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FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH IN ALGERIA: AN ECONOMETRIC ANALYSIS OF THE TRANSMISSION CHANNELS

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ABSTRACT

The main objective of this paper is to examine the relationship between financial development and economic growth with the emphasis on the transmission channels as far as the influence of the financial system on economic growth in Algeria during the period (1970 -2012). We employ a time series analyses approach as adopted by Toda and Yamamoto (1995) procedure for Granger non causality test in the context of VAR model. Here, three indicators are employed, that are , domestic credit to private sector to GDP, real GDP per capita,and real Gross Fixed Capital Formation. Our main results find a non existence of the causal relationship between financial development and econonomic growth in Algeria ,thus financial development do not affect growth neither through capital accumulation ,nor productivity of capital , and thus suggesting a less developed financial system in Algeria.

KEY WORDS: Financial Development, Economic Growth, Algeria, Transmission Channels, Toda and Yamamoto (1995) approach.

INTRODUCTION

The subject about determinants of economic growth takes a great deal by economists and policy makers, they aimed to try explaining the differences in the economic performance between developing and developed countries, that why countries grow at different rates?, one among these determinants is financial development for trying to underscore the idea that differences in the level of financial systems development may explain economic growth rates across countries. Furthermore , the importance of the role played by financial system in fostering economic growth and development through

mobilizing saving , and ensuring these resources allocated efficiently to productive sector (Schumpeter 1911 , Levine 1997,Goldsmith 1969 , Gurley and Shaw 1955, Hicks ,1969,Patrick ,1966).In addition,well functioning provided by financial system improved the quality and quantity of investment that can spur economic growth rates through the ability of financial development to reduce the market frictions (asymmetric information, transaction costs) that ensure to more efficient allocation of financial resources towards more productive investment projects (King & Levine , 1993a,b , Levine 1997 ,Pagano,1993 , Levine & Zervos ,1998 , Pagano ,1993) .

Financial developement is most important element in economic process, that what showed the theoritical and empirical studies about this subject, according to Gurley&Shaw (1955),Goldsmith (1969) and Hicks (1969) that concluded the positive link between financial and real sector , furthermore , the works of Mckinnon(1973) and Shaw (1973) focused on financial liberalization that leads to improve the efficiency of financial development ,than reflect to increase the level and volume of saving- investment process , thus growth rates.

Depend on the endogenous growth theory , that indicated and stressed on the role of financial intermediaries in improving the productivity of capital(Greenwood & Jovanovic 1990, Bencivinga & Smith 1991, Saint-Paul 1992 , Pagano 1993) , through two main ways :(i), by Collecting information for evaluating alternative investment projects hence improving the allocation of resources,(ii) providing opportunities to investors to diversify and hedge risk thus ,inducing individuals to invest in riskier but more productive investment alternatives (Pagano ,1993).

The recent view associated between financial liberalization and endogenous growth theory (Ang, 2008, De Gregorio & Guidotti, 1995, Benhabib & Spiegel, 2000, Beck et al, 2000, Levine & Zervos, 1998), that financial development contributes in economic growth through two complementarity channels: capital accumulation and productivity of capital.

Algeria as almost developing countries has implemented various financial reforms (financial liberalization) aimed at deepening and improving the efficiency of financial sector to become a main channel for contributing in economic process and diminishing the dependence of economy on the income from oil sector, since the early 1990s to the transition from planned to an open market economy.

Therefore, the purpose of this work is to investigate the empirical relationship between financial development and economic growth, and stressing on the transmission channels which financial development influence growth in Algerian economy, by addressing the following issues : **How does financial development affect economic growth in Algeria** ?, **Does financial development result in a faster economic growth in Algeria** ?. The study employs Toda and Yamamoto (1995) for Granger non-causality procedure in the context of VAR model, during the period 1970-2012, using indicators such as: credit to private sector to GDP measures banking system development, Real Gross Fixed Capital Formation as an indicator of the investment and Real GDP per capita as proxy of economic growth rate.

We organize this paper as follows: **the first section** provides an overview of literature on the link between financial system development and economic growth, **the second section** a set of empirical studies about either the effect of financial development on economic growth, or the direction of causality between them, or the channels that connect between financial and real sector. **The third section** describes the data and the estimation methodologies and presents the empirical results.

THE THEORETICAL FRAMEWORK

The Link between Financial Development and Economic Growth.

The theoretical evidence about the relationship between financial systems development and economic growth rates can traced back to Joseph Schumpeter (1911), that referred the role played by financial intermediaries in economic development process through its ability to choose and finance the most productive investment projects. According to this view, financial intermediaries improve the efficiency of credit

allocation, thus productivity growth and technological change that foster economic growth rates (Schumpeter, 1911), following this view , the study of Ross Levine (1997) indicated that financial development play an important role in economic activity , through its functions , that are mobilizing savings, evaluating projects, managin risk , monitoring managers and facilitating transactions ,that contribute to stimulate saving-investment process and technological innovation and thus economic growth (Levine , 1997).

