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PETROLEUM TRADE AND PER CAPITA INCOME CONVERGENCE IN ECOWAS

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ABSTRACT: *This study investigated per capita income convergence in member countries of ECOWAS and the prospect of petroleum trade providing the needed catalyst to cause their per capita incomes to converge to ECOWAS average. The neoclassical growth model framework was used to examine absolute and conditional convergence among the member countries. The descriptive statistics shows that the mean value of per capita GDP in ECOWAS is $555.0; the median value is $544.8. The maximum is $1286.5 and minimum is $309.513. An inspection of the data indicates that most countries in ECOWAS had per capita income below ECOWAS average hence the need to aim at a convergence towards an average of per capita income within ECOWAS. The models specified include absolute and conditional convergence. Pedroni cointegration tests were used to test for stationarity and cointegration. The results indicate some evidence for a stationary behavior of the residuals and concluded that there exists a panel-cointegrating relationship between per capita income, non oil trade and population. Although there is evidence of absolute convergence, it did so with a slow annual speed of 1.6 per cent. But the conditional β-convergence based on non-oil trade and other variables consistently sustained the convergence with higher annual speeds ranging from 2.1 to 2.5 per cents. The study recommended that common Non-oil trade policies should consider absolute and comparative advantages of member countries in moderating rules on trade liberalization and integration process. Petroleum trade should also be encouraged in the ECOWAS sub region and there should be internal integration with each member state based on political stability, inclusiveness and equity.*

KEYWORDS: Convergence, Petroleum trade, Non oil trade.

Jel Classification: F15.

INTRODUCTION

The promotion of political and economic cooperation among countries, improvement of welfare of citizens, acceleration of economic growth and development the desire to generate income growth dynamics motivated some countries in Africa to form the Economic Community of West African States (ECOWAS) in 1973. Income distribution in a society to a large extent dictates political, social and economic relationships and therefore the stability of society. This is replicated among countries and greatly complicates regional integration process and therefore each country feels threatened by the economic standing of its partners.

Therefore it is imperative to seek for evidence on the progress and prospects of the ECOWAS regional integration by assessing the level of per capita income convergence of ECOWAS member countries. The thrust of this study therefore, is to investigate the level of per capita income convergence through petroleum trade as the basis of harmonious integration in the Economic Community of West African States (ECOWAS).

Petroleum plays a very important role in the economics and politics of every Country. The reasons explaining the relative importance of oil is several. Oil has been the dominant fuel used

around the world to provide energy for many decades. Its use is a key ingredient of economic growth-particularly in the crucial transportation sector where there is no significant competition for petroleum fuels. Indeed oil-based products accounts for a significant proportion in the global transportation sector's fuel consumption. In addition, oil is also used as a raw material in the manufacturing and industrial sectors; for heating in the residential and commercial sectors among others.

Statement of Problem

Available statistics show that among Countries of ECOWAS, there are widespread disparities, in terms of economic development, as measured by per capita income. In particular, over the years these Countries have been characterized by decline and in some instances stagnation of per capita GDP. However, some of them have experienced a surge in growth. This indicates divergence, and means that some Countries are escaping from poverty, while others are trapped and therefore, creates a trauma in the integration process. This diversity which is measured by per capita income of member Countries motivates this study to try to shape growth processes in the sub region jointly.

Given the 40 years of its existence as at year 2015, it is not clear the extent of regional integration achieved so far and the impact of petroleum trade on per capita income convergence. Oil is strategic to development as an important source of energy. Nigeria is a major oil exporting Country while most other Countries are oil importing Countries in the sub region. Our thesis is that oil export can provide the needed catalyst action to stimulate trade among member Countries and cause their per capita income to converge to the ECOWAS average.

Objectives

The main objective of this study is to examine petroleum trade on per capita income convergence in the ECOWAS sub region.

Specifically, the study aims to investigate the level of per capita income convergence among ECOWAS countries; and to examine the prospects of petroleum trade in promoting convergence in per capita income in ECOWAS

The study considers two operational null hypotheses that there is no convergence of per capita incomes among ECOWAS countries; and that Petroleum trade does not promote convergence in per capita income in ECOWAS countries.

