Human Capital, structural change and economic growth developing countries: the case of Nigeria

Lawanson, Olukemi and Evans, Olaniyi

2019

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Olukemi Lawanson
Professor of Economics, University of Lagos, Nigeria

Olaniyi Evans
Pan-Atlantic University, Lagos, Nigeria

Abstract

The objective of this study is to determine if the misallocation of human capital and deficient structural change plays a role in the weak impact of human capital on economic growth in Nigeria. In an augmented Solow model, this study shows that the effect of human capital on growth is more significant when the country enters into the kind of structural change which demands for highly skilled labour. The study further shows that both change from traditional to modern activities and export diversification promote growth. The implication of this study is that human capital is more efficient for growth when structural change is higher. Therefore, robust policies are required to develop new educational curricula in line with national manpower needs. Such new educational curricular which should be the joint responsibility of the educational institutions and the industrial sector of the economy will ultimately benefit the entire economy and therefore enhance growth.

Keywords: Human capital, structural change, economic growth

JEL Classification: C23, E13, F11, O14, O15

1. Introduction

Human capital is a key factor for economic growth and development (Nicet-Chenaf and Rougier, 2009; Oluwatobi and Ogunrinola, 2011). However, empirical evidence is mixed and moreover, "human capital has been rarely linked to the process of structural change underlying both the development process and the deepening of integration to the global economy" (Nicet-Chenaf and Rougier, 2009, p. 3). Structural change is a change in the sector composition of output or labour. As an economy grows, openness to trade and to FDI causes significant changes in the structure of production and exports. Human capital is a key factor in this structural reallocation of resources because it determines the nature and direction of the structural changes in a growing economy. This paper studies the last dimension.

For a growing economy like Nigeria, in the emerging sectors, the demand for skills is not necessarily balanced by a matching supply. The accumulation of capital is not increasing fast enough to match the supply of skills produced by the growing economy. Therefore, "the complementarities between education and technological improvements cannot really take place and the economy can be trapped despite the growing investments in human capital if the structural changes in production are lagging behind" (Nicet-Chenaf and Rougier, 2009, p. 8). This is more so because the Nigerian system operates on "obselete knowledge thus finding it difficult to embrace new knowledge and discoveries. This leads to production of graduates who finds it difficult to fit into the world of work, since their acquired knowledge and skills are rarely relevant to the needs of employers of labour services" (COLI, 2001, as cited in Oluwatobi and Ogunrinola, 2011, p. 73). This has impeded the nation's capacity to build the critical mass of human capital needed to facilitate growth.

The objective of this study is to determine if the misallocation of human capital and the deficient structural change plays a role in the weak impact of human capital on the economic growth in Nigeria. The study explains why increase in human capital may not be a significant variable in

growth regressions in Nigeria. In an augmented Solow model, this study shows that the effect of human capital on growth is more significant when the country enters into the kind of structural change which demands for highly skilled labour.

Several studies in Nigeria has examined the human capital theory and its impact on economic growth (i.e. Lawanson, 2009; Dauda, 2010). However, in spite of the increased academic interest, the issue of structural change relating to interaction between human capital development and economic growth remains hitherto unsettled. While a relationship has been established between human capital and economic growth in Nigeria, the impact of structural change in the interaction between human capital development and economic growth has not been addressed by researchers. This study therefore fills this gap. This study differs in two particular respects from other studies in the literature. Firstly, interactive factors and non-linearity are brought into the model in order to assess the way human capital and structural change interact in the growth process. Secondly, misallocation and skill shifts effects are captured in our model.

The study is organized as follows. The next section surveys the different strands of the literature on human capital, structural change and human capital. Section 3 develops the model. Section 4 provides the econometric analysis. Section 5 concludes.

2. Literature Review

Following the seminal studies of Barro (1991) and Mankiw, Romer, and Weil (1992), an upsurge of empirical research has arisen on the impacts of human capital on growth. Overall, the cross-country evidence is mixed, possibly as a result of difficulties in the specification of cross-country growth regressions (Temple, 1999; Durlauf, Johnson, and Temple, 2005), and attenuation bias due to mis-measured schooling data (Cohen and Soto, 2001; Krueger and Lindahl, 2001; de la Fuente and Domenech, 2001, 2005).

