

Income Convergence and FDI: Evidence from Lower-Middle Income West African Economies

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Abstract: This study examines the role of Foreign Direct Investment (FDI) on real GDP per capita convergence among lower-middle income West African countries. Employing panel unit root (Im, Pesaran and Shin) and Pedroni panel cointegration model on annual data spanning 1986-2013, the study seeks to establish whether there exists a long run relationship between FDI and income convergence as measured by annual deviations of economies from the group averages. Results emanating from the study indicate that there is no long run relationship between FDI and per capita income convergence among the countries.

Key words: FDI, GDP, convergence, per capital income, long run relationship

INTRODUCTION

Issues relating to the determinants of economic growth and income convergence have been extensively discussed in the economic literature (Crespo-Cuaresma *et al.*, 2011). Income convergence has a lot of welfare implications and empirical investigation on it is generally regarded as a way of testing the validity of neoclassical growth theory (Islam, 2003). However, despite such massive attention the area of economic growth received recently, following the re-emergence of interest in the area, there appears to be no consensus among economists on what clearly determines economic growth. According to United Nations Economic Comparison for Europe (2000), it is clear that there is apparent failure from the side of economists in providing clear policy guidelines that can warrant achieving long-term economic growth. This is the case even though the fact remains that the discipline of economics revolves around economic growth.

Neoclassical growth theory by Solow (1956) maintains a proposition that poor countries would grow faster than the richer ones to a point where convergence in growth would take place. In view of this proposition, a lot of literature directed towards testing this hypothesis evolved. Such studies include Maddison (1983), Barro (1991) and more recently Kumar (2011), Fakthong (2012) and Miron and Alexe (2014).

Contrary to the position of Neoclassical growth model that presumes convergence among countries irrespective of the structural characteristics of countries; new growth models are pessimistic about absolute convergence, rather the theories consider human capital

and technological progress as endogenous and necessary ingredients for growth (Silvestriadou and Balasubramanyam, 2000). In the view of Romer (1986) and Lucas (1988), inclusion of human capital and technological progress as endogenous variables to the system of new growth models handles the issue of diminishing return on capital investments in capital-abundant nations and hence, maintains that convergence is conditional.

Endogenous growth theories developed by Romer (1986) and Lucas (1988) emanated as a critical response to the preceding Neoclassical theory. The theories also emphasise on the role of idea gap bridging between poor and rich countries as one of the key factor towards achieving growth convergence among countries. In line with this, a lot of researches were conducted on the means through which 'idea gap bridging' between poor and richer nations can be achieved. Although, trade and foreign investment are regarded as the possible ways via which idea gap bridging between poor and richer countries can be achieved, absorptive capacity of poor countries is regarded as a necessary condition for such countries to grab the benefits attached to the foreign investment and trade (Crespo and Fontoura, 2007).

According to Sala-i-Martin (1996), other reasons than testing growth theories exist as to why empirical researches are being conducted on growth and issues related to it. Both from theoretical and practical points of view, it is undisputable fact that convergence in per capita output across countries is of enormous importance. For instance, in the view of Sala-i-Martin (1996), a significant contribution resulting from re-emergence of researches on growth is using the idea of convergence to distinguish

between neoclassical growth theory from endogenous growth theories. In the words of Durlauf (2003) “convergence tests have been used to evaluate the presence or absence of increasing returns to scale in the growth process. As such, the convergence hypothesis has important implications for modern macroeconomic theory”. These developments can be regarded as theoretical development that emanated from conducting investigations on economic growth convergence. “From an economic point of view, the issue of convergence or divergence is very important (United Nations Economic Commission for Europe, 2000). Achieving per capita output growth convergence across world nations over the long run translates into poverty level reduction and income inequality reduction among world populace. Therefore, outcome of studies on growth convergence across world nations has enormous contribution towards providing policy recommendations on poverty reduction and welfare enhancement.

This study seeks to examine the role of Foreign Direct Investment (FDI) inflows into Lower-Middle Income (LMI) West African Countries (WAC) in realizing per capita income convergence among the countries. In specific terms, panel cointegration model on annual data spanning 1986-2013, the study seeks to establish whether there is a significant long run relationship between FDI inflows into the countries and income convergence as measured by deviation from annual mean of real GDP per capita.

