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Article

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West African Journal of Monetary and Economic Integration

Provided in Cooperation with:

West African Monetary Institute (WAMI), Accra

Suggested Citation: Diallo, Ibrahima; Mendy, Isatou (2017) : Impact of financial development on economic growth in the WAMZ: A heterogeneous panel data approach, West African Journal of Monetary and Economic Integration, ISSN 0855-594X, West African Monetary Institute (WAMI), Accra, Vol. 17, Iss. 1, pp. 1-18

This Version is available at:

<https://hdl.handle.net/10419/264242>

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IMPACT OF FINANCIAL DEVELOPMENT ON ECONOMIC GROWTH IN THE WAMZ: A HETEROGENEOUS PANEL DATA APPROACH

Ibrahima Diallo* & Isatou Mendy**

Abstract

This paper investigates the impact of financial development on economic growth in the West African Monetary Zone (WAMZ) from 1990 through 2015 using a Heterogeneous Panel Data Approach. The study made use of Two (2) financial indicators: liquid liabilities of the financial system as a percent of GDP and domestic credit to private sector as a percent of GDP. Economic growth is proxied by the real GDP per capita. Our results show that while liquid liabilities exerts long-run positive impact on economic growth in the WAMZ, the positive impact of domestic credit to private sector on economic growth is not in the long run. At country level, our findings indicate that most countries in the WAMZ could foster long run economic growth through changes in the size of financial institutions. Our findings suggest that structural reforms are needed in order to channel private credit to long run productive and growth-driving sectors.

JEL Classification: C33, G10, O11, O16.

Keywords: Economic growth, Finance, Panel Data, WAMZ.

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INTRODUCTION

At a first glance, the impact of finance on real activity seems “too obvious” (Miller, 1998) given the growing role and size of banks and other financial institutions in all regions of the world. While financial systems have indeed grown and their sizes increased considerably over the last decades, their impacts on real economic activities continue to take center stage of debates in the literature. There are different views from academic research regarding the nature, the level and the direction of the relationship between finance and economic growth. Proponents of the *supply-leading* approach, argue that there is a positive impact of finance on real activity. This group believes that a well-developed and efficient financial market would promote economic growth by offering financial services to investors to expand their businesses. In this regard, a well-functioning financial market can promote overall economic efficiency, create and expand liquidity, mobilize savings, enhance capital accumulation, transfer resources from traditional sectors to growth inducing sectors, and promote competent entrepreneurial response in these sectors of the economy (McKinnon, 1973; Shaw, 1973; Fry, 1978; Diaz-Alejandro, 1985; Moore, 1986). Thus, a developed financial system is the basis for growth whilst lack of developed financial infrastructure can hinder growth. Consequently, the focus of policy at each point in time should be, among other things, to ensure that the financial system operates efficiently such that the real sector will receive the necessary support (Nzotta and Okereke, 2009).

Demand-leading proponents on the other hand, theorized that it is real activity growth that leads to financial development. This group sees development in the financial sector as a result of an increase in the demand for financial services stemming from a growing real economy. This demand for services put pressure on the financial sector to respond by either expanding or coming up with innovative financial products thus expanding the sector (Robinson, 1952; Patrick, 1966; Ireland, 1994; Demetriades and Hussein, 1996; Darrat, 1999). Others, (Greenwood and Smith, 1997) argue for an existence of a bi-directional causality between finance and growth whilst (Anand Chandavarkar, 1992) identifies the absence of a relationship between finance and growth thus doubting the role of finance on economic growth.

Thus, the literature on the finance -growth nexus have reached different conclusions with some disagreements leaving each country/region to determine whether there exists any relationship between finance and growth and to what extent they matter to each other. The absence of a consensus in the literature combined with the recent developments in the financial system in WAMZ member countries necessitates our desire to investigate to what extent finance matters for the economic growth of the zone. In fact, financial development and economic integration have been seen as key in achieving the monetary union objective for the zone. Over the years, WAMI in collaboration with other sister sub-regional institutions (the ECOWAS² Commission and the West African Monetary Agency) have implemented financial development policies in the region, geared towards deepening the sector to bring about growth. Key achievements of WAMI over the last decade in the area of financial development and integration for the zone include harmonization of banking supervision procedures, the establishment of payment systems, and the establishment of the West African Capital Market Integration Council (WACMIC) for the integration of capital markets in the zone.

Therefore, it becomes imperative to analyze the role finance has played thus far for countries in the zone yearning to achieve better and sustainable standards of living through financial deepening and also advance policy recommendations to reaching that objective (King and Levine 1993a, 1993b, Levine 2004).

