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Financial Development and Economic Growth in Cemac Countries

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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.

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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 20083. 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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[2] CEMAC is made up of six countries: Cameroon, Gabon, Chad, Equatorial Guinea, Central African Republic, and Congo.

[3] http/www.beac/conjontureprevcemac2007-2009

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)[4] 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:

$$Y_t = AK_t \tag{1}$$

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:

$$K_{t+1} = I_t + (1-\alpha)K_t \tag{2}$$

Where Y_t represent the level of production, I_t is investment, K_t capital, α and A are respectively the rate of depreciation and productivity of capital for a given period. He also supposes that a given fraction (1-β) 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:

$$I_t = \beta S_t \tag{3}$$

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:

$$g_{t+1} = \frac{(Y_{t+1} - Y_t)}{Y_t} \tag{4}$$

$$g_{t+1} = \frac{Y_{t+1}}{Y_t} - 1 \tag{5}$$

$$g_{t+1} = \frac{K_{t+1}}{K_t} - 1 \tag{6}$$

By introducing the capital equation (2) and the investment equation (3), we obtain the following stationary state growth rate (g)[5]:

$$g = A\beta S - \alpha$$

1. The proportion of national savings (β) 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-β) 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

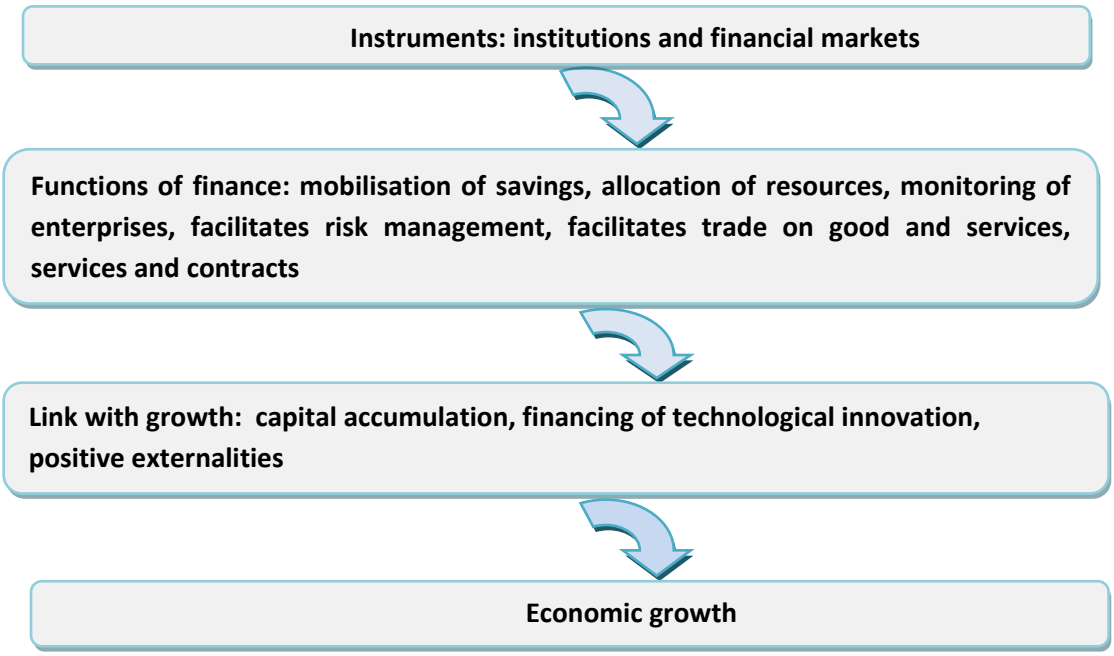
[5] If we suppose that capital grows at the pace of investment (change in $K_t = I_t$)

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 fulfils 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).
4. The presence of a developed financial sector facilitates the trade of goods and services: as such, when a financial system does not increase liquidity, high return projects will have difficulties of being financed. Liquid markets allow shareholders to easily sell their shares while firms have permanent access to capital. Therefore, by facilitating transactions, financial markets reduce credit risk.
5. Finally, financial systems facilitate the protection against and the sharing of risk: except of the reduction in credit risk, the financial sector can attenuate idiosyncratic risk, that is, risk linked to individual's projects, to enterprises, industries, regions, and countries. This reduction in idiosyncratic risk is done through diversification. Concerning the diversification of risk, it could favour the accumulation of capital risk (Bencivenga et Smith, 1991). Meanwhile, according to King et Levine (1993), financial systems that facilitate diversification can accelerate technological changes and economic growth. These functions affect economic growth through the following channels: the accumulation of capital and technological innovation.