Review of related literature

Absolute versus conditional convergence: An economic phenomenon where poor countries grow faster than the richer ones in terms of per capita income is termed as absolute convergence. As highlighted by Barro and Sala-I-Martin (2004), conditional convergence differs from absolute convergence. Conditional convergence refers to an economic scenario where the rate of growth of per capita income of an economy depends positively on the distance of the economy from its own steady state (Refers to a point in the growth evolution of a given country where capital stock, per capita output and consumption tend to grow at the same rate that equals a given exogenous technological progress. Such process is made possible by the assumption of diminishing marginal returns on capital maintained in the solow growth model). Two economies can be converging in the conditional sense if each is growing in terms of per capita income depending on its distance from its own steady state output. On the other hand, same economies may not be converging in absolute terms if the richer economy is growing faster than the poor one as a result of the former

being further below its own steady state compared to the later. However, the two concepts are identical if the two economies are similar in terms of their steady state. Empirically, investigating absolute convergence differs from that of conditional convergence in the sense that when estimating the conditional convergence a set of explanatory variables such as savings and population growth rates are included in the standard cross-section regression.

Club convergence: Another concept directly related to that of conditional convergence is ‘club convergence’. The concept was first introduced in the work of Baumol (1986). However as noted by Islam (2003), exact formulation of the concept can be seen as a credit due to Durlauf and Johnson (1995) and Galor (1996). In the case of absolute convergence predicted by the Solow’s growth model, there is a single ‘unique equilibrium’ to which all economies approach. In the contrast, the conditional convergence hypothesis considers each economy as having its own equilibrium towards which it approaches. In other words, countries grow in per capita towards same steady state providing they are similar in terms certain characteristics such as technology, government policies and population growth, irrespective of their initial levels of income.

At the other end, the idea of club convergence assumes multiple equilibriums and each economy approaches a particular equilibrium depending on its initial position in relation to the equilibrium and certain characteristics it possess. Therefore if a group of economies share same initial location and are common in terms of certain attributes, they tend to approach the same equilibrium and are hence considered as forming a convergence club.

In his famous study, Baumol (1986) utilised data on GDP per worker covering the period of 110 years, 1870-1979 for 16 industrialised market countries. Using both descriptive statistics in the form of ratios and standard deviation and a bivariate cross country regression equation, Baumol established a sort of convergence in per worker GDP across the 16 industrialised countries. Moreover, using data on output per capita for a larger sample of 72 countries similar analysis was carried out over the course of 30 years, 1950-1980. In contrast to the finding for the group of industrialised economies, countries in the larger sample do not only display absence of convergence but they rather reveal evidence of divergence among them. The author therefore concludes that economies that are similar in terms of initial level of income and certain attributes, like level of industrialization in this case, tend to converge.

As mentioned above, precise formulation of the concept of club convergence is the credit of Durlauf and Johnson (1995). Results emanating from Durlauf and Johnson led the authors into drawing to important conclusions regarding convergence across economies. One, the authors observe that the linear model specification used by majority of the empirical studies on convergence is misspecified. Two, segregating the data into various groups using varying initial condition such as initial capital and initial level of adult literacy rates, the authors observed that different countries obey different production functions. This finding by extension implies that countries growth rate patterns are compatible with multiple steady states perspective.

Although, the intuition of club convergence hypothesis was conceived for close to three decades by Baumol (1986) and later formulated more rigorously by Durlauf and Johnson (1995), Galor (1996) and Alexiadis and Tomkins (2004) contend that club convergence hypothesis received relatively less attention of researchers. However, among the popular exceptions to this postulation made by Alexiadis and Tomkins are: Oxley and Greasley (1999) and Su (2003). In addition, more recent studies on club convergence hypothesis include Fischer and Stirbock (2006).

Su (2003) investigated club convergence across a sample of 15 OECD countries using two different sources of data. The first data source is from Bernard and Durlauf (1995), covering the period 1900-1987. The second source of data is from Maddison (1989) ranging 1885-1994. For both datasets, there is no evidence that the entire countries are converging. However, there appears to be five clubs with members ranging from two to four members. As for the comparative analysis of club convergence hypothesis on the basis of two data sources, it was discovered that results are sensitive to data choice and econometric tools. In view of this, conclusion can therefore be drawn that findings of evidence of club convergence or lack of thereof is partly dependent upon the data source and method of data analysis employed.

Alexiadis and Tomkins (2004) used data spanning 1970-2000 to test club convergence hypothesis on 13 Greek regions. Forming a total of 78 pairs, the researcher applied bivariate ADF technique to test for stochastic convergence. Results from bivariate ADF test divulge little evidence in favour of stochastic convergence among the regions. In specific terms, of the 78 possible pairs formed, bivariate ADF test favours stochastic convergence in only 18 out of 78 cases. On the other hand, it was observed that while not all regions follow a particular pattern of convergence, some regions

appear to follow common convergence path. Researchers therefore, conclude that there is evidence of club convergence across some regions of Greece.

