Financial Development and Economic Growth in CEMAC Countries

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Abstract - The main aim of this research work is to determine the relationship that exists between financial development and the growth rate of per capita real GDP in CEMAC countries using panel data estimation techniques. It emphasises the reciprocal impact of financial development on growth in order to determine the type of relationship that exist and make policy recommendations. To do this, we measured financial development and economic growth with the liquidity rate and the growth rate of per capita real GDP respectively. We tested these two measures in a static panel model using Ordinary Least Squares (OLS) for the first model and Feasible Generalised Least Squares (FGLS) for the second. Based on the results obtained from data on these countries for the period from 1980 to 2006, we established that financial development negatively affects economic growth and that the inverse positive relationship is not significant. These results, coupled with those of Granger causality test, allow us to show that there exists a unidirectional causality running from economic growth to financial development in CEMAC countries. We concluded by making policy recommendations in order to ameliorate this relationship.

Keywords: CEMAC, financial development, economic growth, panel data, direction of relationship.

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I. INTRODUCTION

The debate on the role of the financial sector in economic development has been going on for over a century now. Schumpeter (1912) explains that the financial system plays an important role in economic growth by favouring innovation through financial services. Initially, this literature was centralised on the following question: does the financial sector play a causal role in economic growth or is it simply financial intermediaries that promote the rapid industrialisation of countries? (Eschenbach, 2004). The problem of causality remains an important issue in the literature. It is as such that four schools of thought emerged:

1. those who supported the thesis of bidirectional causality (Patrick, 1966; Bertelemy et Varoudakis, 1994),
2. those who held that causality is unidirectional, going from financial development to economic growth (Pagano, 1993; Spears, 1992; Mckinnon, 1973),
3. those who believed that causality is unidirectional going from the real to the financial sector (Gurley et al, 1995; Lensink et al, 1998; Levine, 1997),
4. and finally those who admitted that finance had no effect on economic growth (Stiglitz, 1991; Akyu, 1993).

In the mid 80s, the commercial bank dominated financial system of the Central African Economic and Monetary Community better known by its French acronym (CEMAC), witnessed a situation of generalised crisis. In fact, out of forty banks that existed in the zone, nine of them ceased their activities. Of all the banks that remained in activity, only one complied with existing norms, twenty others had precarious equilibriums and the remaining ten were insolvent (BEAC, 2004). This crisis forced CEMAC2 countries to undertake the reform of their financial sectors under the prism of financial liberalisation. This liberalisation led to the growth of banking activity that should lead to the amelioration of economic and financial indicators. It is as such that the annual growth rate of the GDP of CEMAC countries moved from -2.3% in 1993 to 4.1% in 2001, Inflation from 3% to 2.2% between 2001 and 2008 (BEAC, 2009).

Also, the coefficient of liquidity (M2/GDP) changed from 20.8% in 1983 to 54.9% in 2005 according to BEAC Report (2007). The investment rate also improved from 5.2% to 6% between 2001 and 2008. Considering all these improvements, one could question the direction of the relationship that could exist between the development of the bank dominated financial system and economic growth in CEMAC countries. What is the impact of financial development on the economic growth of CEMAC countries? What is the effect of per capita real GDP growth on the development of the financial sector of CEMAC countries? This study based on CEMAC countries covers the period from 1990 to 2006. Panel data techniques are used for the estimations. The rate of liquidity is used to measure financial development meanwhile economic growth is measured by the growth rate of GDP per capita. This first section is followed by a literature review (II), which is followed by the methodology (III). Section (IV) presents the results, while

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1 CEMAC is made up of six countries: Cameroon, Gabon, Chad, Equatorial Guinea, Central African Republic, and Congo.

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section (V) concludes by giving some policy recommendations.

II. LITERATURE REVIEW

The relationship between financial development and economic growth has been the object of many empirical and theoretical studies. It has attracted much attention in the modern history of economics. In this section, we review the theories that form the base of this study (II.1), as well as the empirical investigations of certain authors (II.2).

a) Theoretical literature review

This sub-section reviews the theories of endogenous growth and financial development. Even though this theory of economic growth has evolved much over time, we are particularly interested in the new theory of endogenous growth. Furthermore, we also deemed it necessary to present the theoretical link between financial development and economic growth.

i. impact of financial development on economic growth: Pagano’s “AK” theoretical model of endogenous growth.

