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Financial Development and Economic Growth: Case of Mali

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Abstract

This article examines the relationship between financial development and economic growth in Mali. The process by which financial development affects economic growth in Mali has been observed: first, by regressing a growth equation, and second, by Granger causality. To do this, the ordinary least squares method is used to estimate an error correction model over the period 1980-2015. The results obtained show that bank deposits and loans to the economy have a negative and significant effect on short-term economic growth. Moreover, the money supply has a negative and significant effect on economic growth in the short and long term. Moreover, public spending and trade openness have a positive and significant effect on economic growth, in the short and long term for the former and, in the long term for the latter. In addition, no Granger causal link was detected. A probable improvement lies in the continuation of the reforms, already undertaken by the CBWAS.

Keywords: Financial development; Economic growth; Bank.

1. Introduction

The financial system is a whole comprising economic agents, the market, instruments, institutions and infrastructures. It provides payment services, mobilizes savings and allocates credit. In addition, it plays a decisive role in the dissemination of the risks inherent in economic activities. On this level, it determines the price of these risks and allows them to be grouped and negotiated. The idea of financial system development dates back to Shumpeter (1935) and according to Levine (2005), "financial development can be defined as the process by which financial instruments, markets and intermediaries improve the processing of information. , the implementation of contracts and the completion of transactions, thus enabling the financial system to better perform its main functions ". The main function of financial intermediaries is to receive deposits which will be used to grant loans. However, the role of financial intermediaries changes with the level of development. The lending function performed by financial intermediaries is therefore important for the growth of developing countries. In the 1960s, the dominant monetary policy in developing countries was Keynesian in inspiration. McKinnon (1973) and Shaw (1973) were the pioneers in criticism of this policy, which both authors called "financial repression". This monetary policy prevented these economies from achieving an optimal rate of growth by fixing interest rates below their equilibrium value, by administratively orienting credit, by imposing high reserve requirements on banks and by limiting competition to the market. within the banking system. In order for the financial sector to develop and have a positive effect on economic growth, assuming that market mechanisms are optimal, McKinnon and Shaw advocated financial liberalization. Their theory had a significant impact since it was the inspiration for the financial reforms advocated by the World Bank (WB) and the International Monetary Fund (IMF). These financial reforms come following the financial crises of the 1980s which led to the failure of 30 out of 79 banks during the period 1980-1995 for all the countries of the West African Economic and Monetary Union (WAEMU) (Powo, 2000).

A continental country, Mali, with a total area of approximately 1,240,190 km2, is geographically surrounded by Algeria, Burkina Faso, Côte d'Ivoire, Guinea, Niger, Mauritania and Senegal. Climatic vagaries and isolation are constraints that the country must overcome if it is to meet the challenge of development. Previously a member of the issue area of the French West Africa Institute, which in 1959 became the Central Bank of West African States (CBWAS), Mali signatory to the Treaty establishing the West African Monetary Union (WAMU) withdrew in 1962 by creating its own Central Bank. Gradually reintegrating the franc zone, in 1968 and again in 1984, the country must now combine its monetary policies with the common policy of the WAEMU. From the start of independence until the mid-1980s, monetary policy was interventionist. The idea was to encourage domestic investors and direct resources to sectors considered to be priorities. However, the expected results of this monetary policy stance did not live up to expectations and even worse, it resulted in a crisis in the banking system. Although less affected by the crisis, Mali along with the other WAEMU countries, under the leadership of the CBWAS, have opted for financial

liberalization policies with a number of objectives. These objectives include: increasing the efficiency of the banking system, improving financial intermediation and promoting a developed financial system capable of facilitating the implementation of reforms while allowing consolidate the benefits. Since then, the progress made has been marked by the restructuring of the banking system and the liberalization of the financial market. Have these policies enabled Mali's financial sector to play a dynamic role in the process of economic growth?

The McKinnon and Shaw paradigm has given rise to much research and it seems to be accepted today that the development of financial intermediation has a positive and significant effect on economic growth. Although on the theoretical level, the positive relationship between financial development and economic growth does not suffer from any ambiguity, the failure of certain financial liberalization policies as well as the inconclusive nature of the results detected by applied studies call into question such a relationship. Indeed, while most empirical work concludes on the benefits of financial development (Beck *et al.*, 2000; Beck and Levine, 2004; Benhabib and Spiegel, 2000; Christopoulos and Tsionas, 2004; King and Levine, 1993a; Levine, 1998; Levine and Zervos, 1998; Levine *et al.*, 2000; Rousseau and Watchell, 2000), some studies suggest that the positive effect of financial development on economic growth may be less general than theorized (Andersen and Tarp, 2003; Ben and Ghazouani, 2007; Favara, 2003; Fernandez and Galetovic, 1994; Ram, 1999; Rousseau and Watchell, 2002). These studies show that the sign of this effect varies depending on the sample of countries considered (developed countries versus developing countries, emerging markets or least developed countries, etc.), the period of analysis used (period of stability financial or turbulence, 1990s or before, etc.), the category of financial development indicators used (indicators of size, activity or efficiency of the financial system) and many other variables.

