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Policy Mix, Convergence and Growth in ECOWAS Countries

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Abstract

This paper is just a sample template for the prospective authors of IISTE Over the decades, the concepts of This study attempts to examine the convergence of macro-economic policy variables among Economic Community of West African Countries (ECOWAS); examines the nature of convergence of macroeconomic policy variables among ECOWAS countries and analyze the impact of convergence in policy mix on growth in ECOWAS countries. This was in view of examining policy mix, convergence and growth in ECOWAS countries. The study deploys the endogenous growth framework of Solow-Swan (1956) as modified by Ramsey using the Cobb Douglas production function for both the convergence equation and growth equation. The study employed Panel Ordinary Least Square method on panel annual time-series data and analyzed with fixed-effect since a common attribute is expected from the selected countries. Panel unit root data tests were conducted in order to determine whether the series has a problem of unit-root using Dickey-Fuller. The finding of the study showed that all the selected countries diverge in their fiscal variables while they converge in monetary policy. Hence the study recommended that further studies can also conduct their research on regional basis in order to account for appropriate possibility for economic integration within the region among African countries.

Key Words: Policy Mix, Convergence, Economic Growth, ECOWAS, Regional Integration.

1. Introduction

One of the traditional concerns for economists has been to explain why some countries are rich and others are poor. During the 20th century, three main schools of thought have studied the economic growth problem. They are the neoclassical, post-Keynesian, and endogenous growth theory (or new growth theory). Among the different factors that affect economic growth, fiscal policy, monetary policy and, more precisely, public capital have been carefully studied by economists. In neoclassical models (mainly Solow (1956) and Swan (1956), long-term per capita income is exogenously determined by technological progress. In addition, the endogenous growth theory appearing in the mid-1980s (Romer (1990; 1986), Lucas (1988), and Grossman and Helpman (1991) among others) shows a positive long-term growth rate and also designs a fiscal policy that influences long-term economic growth.

The phenomenon of economic convergence between countries has been widely and empirically studied. "Convergence" as explained by Barro and Sala-i-Martin (1992) in the context of macroeconomic growth theory is the process by which developing countries "catch up" with developed countries. The idea underlying the concept of convergence is that, given the existence of decreasing returns in the use of capital and assuming equality of preferences and technology, those countries that begin with lower levels of income per capita will tend to grow more quickly (Barro, 1982).

Empirical evidence showed that good management of macroeconomic environment both monetary and fiscal policies, facilitates high levels of private and government savings, encourages private investment and attract foreign direct investments. The interplay of sound macroeconomic policies, high level of household savings, government savings and foreign direct investment eventually leads to high level and sustained economic growth as demonstrated in the experiences of the East Asian emerging economies (World Bank 1993). In most of the growth theory, fiscal policy variables are immensely contributing to growth. In any economy whose level of taxes is low whether distortionary or non-distortionary, there is tendency for such countries to suffer from huge budget deficit, The unmanaged and uncontrolled deficit is a detriment to economic growth.

Economists recommend a proper mix of monetary and fiscal policy in order to achieve sustainable economic growth and development Brunner and Alan Meltzer (1997) identified four possible outcomes for the mix of policies in an economy in which monetary and fiscal decisions are independently made. These are: loose fiscal policy combined with easy monetary policy; loose fiscal policy and tight monetary policy; tight fiscal policy with easy monetary policy; and tight fiscal policy together with tight monetary policy. coordinated stances of loose fiscal / easy money and tight fiscal / tight money are most effective when they are applied counter-cyclically. Theoretical and in line with the IS-LM framework, the panacea for an economy experiencing a recession is the simultaneously deployment of loose fiscal and easy monetary policies. This produces a large increase in output at the expense of low increase in real interest rates. In the same way, coordinated contractionary fiscal and monetary policies work best in reducing a positive output gap.

