Full paper

Sains Humanika

Human Capital Dynamics of Regional Growth in Nigeria: Dynamic Panel Data Approach

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Abstract

This paper investigates the human capital factors that contribute to the growth of the Nigerian regional growth rates. In particular, it is to determine whether the leading role of human capital factors in other economies could explain the regional growth processes dynamics in Nigeria. If these factors are not applicable, other possible explanations are to be identified for the country's regional economic growth dynamics profile. Nigerian regional cross sectional data of financial, physical and human capital accumulation were utilized to run a growth accounting regression captured by an aggregate production function. The study uses panel data (cross sectional and time series data) from 1998 to 2008 and employed three (3) panel data models to estimate the dynamics and contribution of human capital factors. The results showed that the initial human capital stock has an influence on the GDP per capita growth rate. Similarly, the Southern regions that had a head start in school attendance have higher thresholds or secondary schools are significant; higher levels of schooling (secondary school) have significant impact on the GDP per capita growth rate. On the other hand, the Northern regions have lower technical frontier; as only the primary school have significant impact on the GDP per capita growth. However the federal financial allocation from the federation accounts was found to be significant across all regions with the exception of the South-South regions, and positive investment in physical assets of education. Thus it implies that regional differences should be taken into account when planning developmental processes.

Keywords: Regional growth; human capital; dynamics; panel data

Abstrak

Kertas kerja ini mengkaji faktor-faktor modal insan yang menyumbang kepada kadar pertumbuhan wilayah Nigeria. Kajian cuba menentukan sama ada peranan utama faktor modal manusia ekonomi lain boleh menjelaskan proses pertumbuhan dinamik serantau di Nigeria. Jika faktor-faktor ini tidak berkenaan, penjelasan bagi profil pertumbuhan dinamik ekonomi serantau di negara ini cuba dikenal pasti. Keratan rentas data serantau Nigeria bagi kewangan, pengumpulan modal fizikal dan insan untuk menjalankan regresi perakaunan pertumbuhan dicerna oleh fungsi pengeluaran agregat dilakukan. Kajian ini menggunakan data panel (keratan rentas dan data siri masa) dari tahun 1998 hingga 2008 dan menggunakan tiga (3) model panel data untuk menganggarkan dinamik dan sumbangan daripada faktor modal insan. Hasil kajian menunjukkan bahawa saham modal insan awal mempunyai pengaruh ke atas kdnk kadar pertumbuhan per kapita. Rantau Selatan yang telah lebih awal mempunyai sistem persekolahab mempunyai nilai ambang yang lebih tinggi iaitu faktor sekolah menengah adalah penting; tahap yang lebih tinggi persekolahan (sekolah menengah) mempunyai kesan yang ketara kepada kdnk kadar pertumbuhan per kapita. Sebaliknya kawasan Utara mempunyai sempadan teknikal yang lebih rendah; kerana hanya sekolah rendah mempunyai kesan yang ketara kepada pertumbuhan kdnk per kapita. Walau bagaimanapun kita dapati bahawa peruntukan kewangan persekutuan daripada persekutuan akaun signifikan di semua kawasan kecuali kawasan Selatan-Selatan, dan pelaburan positif dalam aset fizikal pelajaran. Oleh itu, ia menunjukkan bahawa perbezaan serantau perlu diambil kira apabila merancang proses pembangunan.

Kata kunci: Pertumbuhan serantau; modal insan; dinamik; data panel

1.0 INTRODUCTION

Most macroeconomics treatises and researches focused on the determinants of regional growth using cross country studies or inter regional convergence process. This is important because, the regional economic growth in most countries is somewhat uneven, that is, it is not balanced amongst the regions or evenly spread. One of the major determinants of economic growth identified is the human capital. Human capital as an input into the growth process and subsequently convergence processes, has been identified a key factor that spurns countries or regions to develop faster. The key question is, how could the growth processes could be made faster in regions or countries lagging behind and converge with those ahead, if there are uneven or disparities in the basic human capital structure in any particular Country or any Geographical location.

Within the National boundaries, an educational or human capital disparity makes it extremely challenging or rather difficult for poorer regions to catch up with the rich regions. Secondly, according to the general literature on growth empirics, a large mass of human capital that forms the critical mass, in any region allows that region to speed up its rate of catching up with the other rich regions. It is the major

asset that allows poorer regions to tap into the available opportunities that is available in the economy. Furthermore, the quantity and quality human capital proxied by the number and quality of technically proficient persons in any allows the absorption of the available and new technologies that allows the increase in the production processes, which increases the regional productivity, thus improving the regional per capita income, which has a direct bearing on the level and quality of economic growth in a regional and the country in general.

