development as percentage of GDP (1980–2014) .



Source: World Development Indicators (2015).

Fig 2: Economic growth , saving and investment in Algeria



Source: World Development Indicators (2015).

As shown by the graph 2 that the reforms adopted by Algeria in the financial sector did not bear fruit, that the rates of economic growth in the Algerian measured by real GDP per capita has not yet ameliorated after the issue the law of money and credit 1990 in spite of the relatively high savings rates and investment during the period 2002-2014 and this is not the result of the evolution of the banking sector, but rather the application of the recovery program as previously mentioned

In general, the reforms made known in the financial sector in Algeria have not realized the desired results, and the Algerian banking sector was not able to be sufficiently developed, which allows him to strengthen the allocation of resources in the economy and improve economic growth. This is due primarily to the poor functioning of the financial sector and the economy in general.

5. Data and variables

The data used in our study is annual time series for Algeria covering the period from 1980 to 2014. The data was collected from the World Development Indicators (WDI) dataset and UNCTAD Statistics.

a) Indicators of financial development :

Financial development includes two aspects: the development of financial intermediaries and the development of stock markets. In our study, we will take into consideration only the indicators that measure the development of financial intermediation because unavailability of data related to stock markets development in Algeria. Thus, to measure the financial development we used three indicators:

First, Private Credit (PRIVY): equals credit to the private sector as a proportion 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. This indicator has been adopted by the majority of recent studies such as King and Levine (1993) , De Gregorio and Guidotti (1995) , Demetriades and Hussein (1996) , Rajan and Zingales (1998) , Levine and Zervos (1998), Rousseau and Wachtel (2000), Beck , Levine and Loayza (2000) , Favara (2003) , Beck and Levine (2004) , Liang and Teng (2006) , among others .

Second, Money and quasi money: the ratio of broad money (currency plus demand deposits and quasi-money) to GDP (M2/GDP) . This measure has been widely used in the literature as a monetization variable. King and Levine (1993), Demetriades and Hussein (1996) , Ahmed and Ansari (1998) , Calderon and Liu (2003) .

Thirdly, the ratio of commercial bank assets to the sum of commercial bank assets and central bank assets (BASSET): we use this indicator to capture the overall size and depth of commercial banks the financial sector to the whole banking system. This indicator has been widely used in several studies such as Samargandi et al (2015), Sohag et al (2015) and Rafindadi and Yusof (2015), among others.

We follow Ang and McKibbin (2007), Samargandi et al (2014,2015) and Sohag et al(2015) , in constructing a single measure of financial development**(FD)** by using the three indicators of financial development mentioned above and using principal component analysis(PCA). We do this for two reasons. First, it addresses the problem of multicollinearity, or the high correlation between the various financial development indicators. Second, there is no general consensus as to which measure of financial development is most appropriate.

b) The dependent variable and the control variables :

Following standard practice, in our study, we use GDP per capita growth as indicator for economic development.

In addition to the GDP per capita growth and the financial development indicator, we introduced, in our model , other variables (other potential determinants of economic growth) the most used in the empirical growth theory: Trade openness measured by the ratio of exports plus imports to GDP (TRADE); Government expenditure measured by General government final consumption expenditure to GDP (GOV) ; Inflation (proxying for the stability of the macroeconomic and business environment) (INF).

6. The econometric methodology

To examined the relationship between financial development and economic growth in Algeria we use following regression:

$$EconomicGrowth = f(FinancialDevelopment)$$
$$EG_t = f(FD_t, X_t) \qquad (1)$$

Where EG:GDP per capita growth at time t as a dependent variable , (FD) is financial development index at time t, and X denote additional variables at time that used in regression growth models.

$$EG_t = \beta_0 + \beta_1 FD_t + +\beta_2 TRADE_t + \beta_3 GOV_t + \beta_4 INF_t + \varepsilon_t (2)$$

