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Financial Liberalisation, Financial Development and Economic Growth in Cameroon: A Tri-Variate Vector Error Correction Modelling Approach

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Abstract

The aim of this study is to analyse the relationship between financial liberalization, financial development and economic growth in Cameroon. Use is made of a tri- variate VAR model on Cameroon data for the period 1973- 2017. The results obtained show that financial liberalisation and financial development positively affect economic growth. Though financial development does not individually cause economic growth, when considered with financial liberalisation, they jointly cause economic growth. Financial liberalisation and economic growth are individually and jointly found to granger cause financial development. Financial development causes financial liberalisation while economic growth causes financial liberalisation only when jointly considered with financial development. The impulse response functions reveal that economic growth positively responds to both financial development and financial liberalisation though the effect of financial development soon fates out to become negative. Financial development is found to positively react to innovations in financial liberalisation and negatively to economic growth. As concerns financial liberalisation, it negatively responds to financial development and positively to economic growth. Also, variance decomposition reveals that variations in economic growth are mostly explained by its past values, followed by financial liberalisation and finally financial development. Financial development on its part is also mostly explained by its past values followed by financial liberalisation and finally economic growth. Based on all these, the policy recommendation we make is that the on-going financial liberalisation process in the country should be enhanced in view of permitting the financial sector to efficiently play its role in the growth process of the country.

Keywords: Financial liberalization; financial development; Economic growth; Tri- variate VAR.

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1. Introduction

The financial sector plays a critical role in modern economies. While it can be a force for development by providing basic payment and transaction services, intermediating society's savings to its best uses, offering households, enterprises and governments risk management tools, it can also be a source of fragility, as we were reminded during the Global Financial Crisis of 2008. Though the positive effect of financial development on growth has been highly ascertained in the literature [1], authors do not however agree on the growth effects of financial liberalisation.

While most authors believe that financial liberalisation enhances financial development and contributes to economic growth [2,3,4] others are of the view that financial liberalisation can instead make economies more vulnerable to financial instability and may cause banking crises which may affect growth adversely. [5,6,7,8,9]

The aim of this paper is to investigate the effect of financial liberalisation on growth through its effect on the development of the financial sector in Cameroon. To achieve this aim, we use the Vector Error Correction Model (VECM) to analyse time series data of Cameroon from 1973 to 2017. This is particularly important as the recent growth rates of Cameroon fluctuated between 3% and 3.5%. Such a growth rate cannot enable the country to reach the poverty and unemployment reduction targets set by the government within the framework of the Growth and Employment Strategy Paper (GESP). In particular, the overall goal of becoming an emerging country by 2035 is based on a sustained growth of at least 5.5%. Accordingly, the issue of designing an economic policy that ensures sustainable economic growth is yet to be resolved.

The rest of the study is organised as follows: Section 2 provides the literature on financial liberalisation, financial development and economic growth nexus. Section 3 outlines the theoretical framework of the study. Section 4 presents the methodology and the results are discussed in section 5. Section 6 is the conclusion.

2. Literature Review

The financial system performs a number of important functions in an economy. Basically, it takes care of mobilising financial resources, facilitating risk management, allocating resources to the most efficient projects, monitoring the use of financial resources (exerting corporate governance), and providing a payment system that makes trade

among economic participants more efficient. [10] Financial development occurs when a financial system is able to improve on performing these functions. There is a large body of theoretical and empirical work emphasising that financial development is positively associated with economic growth.

Closely related to the discussion of the relationship between finance and growth is the discussion of the role that financial liberalisation can play in this relationship. The main idea is that financial liberalisation may impact on financial development which, in turn, affects economic growth. There is an on-going debate about whether the role of financial liberalisation with respect to the finance–growth nexus is positive or negative.

While there may be several different characterisations of what financial liberalisation contains, in most studies financial liberalisation includes official government policies that focus on deregulating credit as well as interest rate controls, removing entry barriers for foreign financial institutions, privatising financial institutions, and removing restrictions on foreign financial transactions. Hence, financial liberalisation has both a domestic and foreign dimension. In general, liberalisation focuses on introducing or strengthening the price mechanism in the market, as well as improving the conditions for market competition.

In the literature, several arguments in favour of liberalisation have been put forward. Most of these arguments implicitly start from the neoclassical perspective, which assumes that markets are most efficient in allocating scarce resources. The discussion on liberalising financial markets started with the seminal publications of McKinnon [11] and Shaw. [12] Both scholars wrote their work as a critique of government policies, which were focused on restricting and controlling financial markets, also known as financial repression. Among other things, these policies consisted of establishing interest rate ceilings, and government directed credit and subsidies to banks, leading to excess demand and inefficient allocation of capital. McKinnon [13] and Shaw [14] held these policies responsible for the low growth rates in many developing countries during the 1950s and 1960s. They both argued in favour of liberalising financial markets on the grounds that this would lead to more savings as well as more efficient investment which, in turn, would lead to higher economic growth rates. In the 1990s, when the role of financial institutions in economic growth became intensively discussed in the literature, several authors explicitly modelled the relationship between finance and growth, while others focused on investigating the empirical support for these models.

The following arguments have been raised to support the positive relationship between financial liberalisation of both credit (i.e. banking) and capital markets vis-à-vis economic growth. First, it is claimed that introducing market principles and competition in banking markets increases interest rates on deposits, which leads to higher saving rates. This, in turn, increases the amount of resources available for investment. [15] If financial liberalisation includes opening up the capital account, capital inflows (in terms of both credit and equity investment) may increase, again raising the availability of funds for investment and growth. In both cases financing constraints of firms are reduced and investment will rise, leading to higher growth.

Second, competition puts pressure on profit margins of banks, in particular on the interest rates demanded for loans. This reduces the cost of debt, leading to a rise in investment and growth. Moreover, financial liberalisation increases possibilities of risk diversification for financial institutions such as banks, as well as for (international) equity investors. The subsequent reduction in loan rates and equity costs leads to a rise in investment and growth. Again, this argument would support the idea that financial liberalisation reduces financial constraints of firms, which ultimately increases macroeconomic growth.

Third, if banking markets are liberalised, banks are stimulated to become more efficient by reducing overhead costs, improving on overall bank management, improving risk management, and offering new financial instruments and services to the market to keep up with competitors. Moreover, if financial liberalisation means opening up domestic markets to foreign competition, this may lead to the import of bank and risk management techniques together with new financial instruments and services. All these effects will help to improve the efficiency of financial intermediation in a country, contributing to higher returns to investment and thus to higher rates of economic growth.