This study focused on the prospects of Nigeria's petroleum exports to the ECOWAS sub-region assisting in promoting convergence of per capita income to the ECOWAS average in the period 1980-2015. This is premised on the fact that the flow of capital between Countries is suggested as the primary instrument closing a given per capita income gap and leading to beta and sigma convergence.

This study is significant because the large contemporary differences in per capita income across Countries have enormous welfare implications. Therefore, differences in per capita income across Countries play a critical role in explaining levels of poverty and inequality across the world's population. The study also contributes to various research and analytical studies on convergence theory. The findings provided some insights for strategic policy options for member Countries of ECOWAS. Also, researchers and scholars would use the findings and

conclusions of this study as a reference material for further research on the subject or related subject matter.

The study is organized in six sections. Section one is the Introduction. Literature review and Theoretical Framework are presented in section two. Section three presents the Method of Study while section four is Data Presentation, Analysis and Interpretation of findings according to research hypothesis raised in the study. Finally, section five provides the Summary, Recommendations and Conclusion.

LITERATURE REVIEW

Several studies discovered that the effect of integration on regional trade in the ECOWAS sub region has been unsatisfactory, as the majority of the objectives of the regional trade integration in this sub region have not been realized (Iqbal& Khan in Ezekwesili (2011); Torre and Kelly and Foroutan in Ezekwelisi (2011); Ogunkola (1998); Rose (1997). In contrast, other studies (Deme 1995; Foroutan and Pritchett 1993; Velde D.W 2006; Gasiorek and Holmes, 2008) finds that the impact of ECOWAS on trade flow of its member Countries is positive and that regional integration has succeeded in increasing trade flow between several members of ECOWAS.

The mixed conclusions particularly on ECOWAS countries are simply an indication that the effect of regional integration on intra-ECOWAS trade is not as strong as leaders of member states hope for.

One fundamental question that is often asked in the economic literature on integration is to know whether economies tend to converge towards the same levels of income or production per capita. In order words, whether there exist a mechanism that allows a given Country to catch up with the levels of per capita income of a more developed economy.

Jones (2002) in his study show that ECOWAS countries form a convergence club, that is, the tendency for per capita income to converge and a diminution of the standard deviation of per capita income over time. Dramani (2010), showed that the convergence process, and hence integration has not been carried out uniformly in the Franc Zone. Further, the conditional convergence approach, which used similarities related to productions and those related to natural advantage highlight the presence of a convergence club. The study found a period – related convergence in the cotton – producing countries coffee – producing countries and coastal Countries and no convergence in most periods in the study.

Charles A., Oliver D. and Jean-Francois H. (2010) examine absolute and conditional convergence within the common market of Eastern and Southern Africa (COMESA) Countries during the period 1950-2003. Using several panel unit root tests the results show the absence of any stochastic absolute and conditional convergence for the whole COMESA. The results further show that most of the countries of COMESA are locked into a sustained poverty trap process. By implication, the results suggest that convergence process towards the bottom is at work for the COMESA members, except of course Seychelles, Egypt, Libya and Mauritius.

Udah and Nyong (2011) investigates the prospects for systematic and robust tendency for convergence of real per capita income within ECOWAS member states for the period 1969-

2010 using a battery of econometric tests. The results do not reveal the presence of any absolute or conditional β-convergence in income per capita nor any diminution of income disparity in the sub region corresponding to α-convergence**.**

The existing evidence on trade and international income differences is mixed. Bernard and Jones (1996) provide some evidence that freer trade diverges income across countries, Ben-David (1993, 1996) and Sachs and Warner (1995) present evidence linking trade to income convergence.

Theoretical Framework

Most early theories of regional economic growth were spatial extensions of neoclassical economic theories of international trade and national economic growth. Together, these early neoclassical theories predict that over time, differences in the price of labor and other factors across regions will diminish and tend toward convergence. This prediction has generated considerable controversy among theorists, particularly in light of the apparent tendency toward international divergence between the per capita incomes of industrialized nations and less developed nations. Heckscher (1919) and Ohlin(1933) demonstrate that a factor-abundant region will have a comparative advantage in the production of goods that require the intensive use of that factor. Samuelson (1953, 1949, 1948) elaborates on the Heckscher-Ohlin result to demonstrate how free trade and/or factor mobility equalizes the relative and absolute long-run prices of factors of production among regions involved in trade.