Joan Robinson (1952) declared that " where entreprise leads finance follows", depends on his view, economic developement creates and stimulates demand for financial services,that lead to increase competition and efficiency in the financial intermediaries (banks) and financial markets, all these reflect an effect positive on improving the quantity and quality of services provided by financial system. Furthermore, financial development is a response and result of development in real sector (Demand Following hypothesis), that economic development leads to an improvement in the financial systems.

For more contribution in the literature, the link between financial system and growth have studied from several researchers, aimed to clarify and may explain the differences in the level of financial development depend and related to the differences in economic development across countries, the studies by Gurley & Shaw (1955), Hicks (1969) and Goldsmith (1969) that concluded the positive relationship between financial development and economic growth rates, thus , that financial development stimulates economic growth through increasing intermediating activities. Otherwise, Goldsmith (1969) focused on connecting between developed of financial systems and efficiency of investments,"financial development accelerates economic growth and improves economic performance to the extent that it facilitates the migration of funds to the best user, i.e., to place in the economic system where the funds will yield the highest social return" (Goldsmith, 1969, p.400).

Furthermore , Patrick (1966) postulated the stage of development hypothesis, that declared the relationship between financial development and economic growth depends on the stage which country that is ,in early stage , a higher level of economic development stimulates more demand for financial services , that concluded to rise efficiency and development in the financial intermediaries and financial markets (Demand Following Hypothesis) .on the other side , available of information by financial intermediaries to investors allows investment pojects to be launched more efficiently , and thus enhances capital accumulation and economic growth (Supply Leading Hypothesis).

Moreover, the works of McKinnon (1973) and Shaw (1973) about the financial liberalization policies that is result of financial repression application by many developing countries ,through using various tools (interest rate controls, high reserve requirements ,directed credit programs , among others) that facilitate to the intervention of government in the functions of financial systems,,thus financial repression do not encourage to collect more financial resources that responding and stressing on negative real interest rates (high inflation rates and restrict interest rates in low) , than less the amount of saving to finance productive projects (decrease of volume of investment) , thus lead to harm economic growth rates.

According to Shaw (1973) and Mckinnon (1973) that financial liberalization is a solution that taken by developing countries especially by apply many financial reforms, to achieve high level of development through channels of developed of financial system.

Financial Liberalization ⟶ Financial System Development ⟶ Economic Growth.

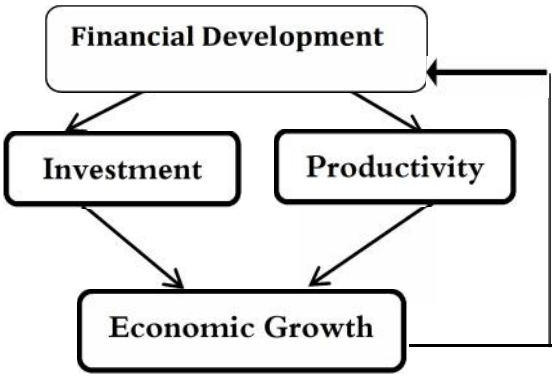
Not all researchers are agreed on the positive effect of financial liberalization,at the head of opposition , Minsky (1975,1991) and Diaz-Aliejandro (1985) declared that financial liberalization leads to financial instability and financial crises, stiglitz & Weiss (1981), Stiglitz (1994) , stiglitz (2000) indicated that government intervention (financial repression policies) can reduce market failures and improve the performance of an economy .

In Addition to above views , others economists declared that financial system development is unimportant factor in economic development such as Lucas (1988) ,Chandavarkar(1992) , Sterm's(1989) and Modigliani & Miller(1958) , among others .

The endogenous growth view tressed that financial intermediation affects growth through productivity of capital (Greenwood & Jovanovic 1990, Bencivinga & Smith 1991, Saint-Paul 1992, Pagano 1993). Financial development increase productivity growth through ameliorate market frictions (information asymmeries and transaction costs), (Levine, 1997), Thus savings channelled through financial intermediaries are allocated more efficiently, and the higher productivity of capital results in high growth (Pagano, 1993 p 615).Depends on Pagano(1993) financial development rises the productivity of capital by two ways : (i) collecting information to evaluate alternative investment projects , and (ii) inducing individuals to invest in riskier but more productive technologies by providing risk sharing , (Pagano , 1993, p 615) .

