



Research Article

Analysis of the Relationship Between Domestic Saving and Economic Growth in the ECOWAS Zone: Panel ARDL Analysis (2000–2020)

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Abstract

In a context of scarcity in the mobilization of external resources in developing countries, the mobilization of domestic resources becomes a determining factor for development financing. Indeed, this paper analyzes the relationship between savings and economic growth in thirteen countries of Economic Community of West African States (ECOWAS) namely Benin, Burkina Faso, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo over the period 2000-2020 on a sample size of 14,130 by focusing on domestic savings. The main contribution of analyzing the impact of savings on growth in a regional space, while highlighting the analysis in a monetary and non-monetary union. To do so, we used the ARDL model to analyze the long-run and short-run impact of domestic savings on economic growth by highlighting the impact of membership in a monetary union on the savings-growth relationship. The panel ARDL model is to show short-term and long-term relationships between variables, while handling series that do not have the same integration order and offering great flexibility and robustness for small samples. The results show a positive and significant impact of savings on long-term economic growth in the ECOWAS zone, but membership in a monetary union has no impact on the savings-growth relationship. However, the results show a significant and negative impact between foreign direct investment (FDI) and economic growth over the long term in the WAEMU zone alone, demonstrating that membership of a monetary union has an impact on the FDI - economic growth relationship. This shows that foreign direct investment has a negative impact on economic growth in WAEMU countries. In addition, our study found a bidirectional relationship between savings and economic growth. In view of these results, ECOWAS authorities should implement policies to mobilize domestic savings in order to finance development policies. And, by having sustainable, stable and inclusive growth, the political authorities should develop incentives to mobilize domestic savings and avoid dependence on external resources, which are becoming increasingly scarce. ECOWAS authorities should also accelerate the process of creating a monetary union in order to take advantage of savings mobilization policies.

Keywords

Savings, Economic Growth, ECOWAS, WAEMU, ARDL

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1. Introduction

Recent literature on the relationship between savings and economic growth has found that countries with a high savings or investment rate tend to have a high growth rate [11-19, 23]. These results are in line with the logic of traditional growth models of [21], [14] and [22] which have demonstrated the importance of savings for development. Indeed, these models show that higher savings increase the economy's domestic capital stock, which in turn leads to higher economic growth. Domestic savings affect economic growth through an increase in the marginal productivity of capital, an improvement in the financial system, an increase in investment projects, an increase in consumption and an increase in national income (Abbar and Sadqi, 2022).

An obvious problem in the empirical results of growth on savings is that the level of growth also affects the savings rate [13], explains Modigliani's life-cycle theory by showing that a multi-year life-cycle model can predict that a high growth rate causes a high level of savings. This is supporting Keynesian theory. Indeed, the standard Keynesian model assumes that savings depend on the level of current income, and that the savings rate rises as per capita income rises. All other things being equal, economic growth precedes an increase in savings. Recently, a number of empirical studies have confirmed that strong economic growth can have a significant effect on saving [10-23, 34].

Consequently, the structural transformation of economies, which enables strong, inclusive growth, has always been in phase with capital accumulation. Foreign capital is important in the first stage of accumulation. This is followed by a stage in which a large proportion of investment is linked to increased domestic savings, as in the case of the newly industrialized economies of Asia [3-7].

However, Sub-Saharan African countries have the lowest savings rates in the world at the same time as encouraging and resilient economic growth rates allowing for improved well being [4]. Savings rates around the world vary considerably: on average, East Asia saves more than 30% of gross national disposable income (GNI), while Sub-Saharan Africa saves less than 15%. The average ratio of gross domestic savings to GDP in Sub-Saharan Africa rose from 22.8% in the 1970s to 20% in the 1980s, then fell to 15.5% in the 1990 [12-31].

According to the theory of the optimal currency area, savings circulate efficiently and have an impact on economic growth in a monetary union by eliminating transaction costs finally ensuring smooth capital flows. However, in a zone outside the monetary union, a country that wants to invest more of its savings must borrow from abroad. It faces an exchange risk leading to a devaluation of its currency.