The HOS theorem also has obvious implications for regional trade and development. In its simplest form, the model suggests that specialization in factor-abundant production combined with free interregional trade will result in equal per capita incomes across regions for workers with similar skills. This hypothesis is a comparative statics version of the interregional convergence hypothesis. Dynamic versions of the convergence hypothesis draw on neoclassical growth theory, particularly the models proposed by Solow (1956) and Swan (1956).

Convergence theory is based on the neoclassical growth model (Solow, 1956; Swan, 1956) and implies a tendency over the long term to level the rate of income growth or that of per capita production in different geographical zones. The model suggests that economies with similar rates of population growth and technological progress should exhibit similar levels of per capita income in the long run, regardless of their initial capital stock. During the adjustment to steady state, Countries with a lower capital stock will grow faster than those with higher capital stock. This is known as the convergence hypothesis.

The concept of convergence, even in its weaker formulation as long-run constant per capita income growth rates, or conditional convergence, has come under attack from many sides. One criticism is largely empirical. Although empirical studies (Perloff et al. 1960; Williamson1965) supported a trend toward economic convergence at the regional scale, at least in the United States, critics pointed to the persistent poverty in most LDCs as evidence that some regions of the world were not conforming to the predictions of the neoclassical growth models.

Another criticism focuses on the unrealistic assumptions underlying neoclassical growth theories, particularly those having to do with the assumption of constant returns to scale, zero transportation costs, identical production technologies across regions, perfectly competitive

markets, identical preferences across regions, and the assumption of homogeneous labor and capital inputs. One response to the convergence critique has been to directly incorporate a prediction of divergence into extant theories of regional economic growth.

The study is anchored on the neoclassical theory and theories of trade. These theories are anchored because of their relevance in the model specification. Specifically, the neoclassical theory remains a basic reference point for the literature on growth and development. It implies that economies will conditionally converge to the same rates of savings, depreciation, labour force and productivity growth. Also, income convergence across Countries is widely interpreted as a test of the Solow (1956) neoclassical model. Thus, the Solow-Swan neoclassical model is the basic framework for the study of convergence across Countries.

The idea of catch-up presumes that cooperation which takes place between Countries in a regional integration framework would enable poor Countries reach the level of incomes already attained by the richer Countries that they are cooperating with. In Africa, despite some progress of integration, the income convergence is still very low.

Indeed the ECOWAS sub region is in need to catch-up with other regional blocs of the developed world and emerging markets. Searching through the literature, empirical investigation on the extent of integration with respect to trade in petroleum vis-à-vis convergence of per capita income in the ECOWAS sub region has been scanty and near nonexistent. This study therefore aims to fill this gap.

RESEARCH METHODOLOGY

Research Design

The research design adopted in this study is descriptive and quantitative. The model estimation is based on the method of panel least squares. Stationarity and cointegration test are carried out. Stationary test assures non spurious mechanism results while cointegration captures equilibrium long run relationships between (cointegrating) variables. Fixed effect model is used to take care of omitted variables relevant to the study.

Data for this study is secondary in nature and were obtained from various sources: ECOWAS handbooks and Statistical bulletins, Econstat, World Bank, Energy Information Administration (EIA) and other published materials over the period 1980-2015. A prerequisite for the collection of industrial and other statistical data in any Country is a list of business enterprises and establishments, which ideally should be as comprehensive and up-to-date as possible. However, because the preparation of such lists is time consuming and expensive, they may be updated only at long intervals (UN Statistical Division, 2011). This is one major limitation of this study as data for some variables are not comprehensive and up-to-date.

Model specification

The variables included in this study are non-oil trade and petroleum trade. According to the interregional convergence hypothesis, trade and investment should eventually lead to the equalization of wages across regions and the equalization of per capita income across regions with equal labour participation rates, skill levels and investment levels. The main variable in use is GDP per-capita income prevailing in different Countries included in our study.