Related to growth theory that financial system development can influence economic growth through two main channels : the capital accumulation channel and the productivity of capital. Capital accumulation channel (quantitative channel) by increasing the level of savings, more funds will be available for investments, and capital accumulation and higher economic growth rates that consists about the amount of investment. Productivity of capital channel(qualitative channel) through that developed financial system can collect and analyse information (more efficiently) ,and evaluate different investment project available, that contribute to diminish the problem of asymmetric information ,that improved the efficiency and quality of investments, through allocating financial resources to its best possible use (De Gregorio & Guidotti 1995, Ghirmay2006 , Ang 2008 , Pagano 1993 ,Levine ,1997,Berthélemy & Varoudakis,1998), furthermore, reduce and hedge against risk by diversify funds to different investment activities, as indicated in the following chart (Shan & Morris , 2002, p 156):

Figure 1: channels to economic growth



Recent view associated between financial liberalization and endogenous growth theory , while financial development influences economic growth through two channels (Ang , 2008) : capital accumulation channel that depends on the view of Shaw (1973) and Mckinnon (1973) that financial liberalization lead to improve efficiency and development in financial system , thus increase the level of savings and investment , according to this view , financial liberalization contributes in increase the volume and amount of investment , on the other hand, endogenous growth theory declared that financial development promote efficiency and productivity of capital though allocated financial resources to the most productive use , and endogenous financial development and growth theory , which postulates a feedback relationship in the finance – growth nexus (Ang ,2008, De Gregorio & Guidotti 1995, Ghirmay2006 , Ang 2008 , Pagano 1993, Levine,1997,Berthélemy & Varoudakis,1998).

EMPIRICAL EVIDENCE

Depend on the debate in theoretical literature about a subject of the link between finance and growth , many empiricals have examined the relationship between financial system development and growth ,that aimed to conclude that the differences in the level of financial development may explain the differences in economic development across countries , they focused on either testing the effect of financial development on economic growth (Supply-Leading hypothesis),or examining the direction of causality between financial and real sector, or emphasize the transmission channels which financial

development can influence economic growth (Ang ,2008) through capital accumulation channel ,its productivity or both , through using various indicators of financial development and growth with different econometrics approaches including cross sectional regression, panel data and time series methodologies ,but they returned to different result to another , almost of them agreed that exist a link between financial development and economic growth , but the direction of causality varied across countries .

According to some researchers , the results may vary and depend on : (i) the indicators used to proxy for financial development (Adul et al 2013 , Ewetan & Okodua ,2013, Kouki ,2013),(ii) institutional factors or policies may play a critical rale in determining how the process of financial development affects economic growth(Arestis & Demetriades , 1998, Demetriades & Law ,2006,Minea & Villieu ,2010,Law & Habibuballah,2006 ,Mishkin , 2009) and depend on the specific characteristicsof the financial structure (Choong & Chan , 2011) , (iii) the link between finance and growth may be non lineaire (Deidda & Fattouh , 2002 , Rioja & Valev , 2003,Rousseau& Wachtel , 2002,Berthélemy & Varoudakis 1998) , (iiii) econometrics problem that did not take when tested and estimated long and short run between proxies of financial development and growth , among others .

The first study about this issue by Goldsmith (1969) that examined the relationship between financial development and economic growth for 35 countries, it concluded that the positive relationship between financial intermediation and economic growth through the channel that focus on the imortance of financial institutions in collecting resources to finance investment project, but this study is failured to show the direction of causality between financial and real sector.

The study of King & Levine (1993a) about 80 countries during the period 1960 to 1989, using cross-country evidence with OLS, employing various proxies of banking system development, it found that indicators of financial development are positively correlated with proxy of economic growth, capital accumulation and total factors productivity growth.

Demetriades & Hossein (1996) examined the relationship between financial development and economic growth on 16 countries, they found that the direction of causality depends on the charactistics of financial systems across countries (in some of them bi-directional and others unidirectional causality).

The study of Ben Naceur & Ghazouani (2007) aimed to examine the effect of banking system and financial market development on economic growth in 11 countries from MENA region, using GMM approach with various indicators of financial development, they found a negative relationship between financial system development and growth, they linked this result to the underdevelopment financial systems that are characterized by the countries under study (in MENA region).

Boulila & Trabelsi (2002) investigated the causal relationship between banking system development and economic growth in Tunisia, they found evidence of finance leading growth during the period 1963-1987 (period of financial repression) ,and bi-directional causality from 1962 to 1998 , they concluded that the weak evidence to support that financial system contributes in economic process in Tunisia .