The study seeks to investigate the nature of convergence in macroeconomic policy (if any) and determine if the convergence in policy mix variable leads to growth in ECOWAS countries. The study samples five economic community of West African countries (ECOWAS) for the periods 1980 to 2010. The selected countries are Nigeria, Ghana, Sierra-Leone, Togo and Burkina Faso. This selection is based on the basis of the quality and availability of data. The rest of the study is structured as follows: Section two presents an overview of the ECOWAS sub region. Section three focuses on the review of relevant literature. Section four entails theoretical framework and research methodology. Section five discusses the results from data analysis while section six encompasses summary, conclusion and recommendations.

2.Overview of Economic Convergence in ECOWAS

The integration of West Africa made up of 15 countries is being led by the Economic Community of West African States (ECOWAS) which was created on 28 May 1975 to promote economic cooperation and regional integration. The countries of the ECOWAS region are Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo. The total population of the region in 2010 was 302.69 million. Overall, although ECOWAS has adopted protocols and policies for sustained integration, regional integration has progressed slowly (ADB /ADF, 2011).

The West African region is largely divided into two main blocks - the Anglophone, and the Francophone countries. There are two Lusophone countries. In 1994, a sub-group of 8 made up essentially of the Francophone countries (including Guinea Bissau) formed the *West African Economic and Monetary Union (WAEMU)* with a common monetary policy, which is implemented by the common central bank, the *Banque centrale des Etats de l'Afrique de l'Ouest* (BCEAO). The French Treasury guarantees the convertibility of the common currency. The WAEMU countries have been able to make more progress towards economic integration than the rest of ECOWAS. The non-WAEMU countries (except Cape Verde), are trying to form a second monetary zone, the *West African Monetary Zone (WAMZ)*. The plan is for the two monetary unions to dissolve into a single ECOWAS monetary zone. The primary macroeconomic convergence criteria established for the economic community are: 1)Budget Deficit/GDP Ratio $\leq$ 4%, 2) Inflation Rate $\leq$ 5%, 3) Central Bank Financing of Budget Deficit/Previous Year's Tax Revenue $\leq$ 10% and 4) Gross External Reserves $\geq$ 6 months of imports cover.

Economic growth in the ECOWAS region was relatively strong during the middle of the last decade. Real GDP growth was above 5 percent in 2004 and 2005, and reached almost 6 percent in 2007 before declining in 2009 as a result of the global economic crisis. Growth began to rise again in 2010 to 6.7 percent. The renewed growth in commodity prices (notably oil and minerals) has benefited natural resource-rich West African countries, and is fostering higher growth in the region as a whole. (ADB Annual Report 2010). The ECOWAS economic performance reflects improvements in macroeconomic management over 2000-2009.

Inflation was under control at less than 10% although it fluctuated because of the impact of changing weather patterns on agriculture. Fiscal discipline was mixed; both national savings and investment as a percentage of GDP were rising; and external debt was declining. In 2010, West Africa as a whole has a budgetary surplus, at 2.9 percent of GDP. The average yearly budget deficits however ranged from a high of 6.9 percent, 6.4 percent and 4.4 percent of GDP in Ghana, Guinea-Bissau, and Gambia, respectively, to an average yearly surplus of 1.7 percent, 1.6 percent and 0.5 percent of GDP in Nigeria, Niger and Liberia. (ADB Annual Report 2010). Also in 2010, West Africa's external current account position improved, with a surplus increasing from 1.4 percent to 4.6 percent of GDP. However, the major variety in macroeconomic performance poses challenges for both

integration and policy convergence (ADB Annual Report 2010).

Overall, macroeconomic policy harmonization remains weak although WAEMU show more progress than the larger ECOWAS. Over time, the performance of both blocks in most of the primary convergence criteria has generally been weak. While the Central bank financing of fiscal deficit criterion has been impressive. The WAEMU countries maintained a zero-financing stance over the entire decade. Most WAMZ countries consistently met their targets but the performance in the primary criteria has been mixed. Seven of the 15 ECOWAS countries have performed relatively well with respect to the budget deficit/GDP ratio criterion, while the others have consistently fallen short. The ECOWAS-WAEMU stronger policy convergence however remains a tremendous challenge (ADB/ADF, 2011). Note: This section has quoted copiously from the ADB Annual Report 2010. Next we present the review of the empirical literature.