The advent of the theory of endogenous growth in the 80s brought about a revival of interest in the link between financial development and economic growth and demonstrated that financial factors can have both level and growth effects on capital stock and productivity. As such, the works of Greenwood and Jovanovic (1990), Bencivenga and Smith (1991), Roubini and Sala-i-Martin (1992), King and Levine (1993), and Saint-Paul (1992) use the endogenous growth model to analyse the interaction of financial factors with economic growth. In fact, there are two types of endogenous growth models: in the first, policies have a permanent effect while in the second this effect is transitory. What is therefore the most appropriate model to model growth with? The model of Pagano (1993), presented below, which explains the mechanisms through which financial development promotes economic growth tries to answer this question. The endogenous growth “AK” model developed by Pagano can be reproduced as follows:

\[ Y_t = AK_t \]  

(1)

In order to capture the important effects that can exist between economic growth and financial development, he introduces an equation for gross investment \( I_t \) to obtain the following equation:

\[ K_{t+1} = I_t + (1 - \alpha)K_t \]  

(2)

Where \( Y_t \) represent the level of production, \( I_t \) is investment, \( K_t \) capital, \( \alpha \) and A are respectively the rate of depreciation and productivity of capital for a given period. He also supposes that a given fraction \( (1-\beta) \) of total savings is lost or is not totally invested in the intermediation process (this represent intermediation cost and prudential norms such as obligatory reserves or information asymmetry). The amount of savings available is therefore:

\[ I_t = \beta S_t \]  

(3)

With \( S_t = sY_t \), \( 0 \leq \beta \leq 1 \) and \( s \) is the savings rate. Also, in case of perfect information, investors would be directly in contact with savers and the intermediation system would not exist and all savings would be invested. The growth rate in year \( t+1 \) is written considering equation (1) as follows:

\[ g_{t+1} = \frac{Y_{t+1} - Y_t}{Y_t} \]  

(4)

\[ g_{t+1} = \frac{Y_{t+1}}{Y_t} - 1 \]  

(5)

\[ g_{t+1} = \frac{K_{t+1}}{K_t} - 1 \]  

(6)

By introducing the capital equation (2) and the investment equation (3), we obtain the following stationary state growth rate (g):

\[ g = A\beta s - \alpha \]

1. The proportion of national savings (\( \beta \)) allocated to productive investment projects; since according to Pagano, the increase of the latter might be due to lack of efficiency of the financial sector. The more efficient the financial sector, the lower the proportion \((1-\beta)\) of savings consumed.

2. The productivity of capital (A): due to information collection and the incitation of investors to invest in more risky projects because of risk sharing with intermediaries.

3. The savings rate (s): the financial system influences economic growth through the savings rate of the economy.

From the above model, financial development can positively influence economic growth through three channels: the savings rate, technological development and the share of savings allocated to the financing of the economy. Globally, the model of Pagano establishes a direct positive relationship between economic growth and financial development. This model has inspired many studies which have

\[ 4 \] see R. LEVINE Financial Development and Economic Growth, p.40-45

\[ 5 \] If we suppose that capital grows at the pace of investment (change in \( K_t = I_t \))
established various theoretical links between financial development and economic growth.

It is as such that King and Levine (1993) show that the prime function of a financial system is to facilitate the efficient allocation of resources both in space and in time, and their putting into place in an uncertain environment. By reducing various costs, the financial system fulfills a primary function which is subdivided into five basic functions, each contributing to the development of the real sector of the economy, Levine (1997):

1. It facilitates the mobilisation of domestic savings: also called pooling, the mobilisation of savings entails the putting together of the savings of small savers for investment purposes. As a primary market, the financial market permits the raising of capital and the direct transformation of household savings into long term resources for private and public collectivities. According to King and Levine (1993a), it can be considered at both the level of enterprises and households.

2. It allows the collection of information on enterprises and an optimal allocation of resources: according to Grossman and Stiglitz (1995), financial markets represent a source of information for, and on enterprises since financial markets can seek information concerning firms. The ability in using this information will stimulate investors to seek this information and to monitor firms. This information is useful to both enterprises and investors what ever their sector of activity. Also, through information transfer, the financial market facilitates the coordination of decentralised decision making in the different sectors of the economy. In fact, out of all firms and entrepreneurs seeking for financing, financial markets and intermediaries select the most promising ones. As such, we obtain a more efficient allocation of capital and by that an acceleration of the growth process according to Greenwood and Jovanovic (1990).

3. It allows a better monitoring of managers and enterprises by equity holders: the development of the stock market can affect the control of enterprises. In fact, Diamond and Verrachia (1982), and Gerschenkron (1962), show that efficient financial markets help to reconcile the interests of managers to those of shareholders. Financial markets help in the transformation of productive structures. This is done either through the acquisition of assets or through take-overs. Such operations can be financed either through the issue of new financial assets, without necessarily affecting the portfolio of the enterprise. The reduction of information asymmetry facilitates external financing and a better allocation of resources according to Sharpe (1990).
The financial system influences the accumulation of capital by affecting the rate of savings and the reallocation of this savings as shown in the “AK” model of Pagano. Theory therefore provides us with conceptual bases to ascertain that a large, liquid and efficient financial system favours economic growth.