Analysis of the relationship between domestic savings and economic growth reveals policy implications in developing countries. Does saving have an effect on economic growth in the ECOWAS zone? Is there a link between the two aggregates in WAEMU and non-WAEMU in the CEDEAO

zone?

The main objective of this article is to analyze the relationship between domestic savings and economic growth in the ECOWAS zone, while highlighting the impact of membership of a monetary union on the relationship between savings and economic growth. By addressing this question, this article enhance the existing literature on the question of the zone and the analysis of membership of a monetary union on relationships between the savings and economic growth.

The rest of our paper is organized as follows: section 2 discusses the literature, section 3 describes the data and the econometric methodology. Section 3 presents the empirical results of the study. Section 4 concludes the study and provides some policy recommendations.

2. Literature Review

2.1. Theoretical Review of Savings and Economic Growth

The model of [21] and [16] supported the relevance of savings in the economic growth model. Indeed, this model emphasizes the increase in the savings rate as one of two means of increasing economic growth. The second is the efficient use of the capital acquired through savings.

Solow's neoclassical model (exogenous growth model): Neoclassical theory, which considers the endogeneity of certain variables in the AK model, is taken as the theoretical basis for this paper.

Solow the pioneer (1956) asserts that savings are imperative to increase economic growth, which is mainly due to the emphasis placed on the effects of economic growth. Economic growth explains differences in living standards between the world's countries. Thus, the consequences of these different standards of living on human well-being are enormous. In conclusion, according to Solow's model, the accumulation of physical capital can explain neither the strong growth over time in output per person, nor the large geographical differences in output per person.

For monetarists, fiscal savings are crucial because of their ability to inspire confidence in the private sector, thereby controlling any possibility of a downward trend in economic activity due to a contraction in fiscal spending.

Keynesians, on the other hand, believe that savings are essential to maintain economic growth, that is during expansionary periods, we should turn to savings to protect the economy from overheating and the bursting of the price bubble [16].

Consequently, gross domestic savings is the point to consider in the context of this document. According to the United Nations System of National Accounts (2009), gross domestic savings is total national disposable income after final

consumption expenditure (total consumption), algebraically expressed as a percentage of GDP, $S = Yd - C$. National disposable income (Yd) is GDP plus net factor income and net transfers from abroad, while national consumption (C) can be broken down into household, business and government consumption [10].

Thus, national savings are equivalent to national disposable income minus national consumption.

According to [16], it is always preferable to save rather than raise funds abroad to limit the shortage of capital accumulation, since borrowing abroad is not a cost-free solution. By definition, developing countries are almost capital-starved. Most can attract private capital on internationally competitive terms. At the same time, the poorest countries rely heavily on official development assistance on concessional or grant terms. But any influx of capital entails certain costs, both financial and political [3]. The East Asian countries recognized as newly industrializing economies (Hong Kong, Korea, Singapore and Taiwan) boast some of the highest domestic savings rates in the world. Moreover, in recent years, these countries have recorded large current account surpluses, meaning that domestic savings are exported.

Reform policies such as the World Bank's Structural Adjustment Programs (SAPs), launched on the continent in the 1980s and 1990s, were designed to stimulate growth. These policies were based on the assumption that increased domestic savings would stimulate growth. The liberalization of financial markets, and in particular the abolition of repressive interest rates, was expected to lead to a rise in real interest rates, and hence to an increase in domestic savings and hence growth [31].

It has been observed over time that higher savings rates tend to go hand in hand with higher income growth. According to [27], this is seen as evidence of the existence of both virtuous cycles of savings and prosperity, and poverty traps linked to insufficient savings and stagnation. At the same time, savings are identified as one of the factors that facilitate economic growth, through the mechanism of investment [12].

However, Romer (1996), analyzing [23] points out that while savings are not indispensable, they are necessary to replace the cost of factors of production, that is to compensate for the depreciation of the machines used in production. This implies that savings act as a buffer against shocks. Moreover, when the national savings rate is broadly in line with the economy's investment rate, it tends to reduce vulnerability to sudden changes in international capital flows, which are affected by factors beyond the recipient country's control [27].