The study in consequence aims to contribute to the current debate on the finance-growth nexus by empirically investigating the impact of financial development on economic growth in the WAMZ. The

² *Economic Community of West African States*

paper therefore seeks to answer the questions with respect to whether financial development plays a significant role in the long run economic growth of WAMZ, determine the direction of the causality, and whether financial development should remain a key priority for the WAMZ in terms of long run economic growth?

The paper is structured into five parts. Following the introduction, section 2 reviews literature on the finance-economic growth nexus. The data and its measurement, model specification and estimation techniques are discussed in section 3. Section 4 provides the empirical results whilst the conclusion and policy recommendations are presented in section 5.

LITERATURE REVIEW

Theoretical Review

Results of studies assessing the linkage between finance and economic growth and their causality over a century ago reveal two main channels through which finance affects growth: capital accumulation and technological innovation (Levine, 1997; Pagano, 1993). To illustrate this, we use our theoretical framework by following the simple endogenous growth model developed by Pagano (1993) called the “AK” model where aggregate production Y is a linear function of capital stock K and total factor productivity A ³:

$$Y_t = AK_t \quad (1)$$

Pagano (1993) assumes that the economy produce a single good that it can either consume or invest. If invested, the gross investment at time t corresponds to:

$$I_t = K_{t+1} - (1 - \delta)K_t \quad (2)$$

Where δ being the rate of depreciation of the capital.

Then considering that a proportion $(1 - \varphi)$ is lost in the process of financial intermediation, the gross saving that satisfies the capital market equilibrium in a closed economy is given by:

$$\varphi S_t = I_t \quad (3)$$

The growth rate g at time $t + 1$ can be derived from (1) as follow:

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

Using equations (2) and (3) and denoting $s = S/Y$, the growth rate at the steady state is given by:

$$g = A \frac{I}{Y} - \delta = A\varphi s - \delta \quad (5)$$

Equation (5) explains how financial development can affect economic growth through its impact on the proportion of saving channeled to investment (φ), the productivity of capital (A) and finally the saving rate (s).

³ Pagano (1992) derived this model considering one of the two (2) underlying frameworks: (i) in the presence of a competitive economy with external sector (Romer, 1989), where each firm faces a technology with constant returns to scale but with the productivity being an increasing function of the aggregate capital stock K_t ; or (ii) in the case where K_t is a composite of physical and human capital (Lucas, 1988), both being reproducible with identical technologies. In both considerations, the aggregate output is given by (1)

The first channel through which financial development affects growth is its ability to improve the part of saving directed to investment. Pagano (2013) assumes that the fraction of saving that is not invested ($1 - \phi$) constitutes an inefficiency of the market as it corresponds to the rents earned by financial intermediaries and the tax revenue extracted from them that are both entirely spent on private and public consumption respectively. However, the development of banks and other financial intermediations is accompanied by the improvement of the inefficiency of the market resulting to the reduction of the rents through easing information, enforcement, and transactions costs in the economy (Levine, 2004), reducing liquidity risks (Bencivenga and Smith, 1991) and thus increasing the fraction that is directed to investment and growth.

The second channel in which finance affects economic growth is through channeling savings to more risky but high productive activities. Financial intermediaries, by using the large portfolios and information in their possession, allow investors to share risks as well as choose the most appropriate technology that can result to a higher productivity and ultimately to faster growth (Greenwood and Jovanovic, 1990; Bencivenga and Smith, 1991).

Another strand in the literature indicates that savings rate can also influence finance on growth. However, the direction of the impact of the savings rate remains ambiguous in the literature as it can fasten as well as lower growth. For instance, Pagano (1993) argues that intermediary institutions during financial repression and imperfect competition, can impose a larger margin of the interest rate spread by keeping the interest rate paid to savers to a lower level compared to a situation under perfect capital markets. As a result, the saving rate will decrease which in turn lowers investment and ultimately the growth rate (McKinnon, 1973; Shaw, 1973). In addition, the savings rate ambiguity is also featured in the risk sharing of endowment. Intermediary institutions like banks allow savers to share risks with them which can enhance the savings rate whilst the insurance market reduces the need of precautionary savings and so the savings rate by shoving the entire risks to the insured. Despite the fact that the savings rate may be ambiguous, it could affect growth positively by assuming a constant savings rate (Levine, 1991) or given the coefficient of the risk sharing of investors equals less than 1 (Saint Paul, 1992).