### ii. The effects of economic growth on financial development: the theoretical model of Berthelemy et Varoudakis

One of the main models linking economic growth to financial development is that of Levine (1997). This endogenous growth model, which remains an extension of the endogenous growth theory developed by Romer, models the link existing between financial development and economic growth and shows that there exists a feedback effect of economic growth on financial development. These two possible effects between financial development and economic growth have been grouped by Patrick, who distinguishes two different stages. In the first stage, it is financial development that leads to economic growth (supply-led) and in the second, it is economic growth that leads financial development (demand-led). The supply-led stage entails a unidirectional causality from financial development to economic growth. This means that the deliberate creation of financial institutions and markets supply financial services that facilitates real economic growth. The model of Levine (1997) and Patrick (1996) formalises as such the analyses of the supporters of the existence of bidirectional causality. As such, Berthelemy and Varoudakis, (1994) using the theory of endogenous growth develop a two sector (real and financial) model that put to evidence the interdependence between the two spheres. Their model demonstrates the existence of multiple equilibrium of endogenous growth, associated with different levels of long term financial development of the financial sector. Each household is endowed with one unit of efficient labour (uE) that is put at the disposal of the firm or the bank \(L = L_F + L_B = 1\) where \(L = uE\). Each firm produces a unique good, which can be used for consumption or investment, using a technology with constant returns to scale with respect to capital stock \(K\) and efficient units of labour.

The aggregate production function is of the following form:

\[
Y = F(K, L) = uE^* f(K, L)
\]

Where \(F(K, L)\) is the production function in its intensive form, with \(F'\) and \(F''\) greater than zero. The usual profit maximisation condition of the representative enterprise imposes the following conditions:

\[
W = (f(1/u) - 1/u f'(1/u)) K
\]

\[
E_t R = f'(1/u)
\]

\(W\) is the real wage rate which, under the hypothesis of perfect mobility of labour, is the same in the real and financial sector. \(R\) represents bank credit market interest rate such that \(R = (1+i)r\), where \(i\) stands for the intermediation margin charged by banks and \(r\) stands for real interest rate which is equal to the marginal productivity of capital less net financial intermediation costs. Since the authors limit financial intermediation to banks, they consider a financial system with \(n\) identical banks in a situation of monopolistic competition, with the objective of collecting household savings. These banks use a technology that is modelled in a stylised manner. The amount of
considered.

Thus these different theories have been empirically
 verified in many regions and countries.

b) Empirical literature review

If some studies empirically verified the impact of
financial development on economic growth, others
concentrated on the inverse relationship.

i. From financial development to economic growth

Empirically, Goldsmith (1969) is one of the first
economists to investigate the interrelationship between
financial development and economic growth using data
on 35 countries (both developed and underdeveloped)
for the period 1898 to 1969. Measuring financial
development with the ratio total financial asset/GDP, he
shows that this ratio is positively correlated with
economic growth. However, the study did not consider
other factors that could influence growth. Later, the
study of King and Levine (1993) based on a sample of
80 countries (developed and underdeveloped) for
the period 1960-1989 showed, on the one hand, that a
bivariate analysis reveals a strong positive correlation
between financial development and economic growth. On
the other hand, using a multivariate analysis, the
results remained significant even after considering
control variables that influence economic growth. Also,
King and Levine (1993) used M2/GDP, the ratio of bank
internal assets, the ratio of bank credit to the private
sector and the ratio of credit to the private sector on
total domestic credit to study the link between financial
development and economic growth. The results they
arrived at show that there exist a close link between
financial development and economic growth and that
the indicators of financial development used are good
predictors of economic growth. They explain their results
by the existence of multiple equilibriums that induce
scale effects. Spears (1992) also used these indicators in
his study of the relationship between financial
development and economic growth in ten countries in
sub-Saharan Africa. The study, based on the granger
causality test, arrives at the conclusion that there exists
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These authors include a binary variable to differentiate periods starting from the early sixties to the nineties. These authors include a binary variable to differentiate periods of financial repression from those of financial liberalization.