The transmission channel between financial integration, capital mobility, and macroeconomic stability is based on a mechanism of resource reallocation. Integration removes regulatory and monetary barriers, leading to capital mobility, which allows savings to flow freely to the most profitable investment opportunities. In theory, this promotes macroeconomic stability by "smoothing consumption,"

allowing countries with a savings shortfall to borrow abroad to absorb domestic shocks. However, this fluidity creates increased interdependence, where stability becomes vulnerable to the volatility of flows within a monetary union. The inability to devalue then transforms any capital flight into an immediate liquidity crisis for the real economy.

2.2. Empirical Literature

Gidigbi and Donga (2020), analyzing the impact between savings and economic growth in Africa, find that savings contribute 3.96% when economic growth increases by 1%. However, the study does not find causality between economic growth and savings, but rather a bidirectional relationship between savings and Foreign Direct Investment (FDI) in Africa. Similarly [34] examine the long-term equilibrium relationship between real domestic savings, investment and growth in India over the period 1951-2015. The results of the study show a lack of causality between savings and economic growth. However, the authors find a uni-directional relationship between savings and investment, confirming the very important role played by savings in supporting domestic investment.

Using the ordinary least squares (OLS) method to determine the impact of savings on economic growth, [22] found that a higher savings rate leads to higher economic growth [36] finds the same results, examining the relationship between domestic savings and economic growth in Cote d'Ivoire over the period from 1970 to 2016. The results show that in both the short and long term, domestic savings are positively and significantly related to economic growth. Based on the results, he concludes that domestic savings play a crucial role in sustaining economic growth in Cote d'Ivoire.

To analyze the relationship between savings and economic growth in Ghana, [33] use the Johansen cointegration test and vector error correction model. The study showed that, in the long term, the consumer price index, trade openness, foreign direct investment and domestic savings have significant positive impacts on economic growth. [30] examined the impact of foreign aid on economic growth in 42 countries, using GMM for estimation. In this study, domestic savings were also included as one of the determinants of economic growth in the countries considered. The empirical results also show that domestic savings have a significant positive impact on economic growth. Similarly, [29] studies the relationship between savings and economic growth in various economies. In general, the empirical results suggest that the rate of economic growth causes the rate of savings growth in 13 countries. Opposite results prevailed in two countries. In five countries, bidirectional causality was found.

Abu (2010) examines the direction between savings and economic growth using the Granger and Co-integration causality technique in Nigeria. The results reveal a unidirectional relationship between economic growth and savings. Thus, the author rejects Solow's hypothesis that savings precede economic growth, and accepts the Keynesian

theory that it is economic growth that leads to an increase in savings. The author recommends that government and policy-makers employ policies that would accelerate economic growth in order to increase savings. While [2] investigates the link between savings and growth in Nigeria using annual data over the period 1970-2013. The empirical results show that bidirectional causality exists between savings and economic growth in Nigeria, leading to a feedback effect, so that both Keynes' and Solow's models are relevant for Nigeria. Policymakers therefore need to implement a set of policies aimed at increasing savings and growth.

3. Methodology

3.1. Model Variable Description

In a closed economy, the value of a country's Gross Domestic Product (GDP) is equal to government consumption (G), household consumption (C) and business investment (I). Thus, all goods and services are absorbed at the national level, that is

$$Y = C + G + I \quad (1)$$

where $Y = \text{GDP}$ and $I = S$ with $S = \text{Saving}$.

In an open economy, the total consumption of residents is made up of the production of goods and services in the country and abroad. The difference between residents' consumption of domestically-produced goods and services and total production constitutes imports (M). Exports (X) are foreign spending on goods and services produced in the country. If the balance of trade is in deficit, that is imports exceed exports, national consumption is greater than total production (Y), that is

$$A = X - M \quad (2)$$

where $A = C + G + I$ et $SC = X - M$.

