

The causality between financial development and economic growth: case of Algeria

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Summary: This paper aims to investigate the direction of causality between financial development and economic growth in Algeria over the period 1980-2018 using Toda and Yamamoto (1995) approach for Granger non-Causality test in the context of VAR model. The study was carried out using two indicators to proxy the level of financial development. The first proxy is the monetization ratio (M2/GDP) as an indicator of the financial depth or size of the financial development intermediaries sector. The second proxy is financial intermediation ratio expressed by the credit to private sector as percentage of GDP. While, the GDP per capita growth was used as measure of economic growth.

The results suggest unidirectional causality relationship running from the economic growth to the financial sector as explained by the broad money to GDP. Nevertheless, the findings suggest non-causality between credits to private sector to GDP and economic growth.

Keywords: Financial development, economic growth, Algeria, Toda and Yamamoto (1995) approach.

Jel Classification Codes : C33; E51 ; G 21; N10.

I- Introduction :

Financial intermediaries play a pivotal role in economic development, by providing a set of functions, as the transfer of funds in space and time, risk management and the provision of means of payment. Gemma et al. (2010) argued that the main role of financial sector development in growth is improving the efficiency of capital allocation¹. While Demirgüç and Levine (2008) stated that financial systems affect long-run growth across saving rates, investment decisions and technological innovation².

Economic growth, which measures the increase in the total volume of goods and services, produced in an economy, constitute an important macro-economic objective because it enables the overall living standard of people.

Therefore, the role of financial development in economic growth has attracted much interest among academics, policy makers and economists around the world. There is a large body of literature, both empirical and theoretical, that addresses the potential links between financial development and economic growth.

Moreover, the assessment of the development of financial sector, in order to investigate its impact on economic growth, requires a good measurement. In practice, it is difficult to measure financial development as it is a vast concept and has several dimensions. The World Bank develops four dimensions characterizing a well-functioning of financial system, where financial intermediaries and financial markets are the two major components of it. These measures are related to financial depth, access, efficiency and stability.

However, the main indicators of financial development, which have been proposed in the literature are initially related to monetary aggregates, such as M1 and M2. These aggregates are

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broadly available and they are “more related to the ability of the financial system to provide transaction services”³ according to Mohsin and Abdelhak (2000). The Credits to the private sector are also considered as a proxy of financial development. They measure the ability to channel funds from savers to the private sector. Calderón and Liu (2003) considered it as favorite indicator, which directly linked investment and growth⁴.

Statement of problem:

The relationship between financial development and economic growth in developing economies has been of considerable interest among contemporary researchers. An efficient financial system plays a crucial role in economic development by performing a set of functions efficiently: allocating capital, mobilizing savings, evaluating and monitoring investments. Since the early nineties, Algeria has implemented various financial reforms to enhance the efficiency of its financial sector to sustain economic growth and to reduce the dependence of the economy on revenues arising from oil income. The challenge is to examine the direction of causality between the development in the financial sector and the economic growth to identify easily the channel through which financial depth affects growth and vice versa.

Main claim:

A sound and efficient financial system is an important determinant for economic growth. However, the financial systems in developing countries, as Algeria, are facing a lot of difficulties and impediments that hamper them from performing their role as intended and thereby sustaining growth. These difficulties are mainly related to the lack of capacity in mobilizing savings, the poor effectiveness in allocating financial resources to productive investments and underdeveloped payment methods.

Sub claims:

1. The level of financial depth and sophistication positively affects economic growth. As a proxy of financial depth, the ratio of money supply to GDP is around 82% in Algeria. An economy with an underdeveloped financial system may have a high ratio of money to GDP. Thus, we may expect a no relationship between this indicator and economic growth.

2. Credits to the private sector to GDP as a proxy of financial development measure the effectiveness of financial intermediaries in channeling funds to a productive private sector. The efficient provisioning of credit has a positive impact on economic growth. However, this proxy demonstrates some weakness in Algeria: it's approximately 22%, which may have a little impact on the Algerian economy. Hence, a strong relationship between financial development and economic growth requires improve this proxy.

