BRAIN DRAIN AND LABOUR OUTPUT IN NIGERIA: AN ECONOMETRIC APPROACH

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ABSTRACT

Western societies' contact with Africa was grossly associated with massive slave trade. Post the contact, the paradigm shifted from slave trade to brain drain. This movement of highly skilled manpower from the country to developed societies reduces both the quality and quantity of labour force in the brain drained-country. Hence, this study investigates the impact of brain drain on labour productivity in Nigeria from 1999 to 2017 using quarterly data gotten from World Development Indicators (2018) and National Bureau of statistics (2017).Autoregressive Distributed Lag (ARDL) model is adopted. The bounds test reveals the presence of cointegration amongst the variables. The Philips Peron unit root test reveals that the variables are stationary both at level form and after first difference, thus fit for long run estimation.Fromthe results: brain drain has a significant impact on labour output such that the higher the brain drain, the lower the labour productivity in real terms; over the years of study, work hours per capita decreased, but total hours worked increased due to increase in population. The study also identifies other causes of poor labour output as: unemployment, poor salaries, poor infrastructures (eg. Road, power, water, etc.), high fuel prices amongst others. Therefore, the study recommends that: government should review policies relating to remuneration/salary and general working conditions of workers, especially medical personnel and other professionals; government should improve infrastructural facilities necessary for improving labour productivity and regulate her population growth rate to a manageable size.

Key Words: Brain drain; Labour output

1. INTRODUCTION

Western societies' contact with Africa was grossly associated with massive slave trade. Post the contact, the paradigm shifted from slave trade to brain drain. This movement of highly skilled manpower from the country to developed societies reduces both the quality and quantity of labourforce in the brain drained-country. This problem of human capital flight has become a topic of major concern to scholars across the world. This is because its occurrence

defiles ideological affiliation of countries worldwide as well as their level of development. In respect of ideological background, brain drain affects both socialist and capitalist nations. Socialist countries like Cuba and Russia would have been exempted from the problem, judging from the fact that they strive to build societies based on equality and humane values of living not for accumulating personal wealth but for using knowledge, skills, talents and whatever resources available to make their countries better places for entire citizenry. The paradigm being the arch rival of capitalism is expected to make its countries free from brain drain (Omonijo,2011). But the reverse is the case. The problem of brain drain is worse in some socialist countries than many capitalist states (BCC News 2002; Richardson et al 2007).

In developing countries of India, Pakistan and Middle East, outflow of professionals to Western Europe and North America is evident (BCC News 2001; Mittelbach et al 2007). Furthermore, a number of Latin America countries had, over the years, suffered a considerable loss of professionals to Western nations (World Bank 2014). In underdeveloped nations of Caribbean Islands, the menace of brain drain has prompted 80% of college graduates from Haiti, Grenada and Guyana to migrate, mostly to the United States (Branche, 2006). Countries of Africa are equally in the same rank with Caribbean Islands in term of underdevelopment. Nevertheless, African continent is the hotbed of brain drain in the world (Harrison 2007; Offiong 2001). Countries like Gambia, Ghana, Kenya, Sierra Leone, Uganda, Zambia and Zimbabwe are the most affected nations, Carrington &Detragiache (1998). South Africa, Nigeria and Ethiopia are also included in the list of affected countries in Africa (Paul et al 2004; Girma 2009).

Migration of people from one place to another in countries of the world in search of better conditions of living predates history. It motivated western societies' contact with Africa. Prior the contact, agriculture was the main stay of Africa's economy. Thus, the movement of farmers from one location to another in search of fertile grounds for cultivation. After independence in Nigeria, there began the movement of highly skilled manpower to the developed societies. This has however, affected the labour productivity in the country. Labour productivity refers to the quantity of labour input required to produce a unit of output. This is often the case, even though it is recognised that labour is NOT the only input utilised in the production process. While Joshua, Olanrewaju & Ebiri (2014) describes brain drain as a large emigration of individuals with technical skills or knowledge from one country to another usually for better conditions of service and good living environment.

However, in the past, University teachers in Nigeria enjoyed higher housing allowances and better social status. The overall working conditions were more attractive than those in civil service, which made teaching the envy of civil servants. The annual salary of the Nigerian university lecturers was enough to provide for their comfort (National University Commission, September 1994:3). Presently, the condition of the Nigerian educational system has deteriorated and university workers have become the least paid among all the professions

in Nigeria. This was revealed in a survey carried out in 2007 by the National universities Commission (NUC). It was found that a full professor in any Nigerian university earned 12,000 dollars per annum in 2006 which was only increased to 21,000 dollars in 2009 and still stand today. A full professor from Botswana earned 27,000 dollars per annum while Namibia full professor earned about 35,000 dollars. A full professor from South Africa earned between 58,000 and 75,000 dollars. The above statistics indicates that the Nigerian university workers earn less among their contemporaries (Adebayo 2010: 2).