In contrast, it has also been argued that financial liberalisation has led in many cases to disappointing results and in some cases even to economic and financial crises. First, Stiglitz [16] and others have pointed out that financial liberalisation as such does not solve the problem of asymmetric information. This may prevent financial intermediation from becoming more efficient in a liberalised market. Many papers, among them the seminal contribution of Stiglitz and Weiss [17], have indeed shown that problems of asymmetric information prevail in financial markets and that therefore financial repression may arise even without government intervention.

Second, some papers make the point that financial liberalisation may actually aggravate information problems. When financial markets become liberalised and competition is increased, this may lead to a reduction of relationship lending, more opportunities may be open to borrowers and they will look for the cheapest way of financing their investment. However, a reduction of relationship lending also destroys information capital and thereby increases asymmetric information. [18]

Third, more competition in financial markets may also imply a reduction in profit margins and an increased financial fragility of financial intermediaries such as banks. Hellmann et al. (1996, 1997, 2000) in a series of articles make the point that liberalisation reduces the franchise value of banks, which makes them more prone to financial disruption and stimulates risk taking in order to try to increase profits under the pressure of falling interest rate margins. Reduced margins may also stimulate banks to economise on screening and monitoring efforts, and they may be more willing to opt for a gambling strategy when allocating loans, i.e. putting less emphasis on risk and more on profit. Thus, financial liberalisation may trigger crises if it leads to excessive risk taking under the pressure of increased competition. [19] Finally, increased risk taking in financial markets and the consequent increase in the number of failures of banks and other institutions may in itself trigger bank runs. [20] Bank runs are another source of

financial instability, even in a situation where some banks may be economically viable.

One way to curb the adverse effects of financial liberalisation on the stability of the financial system is to install financial market regulations. Such regulations should reduce risk taking by banks and should, at least to some extent, bail out depositors when their bank goes bankrupt. Such a deposit insurance system aims to reduce the probability of bank runs taking place in times of financial distress. This is why financial liberalisation in combination with a weak regulatory structure may have strongly adverse effects on growth. [21] Examples of this abound: Chile and Argentina in the early 1980s experienced the negative effects of financial liberalisation. The same holds for Mexico (in 1994–95) and the countries affected by the Asian crisis (1997–98), to name just a few. Also the global financial crisis of 2007–08 was triggered by, among other things, insufficient financial market regulation.

The above discussion shows that, from a theoretical perspective, the nature of the relationship between financial liberalisation and economic growth is ambiguous. Given this theoretical ambiguity, it is important to investigate from an empirical point of view whether or not financial liberalisation leads to higher economic growth. Several papers have looked into this issue. The general picture that emerges from the empirical literature is that the empirical evidence is inconclusive.

King and Levine [22], using cross-country analysis covering 80 countries, investigate whether higher levels of financial development are significantly and robustly correlated with faster current and future rates of economic growth, physical capital accumulation and economic efficiency improvements. They find that higher levels of financial development are strongly associated with the current and future levels of economic growth, the rate of physical capital accumulation, and economic efficiency improvements both before and after controlling for numerous country and policy characteristics.

De Gregorio and Guidotti [23] examine the relationship between long-run growth and financial development in a cross-country framework using a sample of 100 countries during the period 1960-1985. They find that financial development is associated with improved growth performance and the main channel from finance to growth is through increasing the efficiency of investment.

Kar and Pentecost [24] constructs five alternative proxies for financial development to examine the casual relationship between financial development and economic growth in Turkey. Applying Granger causality tests, they find that the direction of causality between financial development and economic growth in Turkey is sensitive to the choice of proxy used for financial development. For example, when financial development is measured by the money to income ratio, the direction of causality runs from financial development to economic growth, but when the bank deposits, private sector credit and domestic credit ratios are alternatively used to proxy financial development, growth is found to lead financial development.

Gamra [25] use panel data techniques to investigate the relationship between financial liberalisation and economic growth for six emerging East Asian countries over the period 1980-2002. Three measures of financial liberalisation are used namely, domestic financial sector liberalisation, stock market openness, and capital account liberalisation. They find that financial liberalisation's growth effect depends on the nature as well as the intensity of financial sector liberalisation. Full liberalisation of the financial sector is associated with slower growth outcomes while more moderate partial liberalisation is associated with more positive outcomes.

Laeven [26] uses panel data on a large number of firms in 13 developing countries to find out whether financial liberalisation relaxes the financial constraints of firms. He finds that liberalisation affects small and large firms differently. Small firms are financially constrained before the start of the liberalisation process, but become less so after liberalisation. The financial constraints of large firms, however, are low before financial liberalisation, but become higher as financial liberalisation proceeds. He hypothesises that financial liberalisation has adverse effects on the financing constraints of large firms, because these firms had better access to preferential directed credit during the period before financial liberalisation. Laeven [27] also finds that countries that have made substantial progress in liberalizing their financial sectors have shown dramatic improvements in their political climate as well. Successful financial liberalisation seems to require both the political will and ability to stop the preferential treatment of well-connected firms that often tend to be large.

Bekaert, Harvey and Lundblad [28] analyse the effects of liberalisation by employing the data from 95 countries for the 1980-1997 period, and taking economic growth rates, the components of GDP (consumption, government, investment and trade), and the official financial liberalisation indicator as variables. Their findings suggest that financial liberalisation proxied by equity market liberalisation leads to a one percent increase in annual real per capita GDP growth over a five-year period. They find this increase to be statistically significant. They also find that the investment to GDP ratio increases, with investment partially financed by foreign capital. Bekaert et al. (2001) also find evidence that consumption to the GDP ratio does not increase after liberalisation suggesting that the capital flowing in after liberalisation is not wasted on increased consumption. In a number of specifications, consumption to the GDP ratio significantly decreases. This is mainly due to reduction or no significant increase in government as well as in private consumption. After liberalisation, government expenditure decreases because of the elimination or reduction of subsidies to the favoured sectors. Similarly, private households are motivated towards investment due to the increased opportunity of investment and high return on capital. They also find that the trade balance deteriorates across all specifications.

Studies that have examined the relationship between financial development and economic growth for the African countries have also reached mixed findings. Ogun [29] uses cross-section analysis to estimate the correlation between financial deepening and economic growth by using data for 20 countries in Africa from 1969-1983. The degree of financial intermediation is measured using ratios of monetary liabilities (M1, M2, and M3) to GDP. For the whole sample, all

the monetary liabilities have negative signs and only the ratio of M3 to GDP is statistically significant. When the countries are split into high and low income countries, some of the coefficients of the monetary liabilities are positive while some are negative. However, they are all insignificant and offer no support to the growth enhancing capabilities of financial intermediation.