Generally speaking, human Capital can be termed as the totality of any stock of knowledge or the particular attributes of the Individual worker or collection of workers that is acquired through academic Institutions and, or innately endowed, that enhances and contributes to the worker's productivity (Acemoglu and Pischke 2001). That is. Impliedly, the quality of the personnel involved in the economic production processes of the general economy and the specialized industries is one of the major construct that is required in modeling the growth processes.

Although, a few studies have confirmed the relevance of the growth model to Nigeria using the exogenous growth technique, none has applied the new endogenous model at the regional level. Majority of these studies have relied on nationally aggregated data, without examining the local spread of economic growth amongst the components of the Nigerian nation. This study is, therefore, an attempt to contribute to this debate, by using aggregate production function approach to estimate an endogenous growth rate for Nigerian regions in panel data framework.

To achieve this, after this introduction, the study presents a review of relevant literature on growth rates model including the essential elements of the model, as well as a few other models used in estimating the determinants of growth rate. The third section explains the data used and the estimation procedure. The fourth section discusses the empirical results and the final section concludes. Broadly the objectives of this study are the Determination of Education as an Important Factor in regional per capita income growth and regional growth dynamics. To achieve these objectives, the study utilized the educational panel data set of the 36 states in Nigeria during the period 1999-2008. The aim is to shed light and contribute to the literature on the issues surrounding the impact of Human Capital on regional growth convergence in Sub Saharan African country. As described above, this study will examine the extent to which primary and secondary schools (as proxies for human capital) drive local welfare positions of the citizenry the 6 Geopolitical Zones in Nigeria. See Figure 1. The general economic theory postulates that, Human Capital has a positive and significant effect on GDP per capita growth.

This paper considers states grouped into 6 homogenous regions and the states data on public school enrollments, number of schools in the states as a form of physical capital investment in human capital, and State's Financial Allocation from the Federation Accounts, because of the fact that most states are dependent upon the Federal Government Allocations from the Federation Accounts, to run the public services.

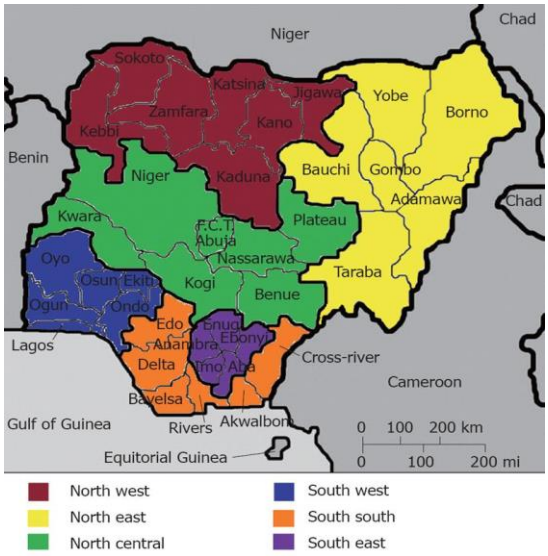

Figure 1 Six geopolitical zones in Nigeria

■2.0 LITERATURE REVIEW

2.1 Growth Processes and Economic Theory

Central to the development of economic growth, there is the question; why do growth rates across countries differ and what factors causes these differences. Throughout the modern evolution of mainstream growth economics, from Adam Smith to Schumpeter, policy maker and economist have tried to underhand what make some countries rich and others poor. Understanding these processes and its dynamics has been the central focus of researches on economic growth disparities. How countries tend to converge at a particular point in time on the growth curve have been the focused on economic growth literature. The major framework of understanding these processes have been dependent on the construct of capital and technological accumulation through trade, as necessary conditionalities for economies to grow fast enough to have spurned positive social changes, which have positive externalities on the welfare conditions of the citizenry.

The first clear exposition was first expounded by Solow and Swan (Solow-Swan 1965). Solow posited that countries economic growth moves up until it reaches steady state point. Implying that countries tend to grow until they reach equilibrium position, where they experience declining rates of return on their investments on the factors of production and thus stagnate. While poor countries in the

meantime will endeavour to catch up and eventually catch up with rich countries by adopting the same path taken by the rich ones. Thus in due course the poor countries will catch up. This position "exogenise" all factor of production and based the rate of growth on the assumption of decreasing returns to scale on the factors of production.

In the aftermath of the economic stagnation of Western economies and the collapse of the Bretton-Woods system of fixed exchange rate between 1970 and 1980, saw the emergence of new theories of economic growth among countries, whereby the rate of a country's growth rate is determined by a complex interaction of economic fundamentals and political dynamics that are endogenous to the economy. In particular, the level of production, research and development, monetary variables (i.e. inflation, quantum of money supply, interest rates among many others), plays a crucial role in determining the speed of the economic growth rate. Due to the complex nature of the interaction of forces and processes, it became difficult to ascertain the major determinants of the variations of a country's growth rates other countries.