Adu George et al (2013) aimed to examine the effect of financial development on economic growth in Ghana , they found that the effect depends on the proxies of financial development used.(the result is sensitive to the choice of the in dicators of financial development), using various measures of financial development comprising private-sector credit/GDP ;private-sector credit/total domestic credit ,broad money/GDP, narrow money/broad money , currency/broad money, currency/GD , totaldomestic credit/GDP, Total bank deposit liabilities/GDP, and real deposit interest rate;during the period 1961-2010 with or using ARDL model .

Alaoui Moustain (2004) and Chatri & Maaruf (2013) are among studies that have tested the financial-led growth hypothesis on Morocco, using VAR and VECM, respectivey model with various indicators of banking system and stock market, they found that the result depended on the

proxies chosen for financial development, these result indicates that Morocco should keep to promote financial development through more financial reforms to spur the real sector

The studies of Bakhouche (2007) and Lacheheb et al (2013) attempted to determine and analyse the effect of financial development on real sector in Algeria (test of supply leading hypothesis) , using the same approach is ARDL model .their finding is no significant effect from financial development on growth in Algeria, they related this result to less developed banking system and need to more financial reforms to accelerate economic growth in Algeria.

Here the studies that focus on the transmission channels which financial development affect economic growth, almost of them used either cross –section regression or dynamic panel data method (De Gregorio & Guidotti, 1995, Levine & Zervos (1998), Benhabib & Spegiel 2000, Beck et al 2000, Rioja & Valev 2003), just the studies of Ghirmay (2006) and Ang (2008) that employed time series analyses approach.

The study of De Gregorio & Guidotti (1995) aimed to re-examine the relationship between financial development and economic growth , also they tried to determine the channels which financial systems can affect growth , using bank credit to private sector to GDP , they found that the main transmission channel from financial development to economic growth is efficiency of investment (productivity of capital channel).

Levine & Zervos (1998) aimed to examine the effect of financial development on growth using cross –sectional data for 47 countries over the period 1976-1993 with OLS method, they found that stock market liquidity and banking sector development both positively affect real GDP per capita growth, capital accumulation and productivity growth.

The study of Beck et al (2000) about 77 countries for the period 1960 to 1995, financial sector development is found to be robustly and positively correlated with both real per capita GDP growth and TFP growth. The results also provide some support for the positive role of financial development on both capital accumulation and private saving rate; but these links are statistically weaker.

Benhabib& Spiegel (2000) using GMM estimator on the Argentina, Chile, Indonesia and Korea from 1965 to 1985.they found that financial development positively affects both investment rates and TFP growth. However, the results are sensitive to the inclusion of country fixed effects and different indicators of financial development.

Rioja & Valev (2003) examined the effect of financial development on economic growth through capital accumulation and productivity growth on different samples of countries that aimed to explain the difference in the level of financial development related to level of development, using GMM approach, and three proxies of financial development.

They found that financial development has positive and strong effect on economic growth through productivity channel in developed countries, while in developing countries through capital accumulation channel, they concluded that the relationship may vary according to the level of financial development.

The study of Ang (2008) aimed to examine the link between financial development and economci growth , thus emphasizing on the mechanisms that connect between financial and real sector in Malaysia , for achieving this target , it used six equations , that are : financial development , private saving , private investment , foreign direct investment , the saving-investment correlation ,aggregate output , employed ARDL model during the period 1960-2003 . It found that financial development has a significant positive impact on economic growth in Malaysia through quantitative channel (capital accumulation) and qualitative channel (productivity of investment).

Ghirmay (2006) investigated the relationship between financial development and economic growth, and also this study attempted to determine through which channel can financial develoment influence economic growth by increasing the level of investment ,its productivity ,or both for US over the period 1970-2001.He found

that financial system development affect economic growth through capital accumulation and productivity channels ,and no support of reverse causality from real to financial sector .This study declared that financial development (market-based financial system) has a positive and significant effect on economic development in US .

This study aims to reexamine the link between financial development and economic growth n Algeria, firstly the direction of causality from financial development to economic growth (assume that financial development affect economic growth, supply –leading hypothesis), and stressing by which channels can financial develoment influence growth rates in Algeria:

$\mathbf{H_1}$: Does financial development foster economic growth through the level and amount of investment in Algeria (capital accumulation channel)?

$\mathbf{H_2}$: Does financial development promote economic growth through productivity channel in Algeria (productivity of investment)?

On the other hand, the third hypothesis that comprises on the reverse causality from economic growth to financial system development.

$\mathbf{H_3}$: Does economic growth cause development in financial system in Algeria?

For testing this hypotheses, we are following an approach, that employed by Gregorio & Guidotti (1995), Benhabib & spiegel (2000), Ghirmay (2006), that is, if financial development is found to causally affect real GDP per capita when an investment variable is included (controlled for) in the model, it indicates that financial development affects economic growth by changing the allocative efficiency or productivity of investment. This way, the productivity effect of financial development is disentangled from its overall growth effect. In addition, if financial development causally affects investment variable when Real GDP per capita is included in the model, it means that financial development causally affects the level of investment. The reverse causality issues, that is, whether increase in Real GDP per capita causes FD are also tested in a similar approach. (Ghirmay, 2006, p 28).