Empirical Review

Concerns regarding the impact of financial systems on the growth of the domestic economies in developed, emerging markets and developing countries continue to be raised over the last decades. The reason being that, finance is seen as one of the main channels of promoting growth and, at the same time a vehicle that can cause havoc to the financial system as evidenced in the 2007/2008 global financial crisis. Consequently, the literature on the finance -growth nexus has reached different conclusions with some disagreements stemming from the financial indicators used as proxies for financial development, based on each country or region, economic, political and legal peculiarities across space and time (Levine, 2003).

Arcand, Berkes and Panizza, (2012) using different empirical approaches examine whether there is a point beyond which financial deepening ceases to contribute to economic growth and they found that the relationship between financial depth and economic growth disappears for countries with massive financial sector. Their results show that credit to the private sector as a ratio of GDP above 80-100 percent negatively impacts on growth and this they attributed to economic volatility, potential resource misallocation and possible financial crisis due to excessive credit volume and growth.

Apergis, Filippidis, and Economidou (2007) assess the existence of a long run relationship between financial deepening and economic growth of 15 OECD and 50 non-OECD countries over the period

1975-2000. They use Pedroni panel cointegration techniques for a dynamic heterogeneous panel. The authors found evidence of the existence of a single long run equilibrium relation between financial deepening proxied by three indicators (liquid liabilities, bank credits to private sector and financial institutions credits to private sector) and economic growth. In addition, the result indicates that there is a bi-directional causality between finance and growth.

In **Emerging Markets**⁴, Blanco (2009), analyzes the finance – growth link in Latin America using Granger Causality tests and impulse response functions in a Panel VAR model over the period 1962 - 2005. The author uses three (3) financial indicators (private credit, liquid liabilities and bank deposits as a share of GDP) and three (3) control variables (government expenditures, openness and inflation). The study found that economic growth causes financial development but financial development does not cause economic growth in the region. However, when the sample is divided into two (2) sub-samples using different income levels and institutional quality, the results indicate the existence of two-way causality between finance and growth only for middle-income countries and countries with stronger rule of law and creditor rights.

Sisira, Colombage and Kalabi, (2012) investigate the Finance-Growth nexus using Panel VECM Analysis in some Asian countries. The authors analyzed both the short and long run relationship between real GDP, equity and corporate bonds outstanding and bank credit to the private sector for China, Indonesia, Philip, South Korea and Thailand between 1994 and 2009. The results reveal the existence of a stable relationship in the direction of economic growth to financial market development, consistent with the information asymmetry arguments for emerging markets.

Paresh Kumar Narayan and Seema Narayan (2013) examine the short-run relationship between the financial system and economic growth by using continental panels for 65 developing countries spanning from 1995-2011. Their results revealed that all the financial sector variables examined (market capitalization, stocks traded) except one (domestic credit) have statistically significant positive impact on economic growth. The study also found that the magnitude of the impact of inflation, gross fixed capital formation, and trade openness, and their statistical significance are broadly the same across the three models regardless of the estimator supporting the robustness of the effects of these variables on economic growth for countries in the panel.

In **West Africa**, Esso (2010) investigated the causal relationship between financial development and economic growth for the Economic Community of West African States (ECOWAS) region during the period 1960-2005 using an AR Lag test for non-causality. The author used credit to GDP as financial development indicator and found that finance causes economic growth in Ghana, Liberia and Mali; economic growth causes finance in Cote d'Ivoire and a bidirectional causality in Cape Verde and Sierra Leone.

Afawubo and Fromentin (2013) examine the interaction between financial development and economic growth in both the ECOWAS and the West African Economic and Monetary Union (WAEMU), a regional common currency bloc, using Panel Cointegration and Vector Error Correction Model (VECM) from 1960 through 2006. The authors use credit to private sector and liquid liabilities as the two financial variables. They found that both variables contribute to economic growth in WAEMU. In ECOWAS, however, only credit to private sector promote growth as liquid liabilities is negatively correlated to economic growth. The authors conclude that the use of common currency promotes financial stability and allow the same preference of demand for domestic credit to private sector whilst liquid liabilities in foreign currencies contribute to economic growth in the WAEMU.

⁴ Given the vast literature on the finance-growth relationship, we focus our literature review on the emerging markets and the African economies.

Agbélénko and Kibet (2015), using credit to private sector as a proxy for financial development, investigated the link between financial development and economic growth of WAEMU from the period 1980 to 2010. Their choice of econometric technique is informed by the General Moment Method (GMM). The study found a positive significant effect of financial development on growth in WAEMU economies. The results indicated bidirectional causation between financial development and economic growth for the bloc.

In the **WAMZ**, the empirical studies that have been done so far remain at the individual country level, principally in Nigeria and Ghana. In **Nigeria**, Jude Okechukwu and Cletus Chike Agu (2009) analyzed the relationship between finance and growth in Nigeria using a VECM and Pairwise Granger causality test over 1971 – 2008. They found that finance and economic growth have a stable long run relationship.