The found a minimal influence of economic growth on the financial system during times of financial repression. The coefficient associated to this indicative variable multiplied by (M2/GDP) is negative and significant. From this, the two authors conclude that a repressed financial sector has a negative impact on economic growth. They explain this situation by the possibility of the existence of multiple equilibriums according to the level of financial development as pointed out by King and Levine. A “high equilibrium” associated with a high growth rate and a normal level of development of the financial sector and a “low equilibrium”, associated with low economic growth, where the economy is unable to develop its financial sector. In between the two, there is an unstable equilibrium that defines an optimum effect of the development of the financial sector on growth. Above this optimum, the economy converges towards the equilibrium with high growth, while below this optimum; the economy is tied up in a poverty trap. From these analyses, they conclude that the impact of financial development on growth is felt only from a certain level; (M2/GDP) should be at least equal to 36.5%. Finally, Aka Brou (2008) moves from a study of 22 Sub-Saharan African countries to show that:

1. The results obtained on the direction of causality between financial development and growth are mitigated, and that in certain countries it is bidirectional, and in others unidirectional going from finance to growth.
2. The results suggest cases of inverse causality and non causality even if they are less than the latter.
3. The results indicate that the direction of causality between financial development and the productivity of factors is either unidirectional or bidirectional and that very few cases of inverse causality and non causality exist.

4. It is evidenced that in countries where financial development granger causes economic growth, it also granger causes technological progress.
5. The results are country specific and vary with the indicator of financial development used (Demetriades and Hussein, 1996)

ii. From economic growth to financial development

Beck et al. (2000), empirically put to evidence the importance of the level of income in financial development. According to them, countries with high income levels have more developed financial sectors than those with low income. Some of these authors hold that factors at the origin of financial and banking crises are constraints to the development of the financial sector. These factors include among others: volatility of the macroeconomic environment (shocks of terms of trade, real exchange rate, interest rate, economic growth, and inflation rate), the poor management of the financial liberalization process and the legal and institutional environment. In fact, an adverse macroeconomic environment is a serious break to financial development.

More so, a high inflation rate or high fluctuations of prices tend to increase the number of financial transactions and thus, the costs of financial intermediation. This then increases the amount of resources lost in the financial system (costs of operations) and hence a fall in the efficiency of the system. Also, it is admitted that large deficits are usually associated to the phenomenon of disintermediation. As such, cross sectional studies have put to evidence the importance of market structure on the development of the financial sector (Beck et al, 2000, Loayza et Levine, 1999). The structure of the market also has an important impact on the development of the financial sector. Likewise, the increase in the incomes of economic agents reduces intermediation costs that tend to increase with bank margins in order to promote innovation and ameliorate the efficiency of the banking sector. It is important to note that increase in revenue (growth) leads to an increase in savings meanwhile the costs of treating savings are fixed. Due to these returns to scale, growth exerts a “natural externality” on financial development. Economic growth, through its positive effects on savings, reduces the costs of intermediation and promotes economic growth. Also, legal and regulatory aspects play an important role in the supply of financial services in order to boost economic growth. Legal laws and their mechanisms of application favour efficient allocation by the market and facilitate financial operations. A recent study by OCDE (2006) followed the same line of reasoning by looking at the importance of efficient financial regulation as a factor of economic progress. Even though we have many studies on financial development and economic growth, very few

6 King and Levine(1993a) used the following four indicators: M2/GDP, (M2-M1)/GDP, credit to the private sector/total domestic credit and credit to the private sector/GDP
7 The two authors used three indicators of economic growth: the growth rate of per capita GDP, growth rate of the global productivity of factors, growth rate of capital per head. On each of these indicators, they ran regressions with each of the four indicators of financial development.

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concentrated on the inverse relationship between economic development and financial development and it is therefore important to study the case of CEMAC countries.

III. METHODOLOGY

a) Equations and variables used

To verify the type of relationship that exists between financial development and economic growth in CEMAC countries, the endogenous growth econometric model of Levine (1997) and De Gregorio et al. (1995) is estimated using panel data techniques. The model specification is the following:

\[ G = \beta_0 + \beta_1 F(i) + \beta_2 X + \mu \]

In which we introduce the subscripts it to obtain the following form:

\[ G_{it} = \beta_0 + \beta_2 X_{it} + \mu_{it} \quad \text{equation 1} \]
\[ F(i)_{it} = \alpha_0 + \alpha_1 G_{it} + \alpha_2 X_{it} + \epsilon_{it} \quad \text{equation 2} \]

Where, \( G_{it} \) is the endogenous variable which represents the growth rate of per capita real GDP of country \( i \) at period \( t \). \( F(i)_{it} \) stands for the exogenous financial variable for country \( i \) in the period \( t \). \( X_{it} \) is the matrix of control variables associated to the economic growth of country \( i \) at period \( t \). We have two econometric equations where the first measures the effect of financial development on economic growth and the second the inverse effect. The first has as endogenous variable \( G_{it} \) and the second \( M2/PIB_t \).