Absolute Convergence:

The model for absolute β-convergence as specified by Udah and Nyong (2011) and Mathur S.K (1998) is as follows:

$(1/T)Ln(y_{i,t}/y_{i,o}) = \alpha + \beta Ln(y_{i,o}) + \varepsilon i$ ----------(3.1)

$\beta<0$

Where

$y_{i,t}$ = per capita income of Country i at time t,

$y_{i,0}$ = per capita income of Country I at time 0

T = length of period of study

α = a constant term

β = convergence coefficient

εi = random error term

Equation (1) is re-specified as follows:

$YTR = \alpha + \beta_1 ln(YXTR) + \varepsilon_1$ ----------(3.2)

Where

YTR = $(1/T)Ln(y_{i,t}/y_{i,o})$

YXTR = ($y_{i,o}$) which represents initial incomes of ECOWAS.

If the various economies have different steady-state positions, other explanatory variables are added to equation (1) to make it a conditional convergence model. Since this work seeks to examine the prospect of petroleum export as a catalyst to ECOWAS convergence, equation (1) is modified to include ECOWAS intra- trade and petroleum trade (imports and exports).

Conditional Beta Convergence

Conditional convergence is estimated on the basis of a multivariate regression analysis, with initial income and a set of "conditioning variables that are supposed to determine the long-run income level as explanatory variables i.e

$(1/T)Ln(y_{i,t}/y_{i,o}) = \alpha + \beta Ln(y_{i,o}) + \alpha_1 LnTOTR + \alpha_2 LnIMPTR + \alpha_3 EXPTR + \varepsilon i$ ----------(3.3)

$\beta<0, \alpha_1>0, \alpha_2>0, \alpha_3>0$

Where

TOTR = Intra-ECOWAS total trade

IMPTR = Petroleum imports of member Countries of ECOWAS

EXPTR = Petroleum exports to member Countries of ECOWAS

$Y_{i,t}$, $y_{i,o}$, T, α and β are as defined in equation (1) and YTR and YXTR are as defined in equation (1.1)

The Data

The dependable variable of this study is the level of GDP per capita (as a measure of growth) and the independent variables in this study are initial income, intra-ECOWAS trade and petroleum trade. Trade and international factor mobility plays a certain role in the convergence process. In the standard neoclassical model, this is due to the fact that factor mobility makes it easier for capital to flow to capital-scarce Countries, in order to benefit from higher return.

Framework of Analysis:

The Panel cointegration tests:

This technique employs the residuals of the long-run model (for a panel of N countries and T time observations. These residuals can be computed from the hypothesized cointegrating regression (Pedroni, 1999). In the most general case, this may take the form

$$y_{it} = \alpha_i + \beta_{1i}x_{1i,t} + \beta_{2i}x_{2i,t} + \ldots.. + \beta_{Mi}x_{mi,t} + \varepsilon_{i,t} \text{ ----------} \quad (3.5)$$

$t = 1,\ldots, T; I = 1,\ldots.., N; m = 1,\ldots\ldots M$

Where:

T = the number of observations over time;

N = the individual members in the panel, and

M = the number of regression variables.

α = individual effects

In general, cointegration estimates the long-run relationships. The term $\varepsilon_{i,t}$ estimates the deviation from the modeled long-run relationship. If the series are cointegrated, this term is a stationary variable. In other words, we establish stationarity by showing that $\rho<1$ in:

$$\varepsilon_{it} = \rho_i\varepsilon_{it-1} + u_{it} \text{ ----------} \quad 3.7$$

The null hypothesis, associated with Pedroni's test procedure, is that $\rho = 1$. In other words, the null hypothesis is equivalent to testing the null of nonstationarity (no cointegration) for all i (Countries) although the alternative hypothesis for the between-dimension and within-dimension based panel cointegration tests differs. The alternative hypothesis for the between-dimension based statistic is $\rho < 1$ for all Countries where a common value for $\rho_i = \rho$ is not required. For within-dimension based statistic the alternative hypothesis is $\rho_i = \rho < 1$ for all countries and assumes a common value for $\rho_i = \rho$