This explains why the Academic Staff Union of Universities (ASUU) is always on strike in order to pressurize the government to upgrade her welfare. As a matter of fact, ASUU was on an indefinite strike as at the time of writing this paper. While in response to this, the federal government was ordering the universities to start the implementation of "No Work No Pay" policy. This also explains why most of these (first class) academic staff want to leave this country for a better working condition abroad. Medical doctors and other professionals in Nigeria are not treated differently. Hence, the escalation of brain drain and relative decline in labour productivity.

Knowledge loss in the form of brain drain has been one of the major challenges facing Nigeria. This negatively affects the rate of economic growth and development in Nigeria. Hence this study investigates the impact of brain drain on labour productivity in Nigeria over the period of 19 years, from 1999 to 2017 using data gotten from World Development Indicators (2018) and National Bureau of Statistics (2017). The period is chosen due to availability of data and hence broken into quarterly data for robust analysis. The findings of this study will clearly reveal how brain drain affects labour productivity; how labour force participation rate affects labour productivity; how salary affects labour productivity and most importantly, how to ameliorate these problems. This would guide the government in policy making towards preventing brain drain and enhancing other factors that lead to increased labour productivity in Nigeria. The output of his research would also be useful to the education sector, the civil servants and other stakeholders alike.

2. LITERATURE REVIEW

2.1 Conceptual Issues

The Concept of Brain Drain

Spokesmen for the Royal Society of London were the first to coin the expression "brain drain" to describe the outflow of scientists and technologists to Canada and the United States in the early 1950s. The term "brain drain" originally referred to technological workers leaving a nation. But nowadays its application or meaning has widened to include the migration of educated and professional people from one country, economic sector or field for another usually for better remuneration and/or living conditions (Merriam Webster Dictionary, 2010).

Its other side of the coin is "brain gain" which refers to the areas to which talents migrate. Brain drain can occur either when individuals who study abroad and complete their education do not return to their home country, or when individuals educated in their home country emigrate for higher wages or better opportunities.

Stenman (2006) describes brain drain as a large emigration of individuals with technical skills or knowledge from one country to another usually for better conditions of service and good living environment. This refers to the emigration of talented people like doctors, engineers, teachers and technicians from one country to another. This movement has a negative impact on the overall productivity and developments of the home country. It was estimated that 30,000 people from both public and private organizations have migrated abroad. It was also discovered that about 64% of Nigerians living in America age 25 years and above have a minimum of bachelor degree (Akusoba, 2014). A national census conducted by the United State in 2004 reveals that 3.24 million Nigerians live in America alone…some 202,000 are medical professionals, 174,000 are experts in information technology, and 250,000 are experts in different areas, including university teachers (Adebayo, 2010). Migration of people has been a regular and common phenomenon of world history, whether as skill or unskilled. But in recent time skilled migration of humans, popularly known as brain drain, is widely discussed for its larger consequences and its impacts toward labour productivity in developing countries.

The Concept of Labour Output

According to Wikipedia, labour output generally refers to the amount of goods and services that a worker produces in a given period of time. But in 2002, the organisation for Economic Co-operation and Development (OECD) defined it as "the ratio of a volume measure of output to a volume measure of input". Volume measures of output are normally Gross Domestic Product (GDP) or Gross Value Added (GVA), expressed at constant prices. The three most commonly used measure of input are hours worked; labour jobs; and number of people in employment. Specifically, labour output refers to the quantity of labour input required to produce a unit of output. This is often the case, even though it is recognized that labour is NOT the only input utilised in the production process.

However, for the purpose of this study, the OECD's definition of labour productivity is adopted and hence, it is derived as the ratio of total output (annual GDP, current prices) to labour input (total hours worked per year) as the formula is stated thus;

$$Labour\ productivity = \frac{GDP_{Year\ N}}{Labour\ input_{Year\ N}}$$

2.2 Empirical Literature

Peter Brem (2013) in his dissertation analyzed the approaches to labor productivity by the most important protagonists which are in the history. He made the historic description based on the pioneers of labor productivity and these include Adam Smith, Karl Marx, Frederick W.Taylor, Henri Fayol, Chester I. Barnard and Henry Ford. After identifying all important key factors of labor productivity from the selected pioneers, he investigated the effects of wages on labour productivity.

Emeghara (2013) reviewed brain drain as a clog in the wheel of Nigeria's development having the university education system in focus. The study went further to critically examine the brain drain phenomenon and its causes in Nigeria. According to Emeghara, these causes range from lack of employment, poor remuneration for top flight intellectuals and professionals, political instability, security risks to lack of research and other facilities (including inadequacy of research funds and professional equipment and tools).