Nzotta and Okereke (2009) replicated Nnanna and Dogo's (1988) model in investigating financial deepening function in pre and post financial reform periods in Nigeria. The results indicated a weak financial deepening index in Nigeria which was attributed to swings rather than the expected robust positive index due to various financial reforms undertaken from 1986 in Nigeria. The low level of financial deepening index during the study period is attributed to the existence of weak and terminally distressed banks especially in the 1990s up to 2003. They, however, discovered that the explanatory variables had some statistical link with financial deepening in a sense that financial structures had enhanced the level of savings and thus correspondingly a positive level of financial deepening. In their conclusions, they opined that the financial system was not able to sustain an effective financial intermediation, especially in extending credit to the real economy.

Yakubu and Affoi (2013) use deposit money banks' credit to the private sector as a proxy to examine the impact of banks' lending to the growth of the Nigerian economy. In their model, they used a simple regression model in which they assumed in the null hypothesis that deposit money banks credit has no significant impact on the growth of the Nigerian economy and in the alternative hypothesis, the contrary was assumed. The authors' findings corroborate the expected relationship with a positive parameter for productivity, supporting thus, the hypothesis that efficient financial intermediation can boost growth.

Emecheta and Ibe (2014) showing that bank credit contributes to economic growth in Nigeria, used the reduced form of Vector Autoregressive (VAR) technique on a time series data spanning from 1960 to 2011 to analyze this effect. The study made use of two independent variables (financial indicator represented by bank credit to the private sector ratio and money supply ratio proxied for financial depth). Although, they found a strong positive relationship between bank credit and Gross Domestic Product (GDP), their Granger causality test show a unidirectional causality going from economic growth to financial development implying that it is economic growth that promotes financial development.

In **Ghana**, Adu, Marbuah, and Mensah (2013) study the long run growth effects of financial development. They found that financial development has a positive impact on economic growth when proxied by private sector credit to GDP or private sector credit as a ratio to total credit but fail to find any impact of finance on growth when proxied by broad money to GDP. The authors conclude that the effect of financial development is sensitive to the choice of proxies used.

Michael and Nkrumah (2013) analyze finance and growth relationship with evidence from Ghana during the period 1971 through 2010. Using three measures of financial development (domestic credit as a share of GDP, domestic credit to private sector as share of GDP and broad money as a share of GDP), they found that finance undermines economic growth in Ghana.

Abebrese, Pickson, and Diabah (2017) apply an ARDL and Granger causality test to examine the finance and growth relationship for Ghana over the period 1970-2013. They found that the amount of credit

from domestic sources to the private sector has a significant impact on growth while domestic deposits has not.

In **Sierra Leone**, Kargbo and Adamu (2009) analyze the relationship between financial development and economic growth over the period 1970-2008. The authors built a financial sector development index using the principal components method and the Autoregressive Distributive Lag (ARDL) approach for the estimation and found a positive impact of finance on economic growth in Sierra Leone.

MODEL SPECIFICATION, DATA AND ESTIMATION METHODOLOGY

Model Specification and Data

We assess the impact of financial development and long run economic growth linkage using the following specification:

$$Y_{it} = \alpha_i + \beta_i X_{it} + \gamma_i Z_{it} + \varepsilon_{it} \quad (6)$$

Where Y_{it} is real Gross Domestic Product (GDP) per capita (in logarithm), X_{it} representing a vector of financial development indicators, Z_{it} corresponding to the control variables, and ε_{it} the error term. Real GDP per capita (*lny*) is in USD and represents the proxy for economic growth. To measure financial development, we use two (2) indicators commonly used in the literature. The first indicator is liquid liabilities (*ll*) of the financial system or broad money as a percentage of GDP. Liquid liability is defined⁵ as currency plus demand deposits and interest-bearing liabilities of the financial institutions. It measures the size of the financial intermediation in a country. The second indicator is domestic credit to private sector as a percentage of GDP (*ps*) and refers to all financial resources provided to the private sector by financial corporations, such as loans, non-equity securities, trade credits, and other accounts receivable that establish a claim for repayment. We also include some control variables used in the literature (Beck, et al., 2000; Beck and Levine, 2004) such as trade as a percentage of GDP (*trade*) to capture the degree of openness of the economies, inflation (*inf*) and government expenditures (*gov*) as measures of macroeconomic stability (Loayza and Ranciere, 2006; Easterly and Rebelo, 1993) and gross capital formation (*capital*).