Pedroni (1999) provides a total of seven tests of the null of no cointegration, of which four involve pooling on the within-dimension (panel tests) and three on the between-dimension (group mean tests).The tests take autocorrelation into consideration for both panel tests and group mean test. The three Pedroni "combining" (between-dimension) tests are:

1. Group rho-stat (p-statistic): combining the Phillips-Perron rho-statistic;
2. Group PP t-stat (non-parametric): combining the Phillips-Perron t-statistic;

3. Group t-stat (parametric): combining the ADF t-statistic.

The "pooled" (within-dimension) Pedroni tests are based on four unit root statistics:

4. Panel variance ratio (v-statistic): based on Phillips and Ouliaris (1990) long-run variance ratio statistics for time-series;
5. Panel rho-stat (p-statistic): based on Philhips-Perron rho-statistic;
6. Panel PP t-stat (non-parametric): based on Phillips-Perron t-statistic;
7. Panel t-stat (parametric): based on the ADF t-statistic.

Of all these test statistics for data sets with small T (T< 100), the group ADF test performs best, followed by the panel ADF test, the panel variance test and group rho test performs poorly. Pedroni's within-dimension cointegration tests are statistics based on common autoregressive coefficients in corresponding unit root for different Countries (panel cointegration tests). Between-dimension cointegration tests are simply averages from individual tests for different Countries (panel group cointegration tests).

Panel Fixed Effect Model

A fixed model assumes that differences across Countries can be captured into differences in the constant term.

The equations for the fixed effects model as adopted by Torres-Reyna (http://dss.princeton.edu/training/) are as follows:

$$y_{it} = \beta_1\chi_{it} + \ldots + \beta_k\chi_{kt} + \alpha_i + \mu_{it} \quad \text{.................................... (3.12)}$$

Where

- αi (i=1….n) is the unknown intercept for each entity (n entity-specifc intercepts).
- y_{it} is the dependent variable where i=entity and t=time.
- χit represents one independent variable,
- χ_{kt} represents other independent variables
- $\beta 1$ is the coefficient for that independent variable,
- β_k the coefficients of other independent variables
- μit is the error term.

The key insight is that if the unobserved variable does not change over time, then any changes in the dependent variable must be due to influences other than these fixed characteristics (Stock and Watson, 2011).

PRESENTATION AND INTERPRETATION OF RESULTS

Results of the Descriptive Statistics

Descriptive Statistics

Table 5.1 presents some descriptive statistics on the variables used in the study.

	YXTR(Per capita income growth)	TOTR (total intra-ECOWAS trade)	EXPTR (export of petroleum)	IMPTR (import of petroleum)
Mean	13577.82	5388552.81	23.909	4.590975
Median	12863.14	1719694.59	13.34250	2.542430
Maximum	20982.63	19534069	82.01400	19.62300
Minimum	7831.51	1719694.59	6.627000	1.479000
Std. Dev.	3841.290	5191433.296	21.41511	4.749302

Source: Author's computation

As shown in table 5.1 above, the mean value of per capita income growth in ECOWAS is $13577.8. This is higher than the median value ($12863); this indicates that most Countries had GDP per capita under ECOWAS average. The maximum level of income in the sub region is $20982.63. This is 2.7 times higher than the minimum level of income ($7831.51) and 1.5 times higher than the mean. This gives a range of $13151.12. This indicates a very wide gap between the ECOWAS Countries income and may have implications on the weak economic integration of this regional bloc. Hence absolute convergence will be difficult. The average difference between the observed values and the mean as shown in the standard deviation is 3841.290.The data is positively skewed indicating that the mean is greater than the median. These results however, are influenced by the great amount of income growth particularly of Cape Verde.

With respect to intra-ECOWAS trade, the mean value is $-516478. This is higher than the median value of $5388552.81 and the median is $1719694.59. The minimum intra-ECOWAS trade is 1719694.59 while the maximum is 19534069. The standard deviation is 5191433.296. With respect to petroleum export, the mean value is $23.909. This is higher than the median value of $13.342. The maximum is 82.014 while the minimum is 6.627. The standard deviation is 21.415. In the case of petroleum import the mean value is $4.590. This is higher than the median value of $2.542. The maximum is 19.623 while the minimum is 1.479. The standard deviation is 4.749.