Endogenous growth models highlight the role of human capital in R&D activities and externalities. Human capital contributes to growth either through its effects on R&D or through the externalities which increase productivity (Nicet-Chenaf and Rougier, 2009). Growth is the result of human capital accumulation (Lucas, 1988). The basic assumption of Lucas (1988) is that human capital investment produces positive externalities in the production of final goods.

The changes in the structure of production are significant factors in the development process. According to Nelson and Pack (1999), changes in the production pattern leads to growth sustainability by avoiding diminishing returns on factor accumulation and feeding a demand for skills. For example, Ventura (1997) highlighted that changes in the production structure prevents diminishing returns to human capital for open economies. Nelson and Pack (1999) highlighted the role of structural changes (i.e. the increase in the size of firms) in the growth pattern of East Asian economies.

In a simple two-sector model of a small open economy, Nicet-Chenaf and Rougier (2009, p. 21) found that "increases in human capital have no significant effect on growth if this human capital is misallocated and underemployed. …the effect of education on growth is more significant if the country has entered into the structural change that raises the demand for skilled labour". From a sample of emerging economies, Nicet-Chenaf and Rougier (2009) provide evidence that reduction in the traditional share of GDP and a higher diversification of export have a positive impact on economic growth.

Ciccone and Papaioannou (2009) employ data for 37 manufacturing industries for 40 countries to examine whether higher levels of education and faster human capital accumulation were correlated with faster growth in schooling-intensive industries. The study shows that output growth in schooling-intensive industries was significantly faster in economies with both greater education improvements and higher education levels.

It has been suggested in the literature that "increases in human capital have no significant effect on growth if this human capital is misallocated and underemployed. Underemployment of workers with higher skills than what is required to operate their tasks has been widely observed in developing countries" such as Nigeria (Nicet-Chenaf and Rougier, 2009, p. 3). The institutional structure of the labour market is such that less productive activities yield a higher private return to the individual than do growth-enhancing activities (Veganzones-Varoudakis and Pissarides, 2007; Nicet-Chenaf and Rougier, 2009). As well, the demand for skills in the modern sector is less than the supply of human capital in the economy. This is particularly true in Nigeria where there are low levels of development and investments in equipments as well as skill mismatches and market rigidities, which lead to underemployment.

In the literature, the problem of the misallocation of factors is a major feature of the dualist models (Fei and Ranis, 1964; Harris and Todaro, 1970). The problem of misallocation of labour arises as a result of the sectoral discrepancies in productive efficiency. Earlier works dwelt on the static efficiency losses and gains vis-à-vis different allocation patterns, and on sectoral migration. For example, Kongsamut et al. (2001) and Ngai and Pissarides (2007) models showed how the uneven sectoral total factor productivity (TFP) growth rates causes changes in industrial employment shares and therefore growth.

In Nigeria, several studies have examined the human capital theory and its impact on economic growth (i.e. Ugal and Betiang, 2003; Adeniyi, 2004; Omotor, 2004; Lawanson, 2009; Diawara, 2009; Awe and Ajayi, 2010; Dauda, 2010; Oluwatobi and Ogunrinola, 2011). These studies have provided both theoretical and empirical foundation for the role of human capital in economic growth in Nigeria. However, in spite of the increased academic interest, the issue of structural change relating to interaction between human capital development and economic growth remains hitherto unsettled. While a relationship has been established between human capital and economic growth in Nigeria, the impact of structural change in the interaction between human capital

development and economic growth has not been addressed by researchers. This study therefore fills this gap.

3. *Model, estimators and data*

There are two possible empirical approaches to estimating how the growth effect of human capital may depend on the degree of structural change. Using growth accounting, Poirson (2001) and Temple and Woeβmann (2006) used a measure of TFP growth and a proxy of the structural change among the standard variables explaining productivity. Nicet-Chenaf and Rougier (2009) estimated a Solow-augmented model of growth with structural change. The current study adopts Nicet-Chenaf and Rougier (2009) approach because it allows using a non-linear specification with interactions between explaining factors of growth.

