Do the Stock Markets Positively Impact Economic Growth in Waemu[1]?

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Abstract

This study analyzes the effect of stock market activity on WAEMU economic growth. A linear growth model is estimated on a panel of six (06) WAEMU countries for the period 1998-2015. The annual data come from the World Bank, the BRVM[3] and the BCEAO[4]. The results show that official development assistance and market capitalization have a positive influence on WAEMU's economic activity. Thus, privatizations, tax relief, good governance are to be encouraged at the state and company level.

Keywords: economic growth, stock market activity, WAEMU

Classification J.E.L.: O4, G1, R1

1. Introduction

The issues of development remain a major concern of the Economic and Monetary Union of West Africa (UEMOA). The creation of the Regional Stock Exchange (BRVM) whose purpose is to facilitate the mobilization of savings and promote the financing of productive investments meets this imperative. Although several studies have shown that the development of the financial market promotes economic growth in both developed and developing countries, some argue that the stock market may not work effectively in developing countries. Indeed, this is proven by Karim and Chaudhary (2017) empirically study to analyze the effect of stock market development on the economic growth of two Asian regions. Their work indicates that stock market development contributes to some extent to the economic growth of the South Asia region but its impact on the East Asia region is not significant. Hoque and Yakob (2017), in a re-examination of the link between the development of the stock market and Malaysia's economic growth, report that in the short and long term, the stock market promotes economic growth. In their study, Azam *et al.* (2016) reveal that stock market development and FDI inflows play key roles in the processes of economic growth and development in four Asian countries namely Bangladesh, India, China and Singapore. A study by Owusu (2016) finds that in the long run, stock markets have no positive and at best an ambiguous effect on economic growth in Nigeria. Werema and Nikupala (2016) also show that market liquidity has a positive impact on economic growth in Tanzania.

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[1] WAEMU is the West African Economic and Monetary Union. This union is created by the Treaty signed in Dakar on January 10, 1994 by the Heads of State and Government of the seven countries of West Africa having in common the use of a common currency, the CFA Franc. UEMOA comprises 8 member states: Benin, Burkina Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo.

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[3] The Regional Stock Exchange (BRVM) was born in 1998, it is located in Abidjan in Côte d'Ivoire. It is a unique financial market for companies in eight West African countries: Benin, Burkina Faso, Côte d'Ivoire, Guinea Bissau, Mali, Niger, Senegal and Togo.

[4] The Central Bank of West African States (BCEAO) is the issuing institution common to the eight (8) member states of the West African Economic and Monetary Union (WAEMU).

In addition, Taiwo *et al.* (2016) reveal that the market capitalization rate, the total value of listed securities, the labor force participation rate, accumulated savings and capital formation are key macroeconomic factors in economic growth in Nigeria. Similarly, Dökmen *et al.* (2015) find positive and statistically significant effects of the market capitalization rate on the economic growth of 8 emerging countries. From the foregoing, it appears that the promotion of financial markets in African countries raises a number of questions about the benefit to a country of having a stock market. In other words, does stock market activity have a significant influence on UEMOA's economic growth? What are the channels through which stock market activity influences economic growth? The general objective of this study is to analyse the effect of the stock market activity on the economic growth of the UEMOA.

Our thinking revolves around three essential sections. Section 2 presents the literature review, section 3 highlights the evolution of stock market activity and access conditions in the WAEMU zone. Section 4 presents the methodology of the study. Section 5 analyzes the results and presents their interpretations. Section 6 presents the conclusion as well as the implications of economic policies.

2. Literature Review

Several economists have contributed to the enrichment of economic literature such as that the positive effect of stock market development on economic growth. The theories of endogenous growth assume that financial markets facilitate the allocation of resources in space and time by working for the mobilization of savings, information acquisition, liquidity and the facilitation of management risk (Levine, 1996). Hicks (1969) shows the important role played by the financial system in taking off industrialization in England by facilitating the mobilization of capital for various long-term investments. Gurley and Shaw (1955) argue that the development of the financial sector promotes economic growth by improving the accumulation of physical capital. McKinnon (1973) and Shaw (1973) argue that the development of the financial market is the key to economic growth subject to the dismantling of financial repression. Bencivenga et al. (1996) find that market liquidity is important for economic growth. In addition, Levine (1996) shows that stock markets reduce credit risk. For Levine and Zervos (1996), risk diversification through internationally integrated equity markets is also a way in which the development of the stock market can affect economic growth.