This article attempts to validate certain conclusions of the literature on the link between financial development and economic growth. For Chouchane-Verdier (2004), "the financial liberalization policies undertaken in the 1980s have allowed neither financial deepening nor an increase in savings, investment and growth rates in sub-Saharan countries…….However, the existence of positive correlations between the real and financial variables proves that sub-Saharan Africa can promote its growth by adopting better adapted policies".Similarly, Raffinot and Venet (1998) in an article concluded: "It seems that financial deepening played a role in the real growth of a large majority of the WAEMU countries for the period 1970-1995. Unfortunately, the effect of financial variables seems to have been negative as soon as situations of deep financial distress developed." What is the effect of financial development on economic growth in Mali?

The purpose of this article, far from being a study of the determinants of economic growth in Mali, is to contribute modestly to understanding the link between the development of financial intermediation activities and economic growth. As such, the article focuses on three essential points. First, the choice to study a single country, to the detriment of a panel of countries, seems relevant given the specificities of each country. Second, although there is a wealth of literature on finance and economic growth, the direction of causation is still a matter of controversy. And finally, the role of banks as the primary recourse for businesses in a debt economy. The remainder of this article is organized into the following sections. The literature review is presented in section 2. The empirical analysis of the effect of financial development on economic growth is presented in section 3. Section 4 presents and interprets the results. Section 5 is reserved for the conclusion and implications of economic policies.

2. Literature Review

For many authors, the link between financial development and economic growth is linear and positive. However, it turned out that this first vision is not the rule empirically. A review of the main theoretical works which analyze the way in which the exercise of the functions of the financial system affects the rate of economic growth will be examined in a first subsection (1.1). Moreover, the existence of a controversy as to the direction of causality between the expansion of the financial system and economic growth will be examined in a second subsection (1.2). And finally, a third subsection (1.3) will be devoted to a review of the empirical literature on the effect of financial development on economic growth.

2.1. The Functions of the Financial System and Economic Growth

Some theorists suggest that the financial system, represented by banks, plays an important role in economic growth. It channels savings by collecting them from savers and ensures their allocation to investment projects. It transforms liquid assets into illiquid and productive assets. In the absence of financial intermediaries, the flow of funds between lenders and borrowers faces various obstacles:

- Conflicts between the liquidity needs of borrowers and those of lenders;
- Transaction costs (research of information on companies, managers, economic conditions, evaluation of this information, establishment and execution of contracts ...);
- Information asymmetries (and therefore risk of adverse selection and moral hazard).

According to Levine (2005), there are five functions of the financial system that militate in favor of economic growth. First, financial systems allow the generation of information on possible investments and the allocation of resources. The emergence of a financial system in an economy enables lower transaction costs, better execution of contracts and facilitates economic transactions and exchanges. Therefore, by improving information on companies, leaders and economic conditions, the financial system is able to better manage savings and investment and thus accelerate economic growth. Financial intermediaries are able to reduce the costs of acquiring and processing information, because the long-term relationship that they establish with firms effectively reduces information asymmetries and in return eases external financial constraints and improves performance capital allocation. The work of Albert and Semedo (1998) and the model of Greenwood and Jovanovic (1990), highlight the existence of

multiple equilibria. These authors show that financial intermediaries facilitate savings on information costs. Moreover, the models developed by King and Levine (1993b), Acemoglu *et al.* (2002) show the contribution of financial intermediaries in the production of information and innovation.

Second, financial systems allow the monitoring of investments and the control of the management of companies. The financial system exercises a control function of corporate governance (Bencivega and Smith, 1990) and thus avoids the problem of "adverse selection" which makes it difficult to fix a price equilibrium between supply and demand of financing (Stiglitz and Weiss, 1981). This control of corporate governance also avoids the problem of "moral hazard" which jeopardizes compliance with the terms of the financial contract. The increase in savings contributes to the growth of investments, the development of the financial system and the acceleration of economic growth. As a result, a developed financial system contributes to improving the quality and profitability of investments.

Third, financial systems enable financial trade facilitation, diversification and risk management. Improving the drafting of credit contracts, strengthening the means of executing these contracts and expanding the range of financial instruments allow portfolio diversification and reduce the impact of risks. Financial intermediaries, unlike individual agents, can decipher macroeconomic shocks in the economy through their large portfolios and choose the most appropriate technology projects. The traditional finance theory highlights the role of financial systems in promoting economic growth via their effect on cross-risk diversification. The risks faced by financial intermediaries are grouped into four categories: credit risk, price risk, liquidity risk and systemic risk. Acemoglu and Zilibotti (1997) Model the links between cross-sectional risk diversification and economic growth. They recognize the importance of the role of financial intermediaries in cross-cutting risk diversification for a regular allocation of funds to the most productive uses and stimulation of productivity growth.

Fourth, financial systems collect and make savings available to the economy. Through this process, they relieve savers of the associated problems (transaction costs, information asymmetries, savings control, etc.). The mobilization of savings by the financial system directly affects the allocation of resources and stimulates technological innovation through innovative and productive investment projects. Financial intermediaries attract savings through the reputation they acquire in their ability to grow these savings, in a context that is also regulated, and accompanied by various deposit guarantees, likely to reassure the saver. Also, financial markets and intermediaries promote capital accumulation by increasing the volume of available savings, facilitating the exploitation of economies of scale and improving control over the indivisibilities of investments. This function is at the heart of the first transmission channel to growth, noted by Pagano (1993), and directly affects the accumulation of capital, but also the availability of large volumes of savings likely to finance innovation.