b) Regression techniques used

The estimation of the two models is carried out using panel data techniques. Panel data regressions have the advantage that they take into consideration at least two dimensions, over individuals and over time. They contain data on many individuals over a long period of time. Data collected for each of the 6 countries come from secondary sources. They have been collected from the World Bank data set (2007) and from BEAC annual reports. They are all quantitative and cover the period from 1980 to 2006. This gives us 154 observations, being at least 26 per country. The models are first estimated under the hypothesis of uniformity in behaviour through time and countries. This implies that the coefficients of the models do not vary over time and across countries. We estimate the model using ordinary least squares (OLS) method considering that we have a homogenous panel or a model with common effects. That is, there are no country specific effects. The fisher test indicates that the model is globally significant at the 1% level (Prob > F = 0.0000) (see table 1.1. and 1.2. of appendix1). It is now important to determine which of the OLS or GLS methods of estimation is appropriate for the estimations. To do this, the heteroscedasticity test of Breusch-Pagan indicates that the two models are heteroscedastic since the results of the test gives Prob > chi2 = 0.0000<0.05. Given that both models are heteroscedastic, they can be corrected by the method of White. In order to be able to conclude on the existence of individual fixed effects, one must estimate the fixed effect model.

But due to the fact that the models can also be affected by autocorrelation, it is important to run an appropriate test in order to choose a method of estimation that solves these problems eventually.

Concerning the test of autocorrelation for the growth rate of per capita real GDP, we have used the test of Wooldridge in the case of panel data shown in the table below:

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8 Ross Levine, op.cit p.39
9 OCDE “regulation of the financial system and economic growth”, in Réforme économique, pp.13-15
Since $\text{Prob} > F = 0.4054 > 0.05$ we accept the null hypothesis of no autocorrelation of first order (AR1) in the first model.

Whereas for the equation of financial development, the fact that $\text{Prob} > F = 0.0005 < 0.05$ as shown in the table below leads to the rejection of the null hypothesis. Therefore, there exist a first order (AR1) autocorrelation that can be corrected during the estimation of the fixed effects model.

**Wooldridge test for autocorrelation in panel data**

- **Hypothesis:** $\text{H}_0$: no first order autocorrelation
- **Test statistic:** $F(1,5) = 65.850$
- **P-value:** $\text{Prob} > F = 0.0005$

It is therefore appropriate as such to run the regression of the fixed effects model. The problem at this level is to know whether country specific effects are significantly different. In order words, is the hypothesis of heterogeneity amongst countries as concerns the growth rate of capita GDP or financial development accepted or rejected? To test this hypothesis, we use the fisher test constructed as follows:

Under the hypothesis of homogeneity of countries ($H_0 : \beta_1 = \beta_2 = \ldots = \beta_{10}$), the estimated model corresponds to the common effects model meanwhile, under the hypothesis of the presence of heterogeneity ($H_1 : \exists i, \exists j \ s.t. \ i \neq j \ i \neq \beta_i$), the model estimated is that of individual effects. The individual effect $\beta_i$ is considered to be of the form $\beta_i = \beta_0 + u_i$; the test of homogeneity then boils down to state null hypothesis that all $u_i$ are zero. The software STATA directly performs the Fisher test when estimating the fixed effects model (see table 2.1. of appendix 2) for the case of the equation for per capita real GDP. The second fisher statistic, found at the bottom of table 1 of appendix 2 giving the estimation results of the fixed effects model, test the joint significance of introduced fixed effects. Since $\text{Prob} > F = 0.0799 > 0.05$, we accept the $H_0$ hypothesis. Therefore, the fixed effects are all zero. In this case, we retain the model estimated using OLS (common effects) since the panel is homogenous.

The results of tables 3.1 and 3.3 of appendix 3 show that: firstly, concerning equation 1, financial development negatively and significantly affects the growth rate of per capita real GDP. This can also be justified by information asymmetry between economic agents and the financial system without forgetting the scale effects explained by certain authors who demonstrate that for financial development to positively influence growth, the liquidity rate $(M2/GDP)$ should be at least 36.5%. For CEMAC countries, this rate is very low. Many studies have shown that for financial development to have a positive impact on growth there is need for a favourable macroeconomic environment. This has not been the case for CEMAC countries during the 1980s and the 1990s. The other
variables that are positively correlated with the growth rate of per capita GDP are: the investment rate, human capital, the rate of inflation, and trade openness. The result of the variable investment rate is significant and positive with respect to the growth rate of per capita GDP. This is not surprising since investment is the engine of growth. Also, the variable human capital is significant and this can be explained by the fact that for many years now, the secondary school attendance rate has considerably increased and continuous to increase nowadays and this exerts a positive externality on growth.