Figure 1: theoretical link between finance and growth following Levine (1997)



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, modelises 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 (1966) 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 ($L_F + L_B = 1$ 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:

$$Y= F(k,L)= uE^* f(K,L) \quad (8)$$

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:

$$W= (f (1/u) –1/u f'(1/u))^*K \quad (9)$$

$$Et\ R = f'(1/u) \quad (10)$$

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

investment intermediated by each bank (j) represent a fraction Φj of current savings. They suppose that this fraction Φj is positively linked to the quantity of labour employed by the bank (noted, Lj for **j**), therefore:

$$\Phi j = \Phi j\,(Lj), \text{ with } \Phi_j^{'} > 0.$$

By hypothesis, the n banks are all identical, we therefore have in equilibrium: $L_j = L_B = 1\text{-}u/n$, where L_B is total labour of the banking sector.
The investment of the bank is given by:

$$I = K^{'} = \quad (L_B).\ S = \quad (1\text{-}u/n).\ S \qquad (11)$$

Where Sj is the amount of savings collected by the bank(S=Y-C)

During each period, the representative bank maximises its profit (holding constant the amount of savings collected by other banks), which has the following equation:

$$\Pi_B = (1+i)\,\Phi\,(L_B).\ S - L_B w - S \qquad (12)$$

In this expression, we have 1+i = R/r, with R exogenous to the bank. The profit maximisation of the bank implies the following condition:

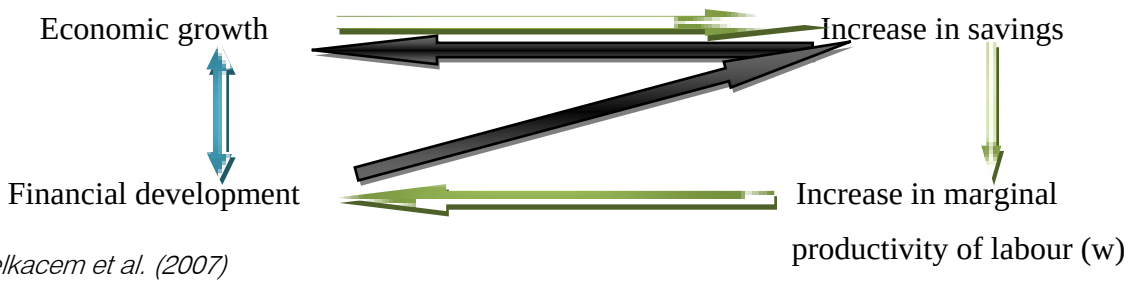
$$\partial \Pi_B / \partial L_B = 0 \qquad (13)$$

Furthermore, this equality implies the equalisation of the marginal productivity of labour to real wage (common to both sectors). In equilibrium, this condition is expressed as follows:

$$w = (1+i)\,\Phi'\,(L_B).\ S/n \qquad (14)$$

From theses results, the authors conclude that the real sector exerts an important externality on the financial sector through the determination of the flow of savings S. The larger the size of the financial sector (that is the higher the amount of household savings) the higher is the productivity of labour in banks and the more developed is the financial sector. In other words, any increase in savings allows an increase, for a given level of labour L_B, in the level of investment and income received by banks. The idea is that, economic growth leads to increase in savings meanwhile the treatment costs of savings is constant. Thanks to these returns to scale, growth exerts a "natural externality" on financial development. Economic growth, through its positive effect on savings, reduces the marginal cost of intermediation, and enhances financial development. The following figure illustrates the causality link between the two phenomena.

Figure 2 : Direction of causality between financial development and economic growth



Source : Belkacem et al. (2007)

These differents 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[6]. 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[7].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

a strong causality going from M2/GDP to economic growth. Berthelemy and Varoudakis (1998) on their part used panel data techniques in their study of the relationship between financial development and economic growth in 82 countries during six five-year 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 exists.
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[8]. A recent study by OCDE (2006)[9] 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.

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:

$$G_{it}=\beta_0 + \beta_1 F(i)_{it} + \beta_2 X_{it} + \mu_{it} \qquad \text{equation 1}$$

$$F(i)_{it} = \alpha_0 + \alpha_1 G_{it} + \alpha_2 X_{it} + \epsilon_{it} \qquad \text{equation 2}$$

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 $M2/PIB_{it}$. We should recall that these two endogenous variables would become exogenous depending on whether we are dealing with equation one or equation two. The explanatory variables are the following:

$PRIV_{it}$: Credits distributed to the private sector measured as the amount of credit distributed to the private sector divided by GDP of country i and period t.