3. Since the early 1990s, the Algerian financial and monetary authorities have implemented various reforms in the financial sector to boost the role of national banks and reduce the restrictions imposed on them. Eita and Jordaan (2007) noted, “Policy restrictions such as credit ceilings and high reserve requirements on the banking system can impact negatively on development of the financial sector. [Hence], this will have a negative effect on economic growth”⁵.

Research Question and Hypothese

A large body of evidence suggests that financial development plays crucial role in economic development, and this effect is causal. Thus, the paper seeks to answer the following question:

Is there a bi-directional influence between financial development and economic growth in the case of Algeria?

In addition, the research hypothesis can be developed as follows:

Null hypothesis (H0): absence of bi-directional causality between financial development and economic growth.

Due to all the reasons previously mentioned, this study seeks to empirically examine the direction of causality between economic growth and financial development in Algeria during the period 1980-2018, using Toda and Yamamoto (1995) approach for Granger non-Causality test in the context of VAR model.

The paper consists of 6 sections including introduction and is organized as follows. The second section provides a brief review of the literature on the relationship between financial development and economic growth. The third section gives an overview on financial sector in Algeria. The fourth section pertains to describe the data and the econometric approach, as well as, the discussion of the results of the empirical analysis. The last section offers some concluding remarks.

There is a vast body of literature that investigate theoretically and empirically the nexus between financial development and economic growth. However, different views are raised regarding this issue. Some of these studies will be present in this part.

Mohsin and Abdelhak (2000) examined a set of empirical studies on the link between financial development and economic growth, and they found a positive effect between these two variables. However, they indicate that the size of this effect varies from study to others by considering some factors related to the indicators of financial development chosen, the estimation method used and functional form of the relationship⁶.

Gemma et al. (2010) investigated the impact of financial system on economic growth for 125 countries using panel data regression. The result shows that financial development has a significant positive effect on economic growth particularly in developing countries. The authors indicate also that the development of financial system become more required after the recent crisis, and its role should shift from accumulation-led growth to productivity-led growth. For this aim, the authors suggested that financial sectors should increase the quality rather than quantity of investment⁷.

From the investigation of empirical works on the finance-growth nexus, **Demirgüç and Levine (2008)** concluded that the level of financial development, the size of banking system and liquidity of stock exchanges are important, more these factors are optimized faster and positively they affect growth. They added also that facilitate access to finance is a funnel through which financial development influences growth. In addition, the authors focus on the important role of governments in the process of growth across shaping the functioning of financial systems. They added, regulators must ensure stable macroeconomic policies, promote access to financial services and reduce policy restrictions in bid to enhance financial system performance⁸.

Using across country regression, **King and Levine (1993)** examined the empirical link between a range of indicators of financial development and growth indicators (growth, rate of capital accumulation and efficiency of resource allocation) for 80 countries over the period 1960-1989. They used as independent variables: the size of the formal financial intermediary sector relative to GDP, the importance of banks relative to the central bank, the percentage of credit allocate to private firms, and the ratio of private credit to GDP. Moreover, they added control variables, which consist to the ratio of trade openness to GDP, the ratio of government spending to GDP (GOV), and the inflation rate. The main empirical findings indicate that the four indicators of financial development are strongly and robustly correlated with growth, the rate of physical capital accumulation, and improvements in the efficiency of capital allocation. Even, they argued that the relationship is stronger with higher level of financial development⁹.

Arcand et al. (2012) examined the relationship between financial depth and economic growth and they argued that too much finance affect negatively the growth. They corroborate their opinion by applying different empirical approach on set of countries, and they found that the financial sector with credit to private industry that is between 80 -100% of GDP affect negatively growth, however they showed that this effect is positive and robust in the case of small and intermediate financial sectors¹⁰.

Observing 72 countries for the period 1978-2000, **Demetriades and Law(2006)** by using cross-sectional analysis as well as panel approaches, asserted on the importance of the quality of financial institutions in determining the link between financial development and economic growth. They found that financial depth does not affect long run growth in countries with poor institutions, however the impact is much larger with sound institutional framework. Hence, they concluded, “‘better finance, more growth’ seems to be a much more widely applicable proposition than ‘more finance, more growth’ ”¹¹.