To estimate this model, we will use the ARDL bound test methodology elaborated by Pesaran et.al. (2001) to analyses the short and long run association between variables. The ARDL bound test can be used just when we have not any series that could be integrated in second difference I (2), using ADF (Augmented Dickey-Fuller) and Phillips- Perron (P-P) unit root tests to show the order of integration of the respective variables. Then, we will formulate an unrestricted error-correction model (UECM) as a particular type of ARDL model as follows :

$$\Delta EG_t = \beta_0 + \beta_1 EG_{t-1} + \beta_2 FD_{t-1} + +\beta_3 TRADE_{t-1} + \beta_4 GOV_{t-1} + \beta_5 INF_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta EG_{t-i}$$
$$+ \sum_{j=1}^{q} \alpha_j FD_{t-j} + \sum_{n=1}^{q} \alpha_n \Delta TRADE_{t-n} + \sum_{s=1}^{q} \alpha_s \Delta GOV_{t-s} + \sum_{z=1}^{q} \alpha_z \Delta INF_{t-z} + + \varepsilon_t (3)$$

7. **Empirical results :**

In this paper, we investigate the short-and long-run effect of banking system development on economic growth in Algeria by the following steps:

Table 03: *descriptive statistics results*

	EG	*FD*	*GOV*	*INF*	*TRADE*
Mean	*0.697432*	*6.60E-17*	*16.30338*	*9.473602*	*57.23658*
Maximum	*5.861446*	*2.857327*	*20.78770*	*31.66966*	*76.68452*
Minimum	*-4.231831*	*-1.843535*	*11.23158*	*0.339163*	*32.68458*
Std. Dev.	*2.525127*	*1.363807*	*2.438179*	*8.625496*	*10.95750*
Observations	*35*	*35*	*35*	*35*	*35*

Table 04*: Matrix of correlation*

	EG	*FD*	*GOV*	*INF*	*TRADE*
EG	*1.000000*				
FD	*-0.372008*	*1.000000*			
GOV	*-0.313007*	*0.339658*	*1.000000*		
INF	*-0.472690*	*0.010511*	*0.137218*	*1.000000*	
TRADE	*0.476725*	*-0.484032*	*-0.513452*	*-0.393190*	*1.000000*

7-1:Financial Development index

Table 05 presents the results of the principal component analysis. The first component is the only one with a high eigenvalue and it explains about 60% of the variation of the dependent variable. The second principal component explains another 34%, and the last principal component accounts for only 6% of the variation. Hence, it is clear that the first principal component has the maximum explanatory power. We use it therefore as our financial development indicator (**FD**).

Table 05: *Principal component analysis for the financial development index.*

Compenent	*Eigenvalue*	*Difference*	*Proportion*	*Cumulative*
Comp1	*1.80683*	*0.788359*	*0.6023*	*0.6023*
Comp2	*1.01847*	*0.843763*	*0.3395*	*0.9418*
Comp3	*0.174705*		*0.0582*	*1.00000*

Number of Obs = 35.

Number of comp. = 3.

7-2:Unit-root test

This study conducts a test of the order of integration for each variable using ADF (Augmented Dickey-Fuller) and Phillips- Perron (P-P) unit root tests . To make sure of our analysis that we have not any series that could be integrated in second difference I (2) and to justify the appropriateness of the ARDL approach. We summarize the results of traditional unit root tests in the following table:

***Table 06**: Results of Augmented Dickey-Fuller (ADF),and Phillips-Perron (P-P) unit root tests.*

	Augmented Dickey Fuller		***Phillips-Perron (P-P)***	
Level I(0)				
variable	***Constant Without Trend***	***Constant With Trend***	***Constant Without Trend***	***Constant With Trend***
EG	*-3.238853***	*-3.369457***	*-3.330507***	*-3.479994****
FD	*-2.633078****	*-0.893106*	*-1.330365*	*-1.424482*
TRADE	*-1.419076*	*-2.475399*	*-1.419076*	*-2.459427*
INF	*-1.702701*	*-2.008133*	*-1.816867*	*-2.127862*
GOV				
First Difference I(1)				
EG	*-5.913478**	*-5.792646**	*-8.050134**	*-7.889938**
FD	*-3.450955***	*-3.411335****	*-3.512476***	*-3.467752****
TRADE	*-4.528525**	*-4.521184**	*-4.435960**	*-4.430823**
INF	*-5.304246**	*-5.210028**	*-5.316276**	*-5.225016**
GOV	*-4.061676**	*-4.005643***	*-3.812697**	*-3.727494***

Notes. The ADF and PP test equations include both constant and trend terms. The Schwarz information criterion (SIC) is used to select the optimal lag order in the ADF test equation. (*),(**) and (***) represent 1%,5% and 10% level of significance, respectively.