$M2/PIB_{it}$: The liquidity rate (M2/GDP) that is measured by the level of financial development or deepening of country i during period t.

TOT_{it} : The terms of trade measured by the ratio price of exports to those of imports of country i at period t.

INF_{it}: Measures macroeconmic stability, which is represented essentially by the stability of the general price level. It is measured by the general consumption price level of country i during period t.

$DETEX_{it}$: External debt that is obtained by dividing external debt by GDP of country i at period t.

Inv_{ite} : The investment rate that is defined as the volume of investment divided by GDP of counry i at time t.

HUM_{it} : human capital that is measured by secondary school attendance rate of country i at period t.

$OPEN_{it}$: The level of trade openness captured by the ratio (Exports + Imports) / GDP of country i at period t.

$DOMS_{it}$: Domestic credit that represents the percentage of domestic credit in GDP of country i at period t.

DEF_{it}: Public deficit which is captured by the budget balance divided by GDP of country i at period t

G_{it} : The growth rate of per capita GDP of country i at period t.

TIR_{it} : Real interest rate is given by the difference between nominal interest rates and inflation of counrty i at period t.

b) Regression techniques used

The estimation of the two models are 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:

[8] Ross Levine, op.cit p.39

[9] OCDE "regulation of the financial system and economic growth", in Réforme économique, pp.13-15

Wooldridge test for autocorrelation in panel data
H0: no first order autocorrelation
F(1, 5) = 0.825
Prob > F = 0.4054

Since 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 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
H0: no first order autocorrelation
F(1, 5) = 65.850
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 (Ho : $\beta1=\beta2=\ldots=\beta10$), the estimated model corresponds to the common effects model meanwhile, under the hypothesis of the presence of heterogeneity (H1 : $\exists$ i,j $\exists$ $i\neq\beta j$), the model estimated is that of individual effects. The individual effect βi is considered to be of the form $\beta_i = \beta_0 + u_{-i}$; the test of homogeneity then boils down to state as 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 Prob > F =0.0799> 0.05, we accept the Ho hypothesis. Therefore, the fixed effects are all zero. In this case, we retain the model estimated using OLS (common effects)(see table 3.1 of appendix 3). Since we have a homogenous panel, this means that there does not exist between the six CEMAC countries individual effects peculiar to each country and that explains the growth rate of its real GDP per capita.

Concerning the financial development equation, the second fisher statistic given in table 2.2 of appendix 2 leads to the rejection of the hypothesis that all the u_{-i} are equal to zero (Prob > F =0.0000 is less than 0.05). Therefore, the fixed effects are not all equal to zero. In this case we reject the model estimated using OLS (common effects) since the panel is heterogenous. There exist between the six countries of CEMAC individual effects peculiar to each country that explains its financial development. The problem that arises is to determine whether these individual effects are deterministic or stochastic. To answer this question, we need to estimate the random effects model and run the Hausman specification test. To elaborate the test of Hausman, we require the fixed effects model to be homoscedastic and that there be absence of autocorrelation between explanatory variables and individual effects. If this is not the case, we employ the method of Feasible Generalized Least Squares (FGLS) to estimate the model. This verification is done using the test of Breusch-Pagan that consist of regressing the squared residuals (r2) of the fixed effects regression on the independent variables of the original regression.

From the results of table 3.2 of appendix 3, we accept the presence of heteroscedasticity in the fixed effects model given that Prob > F = 0.0000 < 5 %. For this reason, there is no need to run the Hausman test since the model suffers from both heteroscedasticity and autocorrelation of order (AR1). The best method, considering the correction for heteroscedasticity and autocorrelation, is that of FGLS on the panel data so as to guarantee the reliability of results shown in table 4 of appendix 3.

Finally, concerning the causality test, we first of all carried unit root tests which showed that the variables growth rate of real GDP and financial development are stationary at levels. This permitted us to run the causality test between these two variables and the results are presented in appendix 4.

