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Financial development and economic growth: evidence from West Africa

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Abstract

In this paper, we employ the Geweke (1982) decomposition method to examine the Granger causality between finance and growth in West Africa. Our sample contains twelve ECOWAS member countries (Economic Community of West African States) and we distinguish two subsamples: seven WAEMU countries which constitute an economic and monetary union (with the CFA Franc as their common currency) and five non-WAEMU countries. Data are from the World Bank (2008) and cover the period 1962-2006. The results show that:(1) finance leads economic growth in countries which have the common currency, (2) the reverse causation dominates in the other countries, (3) there is greater feedback between financial development and economic growth in countries sharing the common currency, (4) there is more instantaneous (contemporaneous) causality between finance and growth in WAEMU than in non-WAEMU countries suggesting that financial development affects growth and vice-versa in the short term in WAEMU countries. The first result can be explained by financial stability which suggests accelerating the process of creation of common currency for all West African countries. This paper highlights that the finance-growth nexus may vary across countries at similar stages of development and suggests that the existence of a stable monetary union may intensify the relationship between financial development and economic growth in developing countries.

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1 Introduction

The relationship between financial development and economic growth has been extensively studied in the economic literature both theoretically and empirically. A recent survey can be found in Levine (2003, 2005) and Ang (2008) . According to Patrick (1966) two possible directions of causality exist, the supply-leading and demand-following hypotheses. Under the first hypothesis the financial sector promotes economic development by supplying financial services which enhance the expansion of the real sector. Financial development[1] leads to an increase in the savings rate and consequently increases the resources available for financing investment. Financial development also results in efficient allocation of savings thereby enhancing the productivity of investment. Conversely, the demand-following hypothesis posits a causal relationship from economic growth to financial development whereby growth implies the demand of financial services which in turn stimulates the creation of financial intermediaries.

Patrick (1966) also proposes the stage of development hypothesis whereby financial development is first generated by capital accumulation at the existing stage of development. This engenders innovation and new financial services, opening up opportunities for investors and savers. Self-sustained economic growth ensues. The effect of finance on economic growth declines with time, and finally the expansion of the real sector generates new financial services needs requiring innovation in the financial sector to support this expansion.

However, some economists have found that finance has different effects on growth across countries, time periods and stages of development, see Demetriades and Hussein (1996), Rioja and Valev (2004), De Gregorio and Guidotti (1995) and Levine et al. (2000) .

Many finance-growth nexus studies have been made of developed countries and recently of emerging economies too, but few have looked to Africa, and especially West Africa. The existing studies suggest a causal relationship from finance to economic growth.

King and Levine (1993a, b) report that finance has positive effects on economic growth in developing countries. Studying the causal relationship between finance and growth in 13 sub-African countries, Ghirmay (2004) shows that the two sectors have a long-run relationship and suggests that they can accelerate their economic growth by improving the financial sector. Abu-Bader and Abu-Qarn (2008) argue that financial development Granger-caused economic growth in Egypt during the period 1960-2001. Allen and Ndikumana (2000) find the same result in the case of South African development community. Atindéhou et al. (2005) report a statistically weak causal relationship, between finance and growth in both causal directions, from finance to economic growth and from economic growth to finance, in the Economic Community of West African States (ECOWAS). The previous causality studies have failed to settle the issue

[1] Financial development refers to the process in which components of the financial sector (comprising banks, stock markets, other financial intermediaries and a central bank) become more efficient at providing financial services (e.g., the pooling of savings and information management), so transaction, enforcement and information costs decrease.

of dependence and simultaneous causal relationships.

In this paper, we use the Geweke (1982) decomposition test to support the existence of a causal relationship from financial development to economic growth among ECOWAS member countries. This approach allows us to test the degree of dependence, which states that linear dependence of causality between two time series, say x (financial development) and y (economic growth), can be measured as the sum of linear causality from x to y, linear causality from y to x and instantaneous linear causality between x and y. Geweke's directional feedback measures are an extension of Granger's (1969) definition of causality, but the instantaneous (or contemporaneous) component is specific to Geweke's technique.