Gross savings (S) is the difference between GDP and household and government consumption ($C + G$). Gross domestic investment is the difference between total production and consumption, that is

$$(Y - C - G) - (A - C - G) = S - I = X - M \quad (3)$$

Equation (3) therefore implies that when the trade balance is in surplus, exports exceed imports and gross savings exceed gross domestic investment. The surplus in savings leads to capital accumulation and higher economic growth in the country. Furthermore, based on the theory of marginal propensity to save, income growth leads to an increase in the savings rate.

On the basis of theoretical and empirical analysis, we have developed the model variables as follows

The endogenous variable: $Y = \text{Gross Domestic Product (GDP)}$

Independent variables: $DS = \text{Domestic Savings}$, $CAB = \text{Current Account Balance}$, $GNI = \text{Gross National Income}$, $GDI = \text{Gross Domestic Income}$, $INV = \text{Investment}$,

3.2. Data Sources

We used data from the World Bank's World Development Indicators (WDI) covering the period from 2000 to 2020 and the fifteen (15) ECOWAS countries, with the exception of Liberia and Cape Verde due to a lack of data over the study period.

3.3. Empirical Model

In this study, we will use an ARDL model to test short- and long-term cointegrating correlations between independent factors, and to identify short-term dynamics by extracting panel characteristics using the error correction model (ECM). The panel ARDL model is to show short-term and long-term relationships between variables, while handling series that do not have the same integration order and offering great flexibility and robustness for small samples. We chose this model to test the short- and long-term relationship between savings and growth, as well as the small sample size of our estimate.

Before moving on to estimation, we'll perform some pre-estimation tests on the data. It is important to determine the order of cointegration before estimating the panel data. To do this, we'll perform unit root tests.

There are three types of unit root test for panel data. Firstly, the [35]. Extended by [37], it's called the IPS test. And finally, a simple Fisher alternative, the Fisher test [38].

Indeed, since the publication of [37], the use of panel data unit root tests has become very popular among empirical researchers with access to a panel data set.

It is now generally accepted that commonly used unit root tests such as the Dickey Fuller (DF), Augmented Dickey Fuller (ADF) and Phillips Perron (PP) (Fisher test) lack the power to distinguish the null unit root from stationary alternatives, and that the use of panel data unit root tests is a way of increasing the power of unit root tests based on a single time series.

The [37], Fisher-ADF and PP tests all allow for individual unit root processes ρ_i so that may vary from section to section. The null hypothesis is a unit root: $H_0 = \alpha_1$, while in the alternative hypothesis there is no unit root: $H_1 < \alpha_1$. [37] propose an alternative test procedure that depends on the means of the individual unit root tests

$$t_{NT} = \frac{1}{N} \sum_{i=1}^N t_{iTi} \quad (P_i)$$

Where t_{iTi} is the t statistic of the individual ADF regressions.

Another approach to panel unit root testing uses [38] results to derive ADF and PP tests that combine the p-values of

individual unit root tests. Defining as π_i value p the individual unit root test for section i , under the null hypothesis of unit root, we obtain p a value for section i , under the null hypothesis of unit root for all N cross-sections. we have

$$2\sum_{i=1}^N \log(\pi_i) \rightarrow X_{2N}^2$$

Similarly, for standard normal statistics

$$Z = \frac{1}{\sqrt{N}} \sum_{i=1}^N \theta^{-1}(\pi_i) \rightarrow N(0,1)$$

where θ^{-1} is the inverse of the standard normal cumulative distribution function. We can therefore calculate the asymptotic X^2 and standard normal statistics for the Fisher-ADF and PP tests. Once the variables have been integrated of order 1, we will be able to use the panel ARDL model to analyze the long-term and short-term impact between savings and growth.