The Solow-augmented model of growth considers the interactions between structural change and human development. From the Solow growth model:

$$\ln(Y_t/Y_{t-1}) = \alpha + (e^{-bt} - 1)\ln(Y_{t-1}) + \varepsilon \quad (1)$$

Introducing the controls for the standard determinants of the steady state,

$$\ln(GDP_t / GDP_{t-1}) = \alpha_0 + \alpha_1 GDP_{t-1} + \alpha_2 POP_t + \alpha_3 INVEST_t + \alpha_4 HUMAN_t + \theta_t + \xi_t \quad (2)$$

Where $\alpha_1 = (e^{-bT} - 1)$ is the convergence coefficient, POP is the growth rate of population, INVEST is the rate of increase in physical capital and HUMAN is the level of human capital disposable at the beginning of the period. According to Quah (1993, as cited in Nicet-Chenaf and Rougier, 2009, p. 16), "the introduction of an auto-regressive term in equation the previous equation could produce a better assessment of the growth process". The introduction of structural change in the previous equation gives:

$$\ln(GDP_t / GDP_{t-1}) = \alpha_0 + \alpha_1 GDP_{t-1} + \alpha_2 POP_t + \alpha_3 INVEST_t + \alpha_4 HUMAN_t + \alpha_5 VA_t + \alpha_5 DIV_t + \xi_t \quad (3)$$

VA_t is the measure of the share of the value added in traditional activities and div_t is the measure of diversification of exports. The share of the value added in agriculture is the proxy for the traditional activities. The diversification of export proxies the entrepreneurial ability to invest in new industrial activities and international trade.

The data used employed consist of annual data for the period 1981 to 2015 and are obtained from World Development Indicators Database (2016). The data are computed as averaged variations or levels on five-year periods. This averaging corrects for cyclical moves and is a good approximation of long run evolution of each variable.

Econometric Techniques

This study uses the Dynamic OLS (DOLS) which were designed to provide optimal estimates of cointegrating regressions. To apply DOLS for estimation, a cointegrating relation must exist among a set of I(1) variables. For that reason, we test for the presence of unit root as well as cointegrating relation. The *Kwiatkowski, Phillips,* Schmidt, and Shin (KPSS, 1992) test is used to test for the unit roots of the variables. Thereafter, we test for the presence of cointegrating relationship among the variables. Johansen (1991; 1995) cointegration test is used in this case.

As developed by Stock and Watson (1993), the DOLS model the regresses the dependent variable on all the independent variables in levels, leads, and lags of the first difference of all I(1) variables (Masih & Masih, 1996). The presence of leads and lags of the differenced independent variables among the regressors takes care of small sample bias and simultaneity bias (Stock and Watson, 1993). According to Saikonnen (1991), the DOLS estimator corrects for endogeneity and serial correlation by including lags and leads of the differenced I(1) regressors in the regression. The DOLS model is derived by augmenting the cointegrating regression with leads and lags of ΔX_t so that the resulting cointegrating equation term is orthogonal to the entire history of the stochastic regressor innovations. The DOLS model is specified as follows:

$$y_t = X_t^{'}\beta + D_{1t}^{'}\gamma_1 + \sum_{j=-q}^{r} \Delta X_{t+j}^{'}\delta + \nu_{1t}$$

(4)

Where y_t is the dependent variable, X_t a vector of independent variables and Δ a lag operator.

It is assumed that adding q lags and r leads of the differenced regressors absorbs all of the long-run correlation between u_{1t} and u_{2t}.

4. **Empirical Analysis**

Firstly, this study investigates the order of integration of the individual series. In Table 1, the absolute values of the KPSS statistics imply that these variables on their levels are non-stationary. In first differences, the variables are all stationary. Thus, the main finding of Table 1 is that all the variables are stationary in their first difference.

Table 1. The KPSS Stationarity Test

	Without trend		With trend	
Initial GDP per capita	I(0)	I(1)	I(0)	I(1)
	0.693	0.421	0.204	0.176
Constant	0.630	0.251	0.277	0.113
Population	0.746	0.316	0.178	0.171
Diversification	0.602	0.226	0.164	0.116
Investment	0.628	0.274	0.151	0.112
VA	0.613	0.319	0.129	0.091
Human Capital	0.597	0.301	0.108	0.128

Human Capital*Diversification	0.581	0.254	0.086	0.108
Human Capital*VA	0.565	0.299	0.064	0.143

*Note: ** and * denote statistical significance at the 5% and 1% level. The bandwidth is selected by Newey-West automatic using Bartlett kernel.*

Having established the order of integration of all series, it is necessary to determine the cointegration of the variables. The Johansen cointegration test is used and the results obtained are as shown in Table 2. The trace test and max Eigen statistic show that there is one cointegrating relationship among the variables, implying that the model can be used to obtain a co-integrating vector or a meaningful long-run relationship.