3.0: Literature Review

In the review of the literature about convergence of fiscal policies, a series of studies beginning with Barro and Sala-i-Martin (1992) Coulombe and Lee (1995); Shioji (2003) among many others, find evidence of absolute and conditional β-convergence (Barro and Sala-i-Martin 1992) across U.S. states, Japanese prefectures, Canadian provinces and European regions. Javier et al (1993) used a cross section of the average values of variables over the 24 OECD countries for sample period 1960-1990, and for six sub-period using pooled data of five years averages. The human capital augmented Solow model explains reasonably well growth and convergence among OECD countries over the whole 1960-1990 periods. However, the estimated parameters are not fully stable across countries and along sub-period. Using data from 1970 to 1997, Sanz and Velázquez (2003) test whether the convergence of the composition of government expenditures is greater for EU member states than in the non-EU countries of the OECD. They find that EU member states are converging towards a different steady state composition of government expenditures and their convergence is faster than the non-EU countries of the OECD.

Arestis, Khan, and Luintel (2002) voice that the notion that a sustainable fiscal arrangement is a must for a viable monetary union. In their comparison of the Euro zone deficit with the US federal deficit, they find (i) fiscal discipline measured by fiscal convergence in most of the countries and by the achievement of 3% criteria by all Euro-countries immediately before the launch of the Euro; (ii) similar magnitudes and variability of deficit in EU and US, and (iii) that Euro-area is subject to smaller fiscal shocks than the US. Our research may also be considered as extending their results as we compare the pilgrims against the core EU members.

Quiroga (2011) who from an historical perspective, analyze convergence among 32 Latin American countries over 108 years, finds no evidence that geographical aspects nor integration processes helped countries to converge except during “the globalization phase” from 1975 to 2007. He finds strong evidence of convergence among those clubs that succeeded in industrializing and / or building good institutions. The reason may be that technology dispersion and capital accumulation is easier when these two observable facts occur.

In a survey of East, Central and Southern Africa, covering 1980 to 2007, Weeks (2008) presents an analytical framework within the standard national accounting framework, pioneered by Geda (2001). He concludes that the link between policy and outcomes are tenuous due to the fact that factors beyond the control of policymakers are so great that they create substantial gulf between policy instruments and outcomes causing bottlenecks in the actualisation of regional cohesion and balanced growth. Hammouda, Karingi, Njuguna, and Jallab (2007) investigated macroeconomic convergence in various African regional economic communities and its relationship to economic growth. The study used both sigma and beta convergence to investigate the convergence in macro economic variables in the region. They found that although, there is seemingly evidence of the tendency of macroeconomic convergence in the various African regional communities, this does not lead to expected higher growth. Only few countries converged to their initial per capita income in the convergence test.

Wane (2004) investigates convergence and dynamic effects of human and physical capital on growth, in West African Economic and Monetary Union (WAEMU) countries. Using panel data and a growth accounting model, he finds a growth-enhancing role for adjustments in literacy rates and factor accumulation. By contrast, total factor productivity has limited significance but per capita income levels are found to converge when economic policies are comparable. Richards and Nwanna (2010) in a study ECOWAS identifies the development of core

human "facilitators", as well as institutional and infrastructural convergence and compatibility in functional market structure as requisites for economic intergration which has been lacking since its inception.

Oseni and Olomola (2011) examine the analysis of convergence of fiscal variables among Sub-Saharan Africa (SSA) countries for the period 1981-2007. Using secondary time-series data and ordinary least square (OLS) econometric techniques their results showed that there were convergence in Burkina Faso, Cameroon, Nigeria, Rwanda, Sierra Leone and Uganda while there were divergence in Burundi, Kenya, Mauritius and South Africa. The examination of the influence of Policy Mix coherence in Economic Community of West African States (ECOWAS) based upon a panel dataset from 1990 to 2006 was conducted by Tapsoba, Combes, and Tanimoune, (2012). They reveal that the impact of the consistency of policy mix is dissimilar according to the stance of the economy within the four possible types of policy mix especially so in the WAEMU sample, where integration is more ingrained than in the non-WAEMU countries,

Most of the authors applied the ordinary least square (OLS) technique to estimate their models. Most of the studies reviewed focus on fiscal and monetary convergence in developed countries while studies from developing countries are scanty most especially ECOWAS countries, this study contributes to the existing literature by examining convergence in fiscal and monetary variables in ECOWAS countries. This study contributes to the body of knowledge.