The ARDL model has three estimators: the mean group estimator (MG), the pooled mean group estimator (PMG) and the dynamic fixed-effect estimator (DFE). The usual practice of an ARDL model in panel estimation is either to estimate N separate regressions, where N is the number of groups, and then calculate the means of the coefficients, which is known as the mean group estimator (MG), or to pool the data and assume that the slope coefficients and error variances are identical, as in the fixed-effects and random-effects estimators. The MG estimator ignores the fact that some parameters may be the same from group to group, and for the pooled estimator, intercepts are free to differ from group to group, while all other coefficients and variances are constrained to be the same. The Pooled Mean Group (PMG) estimator, which involves both grouping and averaging. The PMG estimator constrains long-term coefficients to be identical, but allows short-term coefficients and error variances to differ from group to group. There are often good reasons to expect long-term equilibrium relationships between variables to be similar across groups, due to budget or solvency constraints, trade-off conditions or common technologies similarly influencing all groups $t = 1, 2, \dots, N$

the dynamic fixed-effect (DFE) estimator is very similar to the PMG and imposes restrictions on the slope coefficient and error variances to ensure that they are equal in all countries in the long term. The DFE model also restricts the speed-of-adjustment coefficient and the short-term coefficient so that they are also equal. However, the model has country-specific intercepts. The DFE model has a cluster option for estimating intra-group correlation with standard error.

To illustrate our model, let's assume a panel with periods $t = 1, 2, \dots, T$ we want to estimate an ARDL model error $(p, q, q, \dots, q)$.

$$y_{it} = \sum_{j=1}^p \gamma'_{i,j} Y_{i,t-j} + \sum_{j=0}^q \delta_{i,j} X_{i,t-j} + \mu_i + \varepsilon_{it}$$

Where $i = 1, 2, \dots, N$ = the number of countries $t = 1, \dots, T$ is the time;

j = is the number of shifts;

$X_{i,t}(k \times 1)$ the vector of explanatory variables for group i and μ_i represent fixed effects; coefficients of lagged dependent variables.

To take account of the adjustment coefficient and long-term dynamics, equation (1) is re-parameterized as follows:

$$\Delta y_{it} = \phi_i ECT_{t-1} + \sum_{j=1}^{p-1} \gamma_{ij}^* \Delta y_{i,t-j} + \sum_{j=0}^q \delta_{ij}^* \nabla X_{i,t-j} + \mu_i + \varepsilon_{it}$$

where $\phi_i < 1$ shows the existence of a long-term relationship; ECT = the error correction term;

$X_{i,t}(k \times 1)$ the vector of explanatory variables for group i ; μ_i represents fixed effects; coefficients of lagged dependent variables, γ_{ij} are scalars; δ_{ij} are vectors of coefficients.

The results of our model estimations are presented in the following section, and the data analysis is presented in the other following section

4. Presentation of Results and Discussion

4.1. Descriptive Statistics

ECOWAS countries have an average Domestic Savings of US\$9,794 with a maximum savings of 57,1060, while average GDP is 28,826.91 with minimum GDP of 24,288.76 and maximum GDP of 31,910.32. Most of the standard deviations of the variables are below the mean, indicating that the study is free of outliers.

4.2. Results and Discussion

Before estimating the model for our study, we must first test the stationarity of the time-series variables, then select the optimal lag, test for cointegration, and so on. To do this, we used the Levin, Lin and Chu (t-stat), Im, Pesaran and Shin (W-stat) test, as well as the conventional ADF test (χ^2) and the Phillips-Perron test (χ^2) following Phillips and Perron. According to Tables 1 and 2, all variables are non-stationary in level, with the exception of Foreign Direct Investment and Gross National Income. Nevertheless, all variables are stationary in difference 1. We therefore conclude that all variables are integrated of order 1, which leads us to use the ARDL model.

According to Table 3, the variables are co-integrated, so there is a long-term relationship between them.

Before estimating the model, multiple econometric tests were carried out to check stationarity, find the optimal lag, cointegration and the Hausman test.

The results in Table 4 show that savings have a significant and positive impact on long-term economic growth in ECOWAS, WAEMU and outside WAEMU, confirming

traditional theory. The table thus confirms that the more effort ECOWAS countries make to mobilize more savings, the more financial resources they will have to invest in building infrastructure, creating jobs and ultimately boosting economic growth [5-17, 35]. This result shows that membership of a currency union has no impact on the relationship between savings and economic growth, which is contrary to the theory of the optimal currency area. The result can be explained by low savings and capital volatility in the WAEMU zone.