Rousseau and Wachtel (2009) examined finance-growth relationship using cross data and they showed that this link is not stable over time. They explain their findings by the effect of financial crises which reduce the impact of financial depth, however they added “Financial deepening has a strong impact on growth throughout the sample period as long as a country can avoid a financial crisis”¹².

Gregorio and Guidotti (1995) investigated the nexus between long run growth and the credit to private sector as indicator of financial development, using cross-country for 100 countries during the period 1960-1985. They also examine the link Finace-growth for the countries of Latin America using panel data approach. Among of the control variables, which they used: inflation government spending and foreign investment. They found a positive relationship between the

indicator of financial development and economic growth for the first case, and this effect change across countries and over time. However, the Latin America shows a negative relationship between credits to private sector and growth, results of unregulated financial liberalization. The authors strongly suggest affecting growth through efficiency investment rather than its volume¹³.

According to **Levine (1997)**, the financial development sector spurs growth through two mains channels: capital accumulation and technological innovation, by performing efficiently a set of functions: to allocate capital, mobilize savings, facilitate the inflow of foreign capital (facilitate the exchange of goods and services), facilitate risk management, evaluate and monitor investments¹⁴.

Farah and Deb Kumar (2012), examined the dynamics of the causal relationship between financial development and economic growth in Assam, state of India for the period 1985-2009 using Johansen and Jesulius Cointegration analysis. To carry out this study, they used a set of financial variables, which were the number of bank branches per thousand population, the ratio of outstanding credit of all the scheduled commercial banks of the state to the different sectors to the GDP, the share of the financial system in GDP and credit-deposit ratio of all scheduled commercial banks of Assam.

The authors asserted the presence of a long-term relationship between the two variables of the study in Assam. Further, they asserted the existence of unidirectional causality running from financial development to economic growth in Assam using Granger causality tests¹⁵.

Using the Geweke decomposition test on pooled data of 109 developing and industrial countries **Calderon & Liu (2003)**, examine the direction of causality between financial development and economic growth. Evidence suggests that causality from both directions coexist. Whereas financial deepening in the developing countries contributes more to the causal relationships than in the industrial countries. Their findings also indicate that financial development affect economic growth through capital accumulation and technological changes, with the latter channel being the strongest¹⁶.

I.1. Structure of financial system of Algeria

Algeria's financial system remains dominated by bank and characterized by low levels of intermediation¹. The banking assets representing more than 90 percent of total financial assets, out of this 83% represent the public sector while the remaining assets are held by foreign-owned private banks. (See Table 1)

The public-sector banks: finance large government projects (mainly infrastructure projects). While private-sector banks focus on: Private-sector companies; Large and small and medium-sized enterprises (SMEs); International companies operating in Algeria.

According to the country report of IMF published in 2014, the role of state weaken the banking system to perform effectively its role as intermediary. The government is the largest bank owner and it is the main client. Thus, to enable the financial system to support private sector development and economic growth, IMF urged the Algerian authorities to reform the state banking sector including privatization of SOBs. IMF advocate also that the state banks should move away from executing government priorities "towards noncommercial activities or direct competition with private banks on similar terms"¹⁷.

The Algerian equity market is nascent, with only three listed companies and a capitalization of 0.1 percent of GDP in 2011³. Numerous factors impede the development of financial markets, as well as "lengthy administrative procedures and subsidized bank lending that make market financing unattractive."¹⁸

The main institutions in charge of the Algerian banking system are:

- **The Council on Money and Credit (CMC)** has as mission: issuing licenses and regulations;
- **The Banking Commission (CB)** is responsible for on- and off-site supervision with the power to issue penalties;
- **The Bank of Algeria, the central bank**, is responsible for applying current legislation and the supervision of banks and financial institutions.

I.2. Evolution of financial development indicators:

Domestic credit to private sector to GDP:

The contribution of the private sector to the development process is vital. However, governments should provide a favorable atmosphere to foster the efficiency of this sector through

facilitating access to finance. In this regard, Gemma et al. (2010) noted that access to financial services constitutes an important channel through which financial development boosts growth. Thereby, they cited that “a lack of access to finance can be a serious barrier to investment and business activity in general...[Thus, a] lack of new financing often impedes setting up new businesses essential to a dynamic economy”¹⁹.

