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NEOCLASSICAL GROWTH CONVERGENCE MODELLING IN ECOWAS COUNTRIES

Wycliffe Mugun
Department of Economics, Kaimosi Friends University, Kenya

ABSTRACT
The notion of convergence amidst countries in relation to GDP per capita is presently a common query of economic thinking, this convergence hypothesis is grounded on the neoclassical growth models. For these models the convergence will transpire when a poor nation have a tendency to catch up with the per capita income of the rich country in the long term. Absolutely it's through the opening that the convergence process is instigated and eventually curtails the disparities of income distribution among countries. Nonetheless, due to the fact that there are limited scholarly works on economic growth convergence other studies test convergence of inflation and health expenditure convergence and numerous studies indicate divergent opinions on the convergence of economic growth. For this reason, it is not clear whether or not economic growth among ECOWAS countries converges or diverges. The main objective of this study was to examine the neoclassical growth convergence modelling in ECOWAS states. This study was anchored on the Solow Neoclassical Growth theory. The study concluded that the catching up process is conditional and not unconditional. This advocates that income variations between ECOWAS member states has been deteriorating over time after regulating for inconsistencies in the steady states. The study recommends that enhancement of physical capital such as infrastructure is crucial to shrink income difference in ECOWAS countries and further, maintaining an exchange rate regime that boosts competitiveness of exports is equally important. Care should also be taken to maintain low inflationary pressures among the ECOWAS partner states.
KEY WORDS: *Conditional Convergence, Economic Growth, ECOWAS Countries*

1.0 INTRODUCTION

1.1 Background of the study

The theoretical foundation of the concept of income convergence is the neoclassical growth models, explicitly the Solow (1956) model. Neoclassical growth models hypothesizes that economic growth is a product of technical progress, accumulation of capital and labour.The idea of income convergence is drawn from the hypothesis of decreasing marginal returns to capital. This hypothesis causes economic growth process to reach the long run level where income per capita, stock of capital and consumption grow at the same constant rate leading to the equalization of the rate of technical progress that is exogenously determined,(Nyokabi,2017).There are two notions of convergence that are associated with the Solow (1956) model. First is the unconditional convergence which asserts that if countries are identical, then they will eventually converge to a steady state level if income that is common. This implies that economies that are poor will grow more rapidly compared to rich ones until their growth rates and standards of living are equalized.

Second, it is the concept of conditional convergence which states that if the economies are further away from their long-run levels, they will tend to grow at a faster rate. For conditional convergence to occur, factors determining the long-run level of income like savings and population growth have to be controlled for, after which those countries that are poor will grow at a faster rate than richer ones,(Nyokabi,2017).Barro(1991),Weil,Mankiw and Romer(1992) are the scholars who explored primarily the hypothesis of convergence.Additionally,they pursued to comprehend whether destitute areas that are impoverished would persist so for the numerous generations or whether they are capable of closing the income fissure with the more affluent regions. Also, Barro (1991) observed examinations exhibited that following pertinent of the control variables prologue case in point; human capital, correlation was negative amid per capita income as well as the preliminary magnitudes of income in addition to the succeeding rates of growth for the selected nations. This negative link amidst the original degree of growth rate as well as the income per capita is the conditional convergence notion.Reserachers that comprised of Salai-I-Martin and Barro (1992) and Mankiw *et al* (1992) furthermore conducted the unequivocal construction of the conditional convergence.

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Besides, this inquisition affirms that the model of Solow did not surmise that the entire nations would converge to the identical extent of per capita income. Alternatively nonetheless, studies concluded that respective nation will reach at its stable state individually. Likewise the concept of conditional convergence was established by the academic works case in point; Sevilla, Bloom and Canning (2002) as well as Salai-i-martin and Barro (2004).The convergence theory moreover, amid nations in relation to per capita gross domestic product is presently an ordinary query of the philosophy of economics, this postulate of convergence is grounded on the simulations of neoclassical growth. Notably, in place of these simulations convergence would transpire as soon as an impoverished nation has an inclination to catch-up with the income per capita of the more affluent states in the long run eventually.Wahiba (2015) asseverates that certainly it is via the inaugural that the procedure of convergence is instigated in addition it diminishes ultimately the variations of income allocation amidst the states.

2.0 LITERATURE REVIEW

2.1 Introduction

In this section, both theoretical and empirical literature on conditional economic growth convergence is reviewed. The first section reviews the theoretical framework on economic growth convergence. The second section reviews academic works conducted on the subject, and the final section tackles with the critic of the literature.

2.2 THEORETICAL FRAMEWORK

2.2.1 Theoretical Framework

The theoretical frameworks that has been engaged in this examination is the Neoclassical growth postulate, precisely the Solow model of (1956) growth to elucidate economic growth convergence in ECOWAS nations.