1. Econometrics Approach

This part highlights the econometrics model used to study the relationship between financial development and economic growth in Algeria .We use Toda and Yamamoto (1995) for Granger non –causality Test in context a VAR model. Following the literature, an unrestricted VAR model with deterministic terms can be written as:

$$X_t = \sum_{i=1}^{p} \pi_i X_{t-i} + \delta t + \mu + \varepsilon_t, \qquad \text{for } t = 1, \ldots\ldots\ldots\ldots, T \qquad (1)$$

Where, $X_t = [CREDIT, INVEST, RGDP]$ is a vector of variables such as domestic credit to private sector to GDP, real gross fixed capital formation and real GDP per capita, respectively. π_i are matrices of coefficients, δ trend coefficient, μ vector of constants, and ε is a vector of white noise error terms.

The Toda–Yamamoto (1995) approach to Granger causality test:-

The purpose of this paper is to examine the causal link between financial development and growth, and stressing on transmission channels which financial development affect growth (capital accumulation and productivity of capital), we employ Toda and Yamamoto (1995) methodology, that is Augmented Granger causality test. They proposed this approach to possibly of variables either integrated of different orders or non –cointegrated or both (**Toda &Yamamoto, 1995**).

According to Toda and Yamamoto (1995), we estimate an Augmented VAR model which guarantees the asymptotic χ^2 distribution of the Wald statistic, which formulate a VAR (k+d_{max}) that increase the number of lags through addition of lags , k is an optimal lag length selection, is the maximum order of integration in the system

(Rambaldi & Doran ,1996) , with estimate VAR in the level rather than the first differences in Granger causality test (Toda & Yamamoto , 1995) ,and the coefficient of last lagged vector are ignored Modified WALD Test (Toda & Yamamoto , 1995 , Rambaldi & Doran ,1996).

The VAR (k+d_{max}) take the formula as follows:

$$CREDIT_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} CREDIT_{t-i} + \sum_{j=k+1}^{d_{max}} \alpha_{2j} CREDIT_{t-j} + \sum_{i=1}^{k} \delta_{1i} INVEST_{t-i} + \sum_{j=k+1}^{d_{max}} \delta_{2j} INVEST_{t-j} + \sum_{i=1}^{k} \emptyset_{1i} RGDP_{t-i} + \sum_{j=k+1}^{d_{max}} \emptyset_{2j} RGDP_{t-j} + \lambda_{1t}. \quad (2)$$

$$INVEST_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i} INVEST_{t-i} + \sum_{j=k+1}^{d_{max}} \beta_{2j} INVEST_{t-j} + \sum_{i=1}^{k} \theta_{1i} CREDIT_{t-i} + \sum_{j=k+1}^{d_{max}} \theta_{2j} CREDIT_{t-j} + \sum_{i=1}^{k} \mu_{1i} RGDP_{t-i} + \sum_{j=k+1}^{d_{max}} \mu_{2j} RGDP_{t-j} + \lambda_{2t}. \quad (3)$$

$$RGDP_t = \omega_0 + \sum_{i=1}^{k} \omega_{1i} RGDP_{t-i} + \sum_{j=k+1}^{d_{max}} \omega_{2j} RGDP_{t-j} + \sum_{i=1}^{k} \gamma_{1i} INVEST_{t-i} + \sum_{j=k+1}^{d_{max}} \gamma_{2j} INVEST_{t-j} + \sum_{i=1}^{k} \nu_{1i} CREDIT_{t-i} + \sum_{j=k+1}^{d_{max}} \nu_{2j} CREDIT_{t-j} + \lambda_{3t}. \quad (4)$$

Where the series are defined in Eq. (1) above. From eq.(2) , Granger causality from $RGDP_t$ to $CREDIT_t$ implies $\emptyset_{1i} \neq 0 \forall_i$, similarly in Eq.(3) , $CREDIT_t$ to $INVEST_t$,if $\theta_{1i} \neq 0 \forall_i$, and Eq.(4), indicate that causality from to ,if . In each case , the Wald statistic will be asymptotically distribution with degrees of freedom equal to the of restrictions, finally , , and are assumed to be white noise errors terms with zero mean , a constant variance, and no autocorrelation.