***Table 07**: Selection criteria of VAR lag order*

Lag	***LogL***	***LR***	***FPE***	***AIC***	***SC***	***HQ***
0	-431.8039	NA	216137.8	26.47296	26.69971	26.54926
1	-307.3331	203.6794*	531.3867*	20.44443*	21.80489*	20.90219*
2	-283.2599	32.09760	628.6786	20.50060	22.99478	21.33982

*indicates lag order selected by the criterion, LR: sequential modified LR test statistic (each test at the 5% level), FPE: Final prediction error, AIC: Akaike information criterion, HQ: Hannan-Quinn information criterion,SC: Schwarz information criterion.

From the table 06 , shows that the GDP per capita growth (EG) is stationary at level , and the rest of variables (FD , TRADE, INF, GOV) are non-stationary at level but become stationary after considering the first difference, which is confirmed by four approaches to unit root tests. Therefore, the presence of such mixed orders of integration, as reported in Table 06, supports the application of the ARDL approach as opposed to standard approaches and the table 07 indicates that the optimum lag is 1, according to the Schwarz information criterion and Akaike information criterion through estimate VAR model.

7-3:The long and short run impact of financial development and control variables on economic growth in Algeria.

The mixture of integrations orders and the absence of I(2) in our results, we will lead us to use the autoregressive distributed lags (ARDL) model or Bound-test. For examine the cointegration relationship we will use a Wald joint significance test (F-statistic) is applied on the coefficients of the lagged variables. the null hypothesis ($H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$) that means no long-run relationship between variables via the alternative hypothesis of co-integration ($H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$). The usually procedure is to compare the F-stat with the critical value, upper and lower bound, formulated by Pesaran, et al.(2001). According to Pesaran, et al. (2001), The F-stat is computed and compared with the critical value (upper and lower bound) given by Pesaran et al (2001). The hypothesis of no cointegration will be rejected if the F-computed exceeds the upper critical bound. But, when the F-computed is less than the lower critical bound, we will accept the null hypothesis, concluding that there is no long-run association between the variables. In a particular case, an F-value between the lower and upper bounds do not give a final conclusion. The results in Table 08 suggests that the calculated F-statistic is 3.70 which is larger than the upper bound critical value of at the 5 and 10 per cent significance levels , in this case we can conclude that there is an evidence of a long-run relationship between variables , when the cointegration exists we have to estimate equation (3) following the lag specification (1,1,1,0,1) .

In the long run as indicated in table 09 reveals that financial development index has a negative and significant effect on GDP per capita growth at 10 percent significance level , the GOV and indicator have also a negative and significant impact at 5 percent significance level, TRADE variable has a positive but not significant. The short-run in table 10 shows that the negative and highly significant coefficient of the error correction (ECM) mechanism implies that short-run disequilibrium adjusts by 80% per cent towards the long-run equilibrium.

***Table08**: Result of ARDL bounds test.*

Dependent variable	***F-statistics***	***Critical value, Pesaran et al.***	***Lower bound I(0)***	***Upper bound I(1)***
EG	*3.703042*	*1 percent significancelevel* *5 percent significancelevel* *10 percent significancelevel*	*3.29* *2.56* *2.2*	*4.37* *3.49* *3.09*

***Table 09**: The long run relationship results.*

Long Run Coefficients				
Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
FD	*-0.755410**	*0.37713*	*-2.003022*	*0.0704*
TRADE	*0.004406*	*0.057347*	*0.076823*	*0.9401*
GOV	*-0.112261***	*0.327398*	*-0.342888*	*0.0381*
INF	*-0.010421***	*0.053699*	*-0.194070*	*0.0497*
C	*2.533136****	*7.612431*	*0.332763*	*0.0056*

The lag structure is ARDL (1, 1, 1, 0, 1) and the order of variables is: GDP per capita growth,financial development index , trade, government expenditure, inflation rates.*, **, and *** indicate significance at 10 %, at 5 % and at 1%, respectively.