The panel is composed of the six WAMZ member countries, namely The Gambia, Ghana, Guinea, Liberia, Nigeria and Sierra Leone. Data are from the World Development Indicators, World Bank (March, 2017). Our sample size span from 1990-2015 due to data constraints for some of the WAMZ countries⁶.

ESTIMATION METHODOLOGY

Our methodology is based on the non-stationary panel cointegration technique developed by Pedroni (1999) for the cointegration tests and Pedroni (2001) for the estimation and inferences. These methods have several advantages compared to other traditional techniques. For instance, Pedroni's tests and estimation allow for complete endogeneity of the variables as well as both heterogeneous dynamics and heterogeneous cointegration vectors. More specifically, Pedroni (2001) adopts the *Group Mean method* which deals with heterogeneity dynamics issues in panel time series in contrast to the traditional *Pooling Method* which requires homogeneity of the estimators. Another advantage of Pedroni's approach is that it computes the results for the Panel as well as for each member of the panel.

⁵ The World Bank, WDI (2017)

⁶ For Guinea and Liberia, the longest series available for all the variables of the model start from 1990.

For the purpose of robustness, we run a second estimation using the Kao & Chiang (2000) Dynamic OLS (DOLS) technique which is also widely used in panel cointegration estimation and inference.

Finally, we investigate the causality relationship between financial development and economic growth using Granger causality test proposed by Dumitrescu & Hurlin (2012).

(i) Panel Unit Root Tests

We start by investigating the level of integration of the variables using traditional panel unit root tests from Levin, Lin and Chu (LLC, 2002), Im, Pesaran and Shin (IPS, 2003), and Maddala and Wu (MW, 1999). Using the three (3) unit root tests ensures the robustness of the level of integration for both within and between dimensions since LLC applies to a pooled *within dimension* test while IPS uses a group mean *between dimension* test. All the tests allow for heterogeneous dynamics and are parametric based tests analogous to the Augmented Dickey-Fuller (ADF) from the following regression:

$$\Delta y_{it} = \alpha_i + \rho_i y_{it-1} + \sum_{k=1}^p \varphi_{ik} \Delta y_{it-k} + \eta_{it} \quad (7)$$

Where y stands for each variable under consideration and the unknown p is chosen to ensure η_{it} to be white noise. Then the t-statistics are computed to compare to the critical values⁷ of a left tail of $N(0,1)$ distribution under:

$$H0: \rho_i = \rho = 0 \quad vs \quad H1: \rho_i = \rho < 0 \quad \text{for LLC}$$

$$H0: \rho_i = 0 \quad vs \quad H1: \rho_i < 0 \quad \text{for both IPS and MW}$$

(ii) Heterogeneous Panel Cointegration Tests

The cointegration analysis is applied to all I(1) variables in order to determine the existence of a long run relationship between the variables. We apply Pedroni (1999) who developed, under the null hypothesis of no-cointegration, four (4) *pool tests* and three (3) *mean tests* based on the residuals e_{it} collected from the following OLS regression:

$$Y_{it} = \alpha_i + \delta_i t + \beta_i X_{it} + e_{it} \quad (8)$$

The computation technique of these seven (7) tests are analogous to either Phillips-Perron (PP) or ADF statistics approaches.

(iii) Panel Cointegration Estimation and Inference Techniques

The model is then estimated using the *Group Mean Dynamic Ordinary Least Square* (DOLS) developed by Pedroni (2001) which is analogous to Stock and Watson (1993) approach⁸. This technique is based on the estimation of individual DOLS estimators that are corrected for endogeneity and serial correlation parametrically using leads and lags. As stated earlier, Pedroni approaches have powerful properties even in the presence of small sample sizes and allow heterogeneous cointegration slopes with straightforward

⁷ The critical values are -1.28 for 10 % and -1.64 for 5 %.

⁸ For robustness purpose, we also estimate the model using Kao and Chiang (2000).

interpretations. In fact, the *Group Mean Tests* have more useful properties since it estimates an average long run cointegration relationship compared to the *Pooled Within Tests* which estimates an average long run regression correlation (Pedroni, 2001).

The Pedroni panel estimation also computes the coefficient/slope (β_i) for each individual of the panel for a better understanding of the relationship between the variables of interests.