Panel Cointegration: Pedroni tests

Table 5.2: Panel cointegration tests

	Statistic	Prob	Weighted stat	Prob
Alternative hypothesis: Common AR coefs (within-dimension)				
Panel v- statstic	***11.82276***	***0.0000***	***11.82276***	***0.0000***
Panel rho-statistic	2.196716	0.0357	2.196716	0.0357
Panel pp-statistic	***-0.872580***	***0.2726***	***0.872580***	***0.2726***
Panel ADF-statistic	***-01038-18***	***0.2395***	***-1.010388***	***0.2395***

Alternative hypothesis: Individual AR Coefs. (between-dimension)

Group rho-statistic	2.654985	0.0118
Group PP-Statistic	***-0.723553***	***0.3071***
Group ADF-Statistic	***-0.879166***	***0.2711***

Source: Author's calculations based on Eview

From table 5.2, five tests out of seven reject the null hypothesis of no cointegration between the level of GDP per capita, investment and petroleum trade (null hypothesis is rejected if the statistics has a statistically significant negative value; v-statistics is an exception: in this case the null hypothesis is rejected, if the statistics has a statistically significant positive value). The results obtained lead to the conclusion of cointegration between the variables GDP per capita income, non oil trade and petroleum trade. Therefore, there is a long-run relationship between the level of GDP per capita and non oil trade and petroleum trade. This also indicates convergence. However, the existence of cointegration by itself does not predict convergence. The divergent and contradictory nature of empirical evidences presented to date suggest that cointegration of economic variables and convergence may not be straightforward as is often assumed. Information about such features can be provided by the coefficients (Hendry and Juselius, 2000). We therefore utilize the coefficients to examine absolute and conditional convergence. The model includes fixed effects that are not shown on the tables.

Results of the Absolute & Conditional Convergence of Per Capita Incomes in ECOWAS Countries.

Table 5.3 Results of Absolute Convergence of Per Capita Income.

Dependent variable (YTR)

Method: Panel least square

Variable	**Coefficient**	**Standard error**	**t-statistics**	**Probability**
Constant	9.258411	0.0551	167.8473	0.00
Log YXTR	2.9136	0.56916	5.1190	0.00

Adj. R-squared = 0.4565,

DW = 0.114876

F. statistics = 26.2050

Source: Author's computation

To obtain absolute β-convergence estimates for per capita income convergence among ECOWAS countries, we run a cross sectional regression of per capita income growth on initial income holding other variables constant. The result is presented in table 5.3. It shows that the coefficient of β was positive (2.91) and was significant at 1 percent level of significance. The *a priori* condition for existence of β convergence is that the coefficient of β, must be negative and significant. Since our result reveals a positive and significant β coefficient we therefore

conclude that there is no absolute β convergence of per capita income among ECOWAS countries. This result agrees with some studies that convergence does not hold (Udah and Nyong 2011; Charles, Oliver and Jean-Francois 2010).. The R^2 adjusted is 0.46 showing that about more than 46 per cent of the growth in per capita income (YTR) was explained by log (YXTR). F-statistics of 26.7 shows that the variable is statistically significant. DW-statistics is 0.11 indicating existence of autocorrelation.

Given that there is no convergence from the results above, we examine if trade in non oil and oil can cause per capita income convergence in the sub region. Conditional convergence permits us test for the existence of a channel through which the per capita GDP growth of the countries can converge. Conditional beta convergence would be a better empirical exercise because it reflects the convergence of Countries after we control for differences in steady states. It may be not out of place to confirm that conditional convergence is simply a confirmation of a result predicted by the neoclassical growth model: that countries with similar steady states exhibit convergence. Trade (non oil and oil) within the 14 member Countries of ECOWAS were considered between 1980 and 2015 and were introduced into the model.