However, the development of stock markets can be detrimental to economic growth by encouraging counterproductive controls for businesses (Morck *et al.*, 1990). For Singh and Weiss (1998), while equity markets may attract investors and foreign capital, these flows are speculative and often unrelated to investment activities. Other proponents of this view argue that risk-sharing embedded in stock markets can reduce savings rates and thus slow down growth and economic well-being (Devereux and Smith, 1994). Stiglitz (1993) also remains convinced of the negative correlation between stock market development and economic growth. He argues that the liquidity of financial markets does not impact the behavior of company managers and therefore can't play a certain corporate role. A developed stock market is not important for corporate finance, and the issuance of new shares does not account for much investment by firms (Mayer, 1988). In his analysis, Graf (1999) hypothesizes that financial development could be an obstacle to economic growth.

From what precedes, it appears that the economic literature exposes controversies concerning the link between economic growth and stock market activity on theoretical ground. What about empirical works reval? Karim and Chaudhary (2017) empirically analyze the effect of stock market development on the economic growth of two Asian regions, namely South Asia and East Asia. For this, they use market capitalization, the ratio of the total value traded and the turnover ratio as indicators of stock market development, while the growth rate of GDP per capita is used to measure economic growth. The linear panel data methodology is applied to the 1996-2015 annual data. Their results indicate that stock market development contributes to some extent to the economic growth of the South Asian region, but its impact on the East Asia region is insignificant. Hoque and Yakob (2017) reviews the link between stock market development and economic growth in Malaysia during 1981-2016. Their study applies the Granger test, the ARDL approach, and the multivariate regression approach. The Granger causality test suggests that there are unidirectional effects of stock market development towards Malaysian economic growth. The co-integration test concludes that there is a long-term relationship between stock market development and economic growth. The ARDL model reports that in the short and long term, the stock market promotes Malaysia's economic growth in consistent with the Granger causality test.

Azam *et al.* (2016) examine the role of stock markets in the economic growth of four Asian countries, namely Bangladesh, India, China and Singapore.

The annual time series of data for the 4 countries over the period 1991 to 2012 and the autoregressive approach with staggered delays are used. They find there is a long-term cointegration between economic growth, foreign direct investment (FDI), stock market development and inflation. Estimates of the long-term elasticity of stock market development in all countries show an expected sign but statistically significant sign only in China and Singapore. Inward FDI has a positive relationship with economic growth in all countries except India and is statistically insignificant for all countries except China. In the short term, the stock market also has a positive relationship with economic growth in all countries, but only significant in India and China. The impact of FDI on growth is significant and positive only in Singapore. In addition, the results indicate that the inflation variable is statistically significant in Bangladesh and Singapore. In short terms, the results of the study reveal that stock market development and FDI inflows play key roles in the process of economic growth and development in selected countries. Owusu (2016) assesses the relationship between stock market development and sustainable economic growth in Nigeria. The study uses an autoregressive error correction approach (ARDL) and a combined index of stock market indicators to examine the relationship. It finds that in the long run, stock markets have no positive and at best an ambiguous effect on economic growth in Nigeria.

This finding back many previous studies which have reported negative / mixed or inconclusive results on the effects of stock markets on economic growth. The paper concludes that there is a need to deepen funding and eliminate bottlenecks in the financial sectors of economy by providing better public and institutional information on the value of stock markets for economic development. Werema and Nikupala (2016) analyze the impact of the stock market on economic growth in Tanzania over the period 1998 to 1992. A simple regression model is used. Empirical results show that the size of the market has a negative impact on economic growth. The results also show that market liquidity has a positive impact on economic growth. This explains suggesting that despite the size of the stock market, the market is very active. Taiwo *et al.* (2016) evaluate the contribution of the capital market to the growth of the Nigerian economy. To achieve this goal, an error correction model was estimated for economic growth in Nigeria, using vector error correction techniques over annual time series from 1981 to 2014.

The result of standardized cointegrated series reveals that the market capitalization rate, the total value of listed securities, the participation rate in the labor market, accumulated savings and capital formation are key macroeconomic factors of economic growth in Nigeria. They recommended that for the capital market to realize its full potential, its environment should promote and encourage investment opportunities for local and international investors, as the stock market operates in a macroeconomic environment. Therefore, an improvement of the Nigerian trading system for investors to easily exchange shares, could guarantee the liquidity of the stock market.

As we see, very few studies exist on the contribution of stock market development to macroeconomic variables in WAEMU. It is worth undertaking this study.

3. Evolution of Stock Market Activity and Access Conditions in WAEMU

3.1. Evolution of Stock Market Activity in WAEMU

The market capitalization, the turnover ratio and the value of shares traded are the stock market indicators selected from the literature. Market capitalization is defined as the market value of a company. It results from the share price at which the number of shares forming the capital is multiplied. Figure 1 illustrates the evolution of the market capitalization of the regional market.