We can also notice a negative correlation between certain variables such as credit to the private sector, external debt, terms of trade, domestic savings, and real interest rate with the growth rate of per capita real GDP. The result of the variable credit to the private sector can be explained by the low amount of credit allocated to the private sector due to the high cost of bank credits. The result of the variable external debt shows that the high indebtedness of a country is a hindrance to its growth. However, we know that most countries of the CEMAC zone have been admitted to the decision point of the Highly Indebted Poor Countries (HIPC) initiative due to the heavy weight of their debts.

Concerning the results of the second equation, there is a positive and non significant effect of economic growth on financial development in CEMAC countries. In fact, this non significant positive contribution of growth to financial development can be explained by low household incomes. Due to this fact, most of household income is used for consumption than for savings. Actually, bank deposits are dominated by demand deposits whereas long term deposits (loansable funds) which are a prerequisite for productive investment are very low.

The results of the variables external debt and inflation rate are similar to those of the variable per capita real GDP. These results are interesting since CEMAC countries regained macroeconomic and financial stability. Nonetheless, the coefficients of variables such as trade openness and public deficit have a negative correlation with financial development. The results of deficit indicate that an increase of public deficit leads to a degradation of the financial sector. This result is logical since an increase in public deficits push the state to repress the financial sector in view of obtaining cheap resources to meet its social needs.

Finally, the results of figure 3 and table 4 show a positive correlation between financial development and economic growth. From this figure, the development of the financial sector comes partly from an increase in the growth rate of per capita real GDP. Also, table 4 shows that the relationship of causality between the real and the financial spheres is unidirectional going from economic growth to financial development i.e. “demand-following”.

V. Conclusion and Recommendations

The main objective followed in this study was to appreciate the type of relationship that exists between financial development and economic growth in CEMAC countries. Panel data regression techniques were used for the analysis. The results show that there exists a unidirectional causality running from economic growth to financial development. These results call for a number of recommendations:

It has been shown both theoretically and empirically that financial development promotes economic growth. As such, policy makers of CEMAC countries should take dispositions to increase the efficiency of their financial sectors so that they can contribute to economic growth. Therefore, they should implement measures that would allow financial institutions to efficiently allocate resources to the most productive opportunities. In fact, banks of the zone are characterized by excess liquidity meanwhile investment financing needs are not met. Many banks still show their lack of confidence to investors that do not have sufficient guarantees. This is why the creation of a guarantee fund in CEMAC countries is imperative. Surplus agents should also be encouraged to save by raising the minimum deposit rate of the central bank.

To backup the banking sector, there is need for the effective functioning of the two stock exchanges (Douala stock exchange and the Libreville stock exchange) of the zone to allow investors to dispose of long term resources that are indispensable for the financing of medium and long term projects.

REFERENCES


### Table 1.1: Estimation of growth rate of per capita real GDP equation

| Source | SS     | df    | MS      | F(10, 143) = 12.01 | Prob > F  = 0.0000 | R-squared = 0.4564 | Adj R-squared = 0.4184 | Root MSE = 7.7058 |
|--------|--------|-------|---------|-------------------|-------------------|-------------------|---------------------|----------------|----------------|
| Model  | 7128.52732 | 10   | 712.852732 |                   |                   |                   |                     |                |
| Residual | 8491.28328 | 143  | 59.3796034 |                   |                   |                   |                     |                |
| Total  | 15619.8106 | 153  | 102.090265 |                   |                   |                   |                     |                |

| g | Coef. | Std. Err. | t | P>|t| | [95% Conf. Interval] |
|---|-------|-----------|---|-------|-------------------|
| inv | 0.2383272 | 0.0565548 | 4.21 | 0.000 | 0.1265358 - 0.3501186 |
| doms | -0.0218149 | 0.049799 | -0.44 | 0.662 | -0.1202523 - 0.0766225 |
| tir | -0.0804083 | 0.0478358 | -1.68 | 0.095 | -0.1749649 - 0.0141483 |
| tot | -0.032263 | 0.014612 | -2.21 | 0.029 | -0.0611463 - 0.0033796 |
| hum | 0.029762 | 0.0544514 | 0.55 | 0.586 | -0.0778716 - 0.1373956 |
| open | 0.022749 | 0.0221465 | 1.03 | 0.306 | -0.0210278 - 0.0656257 |
| m2pib | -0.4150299 | 0.193041 | -2.15 | 0.033 | -0.7966125 - 0.0334744 |
| priv | -0.1748138 | 0.1113561 | -1.57 | 0.119 | -0.3949305 - 0.0453028 |
| inf | 0.0244318 | 0.0562553 | 0.43 | 0.665 | -0.0867767 - 0.1356313 |
| detex | -0.0543211 | 0.0133133 | -4.08 | 0.000 | -0.0806375 - 0.0280048 |
| _cons | 11.30846 | 3.727726 | 3.03 | 0.003 | 3.939894 - 18.67703 |