Allen and Ndikumana [30] used the ratio of liquid liabilities, ratio of banks' private sector credit, ratio of banks' total credit, and an index to include all the three measures as proxies for financial intermediation. They find that only the ratio of liquid liabilities is positive and significant, but this variable is insignificant in the fixed effects estimation and when annual data are used. The other financial variables take on different signs and are insignificant.

Fowowe (2008) examine the relationship between economic growth and financial liberalisation policies in 19 SSA countries. Two indices are developed which track the specific measures and institutional changes involved in financial liberalisation. Using the fixed effects estimator to control for unobservable country specific effects and a dynamic panel estimator to control for potential endogeneity, they find that financial liberalisation has had a positive effect on economic growth. Most particularly, the two indices of financial liberalisation and a dummy variable to capture major moves towards liberalisation show a significant positive relationship between economic growth and financial liberalisation. The results are robust to alternative specifications of the model, and also across slow and fast-growing countries.

For the case of Cameroon, Tabi et al. (2011) study the relationship between financial development and economic growth using time series techniques on Cameroon data from 1970 to 2005. They use the ratio of liquid liabilities on GDP and private credit to the private sector as measures of financial development and find a long run positive relationship between financial development and economic growth. They also find that there exists a one way causality running from financial development to growth between the variables. This study improves on this study by using a financial development index which captures improvements in the functioning of the financial sector better. Also, the VAR methodology is used which allow us to control the effect of financial liberalisation on the finance growth nexus in Cameroon.

3. Theoretical framework

Let's consider the growth effects of an innovation in financial development. In the context of the Solow growth model, the resulting increases in total investment and improvements in the allocation of investment would, with a given state of technology, result in a boost to the rate of economic growth while capital is being reallocated from less to more productive use and before diminishing returns drive the marginal product of capital down to its steady-state level. After the reallocation of capital has been completed and the steady state has been reached, growth would return to its natural level, albeit at a higher level of income per capita.

More sustained effects on growth are possible if the productive factor that the economy can accumulate endogenously is not subject to diminishing returns. To study the effects of financial development on growth in this setting, consider the simplest possible model consistent with endogenous long-run growth. This is one in which the aggregate production function is given by an "AK" technology (Rebelo, 1991), and the saving rate is constant:

$$Y = AK \quad (1)$$

$$K = I \quad (2)$$

$$I = \Phi sY \quad (3)$$

In this model, Equation (1) is the aggregate production function, with output proportional to the capital stock, and Equation (2) describes the dynamics of the capital stock. The final equation is the goods-market equilibrium condition, which equates saving to investment. The assumption is that the notional saving rate is constant, with a value given by the parameters, but that the process of financial intermediation absorbs a fraction (1-Φ) of all saving, which is diverted into consumption (Pagano, 1993). This model serves as a simple point of departure from which extensions are derived below to illustrate particular points.

The behaviour of economic growth implied by this model is:

$$Y = A \Phi S \quad (4)$$

Thus, innovations in financial development can alter the growth rate through three channels:

- Improved efficiency of intermediation (increase in Φ).
- Improved efficiency of the capital stock, measured by increases in the parameter A.
- An increase in the saving rate s.

Whether a given innovation in financial development affects growth through any one (or more) of these channels depends, of course, on the nature of the innovation and the features of the economy.

The role of financial liberalisation

Due to the mutual interdependence between financial development and growth, the identification of innovations in financial development is not a trivial matter. Changes in financial-sector policies, however, are an identifiable source of such innovations. At a given level of income, and thus at a given stage of financial development, the efficiency of the financial system depends, among other things, on the policy environment. Thus, the adoption of policies to facilitate financial intermediation can be regarded as a form of "innovation" in financial development. To assess whether changes in policies directed to the financial system in developing countries are likely to affect growth through any of the channels mentioned above, it is necessary to consider the specific policies themselves.

Many developing countries are at a stage of financial development in which commercial banks are the dominant financial institution. As indicated above, policies directed to the financial system in such countries can often be summed up by the term financial repression (McKinnon (1973) and Shaw (1973). This policy contains several key elements such as: the restrictions on entry into banking often combined with public ownership of major banks, high reserve requirements on deposits, legal ceilings on bank lending and deposit rates, quantitative restrictions on the allocation of credit and the restrictions on capital transactions with foreigners.

One way of creating a policy-induced innovation in financial intermediation would be the removal of regulations

such as these - i.e., the adoption of financial liberalisation. The possible effects of financial liberalisation on growth through the three channels previously identified are considered below.

• Improved efficiency of intermediation

With improved financial intermediation, the portion of national saving that is diverted by the financial system into non-productive uses falls, and the rate of capital accumulation consequently increases, for a given saving rate. The parameter (1-□) is an index, among other things, of the resource cost of operating the financial system. Restrictions to entry into the financial system, high required reserve or liquidity ratios, ceilings on interest rates, and the other regulations that together comprise financial repression, can each increase the costs of financial intermediation. The first of these permits firms in the financial system to extract monopoly rents from savers and borrowers, while the second extracts resources for the government. The third diverts intermediation into the informal financial system, where the scale of operation may be inefficient, or abroad, from where it may not find its way back into domestic investment.

• Improved efficiency of the capital stock

The monitoring function of financial institutions described above takes the form of measuring the marginal product of capital in alternative activities. A simple extension of the model described above, due to Easterly et al (1992), illustrates the role that funding high-return projects can play in sustaining high rates of economic growth. Suppose that the aggregate capital stock consists of two types of capital, K1, and K2, which can be transformed into each other at a constant rate (perhaps because they are both traded goods, or because they are each made in the same way from some currently produced good). By choice of units, let one unit of K1, be convertible into one unit of K2. Thus the aggregate capital stock is K1+K2=K

Aggregate output takes the form:

$$Y = F(K_1, K_2) \tag{5}$$

a standard neoclassical production function with constant returns to scale. Dividing F by K2 and definin ϴ = K1/ K2, the production function can be written as:

$$Y = F(K_1 / K_2)K_2$$

$$= F(\theta)\frac{1}{(1+\theta)}K$$

$$= A(\theta)K \tag{6}$$

The effect is to make the productivity parameter a function of the allocation of the aggregate capital stock. Under present assumptions, the value of ϴ that maximizes A satisfies:

$$f(\theta)\frac{1}{1+\theta} - f(\theta)\frac{1}{(1+\theta^2)} = 0 \tag{7}$$

Or,

$$f(\theta) = f(\theta) - f'(\theta)\theta \tag{8}$$

which is the requirement that the marginal product of the two types of capital be equalised.