Figure 1: Evolution of the market capitalization of the BRVM
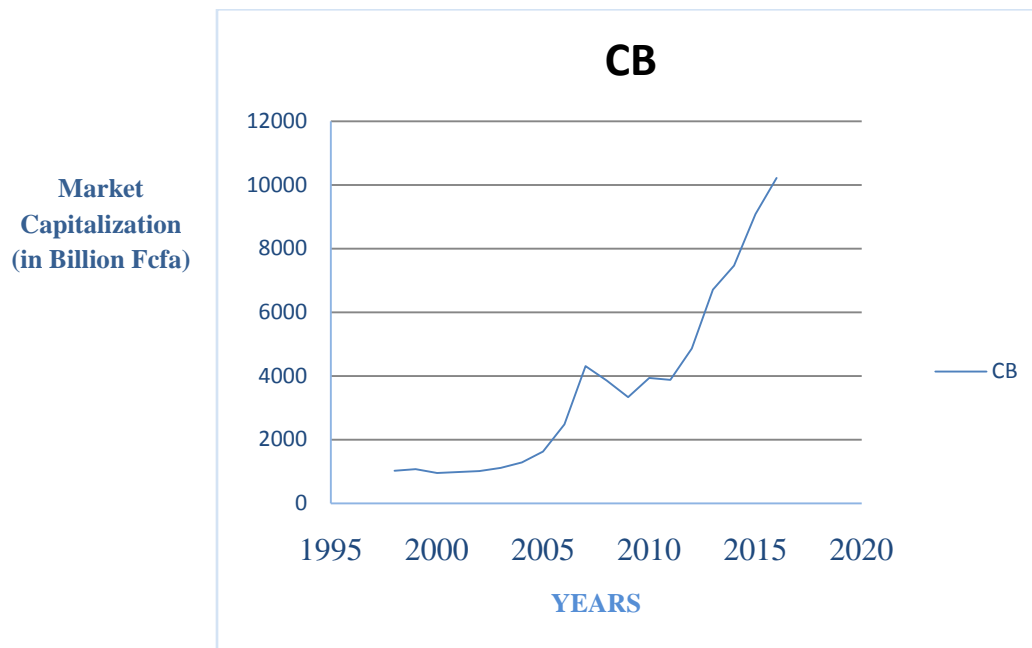
Source: author based on BRVM data

Figure 1 above shows that the curve has an increasing trend which still has some drop-off points. Indeed, we observe the decline in capitalization from 2007 to 2009, meaning that the WAEMU stock market was also affected by the financial crisis that the world experienced at this precise time. But there is a start that could be attributable to the merger-absorption between SDV and SAGA[5] in 2007 as well as capital increases by incorporation of reserves made by BANK OF AFRICA in Benin (BOAB) and ECOBANK. Furthermore, the slight decline of 2010-2011 is certainly due to the political crisis of some countries of the Union including Côte d'Ivoire and Burkina Faso. Thus, stability within the countries of the Union is important for the performance of the stock market. The upward trend of 2012 was confirmed in 2013. This performance has allowed the BRVM to occupy sixth place in the African stock market in terms of domestic capitalization (Central Depository / Settlement Bank, 2013). The turnover ratio refers to the ability to absorb a large volume of transactions without too much repercussion on prices. It measures the depth and the dynamism of the stock market. Figure 2 highlights the evolution of this indicator.

Figure 2: Evolution of the market rotation ratio of the BRVM
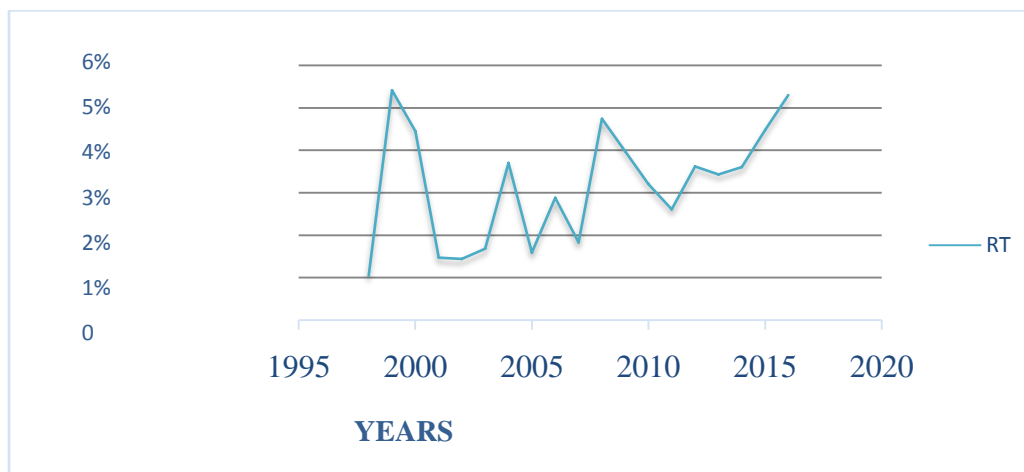
Source: author based on data from the BRVM (2016) and BCEAO (2016)