Thus, the need for a new theoretical underpinnings as well as empirical representations of the economic growth process became necessary, not only on the basis of the disparities between countries growth rate, but also to determine the future path of the growth movement and the speed of such movement. Hence, the birth of an unending intellectual debate immediately after the outset of the Solow-Swan Growth "exogenous" growth rate regime in the mid-1970s. During this early period, saw the emergence of the Lucas Model of Economic Growth (Lucas, 1988)[1], where a production function is used to model the output of the domestic economy, with physical assets, and the stock of human capital. In this model, the engine of growth is the human capital, as human capital accumulation raises the level of productivity in terms of labour and physical capital. This modeling approach "endogenises" the human capital.

The endogenous economic growth model and many other models of growth rate determination certainly helped in explaining the dynamic pattern of economic growth rate and undoubtedly contributed to the understanding of the cross country of economic growth rates. However, despite the wide acceptance of the model, there is still divergence of opinions amongst academic researchers and policy analysts as to the applicability of the model to emerging/developing economies.

In a developing economy, the determination of the nature of the economic growth potential, productivity levels, and output is a very important task. Because the economic growth and social welfare nexus is a fundamental fulcrum of reducing poverty, inflation levels and stabilizing the monetary exchange rates of the domestic economy and currency. These factors are mostly exogenously determined, thus there is the need to ascertain the impact and influence of endogenous factors in the growth processes.

The importance of the human capital in the productivity of economic growth has been well established and recognized in the economic literature. Mincer (1974)[2] seminal work on the determination of individual earnings in particular and the labour economics generally introduced human capital to the mainstream economics literature. Major seminal works that emphasized the importance Human capital in the determination of the economic growth and convergence in the economic literature, seminal works like that Romer (1990), Mankiw *et al.* (1992), Barro (1991, 2001). All these studies showed that the accumulation of Human Capital can spurn and sustain economic growth in the short term and sustain economic growth in the short run as well as the long run growth process and have positive externalities on the economic growth.

2.2 Panel Data and Growth Processes

The general framework in most empirical studies on the issue of modeling growth in econometrics has been the assumption that, the aggregate production functions are Identical for all contexts; be it countries or regions. It is an accepted fact that the production function may actually be different across countries or regions, but to actually accommodate such differences in the production specification and estimation have been limited by the fact that majority of these studies have been utilizing the framework of single country cross-sectional regressions. (Islam, 1995) Thus, it became econometrically difficult and challenging to accommodate or make allowances for such difference in the production functions, based on the single country cross sectional regressions.

To overcome this issue, Islam (1995) proposed a panel data framework to model growth empirics because panel data framework makes allowances for the accommodation of the differences in the growth regressions that might arise from unobservable individual *"country effects*."""—Islam (1995)

In this study, we take in account the work by Mankiw, Romer, and Weil (1992) as its starting point and examines how the proxies for human capital affects the per capita income of the 6 regions of the Nigerian State. The model was formulated based on the fixed effect (LSDV) regression equation and a dynamic panel data model with individual (country) effects, and were estimated using the panel data estimation procedures.

2.3 Human Capital and Economic Growth in Nigeria

Human capital formation and its accumulation has long being recognized as an important factor in economic growth processes, because the level of educational attainment of the labour force is one of the determinants of an economy's ability of improvise or adopt any existing technology which can be a precursor of higher productivity. There is a multitude of studies, researches, empirical studies and reviews on the nexus of Nigeria's economic growth and several other factors that were deemed important based on the literature. To review all these is near impossible and beyond the scope of this paper, therefore a selected few current works are reviewed and presented.

In Nigeria, since independence, the main focus of developmental planning has been on physical accumulation and development rather than human capital (Sankay *et al.* 2010). After the launching of the national developmental plans the importance of the human capital was recognized, since it has been established that human capital is the key factor that would power the country to achieve its developmental objectives (Ogujuiba and Adenuga, 2005). Despite this recognition, the level of development in the country is still below the objective desired. Several studies have tried to determine why this state persists, Oseni (2012) argued that the financial budgetary allocations to the educational sector are consistently falling short of the standard benchmark needed to sustain and achieve the desired growth rate. Others

[1] See Lucas R.E (1988).
[2] See Mincer, Jacob (1974).

have argued in similar terms, by trying to establish the causal relationship between the educational attainment and the level of economic growth in Nigeria (Omojimite, 2010; Wakeel and Alani, 2012). Others posits that there are other factors like health and locational dimension that should have been considered in the determination of the impact or the connection of Human capital factors to the level of growth rate (Amaghionyeodiwe and Osinubi, 2004) and this affects the quality of the human capital.