2. Description Data and Source

Financial system development measurement:-

various indicators as proxies financial development that used in the literaure such as , real interest rates (Shaw 1973 ; Mckinnon ,1973 ; Fry 1995, among others) , monetory aggregates M1, M2 or M3 to Nominal GDP , and private credit to private sector to GDP that uses in this study , which measures the degree of bank intermediation toward the private sector in the absence of the role of financial market in Algeria(bank-based) . this is one of the most widely used measures (proxies) of financial development (De Gregorio & Guidotti 1995, Benhabib & Spiegel,2000 , Adu et al ,2013, Beck et al, 2000, levine and Zervos ,1998),that measured the quantity and quality of services provided by financial intermediaries," the ratio of bank credit to private sector to GDP is more directly linked to investment and economic growth" (Gregorio & Guidotti 1995 , p 434).

Economic growth is measured by real GDP per capita as used in the literature, real gross fixed capital formation as a proxy of volume of investment (capital accumulation) that used from previous studies such as: Adul G et al (2013), Ghirmay (2006), among others.

The empirical analysis was carried out using time series model. The study uses annual time series data over the period 1970 to 2012, with total of 43 observations for each variable. The data of real GDP per capita, real gross fixed capital formation, and domestic credit to private

sector to GDP, are obtained from the World Bank's World Development Indicators (WDI). We took logarithm of real GDP per capita and real gross fixed capital formation, and the credit to private sector is in percentage (%).

Table 1: Description of variables

Variable name	Description
RGDP	Logarithm of real GDP per capita
INVEST	Logarithm of real gross fixed capital formation
CREDIT	Domestic credit to private sector to GDP (%)

3.Empirical Result

To acheive the Toda and Yamamoto (1995) for Granger non causality test in context of VAR model, we apply the main steps as follows:

3-1 unit root test: The first is to test whether the variables have a unit root to confirm the stationarity of each variable, and to determine maximal order of integration (d_{max}).We use Augmented Dickey –Fuller (ADF), the results are reported in table 2, and show that all variables are integrated of order one I (1), thus, the maximum order of integration for these time series is =1.

Table 2: Augmented Dickey –Fuller (ADF) Unit Root Test

Variable name	ADF test		Conclusion at the 5% and 10% level
	At level	difference	
RGDP	-1.78	- 5.98	I(1)
INVEST	-1.58	-3.85	I(1)
CREDIT	-2.11	- 4.73	I(1)

Note : theoretical values at 5% critical values for models none, with intercept , and intercept and trend are -1.94,-2.93, and -3.52 respectively . the corresponding 10% critical values are -1.61, -2.60, and -3.19 respectively.

3-2 Selection for optimal lag length in VAR model:the next step is to determine the optimal lag length for variables in VAR model,the lag length of variables are set according to Akaike Information Criterion (AIC), that indicates is 2 (k=2) according to table 3 .

Table 3: Lag Length Selection

Lag	LR	FPE	AIC	SC	HQ
0	NA	0.949889	8.462190	8.588855	8.507988
1	196.2280*	0.006408	3.461410	3.968074*	3.644604*
2	16.24267	0.006198*	3.419208*	4.305870	3.739797
3	6.283823	0.008055	3.659747	4.926407	4.117732

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

3-3 Cointegration Test : the time series have a same order of integration I(1) , then test to check if they are ciontegrated, just for confirming with the result of causality ,Johansen's Trace Test and Max Eigen value both indicate no cointegration among variables at 5% significance level

Table 4: Test of Cointegration (Johansen cointegration test)

H0 : rank : r	Traces	Critical value 5%	Max-Eigen value	Critical value 5%
r=0	26.64	29.79	19.26	21.13
r=1	7.38	15.49	6.48	14.26
r=2	0.89	3.84	0.89	3.84

3-4 Test for Granger-non causality: The test of causality shows that do not find any direction of causality between financial development, investment and growth, as indicated in **table 5,** thus financial development do not affect economic growth neither through capital accumulation channel, nor productivity of capital, and any find about reverse causality from economic growth to financial system in Algeria at 5% and 10% significant level.

Table 5: Toda-Yamamoto causality (Modified Wald) test results

Hypotheses (??$_{??}$) :	Wald test statistic	Result	
		5% level	10% level
Productivity channel **Financial Development does not cause Economic Growth**	$\chi^2(2)=1.55(0.46)$	Not Rejected	Not Rejected
Capital accumulation channel **Financial Development does not cause investment**	$\chi^2(2)=1.42(0.49)$	Not Rejected	Not Rejected
Reverse effect **Economic Growth does not cause Financial Development**	$\chi^2(2)=0.13(0.93)$	Not rejected	Not rejected

SUMMARY AND CONCLUSION

The target of this article is to examine the causal nexus between financial system development and economic growth in Algeria and emphasizing on the channels that financial system influence the real secter through either capital accumulation, or its productivity or both.We use three indicators , that are , domestic credit to private sector to GDP (CREDIT) for measuring the level of development in Algeria financial system , Real gross fixed capital formation as proxy of the volume of investment , and Real GDP per capita is an indicator of economic growth , during the period 1970 -2012 , with employed Toda and Yamamoto (1995) approach for Granger non-Causality test in the context of VAR model . This paper found non existence the causal relationship between financial development and econonomic growth in Algeria ,thus financial development do not affect growth neither through capital accumulation ,nor productivity of capital. This result corresponds what concluded by Bakhouche (2007), Lacheheb et al (2013), and Ben Naceur & Ghazouani (2007), that concluded no significant effect of Algian financial system on real sector and they related this finding to less developed financial system in Algeria.