4 Research Methodology

1. 4.1Theoretical Framework

Theoretically the study will employ endogenous growth model based on the Solow-Swan (1956) modifications and this is based on Cobb Douglas production function where the steady state of capital-labor ratio is in form of:

$$k^* = [sA/(n+\delta)] \quad \text{.....1}$$

It should be noted that in the general production function $f(k), K^*$ increases with the rate of savings *s* and the level of technology *A,* and reduces with the population growth rate n and the rate of depreciation δ . The steady state level of output per capita is represented by:

$$y^{\cdot} = A^{1/(1-\alpha)}.[s/n+\delta]^{\alpha/(1-\alpha)} \quad \text{.....2}$$

Thus y^* is a positive function of *s* and *A,* a negative function of n and δ . Along the transition, the growth rate of k is given from the equation by:

$$k/k = sAk^{-(1-\alpha)} - (n+\delta) \quad \text{.....3}$$

If k (0) $< k^*$, then k/k in equation 3 is positive. This growth rate declines as k increases and approaches 0 as k approaches k^* . Since equation above implies $y/y = \alpha.(k/k)$, the behavior of y/y mimics that of k/k . In particular, the lower $y(0)$, the higher y/y .

Interestingly, it is imperative to identify that when the production function is a Cobb-Douglas and the saving rate is constant, the closed-form solution for the same time path of k as in equation 3 can be written as follows:

$$k.k^{-\alpha} + (n+\delta).k^{1-\alpha} = sA \quad \text{.....4}$$

If we define $v = k^{1-\alpha}$, we can transform equation (4) to:

$$\frac{\cdot}{(1-\alpha)}.v + (n+\delta).v = sA \quad \text{.....5}$$

Which is the first-order, linear differential equation v . The solution to this equation is

$$v = k^{-\alpha} = \frac{sA}{(n+\delta)} + \left\{[k(0)]^{1-\alpha} - \frac{sA}{(n+\delta)}\right\}.e^{-(1-\alpha).(n+\delta).t} \quad \text{.....6}$$

The last-term is an exponential function which exponent equal to $-(1-\alpha).(n+\delta)$. Hence the gap between $k^{1-\alpha}$ and its steady-state value, $sA/(n+\delta)$, vanishes exactly at the constant rate $(1-\alpha).(n+\delta)$.

Furthermore, two concepts of convergence appear in the literature of economic growth across countries or regions. In one view, convergence applies if a poor economy tends to grow faster than a rich one, so that the country tends to catch up to the rich one in terms of levels of per capital income or product. This is called β-convergence. The second concepts is concerned with cross-sectional dispersion, where convergence occurs if the dispersion measured by standard deviation of the logarithm of the per capita across a group of countries or regions declines over time. This is called σ-convergence, (see Barro and Sala-i- Martins (1992).

From the growth theory, the convergence equation relating to per capita income for economy i between two points in time to the initial level of income with the random disturbance can be written as:

$$\log(y_{it}/y_{i,t-1}) = a_{it} - (1-e^{-\mu}) \bullet \log(y_{i,t-1}) + u_{it} \quad \text{.....7}$$

Where the subscript t denotes the year, and the subscript i denotes the country or region. The theory implies that the intercept, α_{it}, equals $x_i - (1-e^{-\beta}) \bullet [\log(\hat{y}_{i^*}) + x_i \bullet (t-1)]$, where $\hat{y}_{i^*}$ the steady-state level of is $\hat{y}_i$ and x_i is the rate of technological progress.