And finally, fifth, the facilitation of trade in goods and services. Financial systems provide the means of payment necessary for national and international economic activity. In the absence of means of payment, economic actors resort to barter. This situation requires the double coincidence of the needs of the economic partners. The introduction of money into an economy results in specialization which reduces the cost of trade. Therefore, the financial system facilitates the exchange of goods and services by reducing the transaction costs and access to information associated with these exchanges. The link with growth passes through the interaction between the development of trade and specialization, productive efficiency and innovation. In a study, Greenwood and Smith (1997) model such connections. They develop a model in which the adoption of the most advanced (profitable) production technologies requires the use of specialized intermediate goods. The authors show that markets play an important role in promoting the specialization of economic activity, increasing productivity gains and stimulating growth.

2.2. Controversy of the Direction of Causality between Financial Development and Economic Growth

The direction of causality between financial development and economic growth is the subject of both theoretical and empirical controversy. Indeed, if financial development stimulates growth, the latter may lead to the development of financial systems. This thesis was supported by Robinson (1952) for whom economic development creates demand for a number of financial services provided automatically by the financial system. The financial sector therefore responds passively and simply to growth and cannot play a functional role in the process of economic development. Financial development is, in this context, only the result of growth: "where growth leads, finance follows", Robinson (1952). Patrick (1966) suggests, for his part, that the direction of causality between the real and financial spheres depends on the level of economic development of a nation. To do this, he distinguishes two stages in the process of economic development of a nation. In the first stage, the financial sector plays a driving role in economic development. It allows, thanks to the offer of financial services, a better channeling of savings (from "traditional" low-productivity sectors to more efficient "modern" sectors) for more accelerated economic growth ("supply leading" phenomenon). The author shows that as the economy grows, the financial system improves, becomes liquid and, as in (Gurley and Shaw, 1960), stimulates growth. It develops as a result of economic development and not the other way around. It does this passively, simply responding to the demand for new financial services that comes to it ("demand following" phenomenon).

Several theoretical models support the presence of cross interactions between financial development and growth (Berthélemy and Varoudakis, 1996; Boyd and Smith, 1996; Greenwood and Jovanovic, 1990; Greenwood and Smith, 1997; Saint-Paul, 1992). For example, Greenwood and Jovanovic (1990) develop an endogenous growth model from which they formally model such interactions. These authors demonstrate that, by collecting and analyzing information, financial intermediaries save information costs. They offer safe and high returns on financial

deposits and ensure an efficient allocation of financial resources, with favorable spillover effects on economic growth. The model reveals that during the early stages of a country's development process, economic growth is low and the financial structure is non-existent. However, as the level of income increases, financial intermediaries begin to emerge and expand. Their development increases the return on capital, improves its use and stimulates economic growth. At maturity, the development of the financial structure is reaching its maximum and economic growth is at its highest level.

2.3. Financial Development and Economic Growth: Empirical Studies

The empirical literature on the relationship between financial development and economic growth has grown considerably from the work of King and Levine (1993a). Although the first study establishing an empirical link between finance and growth dates back to Goldsmith (1969), the pioneering work of King and Levine (1993a) provided validation for the theoretical models of endogenous growth of Greenwood and Jovanovic (1990). Bencivega and Smith (1990), Saint-Paul (1992) and Pagano (1993). Consistent with theoretical predictions, most subsequent empirical studies conclude that there is a positive linear relationship between financial development and economic growth (Beck *et al.*, 2000; Beck and Levine, 2004; Benhabib and Spiegel, 2000; Christopoulos and Tsionas, 2004; Levine *et al.*, 2000; Rousseau and Watchell, 2002).

A certain number of authors nevertheless provide proofs contrary to this assertion and show that the relationship between the two variables is non-existent, even negative (Andersen and Tarp, 2003; Ben and Ghazouani, 2007; Favara, 2003; Fernandez and Galetovic, 1994). One of the arguments put forward is that financial instability linked to financial development would penalize growth and wipe out the favorable effects linked to financial development (Asongu *et al.*, 2017; Batuo *et al.*, 2018; Eggoh, 2010; Guillaumont-Jeanneney and Kpodar, 2004; Loayza and Rancière, 2002;2004). Another argument put forward is defended by certain economists who attribute to threshold effects the absence of a link between financial development and economic growth (Aghion *et al.*, 2004; Berthélemy and Varoudakis, 1996; De Gregorio and Guidotti, 1995; Deidda and Fattouh, 2002; Demetriades and Law, 2004; Gaytan and Rancière, 2004; Rioja and Valev, 2004a; Rousseau and Watchell, 2002).

Empirical studies on the relationship between financial development and economic growth can be classified into three groups depending on the nature of the data used: cross-sectional studies, panel data studies, and time series work.