This outcome will emerge if financial institutions are able to identify the marginal product of capital in alternative uses, and channel funds in such as a way as to give priority to high-productivity projects. It is less likely to emerge under financial repression, for a variety of reasons:

• Whether interest rates are controlled at below-market levels or not, banks have to screen prospective credit applicants. When loan rates are high, part of this screening function is performed by the price system, which in effect truncates the distribution of projects that apply for funds, leaving only those with expected returns in excess of the prevailing interest rate.

• Low interest rates in the formal financial system are likely to create an informal financial market. When formal and informal financial markets coexist and some firms have unlimited access to the formal market, the marginal product of capital in these "favoured" firms will fall below the cost of borrowing in the informal system.

• The appropriation of funds by the public sector through the maintenance of high reserve requirements means that a portion of household saving will be channelled into government spending. To the extent that the government consumes these resources, □ will fall. To the extent that they are invested in public capital, the associated projects may not yield returns in excess of the foregone investment in the private sector.

• Directed credit is often a component of financial repression, and favoured borrowers will by definition not be those that offer the highest prospective private returns on their projects, since otherwise they would have received funds anyway.

• State-owned and subsidised banks will not have the competitive incentives to screen and monitor borrowers closely.

• Increases in the saving rate

In the simple framework above, the saving rate is exogenous. To investigate the role of the financial sector in influencing aggregate saving, it is necessary to examine household saving behaviour. The upshot is that the effects of financial liberalisation on household saving are ambiguous on theoretical grounds.

The most familiar framework for private saving is based on analysing the behaviour of a representative agent with an infinite horizon and additively-separable preferences. In this case, if the utility function is of the constant relative risk aversion (CRRA) type, the rate of growth of consumption over time is given by:

$$\dot{C} = \sigma^{-1}(A - \rho) \tag{9}$$

where the inverse of σ is the intertemporal elasticity of substitution, and p is the rate of time preference. With the same technology as before, from an arbitrary initial capital stock K_0, the growth rate of output, consumption, and capital stock will eventually converge to the growth rate of consumption given by Equation (9), so we have:

$$Y = \sigma^{-1}(A - \rho) \tag{10}$$

An increase in the real rate of return on capital A, then, is likely to distort the consumption path, depressing present

consumption in favour of future consumption, to a degree that depends on the intertemporal elasticity of substitution. Whether household saving increases or decreases, however, depends on whether this effect dominates the positive income effect on current consumption emanating from a higher present value of lifetime resources.

Moreover, if utility is of the CRRA type, but the argument in the utility function is the excess of consumption over some subsistence level (rather than the level of consumption itself), then the intertemporal elasticity of consumption will be an inverse function of the initial level of consumption. This implies that consumption twisting in response to an increase in A will be weak in countries with low initial levels of per capita consumption. Further, this analysis assumes that financial liberalisation affects household saving primarily through its effect on A. To the extent that it additionally serves to remove liquidity constraints faced by households under financial repression, this factor may lead to a reduction in saving.

4. Methodology

The Vector Error Correction Modelling (VECM) procedure that is used to investigate the inter-relationship between financial liberalisation, financial development and economic growth is presented. Data sources and variables are also discussed.

4.1. Vector Error Correction Model (VECM) and Causality Testing

We construct a trivariate VAR model for our estimation purpose. Only three endogenous variables are used in each model in order to conserve degrees of freedom given the annual nature of the data and its limited length.

The exact formulation of the VAR model depends on the time series properties of the data. The testing procedure involves three steps. We begin by testing the existence of unit roots by using Augmented Dickey-Fuller (ADF) test. The second step is to test for cointegration using the Johansen approach for each of the VARs constructed in levels.

Our causality tests are preceded by cointegration testing since the presence of cointegrated relationships have implications for the way in which causality testing is carried out. If cointegration is detected, the third step is to test for causality by employing the appropriate types of causality tests available in the recent literature.

The presence of cointegrated relationships is consistent with the economic theory which predicts that finance and output have a long-run equilibrium relationship. According to Engle and Granger (1987), cointegrated variables must have an error correction representation in which an Error Correction Term (ECT) must be incorporated into the model. Accordingly, a Vector Error Correction Model (VECM) is formulated to reintroduce the information lost in the differencing process, thereby allowing for long-run equilibrium as well as short-run dynamics. The VECM is given by:

$$\Delta Y_t = A_0 + \prod Y_{t-1} + A_1 \Delta Y_{t-1} + A_2 \Delta Y_{t-2} + \cdots\cdots + A_{p-1} \Delta Y_{t-p+1} + \varepsilon_t \quad (11)$$

Where Δ is a difference operator, Yt is a column-n vector of endogenous variables, A1, , Ap-1 are (n x n) matrices of coefficients, and εt is a vector of normally and independently distributed error terms. By construction, Π has rank r and can be decomposed as Π=αβ'. The elements of α are known as the speed of adjustment of parameters, it is a (n x r) matrix where a larger α suggests a faster convergence towards the long run equilibrium when there are short run deviations from its equilibrium. β' is a (n x r)' matrix of cointegrating vectors, that is the long run coefficients in the VECM. Equation (11) can be re-written as follows:

$$\Delta Y_t = A_0 + \alpha(\beta' Y_{t-1}) + A_1 \Delta Y_{t-1} + A_2 \Delta Y_{t-2} + \cdots\cdots + A_{p-1} \Delta Y_{t-p+1} + \varepsilon_t \quad (12)$$

For example, when r=1 and n=3, α and β' take the form:

$$\alpha = \begin{pmatrix} \alpha_{11} \\ \alpha_{21} \\ \alpha_{31} \end{pmatrix} \quad \text{and} \quad \beta' = (\beta_{11}, \beta_{21}, \beta_{31})$$

For the three variable case with one conintegrated relationship, the VECM can be represented as follows:

$$\Delta FLI_t = \mu_1 + \alpha_{11} ECT_{t-1} + \sum_{j=1}^{p-1} \phi_{1j} \Delta FLI_{t-j} + \sum_{j-1}^{p-1} \theta_{1j} \Delta EG_{t-j} + \sum_{j=1}^{p-1} \psi_{1j} \Delta FDI_{t-1} + \varepsilon_{1t} \quad (13a)$$

$$\Delta EG_t = \mu_2 + \alpha_{21} ECT_{t-1} + \sum_{j=1}^{p-1} \phi_{2j} \Delta FLI_{t-j} + \sum_{j-1}^{p-1} \theta_{2j} \Delta EG_{t-j} + \sum_{j=1}^{p-1} \psi_{2j} \Delta FDI_{t-1} + \varepsilon_{2t} \quad (13b)$$

$$\Delta FDI_t = \mu_3 + \alpha_{31} ECT_{t-1} + \sum_{j=1}^{p-1} \phi_{3j} \Delta FLI_{t-j} + \sum_{j-1}^{p-1} \theta_{3j} \Delta EG_{t-j} + \sum_{j=1}^{p-1} \psi_{3j} \Delta FDI_{t-1} + \varepsilon_{3t} \quad (13c)$$