The first step is to estimate, for each member i , the individual DOLS estimator $\hat{\beta}_{D,i}^*$ and its corresponding t-statistics from the following regression:

$$y_{it} = \alpha_i + \beta_i X_{it} + \sum_{k=-K_i}^{K_i} \gamma_{ik} \Delta X_{it-k} + \mu_{it} \quad (9)$$

$$\text{to obtain: } \hat{\beta}_{D,i}^* = (\sum_{t=1}^T z_{it} z'_{it})^{-1} (\sum_{t=1}^T z_{it} \tilde{y}_{it}) \quad (10)$$

and the corresponding t-statistics for each member i as:

$$t_{\hat{\beta}_{D,i}^*} = (\hat{\beta}_{D,i}^* - \beta_{0,i}) (\hat{\sigma}_i^{-2} \sum_{t=1}^T (X_{it} - \bar{X}_i)^2)^{1/2} \quad (11)$$

$$\text{where: } \tilde{y}_{it} = y_{it} - \bar{y}_i \quad (12)$$

$$z_{it} = (X_{it} - \bar{X}_i, \Delta X_{it-k}, \dots, \dots, \Delta X_{it+k}) \quad (13)$$

$\beta_{0,i}$ is the value of the coefficient being tested under the null hypothesis and $\hat{\sigma}_i^2$ is the long run variance of DOLS regression residuals.

The next step is to compute the Group Mean DOLS estimator as follow:

$$\hat{\beta}_{GD}^* = N^{-1} \sum_{i=1}^N \hat{\beta}_{D,i}^* \quad (14)$$

$$\text{Which is equivalent to: } \hat{\beta}_{GD}^* = N^{-1} \sum_{i=1}^N (\sum_{t=1}^T z_{it} z'_{it})^{-1} (\sum_{t=1}^T z_{it} \tilde{y}_{it}) \quad (15)$$

And the Group Mean DOLS t-statistics as:

$$t_{\hat{\beta}_{GD}^*} = N^{-1} \sum_{i=1}^N t_{\hat{\beta}_{D,i}^*} \quad (16)$$

(iv) Panel Causality Test

The final approach we took to test the model involves the Panel Causality Test which investigates the causality between finance and growth in our panel. In this case, panel Granger causality test developed by Dumitrescu & Hurlin (2012) was used for the underlying regression:

$$y_{i,t} = \alpha_i + \sum_{k=1}^K \beta_{ik} y_{i,t-k} + \sum_{k=1}^K \gamma_{ik} x_{i,t-k} + \varepsilon_{i,t} \quad (17)$$

As in Granger (1969), the idea to determine the existence of causality is to test for significant effect of past values of x on the present values of y . The null hypothesis of the absence of causality is therefore defined as:

$$H_0: \gamma_{i1} = \dots = \gamma_{iK} = 0 \quad \forall i = 1, \dots, N \quad (18)$$

Dumitrescu & Hurlin (2012) propose to estimate the regression (17) and to perform Wald Tests of the K linear hypothesis $\gamma_{i1} = \dots = \gamma_{iK} = 0$ and finally compute \bar{W} as the average of the N individuals Wald statistics:

$$\bar{W} = N^{-1} \sum_{i=1}^N W_i \quad (19)$$

Where \bar{W} is the standard adjusted Wald statistic for individual observed T periods.

EMPIRICAL RESULTS

(i) Panel Unit Root Tests Results

Table 1 presents the results of the panel unit root tests of the variables in level and in first difference using *Levin, Lin and Chu* (LLC, 2002), *Im, Pesaran and Shin* (IPS, 2003), and *Maddala and Wu* (MW, 1999). The null hypothesis for all the three tests is that the variable contains unit root (i.e. not stationary).

Table 1: Panel Unit Tests Results

	LLC		IPS		MW	
	Levels	1 st Dif.	Levels	1 st Dif.	Levels	1 st Dif.
<i>ln(y)</i>	1.25	-3.01***	-0.48	-3.66***	1.15	-2.85***
<i>ll</i>	-0.20	-5.03***	-1.65	-5.67***	0.61	-4.86***
<i>ps</i>	1.34	-5.01***	-0.64	-5.84***	2.92	-4.03***
<i>gov</i>	-1.51	-9.15***	-1.34	-4.94***	-1.17	-4.47***
<i>capital</i>	-1.97**	-	-2.27**	-	-0.75	-5.43***
<i>inf</i>	-5.79***	-	-3.31***	-	-4.53***	-
<i>trade</i>	0.85	-3.35***	-2.84**	-	-0.09	-3.91***

Notes: ** and *** significant at 5 percent and 1 percent level respectively

Source: Authors calculation

The results from Table 1 indicate that we fail to reject the null hypothesis (H_0) in all the three (3) tests for the main variables of interest, *real GDP* and the two financial variables (*liquid liabilities and private sector credit*), at level whilst we reject H_0 at the first difference at one percent level. Similarly, the control variables (*Government expenditure* and *Trade*) present a unit root as we fail to reject H_0 at level indicating that they are stationary when taken in difference at 5 percent level. Finally, we reject the null hypothesis at level for the series *inflation* and *Gross capital formation* based on the tests meaning that they are stationary at level at 5 percent. We, in consequence, excluded these two variables from the panel cointegration tests and estimations.

