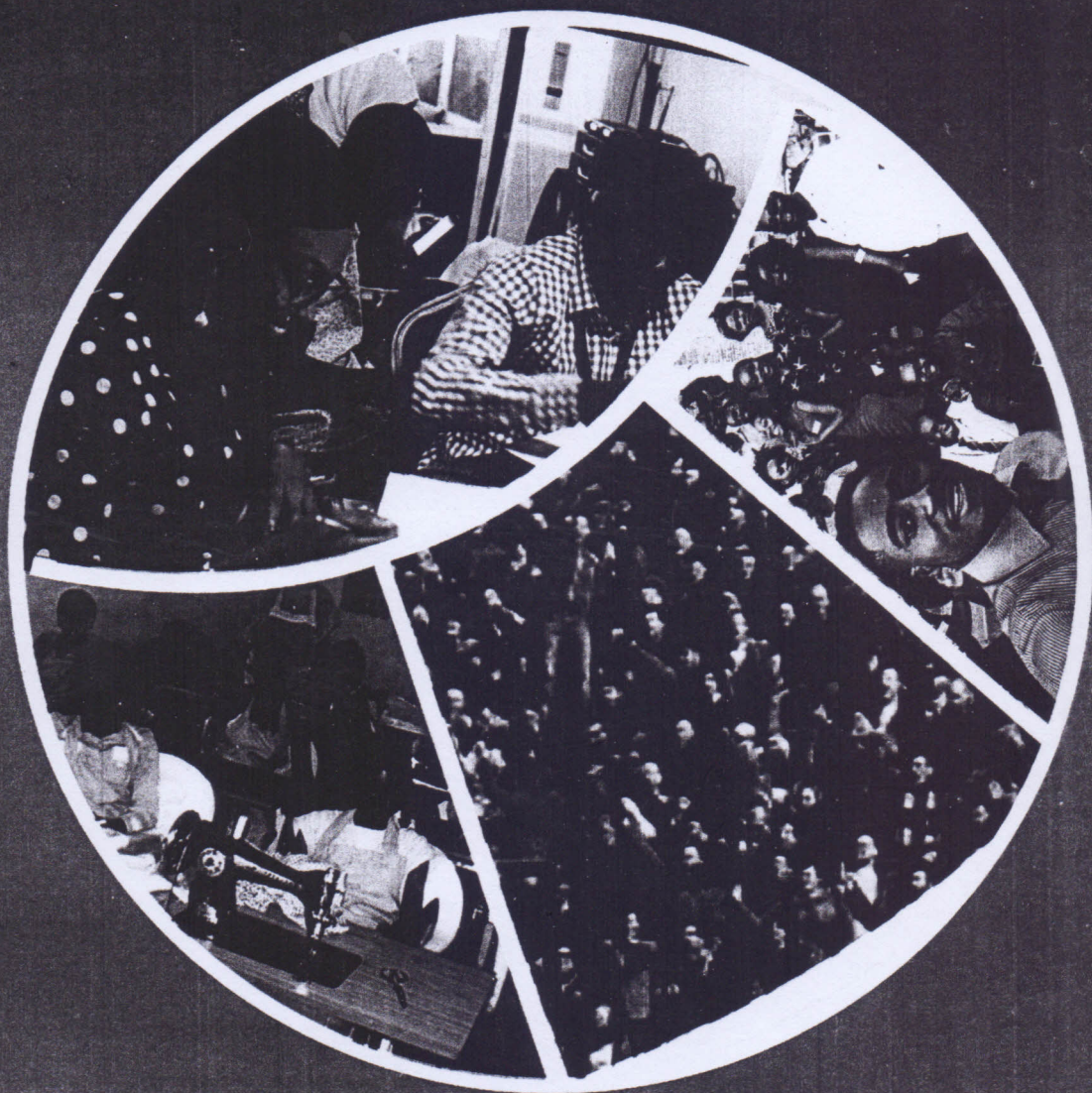


ECONOMICS OF HUMAN RESOURCE: **ISSUES, CHALLENGES & OPPORTUNITIES**

A Festschrift in Honour of Professor Folayan Ojo



Edited by Lawanson O. I & Nwakeze N. M

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Chapter 6

HUMAN CAPITAL, STRUCTURAL CHANGE AND ECONOMIC GROWTH IN DEVELOPING COUNTRIES: THE CASE OF NIGERIA

Lawanson O. I. and Evans O.