In our knowledge this method has not been used in the African sub-region and it provides interesting new results about the finance and growth nexus. Firstly, we study linear causality but also instantaneous (or contemporaneous) causality and dependence, which has not been tested previously for these countries. Secondly, we conduct an empirical investigation in a monetary integration context by dividing the countries into two subsamples. Thirdly, we improve financial development proxy variables by taking into account domestic credit to the private sector and not only total domestic credit to economy.

The results point to bi-directional and instantaneous (or contemporaneous) causality between financial intermediation and growth in West African Economic and Monetary Union (WAEMU) countries. Moreover, financial development contributes more to the causal relationships in WAEMU member countries than in non-WAEMU countries. Theses results are new and have implications for development policy.

The rest of the paper is organized as follows. Section 2 briefly describes the economy of West Africa. In section 3, we present Geweke's (1982) measures of feedback and we discuss the main advantages of this technique over the standard Granger causality test. We present the data also. The econometric tests results are presented in section 4. Finally section 5 concludes and sets out the policy implications.

2 The economy of West Africa

The Economic Community of West African States (ECOWAS) includes all west African countries, except Mauritania. These countries are Benin, Burkina Faso, Cap Verde, Ivory coast, Ghana, Gambia, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo. ECOWAS was founded in May 1975 at Lagos in Nigeria as a regional economic community for the purpose of promoting economic integration in all fields of economic activity, particularly in industry, transports, telecommunications, energy, agriculture, natural resources, trade, monetary and financial matters, social and cultural issues, etc. Its goals are to fight against poverty, improve living standards, maintain and enhance economic stability, and promote peace among its member countries. To attain this goal, the organization has created the following institutions: an authority

of heads of state and government, a council of ministers, a community parliament, an economic and social council, a fund for cooperation compensation and development, a West African monetary agency. This later institution has been created for the establishment of a common currency for all ECOWAS members.

The financial systems in ECOWAS countries are dual systems, comprising a formal financial system and an informal financial sector. The formal financial sector comprises the Central Bank, the banking sector and non-banking (or other) financial institutions. Eight members countries of the West Africa Economic and Monetary Union (WAEMU), including Benin, Burkina Faso, Ivory Coast, Guinea Bissau, Mali, Niger, Senegal and Togo share a common Central Bank, "la Banque Centrale des Etats de l'Afrique de l'Ouest" (BCEAO), and a common currency, "le Franc de la Communauté Financière d'Afrique" (FCFA). Each of the non-WAEMU countries has its own Central Bank and currency. The banking sector in ECOWAS countries includes commercial, development, cooperative and savings banks, while other financial institutions include government statutory agencies, finance companies, leasing companies, insurance companies, etc. The financial system is dominated by commercial banks. ECOWAS has three stock exchanges: the Nigerian stock exchange, the Ghana stock exchange, and "la Bourse Régionale des Valeurs Mobilières" (BRVM) for WAEMU countries located in Abidjan (Ivory Coast).

3 Methodology and data

3.1 Geweke decomposition test

We say that a variable X Granger-causes the variable Y if the linear projection of Y_t, given its own past values $\{Y_{t-1}...\}$, is better performed using the X past values and Y past values rather than the Y past values alone.

Granger causality can be formally defined through the variance of projection errors. In the case of Granger causality between Y and X the following inequality holds (Granger 1969):

$$\sigma^2(Y/I) < \sigma^2(Y/I - X)$$

where $\sigma^2(Y/A)$ be the minimum mean square error from linear projection of Y given the information set A, and I is the set of information known at time $t-1$ while $I - X$ is the same information set after removing the information due to the X variable.

The method we employ differs from standard Granger test in that we compute measures of feedback that are invariant to linear transforms, along the lines of Geweke's 1982 work.

Feedback is an extended concept of causality: we have a feedback between two variables or vectors when causality runs in both directions.

Formally we have the following inequality, as stated in Granger (1969), definition 2:

$$\begin{aligned} \sigma^2(X/I) &< \sigma^2(X/I-Y) \\ \sigma^2(Y/I) &< \sigma^2(Y/I-X) \end{aligned}$$

One advantage of feedback analysis over a simple causality test is that we explicitly take into account the possibility of a simultaneous causality. In the simple Granger case we test only the null hypothesis of exogenous variable against the alternative of Granger-causality.