***Table10**:short run association results.*

Variable	***Coefficient***	***Std. Error***	***t-Statistic***	***Prob.***
D(GDPPCG(-1))	*0.317446**	*0.170622*	*1.860520*	*0.0897*
D(FD)	*-1.160559*	*0.818629*	*-1.417686*	*0.1840*
D(FD(-1))	*3.996167****	*0.897572*	*4.452197*	*0.0010*
D(TRADE)	*-0.189146***	*0.071641*	*-2.640188*	*0.0230*
D(TRADE(-1))	*0.251954****	*0.065353*	*3.855268*	*0.0027*
D(GOV)	*-0.708926***	*0.270654*	*-2.619313*	*0.0239*
D(GOV(-1))	*0.513413***	*0.239081*	*2.147445*	*0.0549*
D(INF)	*-0.035482*	*0.054415*	*-0.652061*	*0.5278*
ECM(-1)	*-0.801321****	*0.211268*	*-5.402239*	*0.0002*

The lag structure is ARDL (1, 1, 1, 0, 1) and the order of variables is: GDP per capita growth,financial development index , trade, government expenditure, inflation rates. *, **, and *** indicate significance at 10 %, at 5 % and at 1%, respectively.

7-4 :Diagnostic test of ARDL model.

The table 11 indicates that R-squared equal 89.6%,shows that the regression of the underlying ARDL model fits well ,and it reveals the model does not have serial correlation, normality, and heteroscedasticity problems.. Nevertheless, an inspection of the Cumulative Sum of Recursive Residuals (CUSUM) and the Cumulative Sum of Squares of Recursive Residuals (CUSUMSQ) graphs in Figures03 and 04 respectively shows that there is stability and that there is no systematic change identified in the coefficients at 5% significance level over the study period. Thus, the CUSUM and CUSUMSQ graphs confirm that the parameters in this model are stable throughout the sample period.

***Table11** : Diagnostic test results*

Diagnostic	***Tests***	***Results***
Normality Test	*Jarque Bera*	*JB Stat: 0.786023 (0.675021)*
Specification Test	*Ramsey RESET*	*F-Stat: 0.423013 (0.5301)*
Serial Correlation Test	*B-G LM Test*	*Chi-sq: 0.057264 (0.9718)*
Heteroscedasticity	*ARCH LM*	*F-stat : 2.613394 (0.1161)* *Prob. Chi-Square(1): 0.1092*
R-squared	*0.896414*	
Adjusted R2	*0.717492 Prob(F-statistic) 0.004501*	

***Figure 03:** Plot of CUSUM*

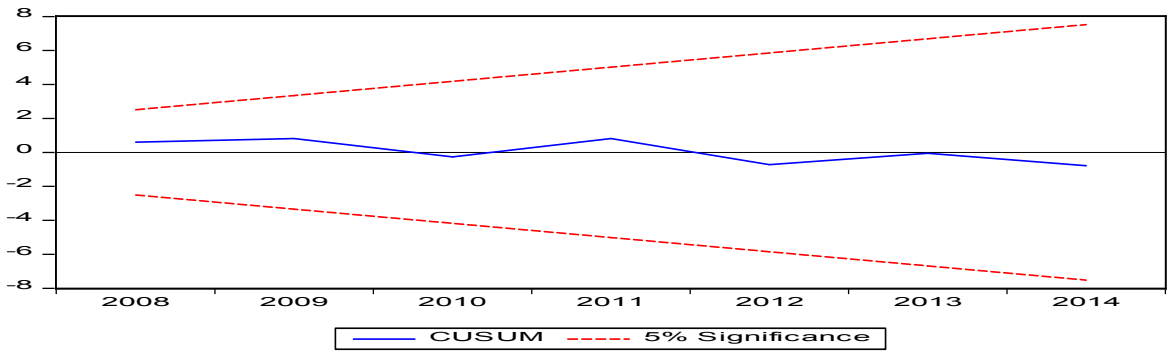
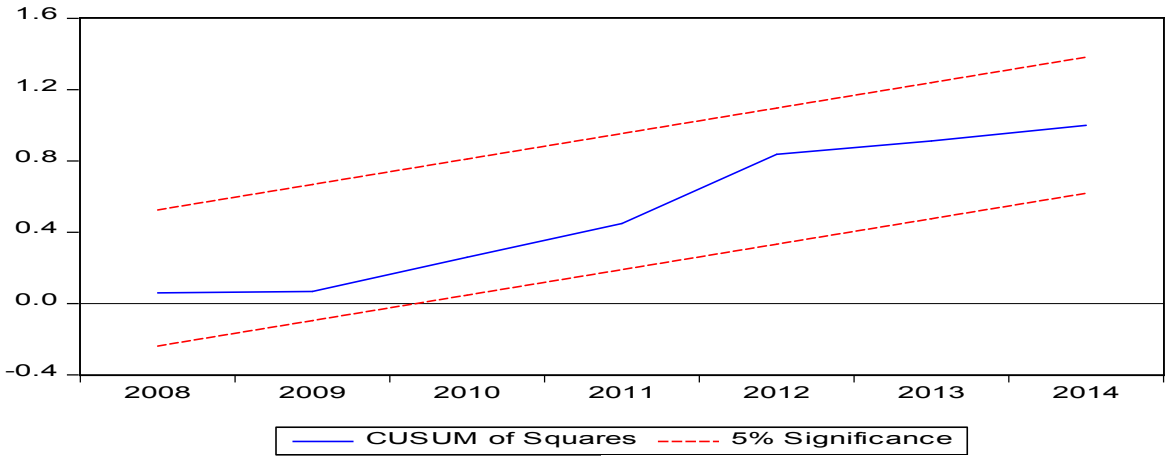