Majority of the studies on human capital and economic growth nexus in Nigeria have relied on the Time series analysis techniques, i.e. modeling the impact of human capital over time and have relied only on national aggregate data. None of the studies used regional or states regional data and none employed panel Data analytical techniques which is more powerful in handling the heterogeneities in the data and the Nigerian context. Thus the studies have only shown how human capital affects or impacts on the National development, but not on how human capital have impacted on regional or states growth and development within Nigeria itself. Therefore this study is an effort in that respect and a contribution to the literature on regional growth in Nigeria.

3.0 METHODOLOGY

A panel data econometric technique of dynamic panel data analysis is employed using a simple Cobb-Douglass aggregate production functions with Human capital as a factor of production, in which the dependent variable is specified, as an analytical framework.

Benhabib and Spiegel (1994) specified an aggregate production function as:

$$Y_{it} = A_t K_t^{\alpha} L_t^{\beta} H_t^{\gamma} \varepsilon_t \quad (1)$$

Where Y_t = per capita income as the dependent variable

K_t = physical capital
L_t = Labour force
H_t = Human Capital
A_t = Technology
ε_t = Error term

By taking the log differences of Equation (1), the specification becomes;

$$(Log Y_t - Log Y_0) = (log A_T - log A_0) + \alpha(Log K_T - log K_0) + \beta(Log L_T - Log L_0) + \gamma(Log H_T - Log H_0) + (Log \varepsilon_T - Log \varepsilon_0) \quad (2)$$

$$Log\left[\frac{Y_T}{Y_0}\right] = Log\left[\frac{A_T}{A_0}\right] + \alpha\left[\frac{K_T}{K_0}\right] + \beta\left[\frac{H_T}{H_0}\right] + \gamma\left[\frac{L_T}{L_0}\right] \quad (3)$$

This is an expression for the long term growth per capita income. A key challenge in estimating such an equation is the possibility that the physical and human capital will be correlated with the error term (ε_t). Labour (Lt) and technology (At) are assumed to be exogenously growing at constant rate of "n" and "g' respectively. While physical and Human capitals are assumed to be evolving linearly, thus;

$$\log Y_{it} = \log A_t + \alpha log K_t + \beta log L_t + log H_t + \varepsilon_t \quad (4)$$

By making assumptions and allowances for the estimation of Equation (4), in OLS, the equation can be rendered into a dynamic panel data model, thus;

$$y_{it} = \gamma y_{i,t-1} + \sum_{j=1}^{2} \beta_j x_{it}^{j} + \eta_t + \mu_i + \nu_{it} \quad (5)$$

This is a generalization of the dynamic panel data model (Mankiw, Romer and Weil, 1992).

3.1 Research Design

Secondary data collected from the National Bureau of Statistics (NBS) is used as the source of the data used. In this study, we study the effect of the Federal Government monthly financial allocation from the Federation Account[3] (Finance), number of public schools, both primary schools and secondary schools (No_PubPriSchool and PubSECSCH) are used as proxies for Physical Investments in the education or human capital. The number of school enrolment is divided based on gender basis[4], between male and female students. The GDP per Capita is used as the dependent variable which will show the level of change in the regional welfare growth determinants. The effect of the regressors ware estimated using OLS regression, fixed effect and dynamic panel analysis.

3.2 List of Variables used in Analyses (Pooled OLS, FE and Dynamic Panel Model)

To achieve these objectives, the paper identified 8 variables primarily based on data availability, parsimony (contextual relevance) and in consonance with the literature. The data values for the variables were transformed into logarithmic values, since they are of different scales. See Table 1.

[3]The Federation Account is the Central Revenue account that is shared by the three tiers of the Government; Federal, States and Local Governments.
[4] Gender is major factor is determining a child's access to school or education, particularly in the Northern part of Nigeria.

We start the analysis by specifying a Pooled OLS regression equation;

$$Y_{it} = \alpha + X'_{it}\beta + \varepsilon_{it} \tag{6}$$

This specification produces consistent and efficient parameter estimates, if there is no individual effect $\boldsymbol{U_i}$ either in the cross-sections or the temporal section. Thus the model becomes;

$$G_i = \beta_0 + \beta_1 Finance_i + \beta_2 No\_Prisch_i + \beta_3 PubPrischM_i + \beta_4 PubPriSchF_i + \beta_5 NoSecSCH_i + \beta_6 PubSecSchM_i + \beta_7 PubSecSchF_i + \varepsilon_i \tag{7}$$

Secondly, a Fixed Effect Panel model (LSDV) with dummies to capture the individual effect in the cross-sectional dimension. The model is specified as;

$$G_i = \beta_0 + \beta_1 Finance_i + \beta_2 No\_Prisch_i + \beta_3 PubPrischM_i + \beta_4 PubPriSchF_i + \beta_5 NoSecSCH_i + \beta_6 PubSecSchM_i + \beta_7 PubSecSchF_i + \varepsilon_1 d_1 + \varepsilon_2 d_2 + \varepsilon_3 d_3 + \varepsilon_4 d_4 + \varepsilon_5 d_5 + \varepsilon_6 d_6 + \varepsilon_7 d_7 \tag{8}$$

The dummies were added to reflect the number of states in every region under analysis.