Geweke (1982) provides a simple technique for computing causality measures and for decomposing total feedback into three parts: a causality measure from Y to X, a causality measure from X to Y , and an instantaneous causality measure. Geweke (1982) also shows how to decompose his measures by frequency employing spectral analysis.

From a methodological point of view there is an important caveat to be mentioned about performing econometric causal analysis. A causal test allows researchers to take into account only few variables without caring too much about incorrect specification or missing variable bias. However, econometric causality does not specify any functional relation and is not true economic causality (see Heckman 2008).

Suppose that variable x causes z with one lag and that x also causes y with two lags. If we studied causality on variables z and y we would find that z Granger causes y. Of course, this would be a misleading result from a policy perspective because we cannot really influence y with the instrument z !

The link between economic and econometric causality changes insofar as the variables under study change; we return to this methodological point when discussing our data.

Let us consider time series that are stationary, purely non-deterministic and invertible to a moving average fundamental representation. Time series are told to be purely non-deterministic as the term $cov(y_{t+s}; y_t)$ tends to zero when time s is so big that the conditional expectation of y_{t+s} can be correctly approximated with its unconditional expectation.

Let us take two linear projections. The restricted form:

$$x_t = \sum_{s=1}^{\infty} a_{1s} x_{t-s} + u_{1t} \qquad E(u_{1t}) = 0 \quad \text{and} \quad Var(u_{1t}) = \Sigma_{u1} \qquad (1)$$

and the unrestricted version:

$$x_t = \sum_{s=1}^{\infty} a_{2s} x_{t-s} + \sum_{s=1}^{\infty} b_{2s} y_{t-s} + u_{2t} \quad E(u_{2t}) = 0 \quad \text{and} \quad Var(u_{2t}) = \Sigma_{u2}. \quad (2)$$

The value of Σ_{u1} measures the accuracy of the autoregressive prediction of x_t based on its previous values, whereas the value of Σ_{u2} represents the accuracy

of predicting the present value of x_t based on the previous values of both x_t and y_t.

The same can be done for the variable Y . The restricted form:

$$y_t = \sum_{s=1}^{\infty} c_{1s} y_{t-s} + v_{1t} \qquad E(v_{1t}) = 0 \quad \text{and} \qquad Var(v_{1t}) = \Sigma_{v1}. \tag{3}$$

and then the unrestricted version:

$$y_t = \sum_{s=1}^{\infty} c_{2s} y_{t-s} + \sum_{s=1}^{\infty} d_{2s} x_{t-s} + v_{2t} \quad E(v_{2t}) = 0 \quad \text{and} \quad Var(v_{2t}) = \Sigma_{v2}. \tag{4}$$

If we jointly consider equations (2) and (4), we obtain a VAR model: we construct a VAR from OLS separated estimation.

Geweke's measures for scalar series can be computed as follows:

$$F_{Y \to X} = ln[\Sigma_{u1}/\Sigma_{u2}]$$

and

$$F_{X \to Y} = ln[\Sigma_{v1}/\Sigma_{v2}]$$

The first equation measures causality from Y to X and the second measures causality in the opposite direction. These measures are zero if and only if Y fails to Granger cause X and X fails to Granger cause Y respectively. These would be equivalent to the null hypothesis $b_{2s} = 0$ and $d_{2s} = 0$ for all s. Whereas $F_{Y \to X} \succ 0$, and $F_{X \to Y} \succ 0$ when there is causal influence from Y to X and from X to Y respectively.