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[5] Became in 2009 BOLLORE AFRICA LOGISTICS COTE D'IVOIRE.

The turnover ratio or turnover ratio captures the dynamism of the market. Within the BRVM, this ratio shows a trend which reflects an unstable and weak dynamism of the stock market of the Union. Figure 3 shows the evolution of the liquidity of the BRVM. There is a significant increase in the liquidity of the market after the year 2010. This can be explained by the operations of bonds within countries for the recovery and revival of their economy after the various socio-political instabilities. Moreover, the entry on the stock market of certain companies such as BOA Mali, BOA Senegal, the Investment Company of Manufacture and Expertise (Simex) of the group Total Senegal through the opening of capital allowed to raise the liquidity level of the BRVM through exchanges (purchase / sale) of the shares.

Figure 3: Evolution of the liquidity of the BRVM

Source: author based on data from the BRVM (2016) and BCEAO (2016)

3.2. Terms of Access

The terms and conditions for the admission and maintenance of equity securities to the First Sub-Fund[6] and the Second Sub-Fund[7] are set by the BRVM. Admission and retention require the satisfaction of elements such as the incorporation in the form of a public limited company, the written commitment of the issuer to disseminate the information required by the Regional Stock Exchange, in particular the publication of the annual accounts in the Bulletin. Official of the Rating ("BOC") then the written commitment of the issuer to participate in the organization of the market including financially.

The Regional Stock Exchange may, at any time, determine that an issuer no longer meets the minimum retention requirements of the First Sub-Fund. It then gives the issuer 60 days' notice of its intention to downgrade the securities. The decision of the Stock Exchange is then announced by Avis. Any issuer whose securities have been decommissioned from the First to the Second Sub-Fund can't request a reclassification before a period of twelve (12) months from the date of the decision of the Regional Stock Exchange.

The terms of admission and maintenance of the debt securities are set by the Regional Stock Exchange through the written commitment of the issuer to disseminate the information required by the Regional Stock Exchange, including the publication of the annual accounts at the BOC, the commitment writing of the issuer to participate in the organization of the market, especially financial sides, the issuer's written commitment to abide by the regulations of the Regional Stock Exchange, the minimum number of securities on issue is 25,000 and the minimum nominal value of the issue is 500 million FCFA. In addition, the Regional Stock Exchange does not set any requirements as to the size or legal form of the issuer. The Regional Grant sets the eligibility criteria by Instruction.

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[6] Securities in the First Sub-Fund are equity securities whose issuer has a market capitalization of more than 500 million CFA francs, a net margin on sales of each of the last three (3) years of at least 3% and five (5) years of certified accounts.
[7] The securities of the Second Sub-Fund are equity securities whose issuer has a market capitalization of more than 200 million FCFA and two (2) years of certified accounts.

Issuers whose securities are admitted to listing must inform the public and the Regional Stock Exchange of any new fact or modification likely to have a significant impact on the market price of such securities. The Regional Exchange sets by Instruction the terms of application of the information requirement. The issuer designates a Management and Intermediation Company (SGI) which will act as a specialist in the listing of its securities. In support of its application for admission, the issuer, through an SGI, files with the Regional Exchange, a complete file in six (6) copies including the documents and documents covered by this Instruction. Issuers wishing to list their securities on the Regional Stock Exchange must comply with the requirements set out in the regulations. The issuer also agrees to pay all fees required by the Regional Exchange for admission and maintenance. The admission file is composed of a letter from the issuer requesting the admission of its securities to the list and containing the commitments listed above, the draft offer document prepared in accordance with the General Regulations and the Instructions of the Regional Council and other documents required by the Regional Exchange.