In a similar study, Siano and D'Uva (2006) employed similar time-series approach Alexiadis and Tomkins (2004) adopted to study club convergence among a panel of 123 European regions from a total of nine countries. Using data covering the period 1981-2000 on GDP per capita in terms of purchasing power parity and employment, the researchers reported some evidence in support of club convergence hypothesis. On the basis of initial level of income, average GDP growth rate over the sample period and sectoral of specialisation of the regions, four groups were formed. Studying convergence pattern among the groups, it was observed that there is strong evidence of convergence among wealthiest members of European Union. The study therefore, affirms evidence of club convergence.

In a related research, Oxley and Greasley (1999), using a sample of four Nordic countries Denmark, Finland, Norway and Sweden found evidence in support of club convergence. Employing time-series technique on data for GDP per capita (Bernard and Durlauf, 1995) covering 1900-1987, Oxley and Greasley (1999) established three economies Denmark, Finland and Norway forming club convergence.

MATERIALS AND METHODS

Data: The study utilized data on a sample of five lower middle income West African countries. The countries in the sample are: Cabo Verde, Cote d'Ivoire, Ghana, Nigeria and Senegal. Data on real GDP per capita and stock of FDI were source from United Nation Conference on Trade and Development. The study utilized an annual data on the variables covering the sample period spanning 1986-2013.

Panel unit root test (IPS): The study employed the most recent development in testing for unit root in dynamic panel data (Im *et al.*, 2003). IPS was developed within the framework of popular ADF test. It takes averages of ADF t statistic for individual panels. IPS panel unit root test is characterized by a couple of features that makes it superior over other forms of panel unit root tests. For instance, unlike the panel unit root test proposed by Quah in which heterogeneity across panels is not accommodated, IPS allows for individual heterogeneity across the panels.

Consider a stochastic process of y for a sample of N cross-sections (countries, industries, cities or regions) over a period of t years generated through AR(1) process:

$$\Delta y_{it} = \alpha_i + \beta y_{i,t-1} + \epsilon_{it} \quad (1)$$

Where:

$i = 1, 2, \dots, N$

$t = 1, 2, \dots, T$

The IPS panel unit root test tests null hypothesis: $H_0: \beta_i = 0$ for all i , against the alternatives: $H_1: \beta_i < 0, i = 1, 2, 3, \dots, N_1, \beta_i = 0, i = N_1+1, N_1+2, \dots, N$.

Panel cointegration analysis: Pedroni's residual based approach uses residuals estimated based on a hypnotized long-run regression of the following form:

$$y_{it} = \alpha_i + \delta_{it} + \beta_{1,i} x_{1,i,t} + \beta_{2,i} x_{2,i,t} + \dots + \beta_{M,i} x_{M,i,t} + \epsilon_{i,t} \quad (2)$$

Where:

N = Stands for the number of cross sectional units

T = The no. of observations over time

M = No. of regressors

α_i and δ_{it} = Are respectively fixed effect parameters and slope coefficients representing time specific effects

Model specification: The role of technology transfer in assisting relatively poor countries to catch-up with relatively richer economies in terms of per capita income has been emphasized in the literature. Moreover, FDI has been identified as an important avenue via which technology transfer from technologically advanced economies to poor economies can be attained. In line with this, the study estimated the following model.

$$\text{Convergence} = f(\text{FDI}) \quad (3)$$

$$\text{DEV}_{it} = \beta_0 + \beta_1 \text{FDI}_{it} \quad (4)$$

Where:

DEV_{it} = The deviation of economy i from annual average of real GDP per capita during period t

FDI_{it} = The stock of FDI per capita for country i at time t , measured in constant 2005 USD

RESULTS AND DISCUSSION

Descriptive analysis: Table 1 provides some highlights on per capita income performance of the five countries the study covers. Table 1 provides information on averages, minimum, maximum and standard deviation of real GDP per capita over the course of 28 year, 1986-2013. As can be deduced from the table, Cape Verde has the highest performance in terms of average real GDP per capita over the sample period. The country achieved an average real

GDP per capita amounting to \$1968.01. This compares with the average for the Cote d'Ivoire who recorded and average of \$1035.46. Ghanaian economy ranked next to Cote d'Ivoire with an average of annual real GDP per capita of \$752.89 over the period 1986-2013. Senegal boasts of an average of \$715.27 as compared to the Nigeria, the least performing economy with \$684.73 for the study period.

Comparing averages for individual economies to that of the entire sample, a couple of issues can be observed. Using the overall average of \$1,031.27 as a benchmark, it can be seen that only two of the five economies have averages above the overall average. The economies forming this group are: Cabo Verde and Cote d'Ivoire. As for Ghana, Nigeria and Senegal, their averages are below the group average. Reading from the table, it can also be deduced that the least performance was recorded by Nigeria with average real GDP per capita for the economy in that year being as low as \$482.57. On the contrast, the record of highest annual real GDP per capita over the sample period was achieved by Cabo Verde where the annual GDP per capita was found to be \$3,236.82.