IV. Results and Discussions

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 be explained by the slackness in the putting in place of financial liberalization in the countries of CEMAC. 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 (loanable 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 Références Referencias

1. AKA, BROU E. (2008), « Développement financier, Croissance économique et Productivité globale des facteurs en Afrique Subsaharienne », Document de travail, Universitéde Cocody- Abidjan.
2. AKYUZ,Y.(1993), « Libéralisation financière : Questions clés », UNCTAD *discussion paper*, vol.53(8) pp 48- 54. Cote 128.
3. BEAC (2004), « Rapport d’activité exercice 2004 ». (2007), « Rapport d’activité exercice 2007 ». (2009), « Rapport d’activité exercice 2009 ».
4. BENCIVENGA,V.R. AND B.D. SMITH (1991), « Financial Intermediation and Endogenous Growth », *Review of Economic Studies Vol.*58(2), pp 195-209.
5. BECK, T., LEVINE R., NORMAN L. (2000), « Finance and the Sources of Growth », *Journal of Financial Economics Vol.*58, pp 261-300.
6. BERTHELEMY, J.C., VAROUDAKIS, A., (1994), « Intermédiation Financière et Croissance Economique », *Revue Economique, Vol. 42,* pp 90-130*,* 1994.

7. BERTHELEMY, J.C., VAROUDAKIS, A. (1998), « Développement financier, Reformes financiers et Croissance. Une approche en données de panel », *Revue Economique,* Vol.49, janvier pp 194-208.
8. BELKACEM, L., DRINE, I., AYOUNI, S. (2007), « Développement financier et Croissance Economique dans les PED : Une approche par les tests de Causalité », IHEC sousse. DEMETRIADES , P. O., K. H., HUSSEIN (1996), " Does financial Development Cause Economic Growth? Time series evidence from 16 countries", *Journal of Development Economics* Vol.51, pp 387-411.
9. DE GREGORIO, J. ET GUIDOTTI (1995), « Borrowing Constraints, Human Capital Accumulation, and Growth », *Journal of Monetary Economics Vo.*l37, pp 49-71.
10. DIAMOND, D., VERRACHIA, R. (1982), "Optimal managerial contracts and Equilibrium security prices" *Journal of Finance*, vol. 37, pp 275-287.
11. ESCHENBACH,F. (2004), « Financial and Growth : A Survey of the Theoritical and Empirical Littérature » Tinbergen Institute, *Discussion paper Vol. 39 (2),* 2004.
12. GERSCHENKRON, A. (1962), « *Economic Backwardness in Historical Perspective: A Book of Essays* », Cambridge, Mass: Harward University Press.
13. GOLSMITH, R.W, (1969), « *Financial Structure and Development* », New Haven, Conn. : Yale University Press.
14. GRANGER, C.W.J. (1988), « Some Recents Developments in a Concept Causality », *Journal of Econometrics,vol* 39, pp 19-21.
15. GREENWOOD, J., JOVANOVIC, B., (1990), « Financial Development, Growth, and the Distribution of Income » *Journal of Political Economy*, vol 8 (5), pp 1076-1107.
16. GROSSMAN, F. J., STIGLITZ, J. E. (1995), « On the Impossibility of the Informationally Efficient Markets » American Economic Review, vol 70 (8), pp 393-408.
17. GURLEY., SHAW (1967), « Financial Aspects of Development », *American Review*, Vol.24 (45), pp 303-311.
18. KING, R. G. ET R. LEVINE, (1993), "Finance and Growth: Schumpeter Might be Right", *Quarterly Journal of Economics* Vol.108, pp 717-737.
19. LENSINK,R.,HERMES,N.,MURINDE,V.(1998),« Les Effets de la Libéralisation Financière sur la fuite des Capitaux dans les Economies Africaines » *World Development,* vol 23 no7, p1349-136.
20. LEVINE, R. (1997), "Financial Development and Economic Growth: View and Agenda", *Journal of Economic Literature*, vol 35, june, pp 686-726.
21. LOAYZA., LEVINE, R. (1999), « Financial Intermediation and Growth : Causality and Causes » World bank policy *Research working paper* vol 10 pp 20-59, the world bank, washington D. C.
22. LONDO, P.C. (2007), « Marchés Financiers et Croissance Economique : Impact des Bourses de la Zone Franc CFA sur la Croissance économique des PAZF à long terme », Mémoire de Master spécialisé. Institut des Sciences Economique de Benin.
23. MCKINNON, R. I. (1973), "*Money and Capital in Economic Development*", Washington DC, Brookings Institution.
24. OCDE(2006), «Régulation des Systèmes Financiers et Croissance», *Réforme Economique*.
25. PAGANO, M. (1993), "Financial Markets and Growth An overview", *European Economic Review, Vol* 37, pp 613-622.
26. PATRICK, H. (1966), "Financial Development and Economic Growth in Underdeveloped Countries", *Economic Development and Cultural Change Vol.* 14, pp174-189.
27. RÖMER, P. M. (1986), "Increasing Returns and Long-run Growth" *Journal of Political Economy* Vol.94, pp1002-1037.
28. ROUBINI, N. AND X. SALA-I-MARTIN (1992). "Financial Repression and Economic Growth", *Journal of Development Economics*,Vol 11 pp 39, 5-30.
29. SAINT-PAUL, G. (1992), "Technological Choice, Financial Markets and Economic Development, *European Economic Review*, Vol 36 (4), pp 763-781.
30. SCHUMPETER, J. (1912), "*The Theory of Economic Development*", Cambridge, MA: Harvard University Press.
31. SHARPE (1990), "Asymmetric Information, Bank Lending and Implicit Contracts: A stylized Model of costumer Relationships" *Journal of Finance*, vol 45, pp 1069-1087.
32. SHAW, E. (1973), « *Financial Deepening in Economic Development* », Oxford University press New York.
33. SPEARS, A. (1992), "The Role of financial intermediation in Economic Growth in Sub-Saharan Africa", *Canadian Journal of Development Studies*, Vol.13, pp 361-380.
34. STIGLITZ J. E., (1991), « The new development economics », *World development*, vol 48. 1986.