Nevertheless, in performing its core function of transferring funds, the financial sector should consider the quality of investment. Muhsen and Abdlhak (2010) in examining the case of Asian countries, stated that the underdeveloped financial system contributed to the Asian crisis of 1997-1998. Inefficient allocation of capital led to the deterioration of the quality of investment, thus weakened the productive capacity of the economy²⁰ (p. 2). Others researchers, indicate that financial development negatively affects the real economy, when the ratio of the credits to private sector as percentage of GDP, is above a threshold of 80 to 100% (Arcand et al., 2012). However, they showed that this effect is positive and robust in the case of small and intermediate financial sectors. They concluded, “ ‘better finance, more growth’ seems to be a much more widely applicable proposition than ‘more finance, more growth’ ”²¹.

In the case of Algeria, the private sector was marginalized; the loans granted by the banks to the private sector during the 1990s were always inferior to the loans provided to the public sector. Access of firms to finance remains limited, and only a few portions of SMEs get loans from banks, because of the banks' stringent collateral requirements “with an emphasis on real estate and personal guarantees”²².

Thereby, the policies adopted by the financial sector constitute an important determinant that the financial system influences growth. However, the effect may be positive or negative. According to Mohsin and Senhadji (2000), “policies to develop the financial sector [were] expected to raise economic growth”²³. Nevertheless, the authors added that policies restrictions on banking systems impeded the process of growth²⁴.

The ratio of private credits to GDP remained low; it has slightly increased over the last two decades, with an average growth rate of roughly 8% per year. Bank lending to private sector only accounts for 6-25 percent of GDP for the period 2000-2018. While, for MENA region it accounts for 38-64 percent for the same period.

The state-owned banks and private banks have a little incentive to finance SMEs. “This [was] mainly due to the decrease in the return on investment in Algeria and the high degree risk associated with these investments”²⁵, as noted by (Belkacem et Iman, 2016). Furthermore, the public banks finance SMEs under directed lending programs and the private banks focus more on international trade finance. Despite the fact that private sector financing remains low, it has shown continued growth in the last years, owing to government initiatives to boost SME lending, including interest rate subsidy, guarantee funds in favor of SMEs.

Moreover, under the current circumstances, the Algerian financial sector is not allocating the required funding for its private sector to successfully diversify its economy in the short and medium term, in accordance with the objectives set in its 2009 Action plan²⁶. Thus, the global institutions, such as IMF, recommend through its consultations (Article IV) the Algerian authorities to boost and improve the role of the private sector in the process of growth. The World Bank in 2003 conducted a discussion in this area for the case of Algeria, which aimed at “...removing the constraints to private sector led growth, particularly those affecting the business environment, SMEs, the financial sector and infrastructure development”²⁷ Article IV of IMF intended for Algeria (2006). Thus, the equity market might be an alternative to support the financing of the private sector; however, this needs to further efforts to develop this market.

The ratio of broad money (M2) to GDP:

The high level of M2 to GDP is the result of a high savings rate²⁸ (n.a, n.p). Waleed (2014, p. 60) noted that according to the previous research of (King & Levine, 1993a, 1993b; Murinde & Eng, 1994; Gregorio & Guidotti, 1995; Agung & Ford, 1998; Odhiambo, 2008; Mahrn, 2012), an increase in the money supply M2 may be an indicator of financial depth improvement. However, Levine et al. (2000) considered that underdeveloped financial systems may have a high level of M2 to GDP²⁹.

During the 1990s, the Algerian ratio of M2 to GDP recorded on average almost 44%. However, during the 2000s, the level of this ratio increased continually to reach its maximum of 82.1% in 2015. This is mainly due to the rise of the Algerian foreign exchange reserves, which exceeded \$ 150 billion in 2009, \$ 176 billion in 2011 and \$ 200 billion in 2013³⁰. Thus, the foreign

exchange reserves, drawn mostly from the oil and gas sector, form the main money supply counterpart.