Instantaneous (or contemporaneous) causality measures can be computed in a similar way but the process include the present values:

$$x_t = \sum_{s=1}^{\infty} a_{3s} x_{t-s} + \sum_{s=0}^{\infty} b_{3s} y_{t-s} + u_{3t} \qquad E(u_{3t}) = 0 \ \text{ and } \ Var(u_{3t}) = \Sigma_{u3} \tag{5}$$

.

$$y_t = \sum_{s=1}^{\infty} c_{3s} y_{t-s} + \sum_{s=0}^{\infty} d_{3s} x_{t-s} + v_{3t} \qquad E(v_{3t}) = 0 \ \text{ and } \ Var(v_{3t}) = \Sigma_{v3}. \tag{6}$$

We get two measures of instantaneous (or contemporaneous) causality, which Geweke proves to be perfectly equal to one another (see Geweke, 1982, Theo 1 p. 307)

$$F_{XY} = \ln(\Sigma_{u2}/\Sigma_{u3}) = \ln(\Sigma_{v2}/\Sigma_{v3})$$

$F_{XY} = 0$ mean that there is no contemporaneous association between the series.

Some mathematical properties of Geweke's measures need to be mentioned. The measures are positive (or equal to zero): the numerator is always larger than the denominator because increasing the number of regressors, reduces the variance of errors. Geweke's measures do not change if we linearly transform the data. The measure of feedback is simply the sum of the three causality measures described above:

$$F_{X,Y} = F_{Y \to X} + F_{X \to Y} + F_{X.Y}$$

In other words, we decomposed feedback in two components of simple causality and one of instantaneous causality.

In summary, linear dependence $F_{X,Y}$ is the sum of the two causality directions and the instantaneous causality. If it is zero then the variables X and Y are independent.

3.2 The data

The sample consists of a set of 12 countries for which we have proxy variables of financial development and economic growth over the period 1962-2006. The ECOWAS member countries are divided in two groups: a first group of seven countries sharing a common currency WAEMU[2], and a second group of five non-WAEMU countries with no common currency. This will allow us to identify any effect of monetary union on economic development. The data consists of measures of financial development indicators and economic development. Financial development is usually measured by the quantitative and qualitative improvement in the services, provided by the financial sector. We employ four commonly used variables to evaluate financial development: domestic credit to all economic sectors, domestic credit to the private sector, the ratio of banks' liquid reserves to assets, and liquid liabilities. The data are from the World Bank's the World development indicators (2008). The financial variables are defined as follows:

(i) Domestic Credit to GDP (DC as a percentage of GDP) includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The banking sector includes monetary authorities, deposit banks and other financial institutions.

(ii) Domestic Credit to Private Sector to GDP (DCPS as a percentage of GDP) refers to financial resources provided to the private sector, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable, that establish a claim for repayment.

(iii) Bank Liquid Reserves to bank assets (BLR as a percentage of bank assets): the ratio of bank liquid reserves to bank assets is the ratio of domes-

[2] WAEMU: Benin, Burkina Faso, Ivory Coast, Mali, Niger, Senegal, Togo.
Non-WAEMU ECOWAS countries: Gambia, Ghana, Liberia, Nigeria, Sierra Leone.

tic currency holdings and deposits with the monetary authorities to claims on other governments, nonfinancial public enterprises, the private sector, and other banking institutions.

(iv) Liquid liabilities to GDP (LL,as a percentage of GDP) are also known as broad money, or M3. It measures the overall level of the financial intermediation development.

Following King and Levine (1993*a*) and Demetriades and Hussein (1996) our measure of economic development is the real per capita GDP taken from the same source.

All the variables in our data set are transformed into natural logarithms. They are also first differentiated to stationarize them. The augmented Dickey-Fuller test (1979) was used for unit root tests. The number of lags in equations is determined using the Schwarz criterion. The results of the Geweke measure of linear dependence between financial development and economic growth are presented below.

4 Results

The following tables present Geweke measure of linear dependence between financial development and economic growth in ECOWAS countries. The first table covers WAEMU member countries and the second table non-WAEMU countries.

Table1. Geweke measure of linear dependence between financial development and economic growth in WAEMU countries.

Observation period :1962-2006 (y represents per capita GDP growth rate).