4. Methodology

4.1. Model Specification

According to neoclassical theory, the sources of growth are the accumulation of factors of production and the improvement of the overall productivity of the factors. Thus, starting from a Cobb-Douglass production function, we define the production function as follows:

$$Y_{it} = F(A_{it}, K_{it}, L_{it}) \qquad [1]$$

Where A_t is the overall productivity of factors reflecting the level of technology and the efficiency of the economy. Moreover, according to Keho (2012) an improvement in productivity may be the result of a financial system so that $A_{i,t} = K(mf_{i,t}) = A_o e^{\alpha_{i,t}}$.

Where mf is a measure of the level of financial development? By combining the two equations and taking the logarithms, we obtain the following equation:

$$y_{i,t} = \beta_0 + \beta_1 k_{i,t} + \beta_2 l_{i,t} + \beta_3 z_{i,t} + \varepsilon_{i,t} \qquad [2]$$

where y, k and l denote the logarithmic functions of Y, K and L and ε_t an error term. Given the importance of financial development for growth, we are now interested in studying its determinants. According to the literature, notably Chaudhary (2017) and N'gare *et al.* (2014), the index of the development of the stock market takes into account the market capitalization which is the size of the market ($capb_{it}$) the dynamism of the market represented by the turnover (rt_{it}) as well as the value of the shares traded (vae_{it}) which reflects the liquidity of the stock market. This choice is not only motivated by the ability of this model to determine the role of the stock market in the economic performance of countries but also the ability to highlight the level of influence specific to each stock market on economic growth. Moreover, according to Refaei and Sameti (2015) the determinants of growth can be the official development aid (oda_{it}).

The purpose of our analysis is to estimate the long-term effects of financial market development on the growth of the real sector in the context of the countries of the Union. We can derive the long term relation in the following form:

$$tce_{it} = \alpha_1 capb_{i,t} + \alpha_2 rt_{i,t} + \alpha_3 vae_{i,t} + \alpha_4 oda_{i,t} + \varepsilon_{i,t} \qquad [3]$$

With i denoting countries and t time.

The growth rate of the Gross Domestic Product (tce) is usually used as a measure of economic growth (Osakwe and Ananwude, 2017). We will use the real GDP growth rate as part of the study to assess the evolution of economic growth in WAEMU countries. It is our dependent variable. Market capitalization (capb) illustrates the size of the market. As Werema and Nikupala (2016) mentioned, the size of the stock market is positively correlated with the ability to mobilize savings and diversify risk. The idea behind this indicator is that the larger the size, the stronger the ability to raise capital and diversify risk. We use the average price and not the price on December 31 of each year because the average price reflects the true financial image of the various listed companies. The analysis is done on the stock market. It is obtained by the following calculations: $capb = share\ value + bond\ value$
$Share\ value = total\ number\ of\ shares \times stock\ price$.

The turnover ratio (*rt*) captures the dynamism of the stock market activity because a market can be large but inactive. We can therefore verify the dynamism of the BRVM. The ratio of turnover or turnover noted *rt* is the ratio between the total value of the transactions and the market capitalization. Turnover ratio is used in the work of Karim and Chaudhary (2017). A high turnover rate is often an indication of low transaction costs. Liquidity allows investors to buy and sell securities easily and makes the investment less risky, making long-term investment easier. The variable used is the value of shares traded as used in the Karim and Chaudhary (2017) model. It is obtained by the following calculation:

$$rt = \frac{total\ value\ of\ transactions}{market\ capitalization}$$

Market liquidity (vae) is represented by the value of shares traded. Werema and Nikupala (2016) show that market liquidity has a positive impact on economic growth, suggesting that the stock market is active. In fact, a liquid stock market leads to reducing transaction costs and diversifying investors' risks. Public investment (*pinv*) is the engine of economic growth for developing countries (Ntembe *et al.*, 2017). When the investment policy is well designed and judiciously oriented, it positively affects economic growth in aiming to increase total factor productivity (health, education, roads, energy ...). Thus, the expected sign of the parameter is positive. Official development assistance helps to build the basic infrastructures necessary for any economic take-off in developing countries because domestic savings are still low and the financial system in place is inadequate with the level of wealth individuals (Refaei and Sameti, 2015).