The first studies(King and Levine, 1993a; Levine and Zervos, 1998) which analyze the relationship between financial development and economic growth are cross-sectional studies. These studies use data with only one individual dimension (country-specific dimension) and neglect any time dimension of these. On the basis of cross-sectional data relating to 80 countries between 1960 and 1989, King and Levine (1993a) use certain economic performance indicators (the growth rate of real GDP per capita, that of the stock of physical capital, that of productivity factor and the investment rate) and they also use indicators of financial intermediation development measures. The results of their estimates reveal the presence of a strong positive correlation between financial development indicators, on the one hand, and each of the economic performance indicators, on the other. To fully understand the causal relationship of finance to growth, and not the reverse relationship, the authors reproduce the same estimation exercise using the initial values (from 1960) of the financial development indicators. They show that financial development does not simply and passively follow economic activity, but also predict growth for the next thirty years. In another study, Levine and Zervos (1998) deepen the analysis to include indicators of stock market development and to examine which of the two sectors, banking and stock markets, contributes the most to promoting growth. Based on international samples covering 47 countries between 1976 and 1993, the authors show that the initial levels of stock market liquidity and banking development both show a significantly positive correlation with future growth in GDP, productivity and income. physical capital stock. Despite the importance of the results obtained by King and Levine (1993a) and Levine and Zervos (1998), this approach has been the subject of several criticisms. The main criticism concerns the not insignificant problem of the endogeneity of financial development. Indeed, even if the use of the initial values of financial development reduces the biases resulting from the reverse causality between finance and growth, this method does not allow the correction of the biases introduced by the omitted variables and the measurement errors. It is therefore insufficient to adequately address the endogeneity of financial development and risks leading to biased results.

Given the multitude of criticisms leveled at cross-sectional studies and the limitations they reveal, several authors (Beck *et al.*, 2000; Benhabib and Spiegel, 2000; Levine *et al.*, 2000) have had use of panel econometrics to analyze the relationship between financial development and economic growth. Such sophistication has many advantages, particularly in terms of taking into account the time dimension and correcting for estimation biases induced by unobserved country-specific effects. In addition, it substantially increases the variability of observations and the precision of estimates. On the other hand, at the level of cross-sectional regressions, unobserved country-specific effects are automatically included in the error term. They are therefore omitted from the analysis, leading to potentially biased estimates. On the contrary, the use of panel data makes it possible to control for unobserved country-specific characteristics (which can determine both financial development and long-term growth) and, consequently, reduce the estimation biases reported to them.

Based on a dynamic panel analysis, Levine *et al.* (2000) and Beck *et al.* (2000) show the existence of a positive and significant correlation between the development of financial intermediation and the growth of real GDP per capita. For a sample of 74 countries and 77 countries, respectively, between 1960 and 1995, these authors conclude that the effect of financial development on growth is through improved productivity. Using the same dynamic panel estimation techniques, Benhabib and Spiegel (2000) also looked at the decomposition of the relationship between

banking development and economic growth, for a sample of 92 countries between 1965 and 1985. They show that the transmission channel between these two variables differs depending on the financial development indicator used. Although they offer a multitude of advantages over cross-sectional studies, dynamic panel applications are subject to the same criticisms as those leveled at the latter. The main criticism concerns the homogeneity between countries of the empirical relationship tested.

Work on time series, which follows on from panel data, relaxes this restrictive hypothesis. They are also found to be particularly suitable when it comes to making predictions about the trajectory of the relationship between financial development and growth (Beck, 2008). Using a variety of time-series-specific estimation techniques, a large empirical time-series literature examines the link between financial development and economic growth. This literature is based on mainly annual data limited to one or a few countries. The diversity of the results of the chronological series analyzes confirms the heterogeneity between the countries of the link between financial development and growth. It highlights the interest in the use of time series and demonstrates the danger of cross-sectional studies as well as dynamic panel studies which do not reflect such a diversity of results. Time series work is particularly relevant when trying to estimate the direction of causality between financial development and economic growth. For example, Keho (2007), analyzes the effect of financial intermediation on economic growth in Côte d'Ivoire. The study shows that loans granted by banks to the private sector have a significantly negative influence on economic growth. Similarly, in a study on the contribution of bank financing to the process of economic growth in Mali, Soumare (2009), shows that bank credit has a significantly negative effect on growth and that deposits have a significantly positive effect on growth. the growth. Notwithstanding the importance of the advantages of time series work for studying the finance-growth link, they still have a number of limitations. According to Ang (2008), if the time series applications, which very often study the case of one or a few countries, are interesting in order to be able to draw implications in terms of economic policies, these are however specific and are only applicable 'in the only country (ies) studied. They are therefore not easily generalized, and cannot be applied to other countries (outside the sample studied).

Several studies on the link between financial development and economic growth have been carried out at the WAEMU level. In a study, Raffinot and Venet (1998) investigated the relationship between financial deepening and economic growth for seven (7) WAEMU countries. The relationship between growth and financial deepening has been analyzed on two levels: a dynamic panel analysis, on the one hand, and a Granger causality analysis on the other. The panel analysis leads to a rejection of any influence of financial deepening on GDP growth. Moreover, with regard to the causal relationship in the sense of Granger, the authors end up with a causal link ranging from financial deepening to economic growth in four countries, and a causal link ranging from economic growth to financial deepening for the other three countries. Another study that examines a simple relationship between finance and growth is that of Keho (2010). The author shows that financial development does not contribute to real growth in WAEMU countries. In order to extend his first study, Keho (2011) examines the role of the quality of institutions on financial development within WAEMU. The Pool Mean Group method is used to estimate a nonlinear dynamic panel model over the period 1984-2005. The results show that the quality of certain institutions conditions the level of deepening of the financial system and its ability to contribute significantly to economic growth. Also, the results show that institutional uncertainty and the public finance deficit are forcing banks to adopt unproductive financial practices, in particular by not making a firm commitment to the long term. These results are promising, although they are limited to the quality of the institutions and provide guidance for future research.