***Figure 04**: Plot of CUSUM-squared*



Interpretation: Generally, the experimental results showed a negative and significant correlation between financial development Composite Index and economic growth, it means that the banking sector hinders economic growth in Algeria rather than stimulate it, and this is due in part to the characteristics of the Algerian economy, which is considered as yield economy in excellence view, largely dependent to the revenues of the oil sector in supporting economic growth, and on the other side this results can be interpreted by the fact that the banking sector in Algeria is still dominated by public banks (six public banks account for 90% of banking activity) which is characterized by government intervention in credit allocation and identification of interest rates at levels lower than the levels of equilibrium, which reflected negatively on the levels of savings and investment and weaker competition between banks, also these results can be linked to the absence of the appropriate legal and institutional environment and the high degree of financial repression and poor supervision and bank regulation that appears through higher volume of non-performing loans. This is in addition to the nature of the Islamic Algerian society as the prohibition of interest by Islamic law and considered as usury contributed to the weakening of the evolution of the financial sector, the fact that most of the Algerian banks are traditional banks and Islamic banks are almost non-existent. The lack of Algeria to the active market contributed to the slow evolution of Algerian financial sector and the weakening of its contribution to the promotion of economic growth.

Conclusion

We have tried through this paper research studying the effect of financial development on economic growth in Algeria during the period 1980-2014. And this by using a composite index of financial development and obtain it by using principal component analysis (PCA) methodology based on three indicators of financial development (Domestic credit to private sector as percentage of GDP, M2/GDP, the ratio of commercial bank assets to the sum of commercial bank assets and central bank assets), and the ARDL methodology for estimation. Generally experimental results showed a negative correlation between financial development and economic growth in the short and long term it means that the banking sector hinders economic growth in Algeria rather than stimulates it.

And in order and for strengthening the role of financial development in economic growth it should be to promote the policies aimed at the development of the financial system and work to increase its depth, diversity and openness, as the Algerian authorities should stop to interfering in the work of banks, and work to improve the possibility to access of the private sector to the credit with reasonable prices especially the micro and medium institutions, and should work to provide a variety of financial services that meet the different agents economists and facilitate procedures and reduce the length of time required to obtain credit. Promote competition in the markets and improve the quality of institutions and create a stable political and security environment and enhance the existing legal environment on the rule of law and ensure the protection of property rights and contract enforcement in order to boost investor confidence. The government should take the necessary measures in order to revive and revitalize the financial market, which has been marginalized and to provide an appropriate environment and helping to develop and which allows it to carry out its role in stimulating economic growth.