APPENDIX

Appendix 1 : RESULTS OF THE ESTIMATION OF THE TWO MODELS USING OLS

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

```
      Source |       SS       df       MS              Number of obs =
154
-------------+------------------------------           F( 10,   143) =   12.01
       Model |  7128.52732    10  712.852732           Prob > F      =  0.0000
    Residual |  8491.28328   143  59.3796034           R-squared     =  0.4564
-------------+------------------------------           Adj R-squared =  0.4184
       Total |  15619.8106   153  102.090265           Root MSE      =  7.7058

------------------------------------------------------------------------------
           g |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         inv |   .2383272   .0565548     4.21   0.000     .1265358    .3501186
        doms |  -.0218149    .049799    -0.44   0.662    -.1202523    .0766225
         tir |  -.0804083   .0478358    -1.68   0.095    -.1749649    .0141483
         tot |   -.032263    .014612    -2.21   0.029    -.0611463   -.0033796
         hum |    .029762   .0544514     0.55   0.586    -.0778716    .1373956
        open |    .022749   .0221465     1.03   0.306    -.0210278    .0665257
       m2pib |  -.4150299    .193041    -2.15   0.033    -.7966125   -.0334474
        priv |  -.1748138   .1113561    -1.57   0.119    -.3949305    .0453028
         inf |   .0244318   .0562553     0.43   0.665    -.0867676    .1356313
       detex |  -.0543211   .0133133    -4.08   0.000    -.0806375   -.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              Number of obs =     157
-------------+------------------------------           F(  6,   150) =    7.31
       Model |  7756.56232     6  1292.76039           Prob > F      =  0.0000
    Residual |  26530.4464   150  176.869642           R-squared     =  0.2262
-------------+------------------------------           Adj R-squared =  0.1953
       Total |  34287.0087   156  219.788517           Root MSE      =  13.299

------------------------------------------------------------------------------
      m2pib |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           g |   .2630223   .1302892     2.02   0.045     .0055832    .5204613
         tir |  -.0189434   .0810359    -0.23   0.815    -.1790626    .1411758
         inf |  -.0127896   .0964687    -0.13   0.895    -.2034026    .1778233
         def |  -.4365826   .1788199    -2.44   0.016    -.7899138   -.0832515
        open |  -.0770092   .0215035    -3.58   0.000     -.119498   -.0345203
       detex |  -.0717505    .019974    -3.59   0.000    -.1112172   -.0322839
       _cons |   34.21546   2.608655    13.12   0.000       29.061    39.36992
```

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

Table 3.1. : Estimation of model after correction of heteroscedasticity

```
FE (within) regression with AR(1) disturbances  Number of obs      =       148
Group variable (i): i                           Number of groups   =         6

R-sq:  within  = 0.3196                         Obs per group: min =        20
       between = 0.0889                                        avg =      24.7
       overall = 0.2110                                        max =        26
                                                F(10,132)          =      6.20
corr(u_i, Xb)  = -0.5230                        Prob > F           =    0.0000
------------------------------------------------------------------------------
           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   .0974922     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 |  -.3143691   .1431159    -2.20   0.030    -.5974665   -.0312716
         inf |   .0491597   .0573645     0.86   0.393     -.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 |  -.08864987
     sigma_u |   6.937531
     sigma_e |  7.7262259
     rho_fov |   .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