2. 4.2: Model Specification

In order to theoretically examine the effect of fiscal and monetary policy convergence on growth in ECOWAS countries, this study builds its model in line with endogenous growth model as modified by Ramsey in his framework. The study employs two equations: the convergence equation and growth equation.

4.2.1 Convergence Equation

To determine the convergence of macroeconomic policy variables (fiscal and monetary variables) among the ECOWAS countries, the study employs conditional beta convergence. According to Sala-i-Martin (1996), he argued that the neoclassical model prediction of convergence depends on the main assumption that the variations in the countries depends on the initial level of the variable in question. In reality, however, economies may differ in their level of technology, their propensities to save, or their population growth rates. If different economies have different technological and behavioural parameters, then they will have different steady state. Thus, conditional beta convergence allows testing of convergence among countries with different steady state. One way of performing this test is to hold the steady state of each economy constant by introducing a vector of other explanatory variables in the equation (Barro and Sala-i-Martin, (1992), and Mankiw, Romer, and Weil (1992). However, Pesaran (2007) argued that the conclusion of the existence of a convergence club may have spurious results, reflecting inconsistency in model structure, choice of sample period and data generation problems. Following the work of Barro and Sala-i-Martin (1996) and Islam (1995), we specify the macroeconomic policy convergence equation for a group of countries *i*=1,2,…N in ECOWAS as follows:

$$\Delta InM_{it} = \alpha_{NT} + \beta InM_{it-1} + \sum_{i-1}^{'} x_i + \varepsilon_{it} \quad \text{.....8}$$

Where *M* is the relevant macroeconomic policy variables which are fiscal deficit for fiscal policy and inflation rate for monetary policy, α and β are parameters and ε is a classical error term. The parameter β captures convergence (β<0) from short-run disequilibrium towards the steady-state, x_t captures control/explanatory variables.

Thus, for smooth international comparison, all the variables are expressed in international purchasing power parities (PPP).

4.2.2: Growth Equation

From equation (7), the growth equation can be specified as follows:

$$\log(y_{it}) = \beta_{i0} + \beta_{i1}\Delta\inf_{it} + \beta_{i2}\Delta fis_{it} + \sum_{i=1,2,\ldots k}^{'} \delta_{it}X_{it} + \varepsilon_{it} \quad \text{.....9}$$

Where y_{it} is the real growth rate of GDP for the selected countries at time t, $\inf_{it}$ is the monetary policy variable, fis_{it} is the fiscal policy variable, β's is the estimated parameters that explains whether convergence leads to growth or not. A positive sign of β shows that convergence leads to growth but the negative sign implies that convergence does not lead to growth. X_{it} is the control variables employ to augment the result of growth equation such as size of the government (population), capital formation and labour force and others.

4.3: Estimation Techniques

The study employed time series panel data which will be analyzed using both descriptive and econometric techniques. Basically, the study employs Panel Ordinary Least Square method with fixed-effect since a common attribute is expected from the selected countries. However, the study will employ panel unit root data in order to determine whether the series has a problem of unit-root using Dickey-Fuller techniques since the technique is also a convergence technique in nature. Further econometric test will be employed based on the result of the unit-root test.

4.4: Measurement of Variables

Growth rate is proxied by real GDP measured in purchasing power parities and denoted by 'y', obtained from International Finance Corporation (IFS), World Bank database (2010). Human capital development is proxied by labour force. This is also measured in purchasing power parities for international comparison and obtained from World Development Index (WDI) (2007) across the countries in Sub Sahara Africa (SSA). Non-fiscal capital is proxied by gross capital fixed investment and measured in PPP, obtained from WDI (2007). Budget Deficit/Surplus: this measure the government budget position across the countries and obtained from Government Account, IFS-World Bank database (2007). Inflation Rate: this is measured by the annual consumer price index (CPI) and obtained from Central Bank Statistical Bulletin (2010).

4.5 Source of Data

This study employs time series panel data for five countries among the ECOWAS countries for the period 1980 to 2010, making a period of thirty-one years. Data will be obtained mainly from World Development Indicators (WDI) of the World Bank, 2010, IMF World Economic outlook Database (2010) and Central Bank of Nigeria (CBN), Statistical Bulletin, 2010.