Beside, the results in Table 4 show that gross national income has a significant and positive impact in both the short and long term, while investment has a positive and significant impact on economic growth only in the long term. The table therefore confirms that the more effort ECOWAS countries make to increase their income and mobilize more investment, the more likely they are to build more infrastructure, transform the economy by creating jobs, support businesses and ultimately increase economic growth [17-35]. Membership of a monetary union therefore has no impact on the relationship between national income and investment. However, the account balance has a significant and positive impact on economic growth in the long term and in the short term only in the WAEMU zone, thus showing that belonging to a monetary zone has an impact on the current account balance-economic growth relationship.

The table shows a significant and negative impact between foreign direct investment (FDI) and economic growth over the long term in the WAEMU zone alone, demonstrating that membership of a monetary union has an impact on the FDI - economic growth relationship. This shows that foreign direct investment has a negative impact on economic growth in WAEMU countries. This can be explained by the volatility of capital flows, the loss of control over strategic resources such as the decline in the competitiveness of local companies, the transfer of profits to the non-ECOWAS zone instead of investing them in the zone, thus failing to boost domestic savings in the zone and, in turn, undermining economic growth [1-5, 20]. On other hand the authors such as [9-19] find a positive relationship between economic growth and investment by multinational companies in the extraction and export of raw materials or commodities. However, these investments only generate income in the primary sector and government expenditure resulting from the export of natural resources.

4.3. Granger Non-Causality Test

After estimating the model, we will carry out the post estimation by testing the causal relationship between savings and economic growth using the Granger non-causality test proposed by Dumitrescu and Hurlin [28]. The purpose of the Granger non-causality test in the panel model framework is to study possible bidirectional causality between savings and economic growth. We test the hypothesis of homogeneous non-causality from a variable x to a variable y in a bivariate system. Under the null hypothesis, it is assumed that there is

no causal relationship in the Granger sense from x to a variable y for the N individuals in the sample. The alternative hypothesis, on the other hand, does not necessarily imply a causal relationship for all individuals in the panel. Two subgroups of individuals may coexist: a first subgroup of individuals for whom there is a causal relationship from x to y and a second subgroup of individuals for whom there is no causal relationship. The Granger non-causality test shows a bidirectional relationship between economic growth and savings in the ECOWAS zone. In fact, economic growth causes savings and vice versa. The results of the causality test support and confirm the results of our model estimation, demonstrating the relevance of the Keynesian and classical models in the ECOWAS zone. The results of the causality test confirm the findings of [29] and [2], who found a bidirectional relationship between economic growth and savings. Nevertheless, our study contradicts the studies of [8] and [25] who also find a uni-directional relationship between economic growth and saving.

5. Conclusion

The objective of this research was to examine an impact relationship between domestic savings and economic growth by noting the impact of membership of a monetary union on the relationship for thirteen ECOWAS countries, namely Burkina Faso, Benin, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Nigeria, Niger, Senegal, Sierra Leone and Togo over the period 2000 to 2020. This paper used the ARDL model to analyze the impact relationship between domestic savings and economic growth. The results of our study show a significant and positive long-term impact of savings on economic growth through capital accumulation and the ability to transform savings into productive investment. However, membership of a monetary union has no impact on the relationship between savings and economic growth. Our control variables such as gross national income and investment have a significant impact on long-term economic growth. However, the current account balance has a positive impact and direct domestic investment has a negative short-term impact on economic growth in the WAEMU zone. In addition, there is a two-way causality between economic growth and domestic savings, so the policy implication of this study is that policymakers in the zone should formulate and implement policies that encourage the mobilization of domestic savings, so as to have enough long-term resources to invest in their development policy and not be dependent on the outside world. And, by having sustainable, stable and inclusive growth, the more political authorities will have the incentive to mobilize more savings and invest in their development policies. ECOWAS authorities should also accelerate the process of creating a monetary union in order to take advantage of savings mobilization policies.