Belkacem et al. (2016), by conducting empirical test on the effect of financial liberalization on economic growth in Algeria, found that despite the reforms carried on in the financial sector since the 1990s, the banking system still needs modernization to contribute to the process of development. The improvement of the financial system is needed to cut the dependence of the Algerian economy on the hydrocarbon sector, which contributed over 25 per cent to overall growth³¹. However, the predominance of state-owned banks may hamper that, by providing funding primarily to the public sector, the present structure severely restricts the diversification opportunities for the Algerian economy (FEMISE, 2011).

II- Methods and Materials:

In order to analyze the causality between financial development and economic growth in Algeria, this study employs annual time series data covering a thirty-nine period from 1980–2018. The data was obtained from the World Bank and Central Bank of Algeria. This Research is limited to measuring financial development from a financial depth perspective only, due to lack of data related to the others dimensions of financial development, which concerned access, efficiency and stability. According to the World Bank³² and following (King and Levine, 1993), Calderón and Liu (2003), Mohsin and Abdelhak (2000) and Arcand et al. (2012), this paper will employ two proxies for financial development:

- **M2/GDP (the monetization ratio, or broad money supply M2 to GDP):** This variable is largely used as proxy of financial development, it measures the financial depth or size of the financial intermediaries sector. According to the empirical and theoretical literature review the M2 is expected to have a positive relationship with economic growth.
- **Domestic credit to the private sector as a share of GDP:** measure the role of financial intermediation in channeling funds to private sector. It as favorite indicator, which directly linked investment and growth, stated Calderón and Liu (2003). It is expected that this variable affect economic growth positively.

Meanwhile, the real gross domestic product (GDP) per capita growth as a measure of economic growth (King and Levine, 1993).

The table 2 (See appendices) outlines the summary statistics of the variables used in this study. The results can be is illustrated as follow:

- The mean value of GDP per capita growth is 0.69 percent. The maximum value has been observed at the level 5.84 percent and the minimum level remained at -4.25 percent. The standard deviation is calculated at the level 2.39.
- The data of the second variable of the study: the broad money (% of GDP) shows a value of 62.31 percent on the average. This value is ranged between a minimum of 33.01 and a maximum of 83.82. Data also displays a value of 14.37 for the standard deviation.
- The credits to the private sector (% of GDP) indicate a mean value of 27.26 ranged between a minimum of 3.90 and a maximum of 69.28. The standard deviation shows a value of 23.84.

The calculation of the coefficient of correlation using the World Bank data for the period of the study shows a figure of -0.1, which indicates a negative linear relationship between the broad money to GDP and economic growth. While the coefficient of correlation between the second proxy of financial development "credit to private sector to GDP" displays a value of -0.33, which also indicate a negative linear relationship.

Causality frameworks:

According to Olushina(2012)“X is said to Granger-cause Y if Y can be better predicted using the histories of both X and Y than it can by using the history of Y alone. Hence, in order to check the Granger causality between financial development (measured by credit to private sector as

percentage of GDP and M2/GDP) and economic growth, this study employed the Toda and Yamamoto (1995) procedure. This version of Granger causality could be applied even the economic series are non-cointegrated³³ (Phung, 2010). Moreover, according to Toda and Yamamoto (1995), this procedure could be used even the variables are either I(0) or I(1) or I(2). In addition, this technique requires the estimation of the following VAR model³⁴:

$$Y_t = a_0 + a_1Y_{t-1} + \dots + a_pY_{t-p} + b_1X_{t-1} + \dots + b_pX_{t-p} + u_t \quad (1)$$

$$X_t = c_0 + c_1X_{t-1} + \dots + c_pX_{t-p} + d_1Y_{t-1} + \dots + d_pY_{t-p} + v_t \quad (2)$$

Where Y: GDP per capita growth and X: financial development indicator.

The appropriate maximum lag length "p" for the variables in the VAR is determined using the information criteria, such as AIC, SIC. To ensure that VAR (p) is well specified, a number of tests should be conducted, relating to: residual serial correlation, residual normally test, and the stability of the VAR model.

Moreover, to check for the Granger non-causality, the method involves using a Modified Wald statistic³⁵ for testing the significance of the parameters of a VAR (P) model. Thus, this involves to develop a VAR (p+d_{max}), where d_{max} is the maximum order of integration in the model.