Abstract

The objective of this study is to determine if structural change plays a role in the relationship between human capital and economic growth in developing countries. The case study is Nigeria for the period 1981 to 2016 using Solow-Swan model and dynamic OLS. The 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 traditional share of the value added has significant negative relationship with GDP growth, implying that economic growth is higher when the share of traditional activities is less. Further, the diversification of exports has a significant and positive effect on GDP growth, implying that a key factor for higher growth is the capacity of entrepreneurs to introduce new exportables via new investments in modern activities. The effect of human capital on growth is greater when diversification is higher and the share of the traditional activities is less. 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.

Keywords: Human Capital, Structural Change, Economic Growth

1. Introduction

Human capital is a key factor for economic growth and development (Fang and Chang, 2016; Sultanova and Chechina, 2016; Chao and Dahu, 2017; Hendricks and Schoellman, 2017; Fahimi, Saint Akadiri, Seraj and Akadiri, 2018; Ogundari and Awokuse, 2018). However, empirical evidence is mixed and moreover, human capital has been rarely associated with the process of structural change underlying both the development process and integration to the global economy of developing countries. 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 developing economy.

For a developing 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 technological improvements and education cannot really occur and the economy may be trapped regardless of the rising investments in human capital if structural changes in production lag behind (Nicet-Chenaf and Rougier, 2009). This is more so because developing countries such as Nigeria are not operating on up-to-date knowledge and discoveries, leading to the production of graduates who are unfit for the world of work, and whose acquired knowledge and skills are hardly relevant to the needs of employers (COLI, 2001, Oluwatobi and Ogunrinola, 2011). This can impede a nation's capacity to build the critical mass of human capital needed to facilitate growth. This structural change problem is particularly true in developing countries such as Nigeria where there are low levels of development and investments in equipment as well as skill mismatches and market rigidities, which leads to underemployment.

A vast number of studies have explored human capital theory and economic growth. Several studies in Nigeria have also examined human capital and its effects on growth (e.g., Ogujiuba and Adeniyi, 2004; Omotor, 2004; Lawanson, 2009; Diawara, 2009; Awe and Ajayi, 2010; Dauda, 2010; Oluwatobi and Ogunrinola, 2011; Omitogun, Osoba and Tella, 2016; Lucas and Shobayo, 2017). However, in spite of the increased academic interest, the issue of structural change relating to interaction between human capital 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 and economic growth has not been addressed by researchers. This study therefore fills this gap. It differs in two particular respects from other studies in the literature. Firstly, interactive factors and nonlinearity 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 the model. The study explains why increase in human capital may not be a significant variable in growth regressions in developing countries. In an augmented Solow model, this study shows that the effect of human capital on growth is more significant when a country enters into the kind of structural change, which demands for highly skilled labour.

The remainder of the chapter is organised as follows. The next section surveys the theories and different strands of the literature on human capital, structural change and human capital. Section 3 describes the data and methodology while section 4 presents the empirical results. Section 5 provides the discussion of findings while section 6 concludes.

2. Theory & Review of Literature

The dualist models of economic growth emphasise the problem of the misallocation of factors of production (Fei and Ranis, 1964; Harris and Todaro, 1970). For example, 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.

Endogenous growth models highlight the role of human capital in research and development (R&D) activities and externalities (Minniti and Venturini, 2017; Choi and Yi, 2018). 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. 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, 2004; de la Fuente and Domenech, 2001, 2005).

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) found that increases in human capital have no significant effect on growth if human capital is misallocated and underemployed. The effect of education on growth is more significant if the country has entered into the kind of structural change that raises the demand for skilled labour. 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 developing countries such as Nigeria where there are low levels of investments in equipment's as well as skill mismatches and market rigidities, which lead to underemployment. From a sample of emerging economies, Nicet-Chenaf and Rougier (2009) provided 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) employed 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.

In Nigeria, several studies have examined the human capital theory and its impact on economic growth (e.g., Ogujiuba and Adeniyi, 2004; Omotor, 2004; Lawanson, 2009; Diawara, 2009; Awe and Ajayi, 2010; Dauda, 2010; Oluwatobi and Ogunrinola, 2011; Omitogun *et al.*, 2016; Lucas and Shobayo,

2017). 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 the previous studies. This study therefore fills this gap.