3. Empirical Analysis of Financial Development-Economic Growth
3.1. The Econometric Method

The ordinary least squares method (OLS) is a least squares method widely used to estimate the parameters of an equation whose random perturbation is homoscedastic and occurs in additive form. It consists in establishing a relationship between an explained variable Y and explanatory variables X.

The ordinary least squares estimator is the most widely used and has many uses. It is used, for example, to describe the data or to estimate a parameter whose causal direction is concerned: what do you get by varying a given variable by a determined amount? The OLS estimator is based on the central assumption that the explanatory variables and the error term are orthogonal.

3.2. Presentation of the Empirical Model

According to the economic literature, the relationship between financial development and economic growth can be analyzed through the following equation:

$$Y_t = \alpha_0 + \alpha_1 Z_t + \alpha_2 X_t + \epsilon_t \qquad (1)$$

With:

Y the growth rate of gross domestic product per capita;

Z the variable representative of financial development;

X the matrix of control variables;

ε the error term;

t the time index.

Before estimating the model, two preliminary tests must be done: the unit root test concerning the stationarity of the series and the cointegration test.

3.2.1. Stationarity Analysis

For the analysis of stationarity, reference is made to the Dickey Fuller Augmented (ADF) statistic. This statistic is defined in Eviews.

If ADF in absolute value is greater than or equal to the critical value (CV) in absolute value, we will say that the series is stationary. On the other hand, if ADF in absolute value is less than the critical value (CV) in absolute value, the series is not stationary and the process of stationary must continue. The tests are summarized in Table 1. The tests show that only two variables, growth rate of GDP per capita and inflation, are stationary in level, all the other variables are stationary in first differences. Therefore, the cointegration test will be done using the Johansen test.

Table-1. Unit root tests

Variables/Tests	Level tests		First difference tests	
	ADF	CV 5%	ADF	CV 5%
GDP growth rate per capita	-7.948313	-2.948404	-8.656545	-2.954021
Credits to the economy on GDP in Logarithm	-0.306582	-2.948404	-5.953570	-2.951125
Money supply over GDP in Logarithm	-0.629261	-2.948404	-5.465140	-2.951125
Bank deposits on GDP in Logarithm	-0.018601	-2.948404	-7.098360	-2.951125
Public expenditure on GDP in Logarithm	-2.467395	-2.948404	-6.872846	-2.951125
Inflation	-4.682084	-2.948404	-6.747706	-2.954021
Investments on GDP in Logarithm	-1.990781	-2.948404	-5.532693	-2.951125
Exports + Imports on GDP in Logarithm	-2.713358	-2.948404	-6.540260	-2.951125

3.2.2. Johansen Cointegration Test

The statistic is defined by the "Likehood Ratio (LR)" or the likelihood ratio in Eviews, If LR is less than the critical value (CV), it is concluded that there is no cointegration. On the other hand, if LR is greater than or equal to the critical value (CV), the conclusion leads to cointegration. The cointegration test is given in Table 2.

The maximum eigenvalue test indicates that there are two out of eight cointegration relations at the 5% threshold, six relations are non-cointegrated, Therefore, the specification of an error correction model (ECM), is more appropriate.

Table-2. Johansen cointegration test

Variables	Hypothesized No. Of CE(s)	Max-Eigen Statistic	0.05 Critical Value	Prob.
GDP growth rate per capita	None	60,55761	52,36261	0,0059
Credits to the economy on GDP in Logarithm	At most 1	50,37689	46,23142	0,0170
Money supply over GDP in Logarithm	At most 2	29,61115	40,07757	0,4497
Bank deposits on GDP in Logarithm	At most 3	25,08927	33,87687	0,3790
Public expenditure on GDP in Logarithm	At most 4	16,22018	27,58434	0,6471
Inflation	At most 5	14,32547	21,13162	0,3389
Investments on GDP in Logarithm	At most 6	8,760899	14,26460	0,3066
Exports + Imports on GDP in Logarithm	At most 7	0,031605	3,841466	0,8588

3.2.3. The Error Correction Model

Following the stationarity and cointegration analyzes, the error correction model (ECM) is written:

$$Y_t = \beta_0 + \beta_1 D(Z_t) + \beta_2 D(X_t) + \gamma_1 Y_{t-1} + \gamma_2 Z_{t-1} + \gamma_3 X_{t-1} + \mu_t \quad (2)$$

With:

D is the operator representing the first difference;

μ is the error term.

3.2.4. Causal Direction Financial Development - Economic Growth

Following the regression approach of the error correction model, the article seeks to establish an empirical link between financial development and economic growth based on statistical causality analysis. The most frequently used test is the Granger test. Causality "à la Granger" is different from causality in everyday language. Indeed, these tests highlight several scenarios: causality from one of the variables to the other, without the converse being true (unidirectional causality), causality in both directions (bidirectional) or no causality of the all.

The Granger causality test involves studying the relationship between the growth rate of gross domestic product per capita, its own past values and past values of one of the financial development variables (and vice versa). If the coefficients of the financial development variables are significant, we will say that financial development is a "cause" of real growth.