Then, testing the following null hypothesis:

$H_0 = b_1 = b_2 = \dots = b_p = 0$, against H_A : financial development does not Granger-cause economic growth.

Similarly, testing:

$H_0 = d_1 = d_2 = \dots = d_p = 0$, against H_A : economic growth does not Granger-cause financial development.

The rejection of the null hypothesis implies a rejection of Granger *non*-causality, which reflects the presence of Granger causality.

The figure 1 (See appendices), summaries the mains steps in order to apply Toda and Yamamoto (1995) Granger non-causality test.

III- Results and discussion :

▪ Unit root test results :

As mentioned in the figure 1 (See appendices), we need firstly to check the stationarity of the variables, in order to identify the maximum order of integration in the model (d_{max}). For this reason, we employ an Augmented Dickey-Fuller (ADF) unit root test, and the results of this test are summarized in the table 3 (See appendices):

Comparing the ADF t-value of the level series with 5% critical value, the results suggest that all variables under study are non-stationary at their levels but stationary at their first differences. Hence, the variables are said to be integrated of order one, I (1). Thus, the maximum order of integration for these time series equal to one (d_{max}=1).

▪ According to AIC criteria, the optimal lag length for variables in VAR models is p=3 for the model of Broad money and p=2 for the model of domestic credit to private sector as it shows the table 4 (See appendices).

With the optimal lag length equal to 3 for the case of broad money model, the VAR well behaved in term of AR unit root graph, even there is no serial correlation in the residuals, as shown in the figure 2 (See appendices). However, the VAR of credit to private sector with p=2 indicates problem of serial correlation in the residuals, which implies to increase the lag length p to 3 in order to get a well VAR, as shown in the figure 3 (See appendices).

After specifying the VAR model and checking that there is no evidence of diagnostic problem with the models (the serial correlation and stability of the VAR models) in each case, we tested for Granger non-causality, and the results is given in the table 5 (See appendices).

According to this table, it appears that Granger causality runs one-way from GDP per capita growth to broad money (as percentage of GDP) at 10% level of significance. However, the results show non causality if we consider 1% or 5% level of significance. Moreover, the results also suggest non causality between the second proxy of financial development “credit to private sector” and GDP per capita growth for all level of significance. According to Dave (2011) this might occur if the sample size is too small to satisfy the asymptotic that the cointegration and causality tests rely on. Moreover, this can also be explained by the indirect causality or effect among the targets variables, which cannot be detected by Granger causality, since the transmission of the effect from the independent variable to the dependent requires intermediaries. Thus, path analysis models might be an alternative, since it takes in consideration the indirect effect using intermediaries.

IV- Conclusion:

This paper aims to investigate the direction of causality between our targets variables (financial development and economic growth) using Toda and Yamamoto (1995) approach for Granger non-Causality test in the context of VAR model.

The study carried out using two indicators to proxy the level of financial development. The first proxy is the monetization ratio (M2/GDP) as an indicator of the financial depth or size of the financial development intermediaries sector. The second proxy is financial intermediation ratio expressed by the credit to private sector as percentage of GDP. While, the GDP per capita growth was used as measure of economic growth.

Motivated by the growing interest among researchers and policy makers in achieving sustainable economic growth, which is the ultimate goal of every country. Many tools and strategies were described for making development achievable. The contribution of financial development on the process of growth is among the issues, which have attracted much interest during the last decades.

In this regard, the empirical investigation of the causality between financial development and economic growth in Algeria shows unidirectional causality running from economic growth to financial development at 10% level of significance, when we used broad money as indicator of financial development. Hence, this reflect that " economic development creates demands for particular types of financial arrangements, and the financial system responds automatically to these demands"³⁶ (Willem, 2001). However, the results suggest non-causality at 1% and 5% level of significance. Even, the results show non-causality between the domestic credit to private sector to GDP as measure of financial development and economic growth. This can be explained by the indirect effect (causality) among the targets variables, which cannot be detected by Granger causality, since the transmission of the effect from the independent variable to the dependent requires intermediaries. Thus, path analysis models might be an alternative, since it takes in consideration the indirect effect using intermediaries.