5. Data Analysis and Results

5.1 Time Series Properties of Variables Used

The time series properties of the variables used in this study were examined through Augmented Dickey-Fuller (ADF) test as explained in Engle and Granger (1987). This development arises from the prevalence of substantial co-movement among most economic time series data, which has been argued in the literature as undermining the policy implications that could be inferred from such modeling constructs (Engle and Granger, 1987). The results of the unit root test on variables are shown in table 4.1. Evidence from the table shows that fiscal deficit, real gross domestic product and population are integrated of order one I(1) at 5 percent level while inflation rate is integrated of order zero I(0). These results indicate that all the variables are I(1) series while inflation rate is I(0) series.

Table 1: Unit Root Test Results

Variables	ADF		PP		Order of Integration
	Level	1st Difference	Level	1st Difference	
FIS	2.768	-6.082	3.185	-8.965	I(1)
INFL	-4.018	-8.867	-5.692	-10.869	I(0)
RGDP	2.511	-4.642	2.665	-6.653	I(1)
GCF	4.148	-3.758	9.622	0.968	I(1)

Source: Authors' Computation 2013

5.2 Empirical Analysis of Convergence of Macroeconomic Policy Variables

In order to examine the convergence of macroeconomic policy variables in ECOWAS countries, this study employed beta convergence. The result of the beta convergence show that there is no convergence in fiscal policy variable among ECOWAS countries since the coefficient of lagged value of fiscal deficit (fiscal policy variable) is positive and statistically significant at 5 percent level. Thus, there exists a divergence in fiscal policy variable in ECOWAS countries. However, the result of monetary variable as proxied by inflation rate indicates that there a convergence in monetary policy variable in ECOWAS countries since the coefficient of the lagged value of inflation rate is negative and statistically significant at 5 percent level as shown in the table 4.2 below.

Table 2 Empirical Analysis of Convergence of Macroeconomic Policy Variables

Variables/Dependent	Fiscal Policy	Monetary Policy
dFIS(-1)	0.257(0.076)	
INFL		-0.365* (0.088)

Note: * implies that the variables are significant at 5% level.

Source: *Authors' Computation, 2013*

5.3 Empirical Analysis of nature of Convergence of Macroeconomic Policy Variables

The study employed stochastic convergence- co-integration technique to examine the nature of convergence of both fiscal and monetary policies variables among ECOWAS countries. Thus, the result of the analysis shows that monetary policy exhibits full convergence while fiscal policy shows no convergence based on the co-integration results as shown in table 4.3.

Table 3 Co-integration Results of the Nature of Convergence of Macroeconomic Policy Variables

Macroeconomic Policy Variables	Number of Co-integrating Equation	Nature of Convergence
Fiscal Policy Variable (FIS)	None	No
Monetary Policy Variable (INFL)	One	Full

Source: *Authors' Computation, 2013*

5.4 Empirical Analysis of Policy Mix, Convergence and Growth in ECOWAS countries

This study employed simple ordinary least square technique to analyze the empirical relationship between convergence of policy mix and growth in ECOWAS countries because the estimators from this technique is best linear unbiased, efficient and sufficient to explain the real life situation. The table 4.4 below shows the result of the ordinary least square technique employed. The dependent variable is proxied by RGDP while the independent variables are the policy mix variables (Fiscal and Monetary Policies variables)

Table 4 Empirical Analysis of OLS Result of Policy Mix, Convergence and Growth

Variables	Coefficients	Standard Error	t-statistic
C	-0.0501	0.0648	(-0.7735)
dFIS	2.76E-12	1.59E-12	(1.742)
INFL	-0.0004	0.0002	(-2.4512)
Log(GCF)	0.0059	0.0035	(1.6648)