### Table 1.2: Estimation of financial development equation

| Source | SS     | df    | MS      | F(6, 150) = 7.31 | Prob > F  = 0.0000 | R-squared = 0.2262 | Adj R-squared = 0.1953 | Root MSE = 13.299 |
|--------|--------|-------|---------|-----------------|-------------------|-------------------|---------------------|----------------|----------------|
| Model  | 7756.56232 | 6    | 1292.76039 |                   |                   |                   |                     |                |
| Residual | 26530.4464 | 150  | 176.869642 |                   |                   |                   |                     |                |
| Total  | 34287.0087 | 156  | 219.788517 |                   |                   |                   |                     |                |

| m2pib | Coef. | Std. Err. | t | P>|t| | [95% Conf. Interval] |
|-------|-------|-----------|---|-------|-------------------|
| g | 0.2630223 | 0.1302892 | 2.02 | 0.045 | 0.0055832 - 0.5204613 |
| tir | -0.0189434 | 0.0810359 | -0.23 | 0.815 | -0.1790626 - 0.1411758 |
| inf | -0.0127896 | 0.0964687 | -0.13 | 0.895 | -0.2034026 - 0.1778233 |
| def | -0.4365826 | 0.1788199 | -2.44 | 0.016 | -0.7899138 - 0.0832515 |
| open | -0.0770092 | 0.0215035 | -3.58 | 0.000 | -0.119498 - 0.0345203 |
| detex | -0.0717505 | 0.0133133 | -4.08 | 0.000 | -0.0806375 - 0.0280048 |
| _cons | 34.21546 | 2.608655 | 13.12 | 0.000 | 29.061 - 39.36992 |
### Table 3.1: Estimation of model after correction of heteroscedasticity

| g  | Coef.   | Std. Err. | t    | P>|t| | [95% Conf. Interval] |
|----|---------|-----------|------|-----|----------------------|
| inv| .2533914| .0654836  | 3.87 | 0.000 | .1238583 .3829244    |
| doms| .0148279| .0662438  | 0.22 | 0.823 | -.1162089 .1458646   |
| tir| -.0634845| .050532   | -1.26| 0.211 | -.1634418 .0364728   |
| tot| -.035159 | .0216711  | -1.62| 0.107 | -.0780265 .0077085   |
| hum| .0702894 | .074922   | 0.72 | 0.472 | .2631387 .1225599    |
| open| -.0503259| .0356373  | -1.41| 0.160 | -.1208201 .0201683   |
| m2pib| -.3232571| .2366939  | -1.37| 0.174 | -.7914611 .1449468   |
| priv| -.0503259| .0356373  | -1.41| 0.160 | -.1208201 .0201683   |
| inf | .0491597 | .0143691  | 0.36 | 0.719 | -.064313 .1626324    |
| detex| -.1038913| .0244144  | -4.26| 0.000 | -.1521855 -.0555971  |
| _cons| 20.04822| 7.237107  | 2.77 | 0.006 | 5.732507 34.36393    |

\( \rho_{ar} = -0.0884987 \)
\( \sigma_u = 6.937531 \)
\( \sigma_e = 7.7262259 \)
\( \rho_{fov} = 0.44636982 \) (fraction of variance due to \( u_i \))

F test that all \( u_i = 0 \): \( F(5,132) = 2.02 \) Prob > F = 0.0799

### Table 3.2: Breusch-Pagan test for heteroscedasticity for fixed effect model

| m2pib | Coef.   | Std. Err. | t    | P>|t| | [95% Conf. Interval] |
|-------|---------|-----------|------|-----|----------------------|
| g     | .0035312| .0364553  | 0.10 | 0.923| -.0756097 .0685474  |
| tir   | .0240837| .019863   | 1.21 | 0.227| -.015189 .0633564   |
| inf   | .0025483| .0230299  | 0.11 | 0.912| -.0429858 .0480824  |
| def   | .0733453| .0646958  | 1.13 | 0.259| -.0545697 .2012604  |
| open  | .0440797| .0195289  | 2.26 | 0.026| .0054677 .0826918   |
| detex | .02165  | .0168664  | 1.28 | 0.201| -.0116978 .0549978  |
| _cons | 16.25686| .4593015  | 35.39| 0.000| 15.34874 17.16498   |

\( \rho_{fov} = 0.44636982 \) (fraction of variance due to \( u_i \))

F test that all \( u_i = 0 \): \( F(6,139) = 1.60 \) Prob > F = 0.1502

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Appendix 3: Results of Estimations After Correction of All Problems
Appendix 3 : Results of Estimations After Correction of All Problems