Where FDI is the measure of financial development, εt's are Gaussian residuals and ECTt-1= Ft-1+ (β21/ β11) Gt-1+ (β31/ β11)Zt-1 is the normalized cointegrated equation. There are two sources of causation, that is, through the ECT, if α≠0, or through the lagged dynamic terms. The ECT measures the long run equilibrium relationship while the coefficients on lagged difference terms indicate the short run dynamics. The statistical significance of the coefficients associated with ECT provides evidence of an error correction mechanism that drives the variation back to their long run relationship.

According to Ang and McKibbin (2007), given the two different sources of causality, three different causality tests can be performed, that is, the short run granger non-causality test, weak exogeneity and strong exogeneity tests. In equation (13c), to test that ΔEGt does not cause ΔFDIt in the short run, we examine the significance of the lagged dynamic terms by testing the null hypothesis H0: all =0 using the Wald test. Non rejection of the null hypothesis implies growth does not granger cause finance in the short run. The weak exogeneity test, which is a notion of long run

non-causality test, requires satisfying the null hypothesis H0: α31= 0. It is based on a likelihood ratio test which follows a chi-square distribution. Finally, we can also perform strong exogeneity test which imposes stronger restrictions by testing the joint significance of both the lagged dynamic terms and ECT. That is the strong exogeneity test requires granger non-causality and weak exogeneity. In particular, ΔEGt does not cause ΔFDIt if the null hypothesis H0: all = α=0 is not rejected. The strong exogeneity test does not distinguish between the short run and long run causality but it is a more restrictive test which indicates the overall causality in the system.

Impulse Response Function and Variance Decomposition

We further examine forecast error-variance decomposition (VDC) and the impulse Response function (IRF).

Variance decomposition or forecast error-variance examines the percentage of innovation each variable is contributing to the other variables in the VAR system. This enables us to know which of the variables is relatively endogenous or exogenous to the system by simply decomposing the proportion variance due to its own shock and shock of other variables in the system. For example, if the shocks of other independent variables in the system explain less of the forecast error-variance of the dependent variable, it means that the dependent variable is exogenous to the system. However, if it turns out that most of the shocks of the independent variables explain the forecast error-variance of the dependent variable, it means the latter is endogenous to the system.

The impulse response function is used to trace the time path of structural shocks in the VAR system. In our case, these shocks can be exogenous and hence caused by government authorities or endogenous to the economy. Considering Yt, a column-n vector of endogenous variables, the structural VAR can be specified as follows:

$$B(L)Y_t = \mu + \varepsilon_t$$

$$B_0 Y_t = \mu + B_1 Y_{t-1} + B_2 Y_{t-2} + \ldots\ldots + B_p Y_{t-p} + \varepsilon_t \quad (14)$$

In equation (14), the Bj (j=0,1,...,p) matrices are of dimension (n x n), the vectors Yt, μ and are of dimension (nx1) and they represent the endogenous variables, a vector of constant terms and the vector of structural shocks. To obtain the reduced form of the Structural Vector Autoregressive (SVAR) Model represented by (14), we simply multiply throughout equation (14) by . The reduced form is written in its matrix form as follows:

$$Y_t = A_0 + A_1 Y_{t-1} + \ldots\ldots + A_p Y_{t-p} + \mu_t \quad (15)$$

If the SVAR is identifiable, that is B0 has an inverse, the estimation of the parameters of the model are done using the ordinary least squares method. The optimal lag length being determined using the Akaike or Schwartz criterion.

In other to determine the impulse-response function, the SVAR is transformed into its Vector Moving Average (VMA) form. From the SVAR represented by equation (14), the VMA representation is obtained by taking the inverse of the SVAR as follows:

$$Y_t = \gamma + \psi(L)\varepsilon_t = \gamma + \sum_{i=0}^{\infty} \psi_i \varepsilon_{i-1} \quad (16)$$

Where, $\psi(L) = B(L)^{-1} = \sum_{i=0}^{\infty} \psi_i L^i$ and .

$\gamma = \psi(L)\mu = \sum_{i=0}^{\infty} \psi_i \mu = \left[\sum_{i=0}^{p} B_i\right]^{-1} \mu$ L being a lag operator defined as; $LY_t = Y_{t-1}$.

The matrix is the impact multiplier. It is through this matrix that a shock is transmitted throughout the system Yt.

A change in at any time t affects all the values of Yt. The effect of a shock is therefore permanent and decays with time. In practice, the analyses of shock consist of measuring the impact of an innovation on the variables of interest. In our case these variables are financial development and economic growth.

4.2. Data Sources and Variables Definition

The variables used for our analysis include the Financial

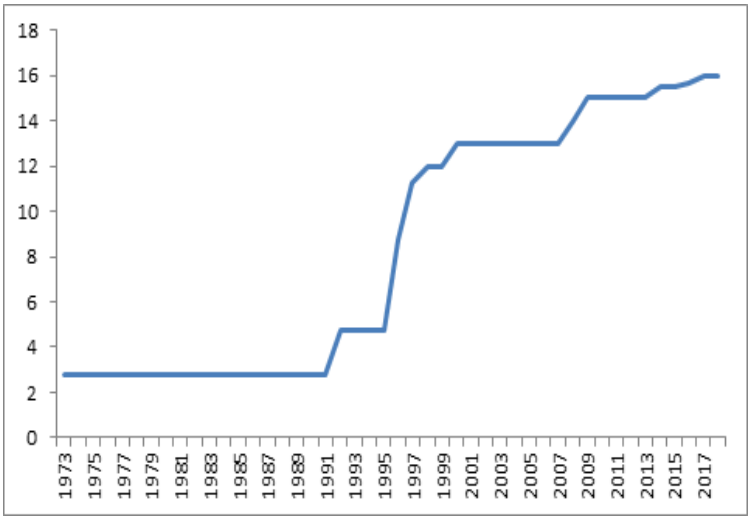


Figure 1: Evolution of financial liberalisation index in Cameroon

Source: authors

Financial development Index

The selection of key variables to represent the level of financial services produced in an economy and how to measure the extent and efficiency of financial intermediation is an extremely difficult task due to the diversity of financial services catered for in the financial systems. In addition, there is a diverse array of agents and institutions involved in the financial intermediation activities. The extent of financial development is best measured by the intermediaries' ability to reduce information and transaction costs, mobilise savings, manage risks and facilitate transactions. The idea is very simple but there is no valid and reliable data available. Despite all efforts made by researchers to refine and improve the existing measures, the financial proxies used are still far from satisfactory.