The results from the panel unit root tests allow us therefore to infer that our variables under study are integrated of order (1) with the exception of inflation and gross capital formation.

(ii) Panel Cointegration Tests Results

The results of the panel cointegration tests using Pedroni (1999) are presented in Table 2.

Table 2: Pedroni Panel Cointegration Tests Results

Tests Statistics	<i>ll</i>	<i>ps</i>
<i>v</i> - panel	1.16	0.22
<i>rho</i> - panel	-1.81**	-0.48
<i>t</i> - panel	-2.02***	-0.58
<i>adf</i> - panel	-1.85**	0.26
<i>rho</i> - group	-0.90	0.58
<i>t</i> - group	-1.89**	-0.02
<i>adf</i> - group	-2.16***	1.71

Notes: ** and *** significant at 5 percent and 1 percent level, respectively

Source: Authors calculation

As mentioned above, Pedroni (1999) computes four (4) *pool tests* and three (3) *mean tests* under the null hypothesis of no-cointegration. The statistics from Table 2 indicate the rejection of the null hypothesis of no cointegration for the indicator variable *liquid liabilities* (in 5 out of the 7 statistics) and fail to reject the null hypothesis for the variable *domestic credit to private sector* (in all the 7 statistics), at 5 percent level. The results lead to the conclusion of the existence of cointegration between the level of liquidity in the financial system and economic growth whilst at the same time showing the absence of cointegration between private sector credit and economic growth. From the cointegration tests, it could be concluded that there exist a long run relationship between economic growth and financial development mainly from the level of liquidity in the system but not from total credit extended to the private sector. In other words, while the size of the financial sector matters for long run economic growth, the credit allocation to the private sector by the financial institutions does not. Consequently, we estimate the long run relationship between finance and growth using the variable liquid liabilities.

(iii) Panel Cointegration Estimation Results

Table 3: Panel Estimation Results

Country / Panel	<i>DOLS estimates</i>
Gambia - <i>ll</i>	0.005***(4.49)

Ghana - <i>ll</i>	0.081***(25.04)
Guinea - <i>ll</i>	-0.001 (-0.23)
Liberia - <i>ll</i>	-0.018***(-4.48)
Nigeria - <i>ll</i>	0.015*(1.18)
Sierra Leone - <i>ll</i>	0.027***(171.2)
Panel by Pedroni (2001)	
Panel – <i>ll</i>	0.018***(80.48)
Panel - <i>gov</i>	0.028***(48.45)
Panel - <i>trade</i>	-0.003***(-18.98)
Panel by Kao and Chiang (2000)	
Panel – <i>ll</i>	0.006*(1.79)
Panel – <i>gov</i>	0.074***(6.47)
Panel – <i>trade</i>	-0.005***(-6.30)

Notes: *, ** and *** significant at 10 percent, 5 percent and 1 percent level respectively. Numbers in parenthesis are T-Statistics

Source: Authors calculation

Table 3 reports the results of the cointegration estimation (by country and for the group) of real GDP per capita with liquid liabilities, and the two control variables, government expenditures and trade. The panel estimation from both Pedroni (2001) and Kao and Chiang (2000) uses the Dynamic OLS (DOLS) technique. The estimated coefficients of the financial indicator, that is, *liquid liabilities*, are all positive and statistically significant from both Pedroni (2001) and Kao and Chiang (2000) estimation techniques at 1 percent and 10 percent levels, respectively. The results indicate a positive long run relationship between finance and economic growth within the WAMZ. For instance, the results revealed that a 1 percent increase in the size of the financial system measured by *liquid liabilities* corresponds to a 1.8 percent (Pedroni 2001) and 0.6 percent (Kao and Chiang, 2000) increase in GDP per capita in the Zone.

In addition, the two control variables are also statistically significant. The estimated coefficient of *government expenditures* is positive implying that fiscal policy is positively linked to economic growth in the region. Finally, the estimation results further show a significant and negative coefficient for *trade* suggesting that trade undermines economic growth in WAMZ.

At country level, the results reveal closely the same outcome, that is, positive and statistically significant coefficients of the financial variable in four (4) countries (The Gambia, Ghana, Nigeria and Sierra Leone). For the remaining two (2) countries, we found a negative and statistically significant coefficient

for Liberia meaning that finance undermines economic growth in Liberia while it is not statistically significant for Guinea denoting the absence of linkage between finance and economic growth in Guinea.