To capture the dynamics that are inherent in the growth process, between the introduction of the regressors and their impact on the GDP per capita, an autoregressive coefficient term of the dependent variable is introduced amongst the regressors. Thereby turning the static (fixed effect) regression model into a Dynamic panel model. The addition of the lagged dependent variable allows for feedback from current or past shocks to current values of the dependent variable to be captured in the model as outlined in Equation (5).

Table 1 List of variables

Serial Number	Variable Name	Definition
1	GDP Per Capita	Income Variable
2	*Finance*	State share of Federal Allocation from the Federation Account
3	*No_PriSCH*	Number of Public Primary schools in the States
4	*PubPriEnrolF*	Total Number of Male Public Primary School Pupils enrollment
5	*PubPriEnrolF*	Total Number of Female Public Primary School Pupils enrollment
6	*No_SecSCH*	Number of Public Secondary schools in the States
7	*PubSECSCHM*	Total Number of Male Public Secondary School Pupils enrollment
8	*PubSECSCHF*	Total Number of Female Public Secondary School Pupils enrollment

■4.0 RESULTS

The regressors were converted into Logarithmic values before the analysis was run, and the data were classified according to the 6 regions in the country. This allows the data to be as homogenous as possible, given the fact the Nigerian context is a diverse and heterogeneous in nature. The results[5] yields are different from the expected theoretical positions based on the general results reported from other applications in the Literature.

Standard Panel data estimation techniques were used to estimate the GDP per capita income in Nigeria. The utilization panel data (time series and cross sectional data) gave allowance for higher degrees of freedom in the estimation process and has the advantage of including specific state effects within the region thereby giving more data information and reducing the multicollinearity effects and this allows for a dynamic specification.

Equation (7) was estimated using the panel data Pooled OLS techniques and the results were reported in Table 2, for all the 6 regions. The results obtained from the OLS estimation showed a varying degree of differences between the models fit for the different regions. Four (4) regions {NE, NW, NC and SW}, the OLS estimation fits the data, quite well by explaining on average 60% of the variation the data. Two (2) regions {SE and SS} showed an average variation below 50% by the pooled OLS estimation model. Federation account allocation from the federal seemed to be significant with a level magnitude in terms of impact on the per capita income for almost all the regions, with the exception of SW region. This may be attributed to the level of internally generated revenue accruing to the states in the region or the inadequacy of the federation allocation from the federal government.

[5] The Analysis was run on STATA version 12.

All the Northern regions, NE, NW, and NC, were positively and significantly affected by the physical investment in human capital by the building of the public primary schools. If this is tenable, it implies the low level of technical frontier of the regions; as such even a simple ability of literacy and numeracy has a positive impact on the income of the persons. The initial per capita income level of the regions is quite significant for all the regions, even if all regressors are held at zero level, the per capita income drops negatively and significantly, with the exception of 2 regions; SE and SS regions. All the Northern regions are significantly poorer than the other regions. This is quite challenge in-terms of bridging the income disparity and the level of growth

Table 2 Pooled OLS results for the 6 regions in Nigeria

	NE	NW	NC	SE	SW	SS
Finance	0.2136946	0.1453912	0.023953	0.1807999	-0.02876	0.121910
	(3.53)*	(4.49)**	(0.61)	(4.34)**	(-0.32)	(3.21)*
No_PriSCH	1.351899	0.6192551	0.567948	-0.002797	-0.37113	-0.054753
	(6.63)**	(4.58)**	(4.49)**	(-0.02)	(-1.41)	(-0.26)
PubPriEnrolM	0.4176952	0.5440396	0.066026	0.150276	-1.38087	-0.10916
	(1.11)	(4.50)**	(0.87)	(1.78)	(-0.92)	(-1.07)
PubPriEnrolF	-0.438383	-0.229610	0.249633	0.152011	2.03381	-0.04264
	(-1.01)	(-1.91)	(2.55)*	(-1.62)	(1.39)	(-0.54)
No_SecSCH	0.0679471	0.0130482	0.115729	-0.02614	0.017171	-0.07642
	(0.83)	(0.40)	(2.05)*	(-0.44)	(0.11)	(-0.95)
PubSECSCHM	0.5516333	0.0233687	0.283287	0.272761	0.486130	-0.62901
	(2.03)*	(0.32)	(1.68)	(-1.26)	(-2.03)*	(-2.35)*
PubSECSCHF	-0.425632	-0.011281	-0.0771	0.382126	1.023196	0.8761
	(-1.73)	(-0.290	(-0.49)	(1.72)	(4.23)**	(3.15)*
Cons	-7.32574	-2.72916	-2.41055	4.22615	-1.57400	6.497393
	(-3.67)**	(-2.71)*	(-1.71)	(2.86)*	(-0.53)	(4.26)**
F	17.92	70.05	20.82	7.68	12.89	6.78
R^2	0.7069	0.8878	0.7370	.05614	0.634	0.477
Adj R^2	0.6674	0.8751	0.7016	0.4883	0.585	0.4069
RMSE	0.2788	0.1543	0.1881	0.1771	0.3763	0.2710