Table 2. Johansen and Maximum Likelihood Test for Cointegration

Hypotheses	Trace Test	5 % Critical Value	Prob. #	Hypotheses	Max. Eigen Statistic	5 % Critical Value	Prob. #
R = 0	89.847*	69.818	0.000	R = 0	42.884**	33.876	0.003
R ≤ 1	46.962	47.856	0.060	R = 1	22.853	27.584	0.179
R ≤ 2	24.109	29.797	0.195	R = 2	14.615	21.131	0.316
R ≤ 3	9.4942	15.494	0.321	R = 3	7.201	14.264	0.465

*Notes: * and ** denotes rejection of the hypothesis at the 0.01 and 0.05 level. # denotes MacKinnon-Haug-Michelis (1999) p-values*

The results for the DOLS is reported in Table 3. In the first model, the core variables of the Solow augmented model have the appropriate sign and are highly significant (*Initial GDP, Labour, Investment, human capital*). With regards to structural change, the traditional share of the value added (VA) has significant negative relationship with GDP growth. This finding confirms the previous research studies of Nicet-Chenaf and Rougier (2009). This suggests that

economic growth is higher when the share of traditional activities is less. The sluggishness of the change from traditional activities to manufactures is harmful to growth. Further, the diversification of exports has a significant and positive effect on GDP growth. This implies that a key factor for higher growth is the capacity of entrepreneurs to introduce new exportables via new investments in modern activities.

Table 3: Regressions for the GDP growth rate: 1981-2015

	Model 1	**Model 2**
Initial GDP per capita	0.374 (3.242)*	0.470 (2.385)*
Constant	0.103 (1.943)**	0.025 (0.291)
Population	0.696 (3.380)*	0.026 (1.866)**
Diversification	0.838 (1.064)	0.033 (0.747)
Investment	0.538 (1.898)**	0.813 (2.806)*
VA	0.347 (2.475)*	0.920 (2.821)*
Human Capital	0.819 (2.816)*	0.138 (1.836)**
Human Capital*Diversification		0.678 (2.069)**
Human Capital*VA		0.650 (2.543)*
Diagnostic Test Statistics Autoregressive conditional heteroscedasticity = 0.629 [0.510] Serial Correlation (LM) = 0.471 [0.518]		

Normality $\chi^2 = 0.220$ [0.871]
Ramsey Reset Test = 0.193 [0.682]

*Notes: *(1%); **(5%).* t-statistics are in parentheses ( )

This evidence suggests the significant effects of structural changes on growth. However, it fails to show how human capital interacts with shifts in the structure of production to spur GDP growth. Interactive variables are therefore introduced in the second model, leading to a non-linear specification of the model. This non-linear specification allows insights into how the impact of human capital on economic growth evolves with the extent of structural change. The results for this second model suggest that the effect of human capital on growth is greater when diversification is higher. Further, this effect is significantly influenced by the share of the traditional share of the value added. The implication is that the change from traditional activities such as agriculture to modern industries has a significant effect on the contribution of human capital to economic growth in Nigeria. This conforms with Nicet-Chenaf and Rougier (2009) and the estimates in the first model which suggest that the reduction in the traditional share of GDP has a positive effect on economic growth. Then the point is that the reduction in traditional activities matters for growth through the skill reallocation from traditional to modern activities.

5. Conclusion

This study has shown that the insignificance of human capital variables in growth regressions could be that increases in human capital have no significant effect on growth when human capital is misallocated and underemployed. The effect of human capital on growth is more significant when the country enters into structural change which raises the demand for skilled labour. The study further shows that both the change from traditional to modern activities and diversification promote growth. The implication is that human capital is more efficient for growth when structural change is higher.

This empirical study implies that Nigeria should improve its human capital. Firstly, robust policies are required to develop new educational curricula in line with national manpower needs. Such new educational curricular which should be the joint responsibility of the educational institutions and the industrial sector of the economy will ultimately benefit the entire economy and therefore enhance growth.

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