Table 3.1. : Estimation of model after correction of heteroscedasticity

| g | Coef. | Std. Err. | t     | P>|t| | [95% Conf. Interval] |
|---|-------|-----------|-------|------|-------------------------|
| inv | .2383272 | .0634472 | 3.76 | 0.000 | .1129117 - .3637428 |
| doms | -.0218149 | .0492114 | -.44 | 0.658 | -.1190907 - .075461 |
| tir | -.0804083 | .0539266 | -1.49 | 0.138 | -.1870046 - .026188 |
| tot | -.032263 | .0151801 | -2.13 | 0.035 | -.0622694 -.0022565 |
| hum | .029762 | .0402535 | 0.74 | 0.466 | .0498069 - .1093309 |
| open | .022749 | .0240864 | 0.94 | 0.347 | -.0248625 - .0703605 |
| m2pib | -.4150299 | .1969299 | -2.11 | 0.037 | -.8042998 - -.0257601 |
| priv | -.1748138 | .0902647 | -1.94 | 0.055 | -.3532394 -.0036117 |
| inf | .0244318 | .037375 | 0.65 | 0.514 | -.049447 - .0983106 |
| detex | -.0543211 | .0130171 | -4.17 | 0.000 | -.0805018 - -.0285904 |
| _cons | 11.30846 | 4.48883 | 2.52 | 0.013 | 2.435425 - 20.1815 |

Table 3.2. : Breusch-Pagan test for heteroscedasticity for fixed effect model

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>Number of obs = 157</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>3606984.97</td>
<td>6</td>
<td>601164.161</td>
<td>F( 6, 150) = 7188.36</td>
</tr>
<tr>
<td>Residual</td>
<td>12544.5415</td>
<td>150</td>
<td>83.6302769</td>
<td>Prob &gt; F = 0.0000</td>
</tr>
<tr>
<td>Total</td>
<td>3619529.51</td>
<td>156</td>
<td>23202.1122</td>
<td>R-squared = 0.9964</td>
</tr>
</tbody>
</table>

| g | Coef. | Std. Err. | t     | P>|t| | [95% Conf. Interval] |
|---|-------|-----------|-------|------|-------------------------|
| g | -.1605935 | .0895908 | -1.79 | 0.075 | -.3376164 - .0164295 |
| tir | 1.289006 | .0557227 | 23.13 | 0.000 | 1.178904 - 1.399109 |
| inf | .25874 | .0663348 | 3.90 | 0.000 | .1276687 - .3898112 |
| def | 3.141262 | .122962 | 25.55 | 0.000 | 2.898301 - 3.384223 |
| open | 2.165223 | .0147864 | 146.43 | 0.000 | 2.136006 - 2.194439 |
| detex | .9130011 | .0130171 | 66.47 | 0.000 | .8858626 - .9401396 |
| _cons | 221.714 | 1.793791 | 123.60 | 0.000 | 218.1696 - 225.2584 |
Table 4: Estimation of model using FGLS on panel data

Cross-sectional time-series FGLS regression

Coefficients: generalized least squares
Panels: heteroskedastic

Correlation: common AR(1) coefficient for all panels (0.8321)
Estimated covariances = 6  Number of obs = 157
Estimated autocorrelations = 1  Number of groups = 6
Estimated coefficients = 7  Obs per group: min = 22
                        avg = 26.16667
                        max = 27
Wald chi2(6) = 5.94
Log likelihood = -390.7874
Prob > chi2 = 0.4296

|          | Coef.    | Std. Err. |     z   |   P>|z|  | [95% Conf. Interval] |
|----------|----------|-----------|---------|-------|----------------------|
| m2pib    |          |           |         |       |                      |
| g        | .0059324 | .0311586  | 1.19    | 0.151 | -.0670021 to .0551373 |
| tir      | .0226663 | .013791c  | 1.64    | 0.100 | -.0043637 to .0496962 |
| inf      | .0029804 | .0145994  | 0.20    | 0.838 | -.0256339 to .0315946 |
| def      | -.0412065| .0492044b | -1.84   | 0.040 | -.1376454 to -.0552323 |
| open     | -.0013735| .0150131  | -0.09   | 0.927 | -.0307986 to .0280516 |
| detex    | .0042677 | .0106126  | 0.40    | 0.688 | -.0165327 to .0250681 |
| _cons    | 17.6651  | 1.727497a | 10.23   | 0.000 | 14.27927 to 21.05093  |

Appendix 4: Granger causality test results

Figure 3: Correlation between growth rate (G) and financial development (M2/GDP)

Pairwise Granger Causality Tests

Date: 10/01/10
Sample: 1980 2006

Null Hypothesis:             Obs   F-Statistic   Probability
M2PIB does not Granger Cause G | 1,77420143 | 0,17328107
G does not Granger Cause M2PIB | 2,81198793 | 0,06336616