4.2. Estimation Method

The data will be processed according to the panel data methodology, namely the stationarity study, the presence of specific effects test, the Hausman test to determine the choice between the fixed effects model and the random effects model. in case of presence of individual effects and diagnostic tests. Stationarity or unit root tests on panel data from Breitung (2000) and Im *et al.* (2003) (IPS) will be made. Note that Breitung's unitary panel test (2000) assumes a uniform autoregressive unit root. Under the alternative hypothesis, the autoregressive coefficient is the same for all individuals. With this test, either we accept the hypothesis of a unit root for the entire panel, or we reject the assumption of a unit root for the entire panel. This is one of the main limitations of this test, as it is less likely that, in case of rejection of unit root, one can take into account that of an autoregressive root common to all individuals on the panel. In addition, the test proposed by Im *et al.* (2003) responds to this criticism. The unit root test of Im *et al.* (2003) accounts for heterogeneity (Hurlin and Mignon 2007). In addition, the homogeneous or heterogeneous specification of the data generating process should be verified. The model will be specified through Fisher's test. Fisher tests the null hypothesis of no individual effects against the alternative hypothesis of individual effects. If Fisher's probability is less than 10%, the null hypothesis of no individual effects is rejected. It is concluded that there are individual effects. Subsequently we check whether the individual effects are fixed or random. To do this, we perform the Hausman test (1978) which tests the null hypothesis of presence of random effects against the alternative hypothesis of presence of fixed effects. We can't also interpret the results without checking for heroscedasticity and autocorrelation of errors. Finally, the estimation of the chosen model will be made by the appropriate method.

4.3. Sources and statistical analysis of data

The database is essentially secondary data. The macroeconomic data come from the website of the World Bank, specifically from the World Development Indicators (WDI) in its 2016 edition. The financial data for its part were collected on the site of the BRVM and the BCEAO. The annual data covering the period from 1998 to 2015 concern a panel of six WAEMU countries due to the availability of data. Table 1 shows the description of the variables used in the model.

Table 1: The description of the variables

Variables	Symbole	Measure	Expected sign
GDP growth rate	*tce*	In percentage	
Official development assistance	*oda*	Percentage of real GDP	+
Market capitalization	*capb*	Percentage of real GDP	+
Ratio or turnover	*rt*	Percentage of real GDP	+
Value of shares exchanged	*vae*	**Percentage of real GDP**	**+**

Source: Author from the economic literature

Table 2 presents the descriptive statistics of the variables used.

Table 2: Descriptive statistics

	Number of observations	Mean	Minimum	Maximum	Standard deviation
tce	114	4,199671	-4,387255	11,81366	2,986653
oda	114	0,0001419	3,98e-11	0,0004058	0,0000848
capb	114	0,0052275	1,51e-06	0,0974632	0,0132717
vae	114	0,00004	2,74e-07	0,0026297	0,0002471
rt	114	0,0287556	0,0001764	1,221496	0,1248911

Source: Author's calculations based on data from WDI (2016), BRVM and BCEAO (2016)

Observations are the same for all variables. The minimum and maximum values suggest the existence of possible outliers. In general, it can also be noted that the standard deviations are small because of the logarithmic transformation of these. Subsequently, we will analyze the correlation between the variables of them model because some variables can be explained between them. According to Gujarati (1995), the strong correlation between the variables could be a nuisance for the significance of these variables. They should be removed from the chosen model. The correlation matrix gives a first idea of the direction of the relationships between the variables studied. Table 3 highlights the correlation of the variables used in our model.

Table 3: Variables Correlation Matrix

	tce	*oda*	*cab*	*vae*	*rt*
tce	1,000				
oda	0,285	1,000			
capb	0,276	-0,188	1,000		
vae	-0,088	-0,172	0,000	1,000	
rt	-0,051	-0,081	-0,066	0,893	1,000

Source: Author's calculations based on data from WDI (2016), BRVM and BCEAO (2016)

From the results of the correlation matrix, the GDP growth rate is positively correlated with variables such as official development assistance and market capitalization. Note, however, that although the correlation between the GDP growth rate and the above-mentioned variables is positive, it is not as strong. In addition, variables such as the value of shares traded and the turnover rate of the stock market are negatively correlated to the rate of GDP growth. How do these institutional variables affect economic growth empirically?

5. Empirical Results

5.1. Results of stationarity tests

The first step in the estimation process is to determine the stationarity and the order of temporal integration of our data. The IPS and Breitung tests were concomitantly conducted to highlight the robustness of the conclusions. IPS tests will be decisive because, in the presence and absence of serial correlation, the IPS statistic is more powerful with a well-specified delay number (Hurlin and Mignon, 2007).

Table 4: Stationarity test results

	Breitung		IPS		Degree of integration
	Coefficient	**P-value**	**Coefficient**	**P-value**	
tce	-4,8315***	0,0000	-3,0945***	0,0010	I(0)
oda	-2,4258***	0,0076	-3,6498***	0,0001	I(0)
capb	-4,8923***	0,0000	-2,1725**	0,0149	I(0)
vae	-5,4061***	0,0000	-3,4099***	0,0003	I(0)
rt	-3,5141***	0,0002	-2,1585**	0,0154	I(0)

*** (significant at 1%) ** (significant at 5%) * (significant at 10%)

Source: Author's estimate based on data from WDI (2016), BRVM and BCEAO (2016)

For the seven variables, the null hypothesis of unit root presence was rejected. The variables are stationary in level according to the two different tests applied. We then move on to the homogeneity test.