Notes: The (*) signifies variable significant at 5%, (**) significance at 1%. Values in brackets are t-ratios. NE=NorthEast, NW=NorthWest, NC=NorthCentral, SE=SouthEast, SW=SouthWest, SS=SouthSouth, regions

Table 3 Fixed effect (LSDV) results

	NE	NW	NC	SE	SW	SS
Finance	0.195756	0.143556	0.026293	0.1026717	0.05509	0.0129747
	(4.55)**	(4.72)**	(0.66)	(2.05)*	(0.84)	(0.30)
No_PriSCH	0.205987	0.782763	0.538783	-0.48309	-0.16696	0.0151493
	(2.60)*	(5.40)**	(3.95)**	(-2.26)*	(-0.70)	(0.07)
PubPriEnrolM	-0.18859	0.402139	0.080985	0.108431	-1.00807	0.008164
	(-1.50)	(2.54)**	(1.00)	(1.62)	(-0.73)	(0.10)
PubPriEnrolF	0.118116	-0.179974	0.228698	-0.03638	1.429272	0.030051
	(1.34)	(-1.27)	(2.18)*	(-0.43)	(1.05)	(0.32)
No_SecSCH	0.035467	-0.00732	0.1087676	0.228383	-0.01973	0.208176
	(0.66)	(-0.22)	(1.88)	(2.83)*	(-0.16)	(2.26)*
PubSECSCHM	0.147713	-0.020901	0.308291	-0.198947	-0.55704	-0.019381
	(1.19)	(-0.27)	(1.76)	(-1.06)	(-3.49)**	(-0.06)
PubSECSCHF	-0.07180	0.032061	-0.065751	0.260558	-0.04128	-0.094056
	(-0.57)	(0.74)	(-0.41)	(1.33)	(-0.19)	(-0.25)
Cons	2.86454	-2.51367	-2.551502	7.794197	9.722494	8.260455
	(1.84)	(-2.25)**	(1.77)	(4.64)**	(3.15)**	(5.06)**
D1	0.272161			-0.49870	0	0.2757234
	(5.06)**			(-4.11)**		(0.97)
D2	0.818918			-0.22842	2.84297	
	(10.22)**			(-1.84)	(7.76)**	
D3	0		0.052834		1.69171	0.0879208
			(0.59)		(5.63)**	(0.37)
D4	0.477273			-0.06680	1.58141	0.2943702
	(28.63)**			(-0.51)	(6.06)**	(0.92)
D5	-0.27126			-0.21974	1.513993	0.138887
	(-4.63)**			(-1.68)	(5.36)**	(0.44)
D6	0	0.029987			2.00762	0.8767618
		(0.36)			(5.06)**	(2.93)*
D7	-	-0.179575				
		(-2.51)*				
R^2	0.8989	0.8999	0.7388	0.7534	0.8584	0.7097
AdjR^2	-	0.8849	0.6979	0.6820	0.822	0.6356
RMSE	0.17046	0.1481	0.1892	0.1396	0.2463	0.2124

Notes: The (*) signifies variable significant at 5%, (**) significance at 1%. Values in brackets are t-ratios. NE=NorthEast, NW=NorthWest, NC=NorthCentral, SE=SouthEast, SW=SouthWest, SS=SouthSouth, regions

The results of the fixed effect (LSDV) in Table 3, showed somewhat similar results but with an improved model fit for all the regions. Averagely all the regions were fitted quite well by the model, with 80% of the variation in the data being explained by the model. The Northern regions still maintained their statuses of being positively and significant being affected by the Federation Allocation from the federation Account and physical investment in human capital which has a direct correlation with the ability to create the necessary human capital stock to favourable close the gap in terms of development between the regions in the south. Availability of schools is closely related to the number of school attendance and access to education. The same situation also applies to the south eastern part of the country going by the value of the coefficient of the public primary school investment.