2.2.2 The Neoclassical growth theory

In this segment advancement has depended immensely on Nyokabi (2017) as well as Acemoglu (2007) nonetheless with amendments. Furthermore the theory of neoclassical growth acquiescence that there is a proclivity of income per individual converging to a stable state. In conventional circumstances, delightfully convergence materializes once the states which are impoverished develops more rapidly than their affluent fellow states so that those that are penniless are able to catch up with the wealthier nations in the long term. Concept of convergence, in this scrutiny was a derivative of the Solow (1956) gross domestic product simulation.

$$\log \tilde{y}_T = e^{\lambda T} \log \tilde{y}_0 + (1 - e^{\lambda T}) \log \tilde{y}_0 \quad \text{.....(3.20)}$$

Equation 3.20, cannot be empirically estimated since data on labour-effective per capita income(y) are not accessible, it has to be written in terms of per capita (y).Since $y_t = y_t / A_t$

$$\log \frac{y_T}{A_T} = e^{\lambda T} \log \frac{y_0}{A_0} + (1 - e^{\lambda T}) \log \frac{y_0}{A_0} \quad \text{.....(3.21)}$$

That is to say:

$$\log y_T = gT + (1 - e^{\lambda T}) \log y_0^* + e^{\lambda T} \log y_0 \quad \text{.....(3.22)}$$

Where use has been made of the fact that $A_T = (1+g)^T A_0$ and therefore

$\log A_T = T \log(1+g) + \log A_0 \approx T_g + \log A_0$ .Subtracting $\log y_0$ from both sides yields:

$$\log \frac{y_T}{y_0} = gT + (1 - e^{\lambda T}) \log y_0^* (e^{\lambda T} - 1) \log y_0 \quad \text{.....3.23)}$$

The left handside of the equation 3.23 is the per capita income growth rate of over the whole (0,T) time period. Therefore, dividing by T, the outcome, $\frac{1}{T} - \log(y_T / y_0)$ is the average annual per capita income growth rate during the period, that is:

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$$\frac{1}{T}\log\left(\frac{yT}{y_0}\right) = g + \frac{1-e^{\lambda T}}{T}\log y_0^* + \frac{e^{\lambda T}-1}{T}\log y_0$$ ……..(3.24)

Since $g + \left[(1-e^{\lambda T})/T\right]\log y_0^*$ and $(e^{\lambda T}-1)/T$ are both constant, let:

$$g + \frac{1-e^{\lambda T}}{T}\log y_0^* = \alpha$$ ……...…..(3.25)

$$\frac{e^{\lambda T}-1}{T} = \beta$$ <0 is the convergence parameter…….….(3.26)

Therefore equation 3.24 can be rewritten as follows:

$$\frac{1}{T}\log\left(\frac{yT}{y_0}\right) = \alpha + \beta\log y_0$$;β<0……..…(3.27)

$\frac{1}{T}\log\left(\frac{yT}{y_0}\right)$ is the growth rate of y in the interval (O,T)

Thus for cross section of n countries (i=1.2….N) with the same long run equilibrium,

The regression

$$\frac{1}{T}\log\left(\frac{y_i,T}{y_i,0}\right) = \alpha + \beta\log y_{i,0} + \varepsilon_{i[0.T]}$$ ……..……..(3.28)

Where $\varepsilon_{i[o,T]}$,should produce an estimate $\hat{\beta}$ <0. $\varepsilon_{i[o,T]}$ is a random error term. Rendering to equation 3.28, nations with a greater income per capita have a growth rate that is reduced. Equation 3.28 gives the theoretical model upon which economic growth convergence of the ECOWAS countries is based.

2.3 Empirical Literature

2.3.1 Conditional Convergence of Economic Growth

Jalloh (2014) evaluated income convergence and regional economic integration in Economic Community of West African countries. The research exploited two techniques explicitly conditional as well as sigma beta convergence. Nations that were encompassed in the enquiry were Togo, Sierra Leone,Benin,Cape Verde, The Gambia,Liberia,Guinea,Burkina Faso,Mali,Niger,Coted Ivoire,Senegal,Nigeria,Guinea Bissau and Ghana. Sigma convergence regression findings confirmed no convergence in income per capita, nevertheless somewhat growth in income per capita amidst ECOWAS affiliate countries. Correspondingly, from the regression findings of conditional beta convergence it exhibited that income convergence speediness for the ECOWAS affiliate nations was roughly 17% annually, denoting that the short term trivial shocks that positions the states of the area into instability might take an extensive epoch to achieve the stable state. Conversely, the scholarly work engaged dual techniques of evaluating income convergence, that is to say conditional beta as well as sigma convergence.