Formally, a Z variable causes a Y variable or vice versa, if and only if we have:

$$Z_t = \sum_{i=1}^{k} \alpha_i Z_{t-i} + \sum_{i=1}^{k} \beta_i Y_{t-i} \quad \text{and} \quad Y_t = \sum_{i=1}^{k} \alpha_i Y_{t-i} + \sum_{i=1}^{k} \beta_i Z_{t-i} \qquad (3)$$

3.3. Presentation of Variables and Data Analysis

The article focuses on Mali only and the data cover the period 1980-2015.

Three financial development indicators have been selected which are likely to be characteristic of debt economies. In other words, we consider that the financing of the economy is mainly done by the banks. The first indicator of financial development is the total of bank deposits (total sight deposits in banks + total term deposits in banks) in relation to GDP, noted MOBEP. This indicator makes it possible to assess the degree of mobilization of savings by banks. The second indicator of financial development is the ratio of money supply (M2) to GDP, denoted LIQUID. It measures financial depth or the overall size of the financial system. And the third indicator of financial development is the ratio between the amount of credits to the economy and the GDP, noted CREDECO. It measures the degree of intermediation of the economy. Excluding the public sector, this indicator highlights the proportion of resources devoted to private investment. These three variables come from the CBWAS database.

The variable economic growth refers to the increase in the production of goods and services in an economy over a given period. In practice, the indicator most used to measure it is the growth of the gross domestic product. This article chooses the growth rate of GDP per capita, assumed to be the variation in the level of wealth per capita within an economy and is denoted TXPIBHT. This variable comes from the CBWAS database.

The various control variables retained by the study appear as follows. The rate of public expenditure, measured by the ratio of total government expenditure to GDP. Here, the article seeks to highlight the role of the state in the accumulation and formation of public investments, often a source of growth. Moreover, economic theory postulates that the state can influence the productivity of private investment through public spending. The expected sign is positive. This variable comes from the CBWAS database.

The trade openness rate, also called the degree of openness, is measured by the sum of exports and imports over GDP, noted OUVCOM. Here, trade openness is defined as an observed state of the economy. But, the degree of openness does not clearly suggest that an outward orientation is associated with high standards of living. However, the expected sign of the ratio is positive. This variable comes from the CBWAS database.

The rate of inflation, measured by the relative change in the consumer price index, noted INFLA. The negative correlation between inflation and growth is often seen as an argument for macroeconomic stability. The literature suggests, however, that the link between inflation and growth is non-linear. At low levels of inflation, upward changes in inflation have only a negligible negative impact on growth rates. In contrast, at high levels of inflation (above 30-40% per year) stabilizing inflation leads to higher growth rates. The expected sign is negative. This variable comes from the CBWAS database,

The investment rate, measured by the ratio of gross fixed capital formation to GDP, denoted TXINVEST. In developing countries, where there is a strong need for capital goods, investment in fixed capital becomes a potential source of wealth creation. The expected sign is positive. This variable comes from the CBWAS database.

Once the variables are defined, we can now analyze our data. The descriptive statistics and the correlation table of the variables are presented in Tables 3 and 4, respectively.

Table-3. Descriptive statistics of the financial development variables and the growth rate of the product per capita.

Variables	Mean	Standard deviation	Minimum	Maximum	Observations
TXPIBHT	1.451443	4.886006	-8.843078	11.31776	36
CREDECO	11.91547	7.090768	4.376270	30.52904	36
LIQUID	17.78408	10.29313	5.407731	39.08413	36
MOBEP	11.78123	7.998727	3.230070	31.96978	36

Table 3 shows that the average economic growth rate per capita is 1.45%. Its minimum value is -8.84% while its maximum value is 11.32%. Regarding financial development indicators, the minimum value for credits to the economy over GDP is 4.38% while the maximum value of this ratio is 30.53%. The highest level of liquidity is recorded at 39.08% and the minimum value of the ratio is 5.41%. Finally, the highest value of bank deposits over GDP is 31.97% and the minimum value of this ratio is 3.23%.

Table-4. Correlation between variables

Correlation matrix	TXPIBHT	CREDECO	LIQUID	MOBEP	INFLA
TXPIBHT	1.000000	0.043045	0.084513	0.054390	-0.024265
CREDECO	0.043045	1.000000	0.967605	0.981611	-0.173253
LIQUID	0.084513	0.967605	1.000000	0.986756	-0.127581
MOBEP	0.054390	0.981611	0.986756	1.000000	-0.119028
INFLA	-0.024265	-0.173253	-0.127581	-0.119028	1.000000

For Table 4, two observations stand out. First, there is a positive correlation between the financial development variables and the growth rate of per capita GDP. There is also a positive correlation between the various financial development variables. Then, we notice a negative correlation between inflation and the various financial development variables as well as the growth rate of GDP per capita.

4. Presentation and Interpretation of the Results
4.1. Presentation of the Results

Equation 2, relating to the error correction model, tests the effect of each of the financial development indicators and control variables on the growth rate of GDP per capita. The results of the estimates, for the ratios of loans to the economy to GDP, money supply to GDP and bank deposits to GDP, are presented, respectively, in Tables 5, 6 and 7.