Traditionally, easily available monetary aggregates such as M2 or M3 as a ratio of nominal GDP were widely used in measuring financial development. However, these were not very good proxies for financial development since they reflect the extent of transaction services provided by financial system rather than the ability of the financial system to channel funds from depositors to investment opportunities. The availability of foreign funds in the financial system also renders this an inadequate measure of financial development. As an alternative measure, bank credit to private sector is often argued to be a more superior measure of financial development. Since the private sector is able to utilise funds in a more efficient and productive manner as compared to the public sector, the exclusion of credit to public sector better reflects the extent of efficient resource allocation. Developed by King and Levine (1993), another commonly used variable is the ratio of commercial bank assets divided by commercial bank plus central bank assets which measures the relative importance of a specific type of financial institution i.e. the commercial banks in the financial system. The basic idea underlying this measure is that commercial banks are more likely to identify profitable investment opportunities and therefore make more efficient use of funds than central banks.

In most cases, these variables are highly correlated and yet there is no uniform argument as to which proxies are most appropriate for measuring financial development. This justifies the need to construct an index as a single measure that represents the overall development in the financial sector by taking the relevant financial proxies into account. We use logarithm of liquid liabilities (M2) to nominal GDP (LLI), logarithm of commercial bank assets to commercial bank assets plus central bank assets (LBA), and logarithm of domestic credit to private sectors divided by nominal GDP (LCP) as the proxies for financial development. Using these three variables, we develop an index using principal component analysis that sufficiently deals with the problems of multicollinearity and over-parameterisation as an overall indicator of the level of financial development.

Table 1: Correlation Matrix between various financial development indicators

variables	LLI	LCP	LBA
LLI	1.000	0.725	0.708
LCP	0.725	1.000	0.806
LBA	o.708	0.806	1.000

Source: authors

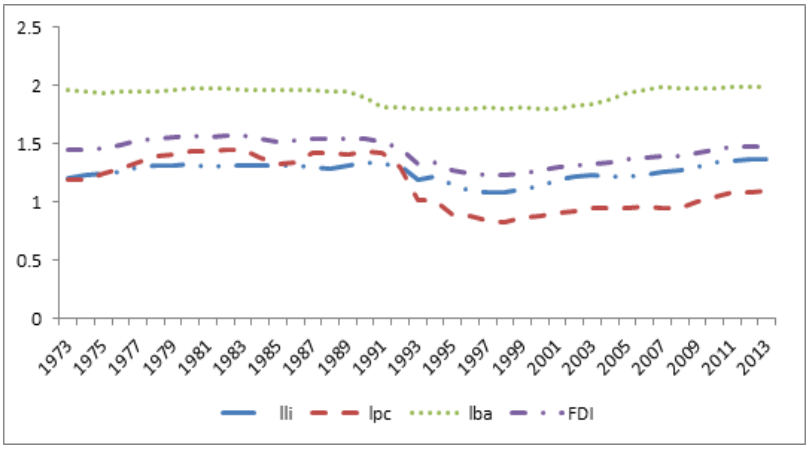
From table 1, we observe that the three measures of financial development are highly correlated and as such we use the principal component analysis to reduce the three financial proxies into one principal component. Principal component analysis has traditionally been used to reduce a large set of correlated variables into a smaller set of uncorrelated variables, known as principal components (Ang and Mckibbin, 2007). This technique allows different measures of financial development to be expressed in terms of a single index. Theoretically, this new proxy for financial development (denoted FDI) is able to capture most of the information from the original dataset which consists of three financial development measures. Table 2 summarises the results obtained from the principal component analysis.

Table 2: Principal component analysis results

Principal component	Eigenvalues	% of variance	cumulative %
1	2.298	76.585	76.585
2	0.494	16.468	96.053
3	0.208	6.947	100.00
Variables	**Factor loading**	**communalities**	**Factor scores**
LLI	-0.14	0.406	0.356
LPC	-0.21	0 .370	0.324
LBA	-0.02	0.366	0.320

Source: Authors computation using SPSS.

The first Eigen values indicate that the first principal component explains about 76.59% of the standardized variance, the second principal component explains another 16.47% and the last principal component accounts for only 6.95% of the variation. The first eigenvector reveals that all variables are negatively correlated with the first principal component. The factor scores suggest that the individual contributions of LLI, LPC, and LBA to the standardised variance of the first principal component are 35.6%, 32.4% and 32 % respectively. We use these as the basis of weighting to construct a financial development index denoted FDI. The graph below shows the evolution of this index in Cameroon from 1973 to 2017.



Source: Authors

The graph indicates that the Cameroonian financial sector was more developed before the 1986 crisis that led to the reform of the sector. The crisis actually deteriorated the progresses registered in financial development. However, long after reforms were undertaken to render the sector more efficient in the collection and allocation of financial resources, and with the regain of the growth path by 1995, the financial development indicators regained upward trends though they have not yet met their levels of before the crisis.

6. Empirical Results and Discussions

The unit root test results on the variables are first presented, followed by the Johansen cointegration test results. This is important as the presence of cointegration affects the way the causality test is carried out. The causality test results are then presented before completing the analyses with the impulse response functions and the decomposition of variances.

6.1. Unit root test results

We use the Augmented Dickey Fuller (ADF) test to determine the degree of integration of the variables. The results are presented in Table 3 below.

Table 3: Unit test results on variables

Variables	ADF test statistics Variables at levels	ADF test statistics Variables at first difference	Decision
FDI	-0.159887	-2.201859**	I(1)
FLI	-1.667612	-2.172748**	I(1)
EG	-3.960945***	_____	I(0)

Note: *, **, *** indicate significance at 10%, 5%, and 1% respectively.

Source: Authors calculations using Eviews 8.0

Economic growth(EG) was found to be integrated of order 0, that is I(0), while the Financial Development Index (FDI) and the Financial Liberalisation Index (FLI) are integrated of order 1, that is they are I(1). The status of the variables being determined, we can then proceed to test for the existence of cointegration between the variables.