```
FE (within) regression with AR(1) disturbances  Number of obs      =       151
Group variable (i): i                           Number of groups   =         6

R-sq:  within  = 0.0648                         Obs per group: min =        21
       between = 0.2901                                        avg =      25.2
       overall = 0.1808                                        max =        26

                                                F(6,139)           =      1.60
corr(u_i, Xb)  = -0.5949                        Prob > F           =    0.1502

------------------------------------------------------------------------------
       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
-------------+----------------------------------------------------------------
```

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

Table 3.1. : Estimation of model after correction of heteroscedasticity

```
Linear regression                                       Number of obs =     154
                                                        F( 10,   143) =    4.65
                                                        Prob > F      =  0.0000
                                                        R-squared     =  0.4564
                                                        Root MSE      =  7.7058
------------------------------------------------------------------------------
             |               Robust
           g |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         inv |   .2383272   .0634472     3.76   0.000     .1129117    .3637428
        doms |  -.0218149   .0492114    -0.44   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   0.046     .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    -.0800518   -.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

```
Source |       SS       df       MS              Number of obs =     157
-------------+------------------------------      F(  6,   150) = 7188.36
       Model |  3606984.97     6  601164.161      Prob > F      =  0.0000
    Residual |  12544.5415   150  83.6302769      R-squared     =  0.9965
-------------+------------------------------      Adj R-squared =  0.9964
       Total |  3619529.51   156  23202.1122      Root MSE      =   9.145

------------------------------------------------------------------------------
          r2 |      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   .0137347    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*

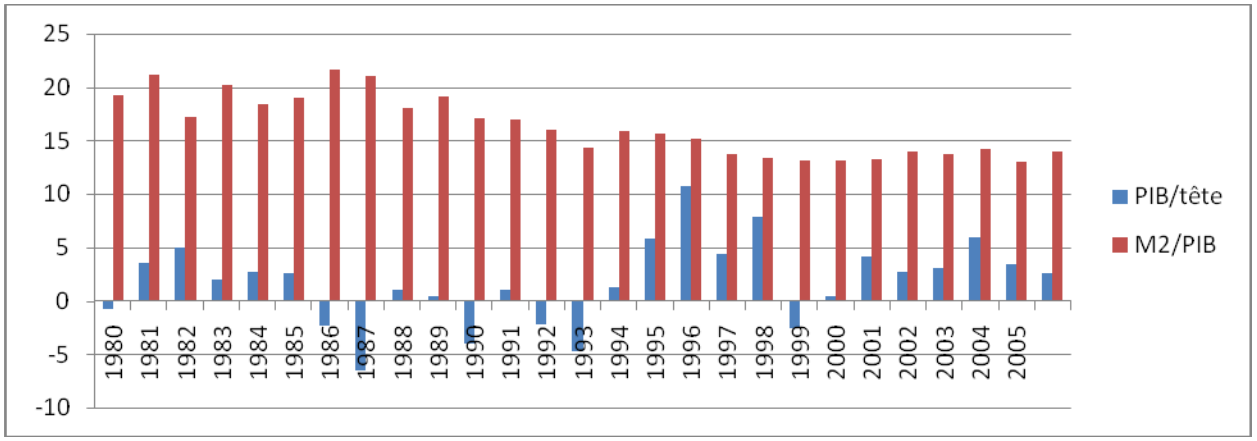
```
Cross-sectional time-series FGLS regression

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
------------------------------------------------------------------------------
       m2pib |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
           g |   .0059324   .0311586     1.19   0.151    -.0670021    .0551373
         tir |   .0226663    .013791[c]   1.64   0.100    -.0043637    .0496962
         inf |   .0029804   .0145994     0.20   0.838    -.0256339    .0315946
         def |  -.0412065   .0492044[b]  -1.84   0.040    -.1376454   -.0552323
        open |  -.0013735   .0150131     -0.09   0.927    -.0307986    .0280516
       detex |   .0042677   .0106126     0.40   0.688    -.0165327    .0250681
       _cons |    17.6651    1.727497[a]  10.23  0.000     14.27927    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
	156		
M2PIB does not Granger Cause G		1,77420143	0,17328107
G does not Granger Cause M2PIB		2,81198793	0,06336616