5.2. Results of the Homogeneity Versus Heterogeneity Test

To be able to identify the source of heterogeneity, we consider a fairly general model in which the heterogeneity can be at the same time at the level of the coefficients of constants and the explanatory variables, as follow: $y_{i,t} = \alpha_i + \beta_i x_{i,t} + \varepsilon_{i,t}$, *avec* $i = 1,...,N$ *et* $t = 1,...T$ where $\varepsilon_{i,t}$ the errors are assumed independently and identically distributed, of normal law of null hope and variance σ_ε^2. The null hypothesis of this test is that there is only one common intercept, no individual effect. The result is a F statistic with (N-1, NT-N-K-1) degree of freedom. If we reject the null hypothesis, then we must include individual effects in the model. With a p-value (0.0000), the null hypothesis of the presence of a common intercept is rejected (Table 5). We now move to the Hausman test.

Table 5: Homogeneity test result

tce	Coef	Std.err.	T	p> |t|	[95% conf.	Interval]
oda	0.808208	0.4018271	2.01	0.046	0.794104	0.961238
cab	0.0000294	0.0000204	1.45	0.151	0.000151	-0.000496
vae	-2.60 e-06	5.79e-06	-0.45	0.654	- 0.000004	8.81 e-06
rt	0.2951425	0.0448193	6.59	0.000	0.206752	0.383532
const.	11.82257	0.8868829	13.33	0.000	10.07351	13.57163
sigma_u	15.806636					
sigma_e	9.1750073					
rho	0.74798481	(fraction of variance due u_i)				
F test that all u_i=0: F(5, 149) = 45.16 Prob > F = 0.0000						

Source: Author's estimate based on data from WDI (2016), BRVM and BCEAO (2016)

5.3. Hausman test results

The purpose of the Hausman test is to test the correlation between fixed effects and random effects. The assumptions supporting the Hausman test are such that for the null hypothesis, there is no systematic difference between the coefficients against the alternative hypothesis that there is a difference between the coefficients. The Hausman test is a specification test that determines whether the coefficients of the two estimates (fixed and random) are statistically different.

Table 5: Hausman test result

	Coefficients		(b-B)	Sqrt (diag(V_b-V_B))
	(b)Fixed	(B) Random	Difference	S.E.
oda	4,972295	3,539553	1,432742	0,6778234
capb	1,647432	0,756785	0,890647	0.4235871
vae	-0,527624	-0,234093	-0,293531	0,1547621
rt	1,148066	0,994965	0,153101	0.0954877
Chi2(6) = (b-B)' [(V_B-V_B)^(-1)](b-B) = 19,90 Prob>Chi2 = 0,029				

Source: Author's estimate based on data from WDI (2016), BRVM and BCEAO (2016)

The Hausman test refutes the hypothesis of no correlation between the random term and the explanatory variables of the model (P-value = 2.9% <5%). The chi-square test is at 4 degrees of freedom because there are under H0, 4 restrictions relating to the equality of the coefficients of the two models for the factors variable in time (oda, cabp, vae, rt). Composite error model estimators are biased. It is better to retain those of the fixed-effects model that are unbiased.

5.4. Result of heteroscedasticity test

Heteroscedasticity may concern either the variance of the individual specific effect or that of the perturbation, or the two variances simultaneously. These problems lead to changes in the structure of the perturbation variance-covariance matrix. These different configurations require each time to find the transformation that makes it possible to obtain the appropriate estimator. We use a modified Wald test, which is essentially a Fisher test. Under the null hypothesis of homoscedasticity versus the presence of heteroscedasticity, Table 6 below shows that the variance of errors between countries is not the same, rejecting the null hypothesis of homoscedasticity (Prob> chi2 = 0.000).