Abbreviations

ADB	Asian Development Bank
AfDB	African Development Bank
ARDL	Autoregressive Distributed Lag
ECOWAS	Economic Community of West African States
WAEMU	West African Economic and Monetary Union

Project administration, Resources, Supervision, Writing – original draft, Writing – review & editing

Mazama Ezzo Herbert Abbi: Data curation, Investigation, Methodology, Resources, Software

Data Availability Statement

The data supporting the outcome of this research work has been reported in this manuscript.

Author Contributions

Bamaze Tchakpi: Conceptualization, Formal Analysis,

Conflicts of Interest

The authors declare no conflicts of interest.

Appendix

Table 1. Panel unit root test.

	In level		Difference 1 st	
	LLC	IPS	LLC	IPS
Variable				
Log (Gross Domestic Product)	0.1573 (0.5625)	6.3905 (1.0000)	-3.632*** (0.0001)	-6.1501*** (0.0000)
Domestic Savings	0.1573 (0.5625)	-1.6012** (0.0547)	-5.5493** (0.0000)	
Foreign Direct Investment	-1.5733** (0.0578)	-2.1924 (0.0142)		
Current account balance	-3.9166*** (0.0000)	3.1702*** (0.0008)		-6.9917*** (0.0000)
Log (Gross National Income)	0.1397 (0.5556)	3.8851 (0.9999)	2.9427 *** (0.0016)	
Log (Investment)	0.6202 (0.7324)	3.5359 (0.9998)	-8.1084*** (0.0000)	-8.031*** (0.0000)

*** p<.01, ** p<.05, * p<.1

Table 2. Panel unit root test.

Variable	In level		Difference 1 st	
	ADF	PP	ADF	PP
Log (Gross Domestic Product)	4.8419 (1.0000)	4.8419 (1.0000)	-12.494*** (0.0000)	-12.4949*** (0.0000)
Domestic Savings	-3.1541** (0.0012)	3.1541*** (0.0012)		
Foreign Direct Investment	-3.9098*** (0.0001)	-3.9098*** (0.0001)		
Current account balance	-3.7158 (0.0002) ***	-3.7158 (0.0002) ***		
Log (Gross National Income)	1.7644 (0.9590)	1.7644 (0.9590)	-14.237*** (0.0000)	-14.2378 *** (0.0000)

Variable	In level	Difference 1 st		
	ADF	PP	ADF	PP
Log (Investment)	3.3360 (0.9993)	3.3360 0.9993		-12.9935 (0.0000) ***

*** p<.01, ** p<.05, * p<.1

Table 3. Pedroni cointegration test.

Dependent Variable: Log (Gross Domestic Product)	
	Coefficient
Modified Phillips-Perron t	2.7834*** (0.000)
Phillips-Perron t	-5.0888*** (0.000)
Augmented Dickey-Fuller t	-4.130*** (0.000)

*** p<.01, ** p<.05, * p<.1

Table 4. Estimation of ARDL model.

Variable	ECOWAS		WAEMU		Outside WAEMU	
	Long term	short term	Long term	Short term	Long term	Short term
Dependant Variable: Log(Gross Domestic Product)						
Domestic Savings	0,0006 (-0.002) ***	0.0003 (-0.521)	0.0006167 (0.059) **	7761 (-0.104)	0.0013459 (0.000) ***	-0.000717 (-0.118)
Foreign Direct investment	-0.00013 (-0.77)	0.01015 (-0.4)	-0.0013 (0.094) *	0.001309 (-0.361)	0.00193 (-0.109)	-0.002461 (-0.333)
Current account	0.00004 (-0.864)	0.00023 (-0.669)	0.0013267 (0.002) ***	-7704 (0.000) ***	-0.000989 (0.001) ***	0.0009128 (-0.389)
Log Gross National Income)	0.982 (0,0006) ***	0.333 (0.001) ***	0.9296909 (0.000) ***	0.384525 (0.000) ***	0.9735992 (0,000)	0.1846962 (-0.397)
Log (Investment)	0, 008 (-0.017)**	0.0035909 (-0.801)	0.0494448 (0.000) ***	0.0034169 (-0.87)	-0.0049374 (-0.493)	0.00824 (-0.528)

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