6.2. Cointegration test results

The existence of a long run relationship between the variables is tested using the Johansen (1992) cointegration test. The results are presented in table 4 below:

Table 4: Johansen cointegration test results

Model	Trace statistic (λ_{trace})			Maximum eigenvalue statistic (λ_{max})			Lags (p)
	$r=0$	$r\leq 1$	$r\leq 2$	$r=0$	$r=1$	$r=2$	
(EG, FDI, FLI)	**0.23**	0.17	0.07	**0.23**	0.17	0.08	1
Cointegrated Equations : none							

Note: *, **, *** indicate significance at 10%, 5%, and 1% respectively.
Source: Authors calculations using Eviews 8.0

The Trace statistic and the Maximum eigenvalue statistic fail to reject the H0 hypothesis of no cointegration between the variables. This indicates that there exists no long run relationship between the variables. This implies that the analysis have to be carried out using a VAR model with I(0) variables in level form and (1) variables in first difference form. This is to avoid spurious regressions. The results of the estimation of this VAR model are presented in Table 5.

Table 5: VAR estimation results

Models	EG	FDI	FLI
EG (-1)	0.854964***	-0.045533**	0.886031
	(0.03680)	(0.02091)	(0.53626)
	[23.2332]	[-2.17721]	[1.65225]
FDI (-1)	4.054752***	1.087444***	-5.561654***
	(1.01118)	(0.05905)	(1.51404)
	[4.00992]	[18.4171]	[-3.67340]
FLI (-1)	0.008294**	0.005309***	0.882727***
	(0.00316)	(0.00180)	(0.04607)
	[2.62362]	[2.95520]	[19.1608]
C	0.125645	1.174420**	-16.89220
	(0.10390)	(0.57466)	(14.7354)
	[1.20932]	[2.04367]	[-1.14637]
Adj. R-squared	0.976949	0.935154	0.980593
F-statistic	551.9744***	188.4745***	657.8638***

Note: values in parentheses ( ) and brackets [ ] represent standard errors and t-statistics of the coefficients respectively. *, **, *** indicate significance at 10%, 5%, and 1% respectively.
Source: Authors calculations using Eviews 8.0

From the results of the estimation of the VAR model presented in Table 5 above, it is noticed that economic growth (EG) is significantly and positively influenced by its past values and the past values of financial liberalisation and financial development.

Financial development on its part is negatively and significantly influenced by economic growth, and positively and significantly influenced by its past values, the lagged values of financial liberalisation and the constant term.

Financial liberalisation on its part is negatively and significantly influenced by the lagged values of financial development and positively by its own past values.

Apart from the findings on the positive effect of the past values of financial development and financial liberalisation on economic growth in Cameroon, the other results are as obtained in previous chapters using other methods of analysis. In order to deepen our analysis, we move on to study the causality relationships between the variables using the granger block exogeneity test.

6.3. Causality test results

Since no cointegration relationship was found between the variables, the causality test is carried out using the granger test. Also, as the analysis is being carried out in the framework of a tri-variate VAR system, the block exogeneity test is chosen. This is more appropriate for the causality between two variables can pass through a third variable forming a system. The results of the causality test are presented in Table 6.

Table 6: Results of short-run granger block exogeneity test

Dependent variable: EG			
Excluded	**Chi-sq**	**df**	**Prob.**
FDI	1.462465	1	0.2265
FLI	6.883402	1	0.0087
All	7.657552	2	0.0217
Dependent variable: FDI			
Excluded	Chi-sq	df	Prob.
EG	4.740254	1	0.0295
FLI	8.733185	1	0.0031
All	8.749130	2	0.0126
Dependent variable: FLI			
Excluded	Chi-sq	df	Prob.
EG	2.729918	1	0.0985
FDI	13.49384	1	0.0002
All	13.50641	2	0.0012

Notes: *, **, *** indicate significance and rejection of the null hypothesis at the 10%, 5%, and 1% respectively.

Financial liberalisation individually granger causes economic growth while financial development does not. Taken together, both financial liberalisation and financial development jointly granger causes economic growth. This implies that financial liberalisation enhances the role of the financial sector in promoting economic growth in Cameroon.

Financial development on its part is individually and jointly granger caused by economic growth and financial liberalisation. Financial liberalisation on its part is individually caused by financial development and jointly granger caused by financial development and economic growth.

The causality relationships being identified, it becomes important to know how an innovation in one of the variables affect the others through the study of impulse response functions; and the magnitude by which each of the variables explain variations in one another through variance decompositions. These analyses are particularly important in making policy recommendations.

6.4. Impulse responses

The impulse responses of the other variables to an innovation in one of the variables are shown in figure 3.