3. Data and Methodology

3.1 The data

The data used consist of annual data for the period 1981 to 2015 and are obtained from World Development Indicators Database (2016). The data includes GDP growth, gross capital fixed formation (% of GDP), secondary enrollment, agriculture value added and Shannon index for exports. The data are computed as averaged variations or levels on five-year periods. This averaging corrects for cyclical movements and is a good approximation of long run evolution of each variable.

3.2 The Model

In line with Barelli and de Abreu Pessôa (2003), and Litina and Palivos (2008), the Solow-Swan growth model is adopted in this study and is expressed as:

$$Y_t = K_t^\alpha (A_t L_t)^{1-\alpha} \quad (1)$$

Where Y is output, K is physical capital, A is labour augmenting technology or knowledge, L is labour; thus AL represents effective labour or human capital, α is the elasticity of output with respect to capital. The proxy for output is GDP growth, for capital is gross fixed capital formation (% of GDP) and for effective labour or human capital is secondary school enrolment.

In linear form,

$$\ln Y_t = \alpha \ln K_t + (1 - \alpha) \ln AL_t \quad (2)$$

The introduction of the structural change variables into the equation gives,

$$\ln GDP_t = \tau_1 \ln K + \tau_2 \ln AL_t + \tau_3 VA_t + \tau_4 DV_t + \epsilon_t \quad (3)$$

Where VA is the measure of the share of the value-added in traditional activities and DV 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 operationalisation of the variables is detailed in Nicet-Chenaf and Rougier (2009).

To determine if there is structural change, the share of traditional activities and diversification of exports are interacted with human capital:

$$\ln GDP_t = \tau_1 \ln K + \tau_2 \ln AL_t + \tau_3 VA_t + \tau_4 DV_t + \tau_5 (L * VA)_t + \tau_6 (L * DV)_t + \epsilon_t \quad (4)$$

3.3 The Estimation Technique

Firstly, the order of integration of the individual series is determined using Kwiatkowski-Phillips-Schmidt-Shin (KPSS) stationarity test. KPSS is more computationally robust compared to the traditional unit root tests such as the augmented Dickey-Fulley and Phillips-Perron tests (Aggarwal and Kyaw, 2005; Tang, 2008). The Johansen cointegration test is then used to test for cointegrating relationships. The main advantage of Johansen's procedure for this study is in the testing and estimation of multiple long run equilibrium relationships, and the testing of hypotheses via linear restrictions in cointegration space (Johansen and Juselius 1990, 1994). This study finally uses the Dynamic OLS (DOLS) for the estimations. The advantage of the DOLS approach for this study is that it robust enough to correct for endogeneity by the inclusion of lags and leads of first differences, and for serially correlated errors, coupled with the fact that it has identical asymptotic optimality properties to the Johansen distribution.

4. Empirical Results

The empirical analysis begins with testing for the order of integration of the individual series. As shown in Table 1, the absolute values of the KPSS statistics imply that these variables are nonstationary on their levels. In first differences, the variables are all stationary. Thus, the main finding of the KPSS is that all the variables are stationary in their first difference.

Table 1: The KPSS Stationarity Test

	Without trend		With trend	
	Level	First difference	Level	First difference
GDP	0.293	0.421***	0.204	0.576**
AL	0.197	0.391***	0.108	0.528**
K	0.328	0.874*	0.151	0.412***
VA	0.113	0.619**	0.129	0.691**
DV	0.302	0.526**	0.164	0.726*

Note: *, ** and *** denote statistical significance at the 1%, 5% and 10% 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
$R \leq 1$	46.962	47.856	0.060	$R = 1$	22.853	27.584	0.179
$R \leq 2$	24.109	29.797	0.195	$R = 2$	14.615	21.131	0.316
$R \leq 3$	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 of the estimations using Dynamic OLS is reported in Table 3. In the first model, only one of the core variables of the Solow-Swan model has the appropriate sign and is highly significant (*physical capital*). Human capital is not significant. With regards to structural change, the traditional share of the value-added (VA) has significant negative relationship with GDP growth. This suggests that economic growth is higher when the share of traditional activities is less. This finding confirms the previous research studies of Nicet-Chenaf and Rougier (2009). Further, the diversification of exports (VA) has a significant and positive effect on GDP growth, implying that a key factor for higher growth is diversification of exports.