Table-5. Financial development and economic growth (Credits to the economy over GDP)

Variable	Coefficient	Std. Error	t-Statistic
C	-94.20943	46.29261	-2.035086
D(LCREDECO)	-13.08694	6.898728	-1.897007
D(LTXDEPUB)	7.221426	6.351857	1.136900
D(INFLA)	-0.174278	0.141526	-1.231419
D(LTXINVEST)	-8.087444	6.782547	-1.192390
D(LOUVCOM)	6.215996	9.789659	0.634955
TXPIBHT(-1)	-0.676387	0.166801	-4.055056
LCREDECO(-1)	-4.906546	3.123669	-1.570764
LTXDEPUB(-1)	8.640543	4.391742	1.967452
INFLA(-1)	0.047250	0.167894	0.281429
LTXINVEST(-1)	1.539031	6.215248	0.247622
LOUVCOM(-1)	19.06568	8.644695	2.205477
R-squared	0.579930		
F-statistic	2.886615		
Prob(F-statistic)	0.015427		

Dependent Variable: TXPIBHT
Method: Least Squares

Table-6. Financial development and economic growth (Money supply over GDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-87.73528	32.88297	-2.668107	0.0137
D(LLIQUID)	-22.19856	8.761600	-2.533620	0.0186
D(LTXDEPUB)	9.039320	6.193655	1.459448	0.1580
D(INFLA)	0.108592	0.138365	0.784827	0.4406
D(LTXINVEST)	-5.978878	5.749772	-1.039846	0.3092
D(LOUVCOM)	0.101295	8.149725	0.012429	0.9902
TXPIBHT(-1)	-0.588749	0.159449	-3.692399	0.0012
LLIQUID(-1)	-9.157335	4.493528	-2.037894	0.0532
LTXDEPUB(-1)	13.54147	5.984413	2.262790	0.0334
INFLA(-1)	0.164765	0.152870	1.077811	0.2923
LTXINVEST(-1)	0.560652	4.121129	0.136043	0.8930
LOUVCOM(-1)	18.32985	7.008937	2.615211	0.0155
R-squared	0.633129			
F-statistic	3.608395			

Dependent Variable: TXPIBHT
Method: Least Squares

Table-7. Financial development and economic growth (Bank deposits on GDP)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-92.50649	34.54154	-2.678123	0.0134
D(LMOBEP)	-28.02312	7.538275	-3.717444	0.0011
D(LTXDEPUB)	15.54360	6.336867	2.452884	0.0222
D(INFLA)	0.055168	0.112891	0.488684	0.6297
D(LTXINVEST)	-8.612158	5.678177	-1.516712	0.1430
D(LOUVCOM)	-4.702270	7.757957	-0.606122	0.5504
TXPIBHT(-1)	-0.515417	0.150337	-3.428404	0.0023
LMOBEP(-1)	-4.427091	4.002057	-1.106204	0.2801
LTXDEPUB(-1)	7.628132	6.155853	1.239167	0.2278
INFLA(-1)	0.061806	0.130019	0.475363	0.6390
LTXINVEST(-1)	5.597666	4.428582	1.263986	0.2189
LOUVCOM(-1)	16.39137	7.693223	2.130625	0.0440
R-squared	0.683911			
F-statistic	4.524030			
Prob(F-statistic)	0.001111			

Dependent Variable: TXPIBHT
Method: Least Squares

Equation 3 represents the Granger method of estimating causality between the growth rate of product per capita and each of the financial development indicators. The stationarity and cointegration tests of the series having already been carried out, it will be a question of successively relating the growth rate of the product per capita to the variable D (lcredeco), to the variable D (lliquid) and to the variable D (lmobep). The results are shown in Tables 8, 9 and 10.

Table-8. Causality at the granger (Product growth rate per capita - Credits to the economy over GDP)

Null Hypothesis:	Obs	F-Statistic	Prb
D(LCREDECO) does not Granger Cause TXPIBHT	33	0.12108	0.89
TXPIBHT does not Granger Cause D(LCREDECO)		0.27350	0.76

Table-9. Causality and granger

Null Hypothesis:	Obs	F-Statistic	Prb
D(LLIQUID) does not Granger Cause TXPIBHT	33	0.25890	0.77
TXPIBHT does not Granger Cause D(LLIQUID)		0.30677	0.74

Table-10. Causality and granger (product growth rate per capita – bank deposits on GDP)

Null Hypothesis:	Obs	F-Statistic	Prb
D(LMOBEP) does not Granger Cause TXPIBHT	33	0.12084	0.89
TXPIBHT does not Granger Cause D(LMOBEP)		0.65632	0.53

4.2. Interpretation of the Results
4.2.1. Econometric Interpretation of the Results
The specified error correction model (ECM) is correct. This is because each of the error correction coefficients in Tables 5, 6 and 7, respectively, is negative and significantly different from zero. For Table 5, the error correction coefficient is equal to -0.68 and it is significant at 1%. For Table 6, the error correction coefficient is equal to -0.59 and it is significant at 1%. Finally, for Table 7, the error correction coefficient is equal to -0.52 and it is significant at 1%.