Test	Benin	Burkina F	Ivory C.	Mali	Niger	Senegal	Togo
			Financial indicator: domestic credit (dc)				
$F_{dc\rightarrow y}$	14.33^{***}	8.17^{***}	92.51^{***}	3.56^{**}	16.13^{***}	3.87^{***}	10.91^{***}
$F_{y\rightarrow dc}$	0.45	0.63	0.96	1.47	0.005	4.65^{**}	29.12^{***}
$F_{dc.y}$	85.22	91.2	7.53	94.97	83.86	91.48^{*}	59.97^{**}
$F_{dc,y}$	100^{***}	100^{***}	100^{***}	100^{***}	100^{***}	100^{***}	100^{***}
			Financial indicator: domestic credit to private sector ($dcps$)				
$F_{dcps\rightarrow y}$	39.93^{***}	48.27^{***}	58.27^{***}	4.84^{**}	86.07^{***}	3.54^{*}	35.49^{***}
$F_{y\rightarrow dcps}$	47.55^{***}	24.34^{***}	16.82^{***}	0.77	0.98	7.17^{**}	1.12
$F_{dcps.y}$	12.48^{**}	27.39^{**}	24.91^{**}	94.39	12.95	89.29^{*}	63.39
$F_{dcps,y}$	$(100)^{***}$	100^{***}	100^{***}	100^{***}	100^{***}	100^{***}	100^{***}
			Financial indicator: liquid liabilities (ll)				
$F_{ll\rightarrow y}$	4.24^{**}	1.10	39.55^{***}	39.55^{***}	33.52^{***}	61.57^{***}	0.001
$F_{y\rightarrow ll}$	57.92^{***}	0.39	45.55^{***}	1.43	0.37	2.72	0.002
$F_{ll.y}$	37.84^{**}	98.51	14.9^{**}	59.02	66.11	35.71	99.99
$F_{ll,y}$	100^{***}	100^{***}	100^{***}	100^{***}	100^{***}	100^{***}	100^{***}
			Financial indicator bank liquid reserves (blr)				
$F_{blr\rightarrow y}$	79.27^{***}	0.07	4.37^{***}	0.20	0.10	0.40	6.69^{***}
$F_{y\rightarrow blr}$	0.41	71.94^{***}	0.05	0.06	2.56	0.01	0.36
$F_{blr.y}$	20.32	27.99	95.58	99.74	97.34	99.59	92.95
$F_{y,blr}$	100^{***}	100^{***}	100^{***}	100^{***}	100^{***}	100^{***}	100^{***}

Notes: The null hypothesis is the absence of causality. This would be equivalent to the null hypothesis that the Geweke's measure is equal to zero. $F_{x\rightarrow y}$ is Granger causality from x to y. $F_{y\rightarrow x}$ is Granger causality from y to x. $F_{x.y}$ is contemporaneous (or instantaneous) causality between x and y. $F_{x,y}$ is the total measure of linear dependence between the two series (x represents the financial indicator and y the per capita GDP growth rate). Numbers are F-tests values. *, ** and *** indicate 10%, 5%, and 1% significance levels, respectively.

Table2. Geweke measure of linear dependence between financial development and economic growth in non-WAEMU countries.

Observation period :1962-2006 (y represents per capita GDP growth rate)

Test	Gambia	Ghana	Liberia	Nigeria	Sierra Leone
Financial indicator: domestic credit (dc)					
$F_{dc\rightarrow y}$	1.35	0.10	0.16	1.69	0.001
$F_{y\rightarrow dc}$	5.26^{**}	9.06^{***}	2.97^{*}	8.25^{***}	0.04
$F_{dc.y}$	73.65	90.84	96.87	90.06	99.95
$(F_{dc,y})$	100^{***}	100^{***}	100^{***}	100^{***}	100
Financial indicator: domestic credit to private sector ($dcps$)					
$F_{dcps\rightarrow y}$	1.21	0.85	0.84	0.69	0.27
$F_{y\rightarrow dcps}$	88.04^{***}	6.06^{***}	20.38^{***}	6.04^{***}	0.77
$F_{dcps.y}$	10.39	93.09	78.78	93.27	98.96
$(F_{dcps,y})$	100^{***}	100^{***}	100^{***}	100^{***}	100
Financial indicator: liquid liabilities (ll)					
$F_{ll\rightarrow y}$	4.14^{**}	0.12	1.66	3.55^{*}	0.003
$F_{y\rightarrow ll}$	0.39	7.30^{***}	7.82^{***}	3.05^{**}	0.99
$F_{ll.y}$	95.47	92.58	90.52	93.4^{*}	99.007
$(F_{ll,y})$	100^{***}	100^{***}	100^{***}	100^{***}	100
Financial indicator: bank liquid reserves (blr)					
$F_{blr\rightarrow y}$	37.35^{***}	0.01	0.32	1.24	0.02
$F_{y\rightarrow blr}$	0.71	0.43	21.57^{***}	1.53	0.06
$F_{blr.y}$	61.94	99.56	78.11	97.23	99.92
$(F_{blr,y})$	100^{***}	100^{***}	100^{***}	100^{***}	100