Table 6: Heteroscedasticity test

Number of obs =159						
F(3, 155)	=58259.80					
Prob > F	= 0.0000					
R-squared	= 0.9991					
Adj R-squared	= 0.9991					
Root MSE	= 40.148					
residues2	Coef.	Std. Err.	T	P>|t|	[95% Conf.	Interval]
capb	1.718466	0.0000026	182.64	0.000	1.69988	1.737053
rt	-0.005989	0.0000202	-296.83	0.000	-0.006029	-0.005493
vae	-0.450815	0.0000942	-94.92	0.000	-0,465019	-0,441435
Oda	-0.595462	0.0000026	-182.64	0.000	-0.604287	-0.549547

Source: Author's estimate based on data from WDI (2016), BRVM and BCEAO (2016)

5.5. Result of the autocorrelation tests

Many tests have been developed on the basis of a model incorporating, from the outset, random or fixed individual specificities. For a comprehensive overview of the subject, see Baltagi (2008a). Baltagi and Li (1995) derived a Lagrange multiplier test to test for the presence of an order 1 autocorrelation, given the existence of random individual specificities. Formally, the test is written:

$$H_0 : \rho = 0 \ (sous) \ \sigma_\alpha^2 \succ contre \ H_1 : \rho \neq 0 \ (sous \ \sigma_\alpha^2 \succ 0).$$

The results of the test give a calculated value of the Lagrange multiplier statistic of 99.238982 (LM = 99, 238982) and a probability associated with an associated probability of Chi-Square to a degree of freedom of 2.238. 10-23 (Prob> Chi2 = 0.0000). We must reject the null hypothesis of no autocorrelation of order 1 of the perturbation. As a result of the tests carried out, the Generalized Least Squares (GCMs) appear appropriate for model estimation.

5.6. Results of model estimation by GCM method

Table 8 presents the results of the WAEMU economic growth estimate

Growth rate: dependent variable	Coefficient	p-value
Official development assistance	0,810909	0,008
Market capitalization	0,721043	0,0001
Market liquidity	-0,280946	0,306
Rotation ratios	0,057648	0,298
Constant	0,639913	0,521
Wald chi2(6) = 34,07	Prob > F = 0,0000	

Source: Author's estimate based on data from WDI (2016), BRVM and BCEAO (2016)

The result above shows that the probability associated with the Wald statistic is very low (Prob> F = 0.0000), reflecting a good overall fit of the model. It emerges from this study that according to economic theory (Refaei and Sameti, 2015), official development assistance positively and significantly influences economic growth. The coefficients associated with this variable are positive, showing that an increase in official development assistance of 100% results in an improvement of 81.09% in economic growth in the WAEMU zone. Moreover, this result is contrary to that of Phiri (2017).

Moreover, among the stock market indicators, only market capitalization has a positive and significant impact on the economic growth of the countries in question. A 100% increase in this index results in a 72% increase in the economic growth of the union. Moreover, this result highlights a strong positive correlation between the size of the BRVM and the economic activity of UEMOA, contrary to the studies of (Werema and Nikupala, 2016).

Given these results, we can note that the theories that underlie the positive and significant impact of all stock market indicators can't be transposable in the case of UEMOA. These differences are related to the environmental and sociological peculiarities in which the populations of the union evolve.

6. Conclusion and recommendations

The various economic potentialities that abound within WAEMU give it an advantage to boost the process of economic development. This study has favorably analyzed the effect of stock market activity on economic growth. To do so, a linear growth model is estimated on a panel of six (06) WAEMU countries for the period 1998-2015. The main results have shown that countries are still confined to the traditional factors of economic growth, such as official development assistance. Moreover, among the stock market indicators, it appears that only the market capitalization influences the economic growth of the union. These observations lead to propose to the decision-makers recommendations to clean up economic recovery policies. Thus, the States must play an important role concerning the privatization in the zone UEMOA and the tax relief of the companies in order to encourage the entry of new companies on the stock market. Indeed, listing will have the effect of strengthening market capitalization. The diversity of securities will increase the trading of securities (buying and selling) which will in turn boost the dynamism of the market by increasing the turnover rate and improve the liquidity of the market. Market liquidity leads to the reduction and the diversification of risk as well as an efficient allocation of savings.

Furthermore, it will be necessary to reduce the tax rates on the purchases and sales of securities which constitute a total of 2% of the market capitalization of listed companies for this can constitute a barrier to the entry for potential companies. . Moreover, knowing that economic growth depends on socio-political stability, the establishment of a peaceful and healthy socio-political environment would foster a stable business climate to minimize the high idiosyncratic risk in our developing countries. It is therefore necessary to promote good governance.

Nevertheless, this study has shortcomings. It would be interesting to analyze the effect of stock market activity on UEMOA economic growth by taking into account the obligations in order to include Guinea Bissau and Mali in the analysis. Also, the analysis by sector of activity and by level of market capitalization (country by country) will allow to better apprehend the sector of activity which best impacts the economic growth of the UEMOA and to capture the effect that may have a significant number of publicly traded companies.

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