References

1. Abu-Bader, S., Abu-Qarn, A.S., (2008). Financial development and economic growth: the Egyptian experience. Journal of Policy Modeling, Vol. 30 (5), pp 887–898.
2. Adu .G, Marbuah .G, Mensah .J .T (2013), Financial development and economic growth in Ghana: Does the measure of financial development matter? , Review of Development Finance, Vol. 3, pp 192–203.
3. Al-Yousif, Y.K., (2002). Financial development and economic growth: another look at the evidence from developing countries. Review of Financial Economics, Vol. 11 (2), pp131–150.
4. Ang, J.B., McKibbin, W.J., 2007. Financial liberalization, financial sector development and growth: evidence from Malaysia. J. Dev. Econ. Vol. 84 (1), pp 215–233.
5. Atje, R., Jovanovic, B., (1993). Stock market and development. European Economic Review, Vol. 37, pp 623 – 640.
6. Ben Jedidia .K, Boujelbène .T, Helali .K (2014), Financial development and economic growth:New evidence from Tunisia, Journal of Policy Modeling, Vol. 36, 883–898.
7. Ben Naceur, S., Ghazouani, S., Orman, M., (2008). Does stock market liberalization spur financial and economic development in the MENA region. Journal of Comparative Economics, Vol. 36 (4), pp 673–693.
8. Berthelemy, J.C., Varoudakis, A., (1997). Economic growth, convergence clubs, and the role of financial development,. Oxford Economic Papers, Vol. 48, pp 300–328.