The fixed effect models posits that each state in the regions have its own intercept while slopes are similar all the states in the same region. Some of the Dummy variables are dropped by the analysis; either due to collinearity or were reported with zero values for being the same with the same baseline intercept. Three (3) states in the NE region have intercepts above the baseline for the region and are significant as evidenced by the coefficients of their dummies. And one is below the baseline. Furthermore, only the NE showed a positive coefficient baseline but not significant, while the other two regions showed negative coefficients, but statistically significant. Thus amongst the Northern regions, the NE is the poorest amongst the three regions. In the Southern part of the country, 2 regions reported a positive and significant impact of Secondary school investments in terms of Human capital development. This position confirms the general positions of the state of human capital development in the Country. Since the Southern regions have had a head start in access to western education long before the same institutions were established in the Northern part of the Country. SW region in the South showed a significant, but negative impact of male student's access to education on the growth of GDP per capita of the region. If a male child attends or accesses education up to the Secondary school, it has a 50% chance of improving the per capita income of the household. Equally, there is a varied variation of the positions of the per capita income of the states that made up the regions in terms of the baseline positions. All the baseline positions of the states in the regions are statistically significant and positive, this implies that they are better off compared to their Northern counter parts. SW also reports 4 states that are better off in terms of the welfare positions given that their intercepts are above the regional baseline and they are statistically positively significant, this impliedly means that amongst the southern states, the SW is at a better position in terms of welfare positions relative to the other regions in the south.

Table 4 Dynamic panel data results

		NE	NW	NC	SE	SW	SS
GDP							
	L1	0.844056	1.615839	0.639809	0.740859	0.784904	0.491643
		(3.22)*	(*4.56*)**	(3.35)**	(4.48)**	(4.92)**	(2.37)*
	L2	0.270755	0.213038	0.656241	0.593278	0.196347	0.473792
		(1.30)	(*0.77*)	(3.39)**	(3.28)**	(1.07)	(2.27)*
Finance		-0.39205	-0.53888	-0.24855	-0.26673	-0.26309	-0.18629
		(-4.01)**	(-*4.25*)**	(-3.01)**	(-3.90)**	(-5.48)**	(-4.96)**
No_PriSCH		0.200587	1.056879	-0.09637	-0.51723	-0.01579	-0.12591
		(0.83)	(*2.66*)*	(-0.33)	(-2.78)*	(-0.15)	(-1.11)
PubPriEnrolM		-0.43145	-0.33195	-0.05145	0.141189	-0.07626	0.012771
		(-1.46)	(-*0.92*)	(-0.97)	(3.02)**	(-0.11)	(0.27)
PubPriEnrolF		0.450196	-0.00081	0.370598	-0.0682	-0.03017	0.063281
		(1.38)	(*0.00*)	(2.50)*	(-0.89)	(-0.04)	(1.42)
No_SecSCH		0.083817	-0.05011	-0.18870	0.036316	0.240415	0.045397
		(1.46)	(-*1.14*)	(-2.62)*	(0.51)	(2.30)*	(0.71)
PubSECSCHM		-0.26729	-0.00372	-0.05423	-0.22296	0.107153	-0.53094
		(-1.20)	(-*0.05*)	(-0.24)	(-1.92)	(1.40)	(-3.15)**
PubSECSCHF		0.290373	0.00026	0.171399	0.255216	0.056735	0.568859
		(1.44)	(*0.01*)	(0.81)	(2.13)*	(0.62)	(3.29)**
Cons		6.258265	1.343869	-0.25334	5.313586	4.438285	4.186638
		(3.04)*	(*0.62*)	(-0.14)	(3.72)**	(3.04)**	(2.58)*
Wald chi2(9)		164.35	126.55	147.05	202.50	863.30	256.75
Prob>chi 2		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Notes: The (*) signifies variable significant at 5%, (**) significance at 1%. Values in brackets are t-ratios. NE=NorthEast, NW=NorthWest, NC=NorthCentral, SE=SouthEast, SW=SouthWest, SS=SouthSouth, regions

The dynamic panel data analysis allows for the partial adjustment of the dependent variable by allowing for a feedback from current or past shocks to current values of the dependent variable. The coefficient of the lagged dependent variables measures the speed of the adjustment. Also, the lagged value of the dependent variable removes any autocorrelation in the data, while accounting for the individual effect. The model in Equation (10) is estimating using the Arellano and Bover (1995) and Blundell and Bond (1998) GMM (General Method of Moments). The estimator uses the lagged values of the endogenous as the instruments in the differenced equations, while the lagged differences of the same variables are used as instruments in the level equations (Podrecca and Carmeci, 2004). This approach is similar to a 2 stage least square (2SLS), this helps to overcome the issue of the non stationarity of the time series, given that these estimation are restricted to a short time series.