Source: *Authors' Computation, 2012*

$R^2 = 0.9092$ Adjusted $R^2 = 0.8992$ F-statistic = 47113.79

Durbin-Watson 'd' Statistic = 1.7083

5.5: Interpretation of Result

The explanatory power of the model explains approximately 90 percent total variations of the growth in the ECOWAS countries as a result of employing convergence of policy mix. Thus, this result shows that the model has high goodness of fit. The value of F-statistic reveals that the model equation is statistically significant at 5 percent level implying that the model is reliable and can predict the future. The coefficient of convergence in fiscal policy variable (fiscal deficit) is positively signed and statistically insignificant at 5 percent level. This findings show that convergence in fiscal policy variable does not aid growth in ECOWAS countries. The coefficient of monetary policy variable (inflation rate) is negatively signed and statistically significant at 5 percent level, this indicates that convergence in monetary policy variable has enhanced the growth rate among ECOWAS countries. The result of the Durbin-Watson d-statistic is statistically significant at 5 percent level, implying that the model has no serial autocorrelation problem.

6. Summary, Conclusion and Recommendations

This study examined the analysis of convergence in fiscal and monetary variables in selected ECOWAS countries from the period of 1980-2010. The study some tests of convergence including beta convergence, multivariate cointegration test to determine the nature and extent of convergence of fiscal and monetary variables among ECOWAS countries. The time series properties of the variables were examined through Augmented Dickey-Fuller (ADF) test as explained in Engle and Granger (1987). This development arises from the prevalence of substantial co-movement among most economic time series data, which has been argued in the literature as undermining the policy implications that could be inferred from such modeling constructs (Engle and Granger, 1987).

The results of the unit root test on variables as showed that shows that fiscal deficit, real gross domestic product and gross capital formation were integrated of order one I(1) at 5 percent level while inflation rate was integrated of order zero I(0). These results indicate that all the variables are I(1) series while inflation rate is I(0) series.

It is evident from the results of the study that the analysis of convergence in policy mix among ECOWAS countries shows that all the selected countries diverge in their fiscal variables while they converge in monetary policy. These countries are Burkina Faso, Ghana, Nigeria, Togo, Sierra Leone and Ghana. Hence, these countries that converge in their monetary variables could form economic integration in order to foster the pace of economic development in their respective country.

The research further recommends that the countries should intensify their efforts towards reduction of external indebtedness that has imposed huge debt service payments on their economy, as this is a major source of government deficits. Additionally, the ECOWAS countries should create a good investment climate (with al low burden of bureaucracy and high quality of infrastructures) in order to encourage competition among successful locations and decentralization of decision-making process. Furthermore, the absence of macroeconomic objectives underlying the persistence of deficit should be incorporated into government fiscal policy.

References

Arai, T., Aiyama, Y., Sugi, M. & Ota, J. (2001), "Holonic Assembly System with Plug and Produce", *Computers in Industry* **46**, Elsevier, 289-299.

Bell, G.A., Cooper, M.A., Kennedy, M. & Warwick, J. (2000), "The Development of the Holon Planning and Costing Framework for Higher Education Management", Technical Report, SBU-CISM-11-00, South Bank University, 103 Borough Road, London, SE1 0AA.

Bongaerts, L. (1998), "Integration of Scheduling and Control in Holonic Manufacturing Systems", *PhD Thesis*, PMA Division, K.U.Leuven.

Deen, S.M. (1993), "Cooperation Issues in Holonic Manufacturing Systems", *Proceedings of DIISM'93 Conference*, 410-412.

Techawiboonwong, A., Yenradeea, P. & Das, S. (2006). A Master Scheduling Model with Skilled and Unskilled Temporary Workers", *Production Economics* **103**, Elsevier, 798-809.

Valckenaers, P., Van Brussel, H., Bongaerts, L. & Wyns, J. (1997), "Holonic Manufacturing Systems", *Integrated Computer Aided Engineering* **4**(3), 191-201.

Van Brussel, H., Wyns, J., Valckenaers, P., Bongaerts, L. & Peters, P. (1998), "Reference Architecture for Holonic Manufacturing Systems: PROSA", *Computers in Industry* **37**(3), 255-274.

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