REFERENCES

1. *Adu G, Marbuah G and Tei Mensah J (2013) « Financial development and Economic Growth in Ghana: Does the measure of financial development matter? » Review of Development Finance 3, pp 192- 203.*
2. *Alaoui Moustain, F (2004) « Does financial Development cause Economic growth? An empirical investigation drawing on the Moroccan Experience » .Working paper N°2004/045.Lancaster University Management School.*
3. *Ang, J. B. and McKibbin, W. J. (2007) Financial Liberalization, Financial Sector Development and Growth: Evidence from Malaysia. Journal of Development Economics.*
4. *Ang, J. B.,(2008) « A Survey of Recent Developments in the Literature of Finance and Growth » Journal of Economic Surveys 22:3 ,536-576.*
5. *Ang, J,B (2008)"What are the Mechanisms linking Financial Development and Economic Growth in Malaysia?" Economic Modelling, 25,pp 38-53*
6. *Arestis P, Demetriades, Fattouh and Mouratidies (2002) « the impact of financial liberalization policies on financial development : evidence from developing economies . » International Journal of Finance and Economics 7: 109 – 121.*
7. *Bakhouche Abderazek (2007) « Does the financial sector promote economic growth? A case of Algeria » savings and development, Vol .31, N°1(2007), pp.23-44.*
8. *Ben Naceur Samy and Ghazouani Samir (2007) « Stock market, Banks, and economic growth: Empirical evidence from MENA region ».Research International Business and Finance 21 ,297-315.*
9. *Bencivenga, V. R. and Smith, B. D. (1991) Financial Intermediation and Endogenous Growth. Review of Economic Studies 58: 195-209.*
10. *Boulila .G and M.Trabelsi, (2002)."Financial development and long run growth: Granger Causality in a bi-variate VAR Structure, Evidence from Tunisia: 1962-1997 .Faculté des sciences Economiques et de Gestion de Tunis (FSEGT).*