Notes: The null hypothesis is the absence of causality. This would be equivalent to the null hypothesis that the Geweke's measure is equal to zero. $F_{x\rightarrow y}$ is Granger causality from x to y. $F_{y\rightarrow x}$ is Granger causality from y to x. $F_{x.y}$ is contemporaneous (or instantaneous) causality between x and y. $F_{x,y}$ is the total measure of linear dependence between the two series (x represents the financial indicator and y the per capita GDP growth rate). Numbers are F-tests values. *, ** and *** indicate 10%, 5%, and 1% significance levels, respectively.

The results (see tables 1 and 2) show that financial development leads economic growth in all WAEMU countries while the reverse causal relationship occurs in the non-WAEMU countries.

More exactly, for WAEMU countries, domestic credit (dc) Granger-causes economic growth in Benin, Burkina, Ivory Coast, Niger, Senegal and Togo at 1% significance level and in Mali at 5% significance level. Domestic credit to the private sector (dcps) leads economic growth in Benin, Burkina, Ivory Coast,

Niger and Togo at 1% significance level, and in Mali and Senegal at 5% and 10% significance levels, respectively. Liquid liabilities (ll) promote growth in Benin at 5% significance level, and in Ivory Coast, Mali, Niger and Senegal at 1% significance level. Finally, bank liquid reserves leads to growth in Benin, Ivory Coast, Togo at 1% significance level. The results (Table 1) also show that economic growth Granger-causes financial development in some cases. It causes domestic credit in Senegal and Togo at 5% and 1% levels of significance, respectively. Domestic credit to the private sector is Granger-caused by economic growth in Benin, Burkina and Ivory Coast at 1% significance level and in Senegal and Togo at 5% level of significance. Liquid liabilities are also promoted by growth in Benin and Ivory Coast at 1% significance level. Finally, economic growth leads to bank liquid reserves in Burkina at 1% level of significance. These relationships indicate that there are many cases of feedback between growth and finance in the WAEMU area except in Mali and Niger In the other WAEMU countries there is feedback between economic growth and at least one of the financial development variable proxies. From these results, we observe the presence of instantaneous causality between growth and finance in countries where there is feedback. The results in (table 1) indicate the existence of instantaneous (or contemporaneous) causality between domestic credit and growth in Senegal and Togo, domestic credit to the private sector and growth in Benin, Burkina, Ivory Coast, and Senegal, liquid liabilities and growth in Benin, and Ivory coast. It can be pointed out that financial development has direct effects on the real sector in the short run in WAEMU countries while it takes more time to impact economic growth when there is no instantaneous causality as in Mali and Niger, and vice versa from economic growth to the financial sector.