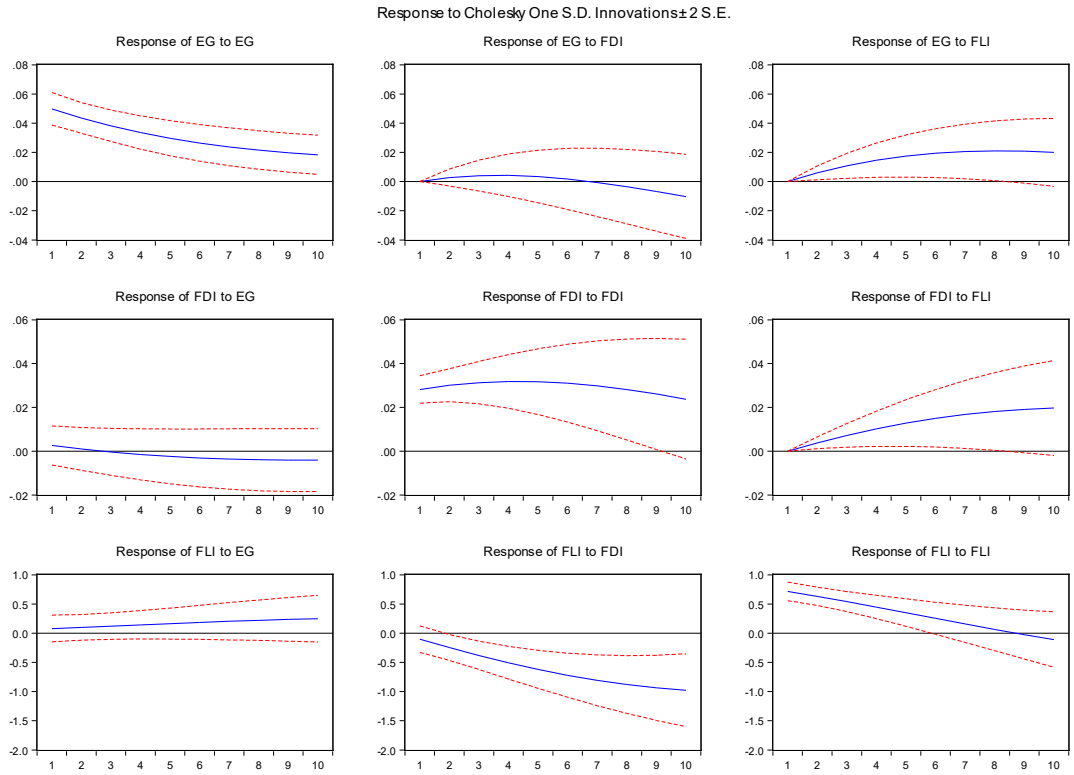


Figure 3: Impulse response graphs
Source: Authors using Eviews 8

Economic growth positively responds to innovations in financial development and financial liberalisation. This positive response quickly fades away to become negative for the case of financial development but persist longer in the case of financial liberalisation. This implies that financial development should be used to promote growth in the short run and financial liberalisation for sustained periods.

Financial development on its part responds negatively to economic growth and positively to financial liberalisation. This suggests that financial liberalisation is an appropriate policy to enhance financial development and that the growth level of the country has not yet reached the point where it can instil the development of the financial sector.

Financial liberalisation positively responds to economic growth and negatively to financial development. As the financial sector develops less and less reforms are needed in order to boost financial development.

Though the impulse response graphs give the direction of response of one variable to innovations in another, it does not say anything on the magnitude or degree to which variations in one variable is explained by variations in another. This can be done using variance decompositions.

6.5. Variance decomposition

The decompositions of the variances of economic growth (EG), financial liberalisation index (FLI) and financial development index (FDI) are shown in Table 7 below.

Table 7: Variance decomposition for EG, FDI and FLI

Variance Decomposition of EG:				
Period	**S.E.**	**EG**	**FDI**	**FLI**
1	0.049774	100.0000	0.000000	0.000000
2	0.066441	99.04132	0.164394	0.794286
3	0.077475	97.09227	0.392606	2.515120
4	0.085788	94.49468	0.561059	4.944258
5	0.092504	91.56807	0.616158	7.815776
6	0.098164	88.55839	0.577728	10.86388
7	0.103074	85.62045	0.527676	13.85188
8	0.107433	82.82412	0.591464	16.58442
9	0.111395	80.17271	0.917053	18.91024
10	0.115098	77.62506	1.653007	20.72193
Variance Decomposition of FDI:				
Period	S.E.	EG	FDI	FLI
1	0.028287	0.855253	99.14475	0.000000
2	0.041482	0.454784	98.71024	0.834971
3	0.052455	0.289733	97.30498	2.405284
4	0.062207	0.265544	95.33194	4.402512
5	0.071024	0.320467	93.05114	6.628389
6	0.079000	0.415419	90.62592	8.958665
7	0.086163	0.526156	88.15791	11.31593
8	0.092526	0.637904	85.71087	13.65123
9	0.098103	0.741873	83.32603	15.93210
10	0.102914	0.833064	81.03186	18.13508
Variance Decomposition of FLI:				
Period	S.E.	EG	FDI	FLI
1	0.725327	1.149148	1.972571	96.87828
2	0.996835	1.578617	7.162758	91.25862
3	1.202702	2.075437	15.04061	82.88395
4	1.387159	2.602497	24.72657	72.67094
5	1.568490	3.118081	35.05267	61.82924
6	1.754910	3.588369	44.93357	51.47806
7	1.949191	3.994177	53.62416	42.38167
8	2.150918	4.330478	60.77567	34.89386
9	2.357887	4.601862	66.34950	29.04864
10	2.567025	4.817577	70.48957	24.69285
Cholesky Ordering: EG FDI FLI				

Source: Authors using Eviews 8

Variations in economic growth are mostly explained by variations in itself, followed by financial liberalisation and finally financial development. During the first period it is explained entirely by variations in its past value, in the second period its past values explain 99% while financial liberalisation and financial development respectively explain 0.8 and 0.2%. As time passes the share explained by financial liberalisation rises to 20.1% and that of financial development moves to 2%. This reconfirms the fact that financial liberalisation is more appropriate in promoting growth in the long run in Cameroon, and policies in this regard should therefore be based on it.

Variations in financial development on its part are mostly explained by its past value, followed by variations in financial liberalisation, and finally economic growth. While the share of the variations explained by economic growth remain fairly constant at 0.8%, that of financial liberalisation rises from 0% in the first period to 18% in the 10th period. Financial liberalisation is therefore an appropriate policy in enhancing financial development.

As for financial liberalisations, the variance is mostly explained by itself followed by financial development and finally economic growth. The share of financial development rises with time to reach the level of 70% during the tenth period, explaining the variations in financial liberalisation even more than its past values. This further suggests that financial liberalisation is mostly used as a tool of promoting financial development than economic growth.

7. Concluding remarks and Policy implications

The aim of this study was to investigate the effects of financial liberalisation and financial development on economic growth in Cameroon. To reach this objective, we used VAR causality techniques coupled with variance decomposition and impulse response functions to analyse time series data on Cameroon spanning the period 1973-2017.

The results obtained show that financial liberalisation and financial development positively affect economic growth. Though financial development does not individually cause economic growth, when considered with financial liberalisation, they jointly cause economic growth. Financial liberalisation and economic growth are individually and jointly found to granger cause financial development. Financial development causes financial liberalisation while economic growth causes financial liberalisation only when jointly considered with financial development. The impulse response functions reveal that economic growth positively responds to both financial development and financial liberalisation though the effect of financial development soon fates out to become negative. Financial development is found to positively react to innovations in financial liberalisation and negatively to economic growth. As concerns financial liberalisation, it negatively responds to financial development and positively to economic growth. Also, variance decomposition reveals that variations in economic growth are mostly explained by its past values, followed by financial liberalisation and finally financial development. Financial development on its part is also mostly explained by its past values followed by financial liberalisation and finally economic growth.

These results have many policy implications as it is clearly shown that in order to enhance the role of the financial sector in promoting economic growth in Cameroon; financial liberalisation policies should be encouraged. Also, in order to promote sustainable growth, financial liberalisation policies should be encouraged meanwhile financial development should be used for shorter term purposes. Based on all these, the policy recommendation we make is that the on-going financial liberalisation process in the country should be enhanced in view of permitting the financial sector to efficiently play its role in the growth process of the country.

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Nill

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