Information on the dispersion of annual real GDP per capita across the economies over the sample period has been provided in Table 2 in the form of standard deviation of the variable. Reading from the table, it can be observed that over the course of 28 years, 1986-2013, the standard deviation of real GDP per capita for the lower middle income economies of West Africa was \$589.39. Comparing the group standard deviation to the standard deviation of individual economies, a situation different than that of average real GDP per capita can be observed. In this case, a total of three economies have standard deviations higher than that of the entire sample. The economies falling within this category are Cabo Verde, Ghana and Nigeria. On the contrary, majority of the countries (three countries specifically) Cote d'Ivoire and Senegal achieved standard deviations lower than that of the group.

Empirical analysis: In order to establish the appropriateness of employing panel cointegration

Table 1: Description of GDP per capita dataset (\$) for lower middle income West African countries (1986-2013)

Countries	Mean	Minimum	Maximum	SD
Cabo Verde	1,968.01	1,119.07	3,236.82	703.05
Cote d'Ivoire	1,035.46	934.30	1,159.09	59.04
Ghana	752.89	553.52	1,200.76	175.39
Nigeria	684.73	482.57	1,084.60	193.95
Senegal	715.27	619.45	810.91	61.28
Total	1,031.27	482.57	3,236.82	589.39

Computed by the researcher

Table 2: IPS Panel Unit Root test results

Variables (level values)	Statistic	p-values
GDP_DEV	-0.98965	0.1612
FDI	0.34293	0.6342

*, **, *** significant at 10, 5 and 1%

Table 3: IPS Panel Unit Root test results

Variables (level values)	Statistic	p-values
Δ GDP_DEV	-5.56839	0.0000***
Δ FDI	-10.93350	0.0000***

*, **, *** significant at 10, 5 and 1%

Table 4: Panel cointegration analysis of real GDP per capita and stock of FDI per capita

Test	Constant	Constant and trend
Panel v-statistic	-0.4332 (0.6676)	0.3628 (0.3584)
Panel ρ -statistic	0.5191 (0.6982)	0.8453 (0.8010)
Panel t-statistic (non-parametric)	0.2955 (0.6162)	-0.0587 (0.4766)
Panel t-statistic (adf, parametric)	0.1355 (0.5539)	-0.1139 (0.4547)
Group ρ -statistic	1.1520 (0.8753)	1.4009 (0.9194)
Group t-statistic (non-parametric)	0.8821 (0.8111)	0.3926 (0.6527)
Panel t-statistic (adf, parametric)	0.2591 (0.6022)	0.1135 (0.5452)

*, ** and *** indicate rejection of null hypothesis of no cointegration at 10, 5 and 1% level of significance, respectively

analysis to examine the relationship of interest, panel unit root test was first conducted on the two variables, annual deviation of real GDP per capita of each economy measuring catch the up and stock of real FDI per capita. Both the variables were found to be stationary at first difference.

As it can be clearly observed from Table 2, the IPS panel unit root test rejects alternative hypothesis for both the variables. This led to taking first difference of the variables and performing same IPS test. Results from the test are presented in Table 3. For both the variables, the IPS test rejects null hypothesis. Results from the test on the first difference of the variables, therefore, support the use of panel cointegration analysis.

The study employs Pedroni residual cointegration test examine whether there is a long run relationship between FDI and per capita income convergence. The study measures per capita income convergence by computing deviation of each economy's per capita income from the annual average. Lesser the degree of deviations accentuates the existence of convergence and higher degree of deviations from the annual averages indicates evidence of divergence. We present the results from panel cointegration model in Table 4.

Reading from Table 4, it can be seen that Pedroni residual cointegration test was carried out using both constant only and constant and trend. As can be seen in none of the cases, we were able to reject the null hypothesis of existence of the long run relationship between FDI (measured by per capital stock of FDI at constant 2005 USD) and per capita income convergence (measured deviation of economies from average annual GDP per capita of the sample).

CONCLUSION

West African Middle income countries have generally performed poorly in terms of GDP per capita growth stability. This may not be unrelated high volatility associated with oil prices as by their nature some of the countries in the regions are oil producing nations and they rely on oil sale proceeds to a very large extent. In term of output convergence role of FDI, results emanating from panel Pedroni Cointegration test indicate absence of long run relationship between per capita income convergence and FDI. One possible explanation to this finding could be the fact that the absorptive capacity of relatively poor countries does not reach the minimum threshold required for the FDI to play any significant role in the catch up process with the better performing economies in the sample.

In view of the above, Economic Community of West African States (ECOWAS) should revisit its strategies towards achieving stable growth and income convergence among member countries and put in place policies that would enhance the FDI absorptive capacity of the economies as poor absorptive capacity of the economies could be the reason for the lack of long run relationship between per capita income convergence and stock of FDI per capita among the economies.

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