11. Boyd, J. H. and Smith, B. D. (1998) The Evolution of Debt and Equity Markets in Economic Development. Economic Theory 12: 519-560.
12. Chandavarkar, A. (1992) Of Finance and Development: Neglected and Unsettled Questions. World Development 20: 133-142.
13. Chatri and Maaruf (2014) "Cointegration and causality between financial development and economic growth: Evidence from Morocco", Indonesian Capital Market Review Vol 6,N°1,ISSN:1979-8997.(pp. 1-18)
14. Choong and Chan (2011) '' Financial Development and Economic Growth:A review" African Journal of Business Management Vol 5,(6),pp ,2017-2027.
15. Deidda, L. and Fattouh, B. (2002) Non-linearity between Finance and Growth. Economics Letters 74: 339-345.
16. Demetriades .P and Hussein (1996) « Does financial development cause economic growth? Time –series evidence from 16 countries » Journal of Development Economics Vol .51(1996) 387-411.
17. Demetriades, P. O. and Hussein, K. A. (1996) Does Financial Development Cause Economic Growth? Time-Series Evidence from Sixteen Countries. Journal of Development Economics 51: 387-411.
18. Diaz- Alejandro C (1985) « Good-bye Financial Repression , Hello Financial Crash . » ,Journal of development Economics 19 ,1-24 , North- Holland .
19. Diaz-Aliejandro,C(1985) " Good-Bye Financial Repression ,Hello Financial Crash " Journal of Development Economics , Vol ,19,pp.1-24.
20. Fry, M. J. (1988) Money, Interest, and Banking in Economic Development. Baltimore and London: Johns Hopkins University Press.
21. Ghirmay, Teame (2006) « Financial Development, Investment, Productivity and Economic Growthin the US. » Southwestern Economic Review , 33(1) , PP 23-36.
22. Goldsmith, R. W. (1969) Financial Structure and Development. New Haven: Yale University Press.
23. Greenwood, J. and Jovanovic, B. (1990) Financial Development, Growth, and the Distribution of Income. Journal of Political Economy 98: 1076-1107.
24. Greenwood, J. and Smith, B. D. (1997) Financial Markets in Development, and the Development of Financial Markets. Journal of Economic Dynamics and Control 21: 145-181.
25. Gurley, J. G. and Shaw, E. S. (1955) Financial Aspects of Economic Development. American Economic Review 45: 515-538.
26. Hicks, J. R. (1969) A Theory of Economic History. Oxford: Oxford University Press.
27. Hill. R, Griffiths.W,and Lim.G (2011) " Principles of Econometrics " ISBN 978-0-470-62673-3,Fourth Edition, p 1-758.
28. J Benhabib and M . Spiegel (2000) « the role of financial development in growth and investment » Journal of economic growth , 5 : 341-360 .
29. Jame B.Ang (2008) « what are the mechanisms linking financial development and economic growth in Malaysia ? » Economic Modelling 25(2008) 38-53.
30. Jordan Shan and Alan Morris (2002) « Does financial development lead economic growth? »International Review of Applied Economics, Vol .N°.2.pp153-69.
31. King, R. G. and Levine, R. (1993a) Finance and Growth: Schumpeter Might Be Right. Quarterly Journal of Economics 108: 717-737.
32. King, R. G. and Levine, R. (1993b) Finance, Entrepreneurship, and Growth: Theory and Evidence. Journal of Monetary Economics 32: 513-542.
33. Kouki Imen (2013) « financial development and economic growth in the north Africa region », African Development Review, Vol 25, N°4, pp. 551-562.
34. Lacheheb et al (2013) "Openness, financial development and economic growth in Algeria: An ARDL bound testing approach» International journal of Economics, Finance and Management sciences, 2013 1(6):400-405.
35. Levine, R. (1997) Financial Development and Economic Growth: Views and Agenda. Journal of Economic Literature 35: 688-726.
36. Levine, R. and Zervos, S. (1998) Stock Markets, Banks, and Economic Growth. American Economic Review 88: 537-558.
37. Levine, R.; Loayza, N. and Beck, T. (2000) Financial Intermediation and Growth: Causality and Causes. Journal of Monetary Economics 46: 31-77.
38. Lucas, R. E., Jr (1988) On the Mechanics of Economic Development. Journal of Monetary Economics 22: 3-42.
39. McKinnon, R. I. (1973) Money and Capital in Economic Development. Washington, D.C.: Brookings Institution.
40. Modigliani, F. and Miller, M. H. (1958) The Cost of Capital, Corporation Finance, and the Theory of Investment. American Economic Review 48: 261-297.
41. Pagano, M,(1993) « financial markets anf growth : An overview » European Economic Review 37,613-622.
42. Patrick, H. T. (1966) Financial Development and Economic Growth in Underdeveloped Countries. Economic Development and Cultural Change 14: 174-189.
43. Rambaldi and Doran (1996)" Testing for Granger Non – Causality in Cointegration Systems" Working Paper in Econometrics and Applied Statistics N°88.
44. Rioja ,F and Valev , N (2003) « Finance and the Sources of Growth at Various Stages of Economic Development », Andrew Young School of Policy Studies , Department of Economics , Georgia State University , Atlanta , pp 29
45. Rioja and Valev (2003) "Finance and the Sources of Growth at Various Stages of Economic Development, Andrew Young School of Policy Studies, Department of Economics, Georgia State University, Atlanta.
46. Roubini N and Sala-i-Martin X (1991) « Financial Development, the Trade Regime, and Economic Growth » working paper N°3876(NBER, Cambridge,MA) Oct.
47. Schumpeter, J. A. (1911) "the Theory of Economic Development". Oxford: Oxford University
48. Shaw, E. S. (1973) Financial Deepening in Economic Development. New York: Oxford University Press.
49. Stiglitz ,J and Weiss .A (1981)" Credit Rationing in Markets with Imperfect Information ", The American Economic Review , Vol 71,Issue 3,393-410.
50. Stiglizt ,J (2000) "Capital Market Liberalization,Economic Growth and Instability" World Development,28: 1075-1086.
51. Thorson Beck, Ross Levine and Norman Loayza (2000) « Finance and the sources of growth »Journal of Financial Economics 58 (2000) 261-300 .
52. Toda and Yamamoto (1995) « Statistical inference in Vector Autoregressions with possibly integrated processes » Journal of Econometrics, 66, p225-250.
53. Toda, H. Y. and Yamamoto, T. (1995), Statistical Inference in Vector Autoregressions with Possibly Integrated Processes, Journal of Econometrics, 66, 225-250.
54. Berthélemy and Varoudakis (1998) ''Dévelopment financier ,Réformes financières et croissance :une approach en données de panel '',Revue Economique ,Vol,49,N°1,pp 195-209.