On the other hand, the autocorrelation of the residuals was performed using the Breusch-Godfrey test. The Breusch-Godfrey test gives the following results. For the ratio of loans to the economy to GDP, the probability obtained from the Fisher statistic (0.40) is greater than the critical value of 5% and therefore a non-correlation of the residuals. For the money supply to GDP ratio, the probability obtained from the Fisher statistic (0.30) is greater than the critical value of 5% and therefore a non-correlation of the residuals. And finally, for the ratio of bank deposits to GDP, the probability obtained from the Fisher statistic (0.25) is greater than the critical value of 5% and therefore a non-correlation of the residuals. The estimates obtained by ordinary least squares on the ECM model are therefore "BLUE (Best linear unbiaised estimator)", that is to say that the estimators obtained are of minimal, linear and unbiased variances. The ECM model is globally significant with the probability of the Fisher statistic equal to 0.015, a value less than the critical value of 5%. In addition, for the three respective tables, the different variables explain the variations in the growth rate of GDP per capita at 58%, 63% and 68%, respectively for the ratios of loans to the economy on GDP, money supply on the GDP and bank deposits over GDP.

4.2.2. Economic Interpretation of the Results
The results from the estimation of equation 2, respectively, for the ratios of loans to the economy to GDP, money supply to GDP and bank deposits to GDP, show that financial development has a adverse effect on the

growth rate of product per capita in Mali. The allocation of loans to businesses, the mobilization of savings by banks and the liquidity that banks offer to depositors have a significantly negative contribution to the creation of wealth in Mali. Similar results are found by many previous studies, notably (Andersen and Tarp, 2003; Ben and Ghazouani, 2007; Favara, 2003; Fernandez and Galetovic, 1994; Rousseau and Watchell, 2000). More precisely, the results of Tables 5, 6 and 7 show, in the short term, that financial development, captured by the ratios of loans to the economy on GDP, of the money supply on the GDP and bank deposits on GDP, has a negative and significant effect on the growth rate of product per capita. This same result is verified in the long term when financial development is captured only by the ratio of money supply to GDP. In general, credit from banks to the private sector is expected to have a positive effect on investment and growth. This apparently absurd result could be explained mainly by the attitude of the banks, which until now have financed the least risky projects and therefore have low capital intensity. However, it is obvious that this hardly improves investment and even creates distortions within the national economy. Indeed, it appeared that investment is characterized by low and unstable overall efficiency in Africa. This problem of efficiency and instability of investment does not allow projects to have the expected returns and therefore to have a positive influence on economic growth. Likewise, the banks do not seem ready, with financial liberalization, to pass on the signals emitted by the CBWAS regarding the transformation of savings into longer or shorter employment. De Gregorio and Guidotti (1995) obtain a significantly negative effect between the ratio of loans to the private sector on GDP and economic growth for 12 Latin American countries. They show that the significant effect is even stronger for low-income countries. A similar result of negative significance between the ratio of loans to the economy to GDP and economic growth, is found by Keho (2007) for the Ivory Coast and Soumare (2009) for the case of Mali. Moreover, the reforms undertaken in 1989-1993 did not yield the expected results on the mobilization of domestic savings. Indeed, the remunerative rate of savings remains very low and agents are struggling to be banked. As savings are a prerequisite for any investment and in this case for the accumulation of productive capital, a weak mobilization of savings by banks has a negative effect on the rate of economic growth. In addition, it should be noted that following the devaluation of 1994, a significant excess of liquidity, that is to say, an excess of the money supply, was built up. Nowadays, it is possible that this surplus is not completely absorbed to allow the economy to have the optimal liquidity rate for the financing of investment projects.

The results also show a positive and significant effect of public spending on the growth rate of the product per capita, in the short and long term. In addition, trade openness has a positive and significant effect on the growth rate of the product per capita in the long run. These results could be explained by the reforms undertaken at the level of public finances and trade. In fact, Mali undertook major reforms in public spending during the 2000s. This is how the state has made enormous efforts in investing in human development and infrastructure. These expenditures are often cited in the economic literature as generating positive externalities and therefore acting positively on the growth rate of the economy. In the context of infrastructure, it must be said that the organization, in 2002, of the African Cup of Nations gave a serious boost to the many innovative projects and those already undertaken. In terms of trade, the country has opted in recent years for the liberalization of internal and external trade by relying on support measures and incentives likely to develop exports of goods and imports of capital goods and services. intermediate products. Malian exports are mainly focused on agro-food products, gold and cotton. As for imports, they are for the most part final consumption goods and at most a few capital goods.

As for the results from the estimation of equation 3, Tables 8, 9 and 10 retrace these different relationships. The results show that there is no Granger causal relationship of the financial development-economic growth link.

5. Conclusion and Implications of Economic Policies

This article examines the effect of financial development on economic growth in Mali. The method of investigation employed was the Ordinary Least Squares (OLS) estimator. The results, derived from the estimation of an error correction model, show that financial development has a significantly negative influence on economic growth, regardless of the financial development indicator used. The results also show a positive and significant effect, in the short and long term, of public spending on the growth rate of the product per capita, and a positive and significant effect of trade opening on the growth rate of the product per capita. Long term head.

As implications for economic policies, the country must pursue the development policy of its financial system, within a regional framework, with a view to increasing banking competition and increasing the supply of credit to the economy. In addition, to meet public expenditure, the country must increasingly develop internal resources such as mining, the production of various crops including cotton. To this is added good governance, ie an adequate policy capable of supporting the private sector through fiscal incentives and intellectual property protection measures. In addition, the country needs to increase the size of its market in the long term in order to benefit from lower unit production costs in the presence of economies of scale.

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