Table 4 reports the results of the dynamic panel analysis using the GMM technique, by assuming that the errors in levels are uncorrelated and using the appropriate sets of instruments for both the differenced and the level equations. The results are somewhat odd, given the fact that none of the human capital proxies were reported as significant and with the correct expected sign. For all the regions the Financial allocation from the Federation account negatively and statistical significant in explaining the per capita income. Impliedly the per capita income dynamics is negatively impacted by the financial allocation. Meaning it does not help the regions to grow out of poverty in the short run; rather it makes them to be dependent on the Federal Government, rather than developing their regional economies to generate employment.

Current positions of per capita income are dependent upon the immediate past levels of the per capita income for all the regions and they are positively and statistically significant, suggesting a strong adjustment dynamics in the effect and behavior of previous per capita levels. The baseline initial positions of all the regions showed a positive improvement except the NC region. This suggests that the region even at the initial position is somewhat below the other regions baseline. Surprisingly, only the NC showed a positive and significant impact of human capital stock of secondary school and Female students having access to education as a factor of improving the per capita of the region. Therefore it can be argued that, financial positions of the regions conform to the literature on growth finance nexus, though in reverse order and previous positions of the per capita income of the regions informs on the dynamics of the growth process.

■5.0 DISCUSSION

In sum total, the results are somewhat odd and at variance with expected connection between the factors of human capital and the regional per capita income growth dynamics. This can be adduced to several reasons;

1. The negative signs and non-significance of the human capital factors in all the 3 analyses (OLS, LSDV and Dynamic panel) can be attributed to the education levels being taken on by the initial level of per capita income. Since the lag values are all positive and significant across all regions.
2. The past changes on the education process are having a negative effect on the current educational data collected for the analysis and thus there is a poor quality of education data[6]. This is a major challenge, particularly in the developing countries, where the Statistical information system is not fully developed and automated.
3. The poor quality of the education data, can only mean one thing for certain; that there is a large Informal sector which is not captured or recorded by the National Accounts data collection with regards to the GDP data.
4. There is the possibility of heterogeneity in the effects of education across the regions, across time and possibly there are nonlinearities relationships in the effects of education. Since the regional starting positions are different over time and space. There is the need to reappraise the effect of the composition of the different levels of education up to Tertiary levels.
5. Regions with higher baseline (higher income level) seemed to be positively affected by higher levels of education (human capital factor), implying that their initial human capital needs to be sufficiently high for the impact to be felt.
6. While regions with lower levels of education seemed to be having reverse case relative to their human capital levels.

5.1 Implications

Consequently these findings have some policy implications for regional as well national economic planners. Equally it can be applicable to other researchers too. The Nigerian regional growth dynamics has inherent heterogeneity in the states; as such using an aggregated national data does not give the realistic picture about the spread and rate of development, as well as its determinants. Secondly, initial capital stock positions of human capital have a n impact on the speed of the growth rate in almost all the states. Those states that have early start have far higher levels of economic activity which leads to higher levels of entry qualifications into employment. Furthermore, the Federal Financial allocation to states is not having the desired effect on the developmental growth rates

For researchers the implication of this findings is that, the utilisation of Time Series analysis only, misses some of the major complexities and perspective on the real key drivers of the Human capital interms of growth and development in Nigerian states. Therefore there is the need to utilise newer econometric techniques that utilises and maximize the utility of the data collected.

Theoretically, the implications are that, within the Nigerian context, the Financial–Growth nexus is not universal, as the financial allocation from the Federal Government is serving as a disincentive to growth, particularly to human capital growth.

■6.0 CONCLUSION

We are interested in the dynamics of the human capital contribution to the growth and development in the apparent regional disparities within the Nigerian states and regions. Because of the social, economic and political implications of continuous disparities in a developing country like Nigeria. These issues have policy attendant fallouts, for which we want to obtain superior estimate trends. The results of the analyses showed there are not simple relationships between the human capital factors and implied growth in the regions. Increases in financial allocations from the federation accounts and investment in schools have a positive impact and effect on regions with low education levels. Thus it implies that such regions have low technology frontier, and are further away from the National technology frontier. Data quality challenges exists, because large proportion of the domestic economy is engaged in the informal sector, and are not captures by the system of national accounts, thereby making insightful analysis difficult. For regions with higher income positions, higher levels of education seems to have a positive and significant impact on their level of per capita income, relative to other regions, thus confirming our expectation of having a high technology frontier, such regions are closer to the National technology frontier. In this context, the growth of per capita income in Nigeria seemed to indicate that there is a complementarity between the Federal Government Financial allocation, Physical Investment in education and the Technological frontier of the regions.

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[6] See Krueger and Lindahl (2001) and De la Fuente and Domenech (2001).

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