Table 3: Regressions for the GDP Growth Rate

	Model 1	Model 2
<i>Constant</i>	0.103** (0.053)	0.025 (0.050)
<i>Physical Capital (K)</i>	0.538** (0.283)	0.513** (0.285)
<i>Human Capital (L)</i>	0.419 (0.291)	0.838* (0.286)
<i>Traditional Share of the Value-Added (VA)</i>	-0.347* (0.140)	-0.920* (0.139)
<i>Diversification of Exports (DV)</i>	0.838* (0.164)	0.833* (0.161)
<i>Human Capital*Value-Added (L*VA)</i>		0.650** (0.350)
<i>Human Capital*Diversification (L*DV)</i>		0.678*** (0.376)
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%).Standard errors are in parentheses ()

This evidence has shown the significant effects of structural change 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 nonlinear specification of the model. As shown in the second model, human capital has significant positive effects on economic growth, meaning that increase in human capital

leads to increase in economic growth. The human capital effect is significantly influenced by the traditional share of the value-added and diversification of exports, meaning that traditional activities and diversification have significant effects on the contribution of human capital to economic growth. This conforms to the estimates in the first model which suggest that the reduction in the traditional share of GDP has a positive effect on economic growth.

5. Discussion of Results

The empirical results have shown why increase in human capital may not be a significant variable in growth regressions in developing countries. In an augmented Solow model, this study shows that the effect of human capital on growth is more significant when a country enters into the kind of structural change which demands for highly skilled labour. At that stage, human capital has significant positive effects on economic growth, meaning that increase in human capital leads to increase in economic growth. This is consistent with many other studies in the literature that have found significant effects of human capital on growth (Omitogun *et al.*, 2016; Lucas and Shobayo, 2017; Cuaresma, Doppelhofer, Huber and Piribauer, 2018; Ogundari and Awokuse, 2018). For example, Ogundari and Awokuse (2018) showed that the two measures of human capital, education and health, have positive effects on economic growth, though the contribution of health is quite larger than the effects of education. Also, Cuaresma *et al.* (2018) showed that human capital act as important drivers of income growth.

With regards to structural change, the traditional share of the value-added has significant negative relationship with GDP growth, implying that economic growth is higher when the share of traditional activities is less. The slowness of the change from traditional activities to manufactures in developing countries like Nigeria 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.

This study has also allowed insights into how the impact of human capital on economic growth evolves with the extent of structural change. The effect of human capital on growth is greater when diversification is higher. Further, the effect of human capital on growth 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 significant effect on the contribution of human capital to economic growth.

6. Conclusion

This study has shown that the effect of human capital on growth is more significant when a country enters into the kind of structural change which demands for highly skilled labour. With regards to structural change, the traditional share of the value-added has significant negative relationship with GDP growth, implying that economic growth is higher when the share of traditional activities is less. Further, the diversification of exports has a significant and positive effect on GDP growth, implying that a key factor for higher growth is the capacity of entrepreneurs to introduce new exportables via new investments in modern activities. The effect of human capital on growth is greater when diversification is higher. Further, the effect of human capital on growth 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.

The findings have important policy implications. The effect of human capital on growth is greater when diversification is higher and the share of traditional activities are higher, meaning that the effect of human capital on growth is more significant when the country enters into structural change which raises the demand for skilled labour. That is, 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. Nigeria should therefore improve its human capital from traditional to modern activities. Through skill reallocation from traditional to modern activities, the reduction in traditional activities can enhance growth in the country. Robust policies are required to develop new educational curricula in line with evolving manpower needs. Such new educational curricular which should be the joint responsibility of the educational institutions, the industrial and technological sectors of the economy will ultimately benefit human capital and therefore enhance growth.

There are several areas worthy of future consideration. Future studies can explore the relationship between human capital, structural change and economic growth in other contexts or using a larger sample. Such studies can explore the possibilities of nonlinearities in the relationship (whether quadratic or cubic). It would be difficult to determine all the multifaceted channels through which human capital could interact with intersectoral change to cause growth. However, international surveys can still be used to determine how key intersectoral changes may impact human capital and economic growth in different contexts.

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