Finally, we can conclude that financial development could lead to economic growth under certain circumstances, as well as a good regulatory framework and financial stability considerations. Thus, a well-developed financial system should improve the efficiency of financing decisions, supporting a better allocation of resources and thereby economic growth (Willem, 2001).

Our findings can have an important implication of the policy recommendation. Indeed, in order to support economic growth. Algeria should set up a well-developed financial system with a more efficient allocation of credit. It should also improve the role of the private sector in the process of growth and reduce restrictions on the banking system through the liberalization from all financial repression policies.

- Appendices:

Table (1): Structure of the Algerian Financial System

	Assets (in Algerian dinars)	Share of Total Assets (In percent)	Share of GDP (In percent)
Banks	3231.8	92.8	75.7
Public banks	2903.2	83.4	68.0
Private banks	328.6	9.4	7.7
Insurance	96.0	2.8	2.2
Financial institutions (other)	153.0	4.4	3.6
Total	3480.8	100.0	81.5

The source: IMF report

Table (2): Summary statistics

Variables	Obs	Mean	Median	Std	Min	Max
GDP PER CAPITA growth	39	0,69	1,20	2,39	-4,25	5,84
Broad money (% of GDP)	39	62,31	62,99	14,37	33,01	83,82
Domestic credit to private sector (% of GDP)	39	27,26	15,19	23,84	3,90	69,28

The source: Author's computation from Eviews 9.5

Table (3): Results of ADF test (non-stationarity test)

Variables	Description	Level		First difference	
		Constant	Trend and constant	Constant	Trend and constant
GDP_pc	GDP per capita growth	-3.370**	-3.499	-6.102*	-5.999*
M2	Broad money supply to GDP	-1.602	-1.096	-4.476*	-4.436*
CPS	Credit to the private sector to GDP	-1.076	-0.834	-4.191*	-4.214**

Note: *, ** denotes significance level at 1% and 5% respectively.

The source: Author's computation from Eviews 9.5

Table (4): Lag Length Selection

Broad money case:

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-211.5271	NA	1429.840	12.94103	13.03173	12.97155
1	-177.2653	62.29405	228.6617	11.10699	11.37908*	11.19854
2	-171.2549	10.19962	203.1799	10.98514	11.43863	11.13773
3	-165.0414	9.790949*	179.1672*	10.85099*	11.48587	11.06461*
4	-163.4313	2.341975	210.2722	10.99583	11.81211	11.27049

Credits to private sector case:

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-223.5303	NA	2959.537	13.66851	13.75920	13.69902
1	-177.1645	84.30152	227.2684	11.10088	11.37297*	11.19243
2	-170.1925	11.83126*	190.5104*	10.92076*	11.37425	11.07334*
3	-166.8824	5.215995	200.3156	10.96257	11.59745	11.17619
4	-162.8025	5.934397	202.4096	10.95772	11.77400	11.23238

The source: Author's computation from Eviews 9.5

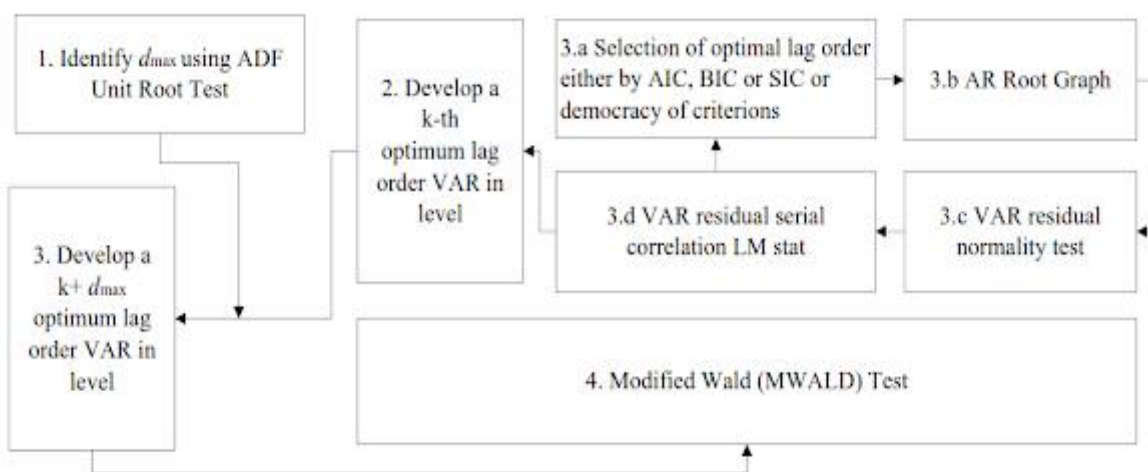
Table (5): Toda and Yamamoto causality test results