In the non-WAEMU countries, domestic credit and domestic credit to the private sector do not Granger-cause economic growth. Liquid liabilities promote growth in Gambia and Nigeria at 5% and 10% significance levels, respectively. Bank liquid reserves lead to growth only in Gambia at 1% level of significance. Conversely, economic growth leads to domestic credit in Gambia at 5% level of significance, Ghana and Nigeria at 1% significance level and in Liberia (10%). Domestic credit to the private sector is Granger-caused by growth at 1% significance level in all non-WAEMU countries, except in Sierra Leone. Liquid liabilities follow economic growth in Ghana and Liberia at 1% significance level and in Nigeria at 5% level of significance. Finally, growth leads bank liquid reserves in Liberia alone, at 1% significance level. We observe that there is not, statistically, a causal relationship between finance and growth in Sierra Leone. We find evidence of feedback between finance and growth in non-WAEMU countries only in Nigeria between liquid liabilities and GDP per capita growth rate. This country is the single case of instantaneous causality These results highlight that the finance-growth relationship may vary across countries having the same economic development level. The key role of finance in the process of economic growth in WAEMU can be explained by the stability of the financial system in these countries due to the exchange rate regime. The non-WAEMU countries is characterized with high inflation rates. For example, in 1999 the inflation rate

was 26% in Sierra Leone, in 2006 the inflation rate was 18% in Nigeria, and 15% in Ghana but only 2% in Ivory coast and Senegal. Huybens and Smith (1999) and Boyd et al.(2001) have shown that high inflation rates have a direct and negative impact on financial sector performance. As mentioned by Boyd et al.(2001):

- At low-to-moderate rates of inflation, there is a strong negative relationship between inflation and (a) lending by the financial sector to the private sector, (b) the quantity of bank assets and (c) the volume of liabilities issued by banks.

- The relationship between inflation rates and financial sector performance is not linear, perhaps due to threshold inflation rates As inflation rates rise, financial sector performance falls, but the marginal impact of additional inflation on the financial sector diminishes rapidly. In their study, Boyd et al. (2001) find that once the rate of inflation exceeds 15% per year, financial sector drops precipitously, but at the same time, the partial correlation between inflation and the measure of intermediary and equity market activity essentially disappears.

As explained above, high inflation rates in these countries reduce financial sector performance and then economic growth leads this sector through raw materials exports. Moreover, non-WAEMU countries inflation rates are more volatile due to their flexible exchange rates.

The results also indicate that we have more instantaneous (or contemporaneous) causality between finance and economic growth in WAEMU countries: between domestic credit and growth in Senegal and Togo, domestic credit to private sector and growth in Benin, Burkina Senegal and Togo, liquid liabilities and growth in Benin, Ivory coast and Nigeria. The instantaneous (contemporaneous) causality indicates the extent of simultaneous finance and economic growth interactions that cannot be disentangled. This result can be interpret as the financial factor having direct effects on the real sector and vice-versa in WAEMU countries in the short run.

5 Conclusion and policy implications

This paper has investigated empirically the causal relationship between finance and growth in West Africa using the Geweke decomposition method. Our sample contains twelve countries: seven of them form a monetary union (WAEMU countries) while each of the other five countries has its own currency. Overall, the results show that finance is a leading sector in WAEMU countries, while economic growth promotes financial development in the non-WAEMU countries. We have also found bidirectional causation between finance and growth in some cases. The paper highlights that results vary from financial proxy variables. However, the two most important proxies for financial development, credit to the economy and credit to the private sector, are strongly linked to economic growth. Therefore the role of the domestic credit to the private sector must be underlined because, statistically, it promotes growth more than all the other financial variables. A total absence of any significant causal relationship between finance and growth in Sierra Leone is striking. This may be explained,

in part, by its particular importance of an informal economy and its high level of inflation. But big efforts must be made to modernize the formal sector in all West African countries. The results indicate also that we have more instantaneous causality between finance and economic growth in WAEMU than in non-WAEMU countries. This suggests that financial development has positive effects on growth in the short term in WAEMU while this duration is relatively longer in non-WAEMU countries.

Most importantly, the results indicate that the sharing of a common currency by WAEMU countries may be a source of financial stability prompting more economic growth. While Calderon and Liu (2003) and King and Levine (1993*b*) showed that finance leads economic growth in developing countries, this paper reports that the finance-growth relationship may vary across countries at similar stages of development and suggests that the existence of a stable monetary union may reinforce the relationship between finance and economic growth in developing countries.[3]. All ECOWAS countries need to pursue their goal of creating a stable and reliable economic and monetary union.

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[3] More evidence is required to test the validity of this conjecture

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