(iv) Panel Causality Tests Results

The existence of long run positive relationship between finance and development in the WAMZ does not constitute a sufficient outcome of explaining the importance of finance for economic growth. In order to confirm that financial development exerts an impact on economic growth, we run a Granger causality test in line with Dumitrescu & Hurlin (2012) to determine the degree and direction of causality. Furthermore, despite the absence of cointegration between *credit to private sector* and *GDP growth* (indicating an absence of long term relationship), we also include the variable (*credit to private sector*) in the causality test given its possible relationship with real activity in the short and medium-term. The results are shown in Table 4.

Table 4: Panel Causality Tests

	Causality Tests	
	W-bar	
$\ln(y)$ does not Granger- cause ll	W-bar	1.69
	Z-bar	1.20 (0.2288)
	Z-bar tilde	0.88 (0.3783)
ll does not Granger- cause $\ln(y)$	W-bar	5.19***
	Z-bar	7.25***(0.0000)
	Z-bar tilde	6.02***(0.0000)
$\ln(y)$ does not Granger- cause ps	W-bar	1.2414
	Z-bar	0.42 (0.6759)
	Z-bar tilde	0.21 (0.8299)
ps does not Granger- cause $\ln(y)$	W-bar	2.97***
	Z-bar	3.41***(0.0006)
	Z-bar tilde	2.76***(0.0058)

Notes: *** significant at 1 percent level. Numbers in parenthesis are P-value

Source: Authors calculation

The above results in Table 4 indicate that we fail to reject the null hypothesis that economic growth ($\ln(y)$) does not cause both liquid liabilities (ll) and credit to private sector (ps) whilst we reject the reverse direction for all the three (3) statistics. This means that the relationship is uni-directional implying that financial development leads to economic growth in the WAMZ. In other words, the development of financial corporations in the zone has a positive long run impact on economic growth for the zone while credit to private sector only have a positive impact on economic growth but not in the long run.

CONCLUSION AND RECOMMENDATIONS

The main findings of this study clearly indicate that financial development has a long run impact on economic growth when measured by liquid liabilities (or broad money) whilst financial development measured by credit to private sector exerts no impact on economic growth in the long run for the WAMZ. The readings of the results signify that financial development contributes to the long run economic growth in the WAMZ through other channels other than credit to private sector. These channels could be the public sector's consumption and investments (claims on government from financial institutions) which might have a long run positive relationship with economic growth given that our findings show that fiscal policies (through government expenditures) are positively linked to economic growth. Despite the absence of long run relationship, we found that credit to private sector affects economic growth at least in the short run. A possible explanation for the absence of the long run impact of credit to private sector on economic growth in the region could be attributed to the structure of the credit. The financial market in the zone is dominated by transactions in the money market geared toward mainly the trade sector and whose maturity profile is short-term in nature. This does not augur well with growth driven investment projects since the average time to maturity of the loan portfolios does not commensurate with long term investment goals. Intra-trade within the ECOWAS sub-region is also very minimal due largely to trade barriers within the states. Despite all the ECOWAS protocols on free movement of goods and persons, the Inter-state Road Transport (ISRT), ECOWAS Trade Liberalization Scheme (ETLS) etc., trade among member states which is seen as a vehicle to regional integration and economic growth is still on the low side compared to the rest of the world. Furthermore, we also found that finance undermines economic growth in Liberia whilst there is no link between finance and growth in Guinea.

The main recommendations of this study are that (i) the WAMZ should continue to encourage the establishment of more sound financial institutions in order to increase the availability of financial products and services for a more positive long run impact on economic growth of the zone. This is particularly true for Liberia and Guinea if they want to reap the benefits of finance as a vehicle of growth for their economies. (ii) the zone should encourage the development and integration of capital markets among member states for easy access to finance for long-term economic growth. Studies have shown that stock and equity markets boost growth as evidenced in two of the WAMZ countries (Ghana and Nigeria) that have vibrant stock markets. Other WAMZ countries without capital markets should endeavour to develop and institutionalize capital markets in order to be on the same footing with the others in the zone. (iii) the WAMZ should also encourage extended credit profiles from the domestic money market to private sector by lengthening the tenure of credit into the medium-term. This credit should be geared toward productive and long run growth-driving sectors of the economy such as construction, manufacturing and processing, rather than to sectors such as distributive trade, (iii) there is also a need for structural reforms on the trade sector so that it becomes an engine of growth in the WAMZ, (iv) fiscal authorities should utilize resources from domestic financial institutions into public investments, given their positive impact on economic growth.

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