9. Blackburn, K., Hung, V., (1998). A theory of financial intermediation and growth. Economica, Vol. 65, pp 107–124.
10. Calderon, C.; Liu, L., (2003). The direction of causality between financial development and economic growth. Journal of Development Economics, Vol. 72, pp: 321–34.
11. Chandavarkar, A., (1992). Of finance and development: neglected and unsettled questions. World Development, Vol. 22, pp 133–142.
12. Chen .K.C, Wu .L, Wen .J (2013), The relationship between finance and growth in China, Global Finance Journal, Vol. 24, pp 1–12.
13. Christopoulos, D.K., Tsionas, E.G., (2004). Financial development and economic growth: evidence from panel unit root and cointegration tests. Journal of Development Economics, Vol. 73, pp 55–74.
14. Deidda, L., Fatouh, B., (2002). Non-linearity between finance and growth. Economics Letters, Vol. 74, pp 339 – 345.
15. Demetriades, P.O., Hussain, K.A., (1996). Does financial development cause economic growth? Timeseries evidence from 16 countries. Journal of Development Economics, Vol. 51, pp 387–411.
16. Friedman, M. and Schwartz, A. (1963), A Monetary History of the United States, Princeton: Princeton University Press.
17. Goldsmith, R.W., (1969). Financial Structure and Development. Yale Univ. Press, New Haven, CT.
18. Greenwood, J. & Smith. B.(1997), Financial Markets in Development and the Development of Financial Market, Journal of Economic Dynamic and Control, Vol. 21(1), pp 145-181.
19. Greenwood, J., Jovanovic, B., 1990. Financial development, growth and the distribution of income. Journal of Political Economy, Vol. 98, pp 1076–1107.
20. Gurley, J.G., Shaw, E.S., (1955). Financial aspects of economic development. The American Economic Review, Vol. 45 (4), pp 515–538.
21. Hicks, J., (1969). A Theory of Economic History. Clarendon Press, Oxford.
22. Ireland, P. N. (1994) Money and Growth: An Alternative Approach. American Economic, pp 47–65.
23. Khan, A. (2001), Financial Development and Economic Growth. Macroeconomic Dynamics, Vol. 5, pp 413-433.
24. Khan, M.S., Senhadji, A.S., (2003). Financial development and economic growth: a review and new evidence. Journal of African Economies, Vol. 12 (supp 2), pp 89–110.
25. King, R.G., Levine, R., (1993a). Finance and growth: Schumpeter might be right? Quarterly Journal of Economics, Vol 108 (3), pp 717–737.
26. King, R.G., Levine, R., (1993b). Finance, entrepreneurship, and growth: theory and evidence. Journal of Monetary Economics, Vol. 32 (3), pp 513–542.
27. Kuznets, S., (1955). Economic growth and income inequality. American Economic Review, Vol. 45, pp 1–28.
28. Levine, R., Loayza, N., Beck, T., (2000). Financial intermediation and growth: causality and causes. Journal of Monetary Economics ,Vol. 46, pp 31–71.
29. Levine, R., Zervos, S., (1996). Stock market development and long-run growth. World Bank Economic Review, Vol. 10 (2) , pp 323–339.
30. Lewis, W.A., (1955). The Theory of Economic Growth. George Allen and Unwin, London.
31. Liang, Q., Teng, J.Z., (2006). Financial development and economic growth: evidence from China. China Economic Review, Vol. 17, pp 395–411.
32. Lucas, R.E., (1988). On the mechanics of economic development. Journal of Monetary Economics, Vol. 22, pp 3–42.
33. Luintel, K.B., Khan, M., (1999). A quantitative reassessment of the finance growth nexus: evidence from a multivariate VAR. Journal of Development Economics, Vol. 60, pp 381–405.
34. McKinnon, R.I., (1973). Money and Capital in Economic Development. Brookings Institution, Washington, DC.
35. Neusser, K., Kugler, M., (1998). Manufacturing growth and financial development: evidence from OECD countries. The Review of Economics and Statistics, pp 638 – 646.
36. Pagano, M., (1993). Financial markets and growth: an overview. European Economic Review, Vol. 37, pp 613–622.
37. Patrick, H.T., (1966). Financial development and economic growth in underdeveloped countries. In: Coats, W.L., Jr., Khathhate, D.R. Eds. , Reprinted in Money, and Monetary Policy in Less Developed Countries. Pergamum, 1980.
38. Peia .O , K Roszbach (2014), Finance and growth: Time series evidence on causality, Journal of Financial Stability, Vol 19, pp 105–118.
39. Rioja, F., Valev, N., (2004). Finance and the sources of growth at various stages of economic development. Economic Inquiry, Vol. 42 (1), pp 127–140.
40. Robinson, J., 1952. The Rate of Interest and Other Essays. Macmillian, London.
41. Roubini, N., Sala-i Martin, X., (1992). Financial repression and economic growth. Journal of Development Economics, Vol. 39, pp 5–30.
42. Rousseau .P .L, Vuthipadadorn .D (2005), Finance, Investment and Growth: time series evidence from 10 Asian economies, Journal of Macroeconomics, Vol 27, p 87-106.
43. Rousseau, P., Wachtel, P., (1998). Financial intermediation and economic performance: historical evidence from five industrialized countries. Journal of Money, Credit and Banking, Vol. 30 (4), pp 657–678.
44. Samargandi .N, Fidrmuc .J, Ghosh .S (2014), Financial development and economic growth in an oil-rich economy: The case of Saudi Arabia, Economic Modelling, Vol .43, pp 267–278.
45. Schumpeter, J.A., (1911). The Theory of Economic Development. Harvard Univ. Press, Cambridge, MA.
46. Shaw, E.S., (1973). Financial Deepening in Economic Development. Oxford Univ. Press, New York.
47. Singh, A., (1997). Financial liberalization, stock markets and economic development. Economic Journal, Vol. 107, pp 771 – 782.
48. Stern, N., (1989). The economics of development: a survey. The Economic Journal, Vol. 100, pp 597–685.
49. Xu, Z., (2000). Financial development, investment, and economic growth. Economic Inquiry,Vol. 38 (2), pp 331–344.
50. Rafindadi A, A and Yusof ,Z .(2015). Do the dynamics of financial development spur economic growth in Nigeria's contemporal growth struggle? A fact beyond the figures. Qual Quant ,49:365-384. DOI 10.1007/s11135-014-9991-0.
51. Sohag K, NabilahAbi,B and Begum Rawshan ,A (2015).Dynamic impact of financial development on economic growth: heterogeneous panel data .analysis of island economies.Int. J. Economic Policy in Emerging Economies, Vol. 8, No. 1,77-95.
52. Pesaran .M . H, Shin .Y, Smith .R .J (2001), Bounds testing approaches to the analysis of level relationships, Journal of Applied Econometrics, Vol. 16, Issue 3, pp 289–326.