Table 5.4: The Results of Conditional Convergence, Non Oil Trade and Petroleum Trade and Investment

Dependable variable (YTR)

Method: Panel least square

Variable	Coefficient	Std error	t-statistics	Probability
C	0.107823	0.536135	0.201112	08422
Log (TOTR)	-0.64350	0.67338	-0.955619	0.3484
Log (IMPTR)	0.178507	0.064835	2.753259	0.0108
L0g (EXPTR)	0.189029	0.63259	2.988180	0.0062
Log (YXTR(-1))	-0.953457	0.030600	-31.15846	0.0000

R^2 Adjusted = 0.993942

F- Statistics = 1190.4

DW = 1.551523

Source: Author's computation

Conditional convergence is investigated with the addition of log of non oil trade, log of petroleum import and export as shown in table 5.4. The result shows that the coefficient of log of initial per capita income (lagged) is negative (-0.953) and statistically significant. These results corroborate evidence in favour of conditional convergence and conform with studies by Lee and Smith (1995) and Katila (2004). The coefficient of the log of non oil trade (TOTR) is negative (-0.0643) and is statistically insignificant. This also indicates that non oil trade does not have a significant effect on per capita income convergence and is in conformity with the

study by Ben David (1993). The coefficient of log of petroleum import (IMPTR) is positive (0.179) and statistically significant. Also, the coefficient of log of petroleum export is positive (0.189) and statistically significant. Therefore results obtained from petroleum import and export implies that oil trade can boost per capita income convergence.

R^2 adjusted is 0.99, showing that about more than 99 percent of growth in per capita income (YTR) was explained by log (TOTR),log (IMPTR), log (EXPTR) and (YXTR-1) only about 1 per cent was unexplained which is captured by the error term. However, there is the presence of multicollinearity between petroleum exports and imports. But what is important is that we are not using it for prediction but for policy option hence the decision to report it the way it is. F-statistics of 1190 shows that the variables as a group were statistically significant. DW-statistics was 1.6 indicating existence of autocorrelation.

SUMMARY, RECOMMENDATIONS AND CONCLUSION

The major findings of this work are summarized below:

i. High level of petroleum trade favours per capita income growth in ECOWAS sub region.

ii. Non oil trade does not contribute positively to the growth of ECOWAS per capita income.

iii. There is conditional convergence β-convergence of per capita income among member Countries of ECOWAS which may cause per capita incomes to convergence to the ECOWAS average in the long run.

iv. The method of study used in this study confirms that per capita incomes of ECOWAS Countries is convergent.

Recommendations

Different methods and variables have been used to examine the topical issue of per capita income convergence in ECOWAS in previous studies. These works however show that per capita incomes either convergence or diverge. In this study we introduce non-oil and oil (petroleum) trade to examine per capita income convergence. Based on our results we recommend that:

i. Non-oil trade should be explored as a source for convergence of per capita income.

ii. Petroleum trade should also be encouraged in the ECOWAS sub region.

iii. There should be internal integration with each member state based on political stability, inclusiveness and equity.

iv. Other methods of study should be employed to examine the convergence hypothesis as different methods bring different results on convergence or divergence.

Conclusion

The study is an attempt to understand and re-examine the conditional convergence process in ECOWAS. Our theoretical model used growth in per capita income as the dependent variable while non oil and petroleum trade as independent variables. The results however showed that there is no absolute convergence but convergence exist using non-oil trade variable. ECOWAS regional trade integration also remains low which also affects per capita income convergence. In particular, unrecorded trade in petroleum and smuggling activities in the sector persists in the sub region which put in doubt the realization of effective integration. Therefore, in order to foster per capita income convergence, as well as macroeconomic stability, ECOWAS countries need to step up their efforts in favour of regional trade integration. Tariffs have to be effectively minimized if not eliminated in the areas where it is well pronounced.

Suggestions for Further Studies

For further research, conditional convergence can be tested using cross sectional data in pertinent growth factors like corruption perception indices, social capital, trust variables, rule of law index and formal and informal rules governing the society, among others. It will be interesting to find out the speed of conditional convergence by including such variables in the per capita income growth equation.

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