Onakoya *et al* (2013) investigated growth, policy mix and convergence for the nations in ECOWAS region. Conformably, the research engaged the endogenous framework growth of Swan and Solow (1956) at that instant it was reformed by Ramsey exploiting the Cobb-Douglas production function equally with the growth equation as well as convergence equation. To add on that, the examination engaged techniques of panel ordinary least squares techniques of estimation on the panel yearly time-series data which was thereafter estimated through the fixed effect because an ordinary feature is anticipated from the nations designated. Besides that the stationarity test of panel modelling was carried out so as to evaluate whether the sequence indicates a problematic case of non-stationarity by the means of Dickey Fuller. The study employed time series panel data for five countries among the ECOWAS countries for the period 1980 to 2010. The nations under scrutiny consisted of Burkina Faso, Togo, Nigeria, Sierra

Leone and Ghana. The study variables included fiscal policy, inflation rate, real gross domestic product and gross capital formation. Also the academic work results confirmed that all the nations designated deviate in their fiscal variables though in the monetary policy there is an affinity to come together. Even though the study was conducted in African region amid ECOWAS States, nations vary regionally in many respects.

Wana (2008) investigated economic growth and convergence in the ASEAN. The scrutiny initial graphical examination established a robust indication of β as well as δ convergence and subsequently the ASEAN affiliate states enlargement. On the other hand, convergence notion was bolstered by the findings positing that the impoverished nations in the ASEANs are capable of catching up with the affluent states. The influence of growth as well as convergence in the ASEAN amalgamation was analyzed by dint of employing the heterogeneous dynamic panel methodology precisely the pooled mean group estimator (PMGE).Moreover, research indication buttressed the conditional together with the unconditional convergence proposition in the ASEAN states specifically; Indonesia, Singapore, Philippines, Malaysia, as well as Thailand for the epoch spanning from 1960 up to 2004.furthermore the ASEAN have an inclination to come together to a stable state growth level of per capita economic growth with a convergence rapidity of approximately amid 1.6 percent as well as 16.6 percent respectively. Weakness arouse whereby the study of growth and convergence was conducted in the ASEAN countries and countries differ in many respects such as economic development and systems.

Nahid (2010) investigated economic growth convergence among Middle East countries. The main result of early neoclassical growth models supports the convergence to their steady state growth path, countries with lower economic growth will move faster than rich ones based on the neoclassical growth models. This study used fixed effect models to test the hypothesis of convergence among Middle East countries for the period of 1995 to 2005. The study tested for both absolute and conditional convergence using both GDP and per capita income and also divided countries into two sub groups, oil producing countries and no-oil producing countries to see whether convergence exists within both group and whether the speed of convergence is different. Results suggested that though there is a tendency of convergence among Middle East countries, the speed of convergence is different for oil producers. In the probe countries comprised of the following;Yemen,Syria,Bahrain,Jordan,oman,Libya,Pakistan,Kuwait,iran,Egypt,turkey as well as Saudi Arabia. The dependent variable was the growth rate of real GDP growth and per capita income. The study convergence including variables such as government consumption, per capita capital, inflation, openness and secondary schooling. However, economic growth convergence was conducted among the Middle East countries and countries differ regionally from each other in many respects such as in their levels of economic development and macroeconomic environment.

Odhiambo *et al* (2015) explored Sub-Saharan Africa's health expenditure convergence by engaging a panel dynamic.Additionally,the academic work assessed health expenditure convergence in the area of Sub-Saharan Africa in the post Abuja declaration epoch. The panel dynamic linear technique of estimation was estimated by GMM-IV technique on a panel data of 41 SSA states for the epoch spanning from 2000 up to 2011.The variables incorporated in the enquiry were HIPC debt reprieve, foreign financed health expenditure, real health expenditure per capita, private health expenditure, public health expenditure as well as the total health expenditure. Conditional as well as absolute health expenditure SSA convergence were the confirmation disclosed by the investigation findings. Profiting from the HIPC debt reprieve, per capita real income as well as health care benefactor finance impacted the trajectory as well as the magnitude of the health expenditure convergence. The catalyst for the Abuja policy, health expenditure public as a proportion of government shrunk the degree of convergence of additional measures of health expenditure apart from the health expenditure private as a proportion of the health expenditure total which in the examination was snowballing. Likewise the findings accentuated that unrelenting dependence on the benefactor financing for health systems unswervingly or via debt reprieve is the most probable in adjourning the convergence towards the Abuja objective. The notable limitation of the research was that it botched to examine the convergence of economic growth nonetheless merely focused on the health expenditure in the SSA area.

3.0 CONCLUSION AND POLICY RECOMMENDATIONS

3.1 Conclusion

The main objective of this study was to examine the neoclassical growth convergence modelling in ECOWAS countries case in point the conditional convergence of economic growth for the epoch from 2004 to 2019. Conditional and absolute convergence was not buoyed from the study. It can therefore be resolved that the catching up process is not conditional and not unconditional. This confirms that income differences among ECOWAS member states has

been declining over time after controlling for differences in the steady states. In this enquiry, the dependent variable was the natural log of GDP rate of growth as well as the natural log of GDP per capita.Also, the independent variable for the absolute convergence was the natural log of GDP per capita.

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