Null Hypothesis	Chi-sq	Prob	Granger causality
M ₂ does not granger cause GDP_pc	3.389878	0.3353	Unidirectional causality at 10% level of significance GDP_pc → M ₂
GDP_pc does not granger cause M ₂	6.722111	0.0813	

Null Hypothesis	Chi-sq	Prob	Granger causality
CPS does not granger cause GDP_pc	4.895271	0.1796	No causality
GDP_pc does not granger cause CPS	3.395959	0.3345	

The source: Author's computation from Eviews 9.5

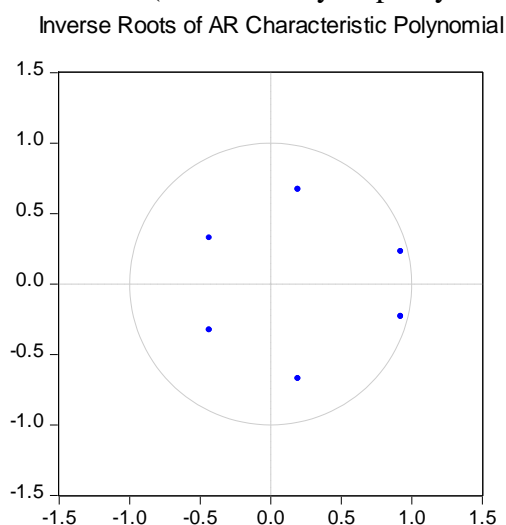
Figure (1): Toda and Yamamoto Granger non-causality test procedure



The source : <https://shishirshakya.blogspot.com/2015/06/the-todayamamoto-approach-to-granger.html>

Figure (2): Diagnostic test for VAR model (Broad money as proxy of FD)
VAR residual serial correlation LM t

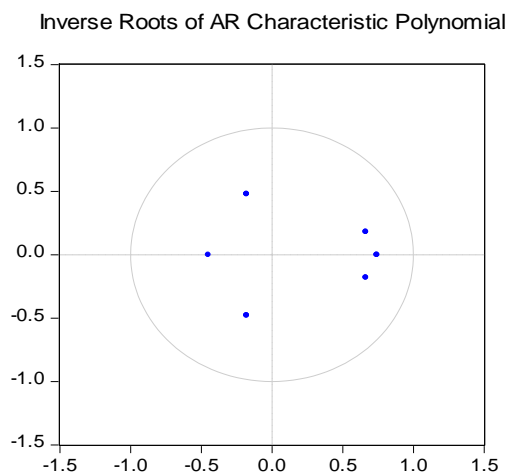
Lags	LM-Stat	Prob
1	2.610528	0.6250
2	2.370057	0.6680
3	0.953564	0.9168
4	2.432362	0.6568
5	3.443072	0.4866
7	6.823187	0.1455
8	1.037612	0.9040
9	2.079773	0.7211
10	4.655134	0.3245
11	1.161409	0.8844
12	2.290667	0.6825



The source: Author's computation from Eviews 9.5

Figure (3): Diagnostic test for VAR model (Domestic credits to private sector as proxy of FD)
VAR residual serial correlation LM test

Lags	LM-Stat	Prob
1	1.644465	0.8008
2	2.818451	0.5887
3	4.827226	0.3055
4	5.342023	0.2540
5	6.047229	0.1956
6	2.464826	0.6509
7	1.861387	0.7612
8	6.037734	0.1963
9	3.410450	0.4916
10	1.216333	0.8754
11	2.276327	0.6851
12	0.317669	0.9886



The source: Author's computation from Eviews 9.5

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