Kerretal. (2016) did a study on "Brain Drain, the Consequence of Globalization and Future Development: A Study on Bangladesh". In this paper they tried to show how skill migration takes place and how countries can retain these brains to home country by providing some push and pull factors with the help of government and private sectors.

Omonijo, et al. (2011), focused on understanding the escalation of brain drain in Nigeria from poor leadership point of view. Among other things, the study found that there is a relationship between poor leadership of the country and escalation of brain drain.

Ngutsav, Iorember&Akighir (2017), studied education financing, labour productivity, and economic development in Nigeria. The study was anchored on the human capital theory. Secondary data from 1970 to 2015 were used to analyze these relationships. With the help of the Vector Autoregressive Model (VAR), it was found that there is a long run relationship between education financing, labour productivity and economic growth in Nigeria.
For all empirical literature reviewed in Nigeria and abroad, the study did not encounter any similar work for the specific study area in Nigeria and within the time frame that make use of the ARDL model to study the impact of brain drain on labour output in Nigeria. It is against this back drop that this current study seeks to contribute to literature by adopting the ARDL model to study the impact of brain drain on labour output in Nigeria from 1999 to 2018, making use of quarterly data.

1. METHODOLOGY

3.1 Theoretical Framework

The underpinning theory for this study is the Neoclassical Economic Theory of labour migration.This theory states that the main reason for labor migration is wage difference between two geographic locations. These wage differences are usually due to geographic labour demand and supply. The proponents of this theorybelieve that areas with a shortage of labour but an excess of capital have a high relative wage while areas with a high labor supply and a dearth of capital have a low relative wage. Hence, labour tends to flow from developing to developed countries where wages are relatively higher.

3.2 Model Specification

LO = F (BRD + LFPR + SAL) ………………..…………………………1

Where,

LO = Labour productivity

BRD = Brain drain

LFPR = Labour force participation rate

SAL = salary

Equation 1 can be modified into an economic model as shown below;

$$LO_t = \alpha_0 + \alpha_1 BRD_t + \alpha_2 LFPR_t + \alpha_3 SAL_t \dots\dots\dots\dots\dots\dots\dots\dots\dots.2$$

Econometrically, equation 2 could be modified as thus;

$$LO_t = \alpha_0 + \alpha_1 BRD_t + \alpha_2 LFPR_t + \alpha_3 SAL_t + \mu_t \dots\dots\dots\dots\dots\dots\dots\dots3$$

However, equation 3 can further be modified into the general form of Auto-Regressive Distributed Lag model, i.e. ARDL (p, q), where p is the maximum lag of the dependent variable and q is the maximum lag of the independent variables. The ARDL model was chosen because of its dynamism, that is, it contains the lag values of the dependent variable, the current and lag values of the independent variables. This can be illustrated below;

$$LO_t = \alpha_0 + \sum_{i=1}^{p} \delta_i LO_{t-i} + \sum_{k=0}^{q} \beta_k BRD_{t-k} + \sum_{f=0}^{q} \in_f LFPR_{t-f} +$$
$$\sum_{l=0}^{q} \gamma_l SAL_{t-l} + \mu_t \dots\dots.4$$

To perform the bounds test for cointegration, the conditional ARDL (p,q1,q2,q3,) model with variables would have the following hypotheses:

$H_0: \delta_i = \beta_k = \epsilon_f = \gamma_l = 0 \quad \equiv there\ is\ no\ cointegration$

$H_1: \delta_i = \beta_k = \epsilon_f = \gamma_l \neq 0 \equiv there\ is\ cointegration$

From the econometric software output, there is an evidence of cointegration among the exogenous variables, hence we reject the null hypothesis, and then we estimate only the Unrestricted Error Correction Model (UECM) thus:

$$\Delta LO_t = \alpha_{01} + \sum_{i=1}^{p} \delta_{01} \Delta LO_{t-1} + \sum_{i=0}^{q} \beta_{1i} \Delta BRD_{t-i} + \sum_{i=0}^{q} \beta_{2i} \Delta LFPR_{t-i}$$

$$+ \sum_{i=0}^{q} \beta_{3i} \Delta SAL_{t-i} + \lambda_1 LO_{t-1} + \lambda_2 BRD_{t-1} + \lambda_3 LFPR_{t-1} + \lambda_4 SAL_{t-1}$$

$$+ \mu_t \dots \dots \dots ..5$$

Where,

μ_t = Error term which is white noice, p is the optimal lag length for dependent variable while q is the optimal lag length for the explanatory variable.

The expressions ($\lambda_1 - \lambda_4$) on the right hand side correspond to the long run relationship. While the remaining expressions on the right hand side with the summation sign ($\beta_{1i} - \beta_{3i}$) denote the short run dynamics of the model.

2. ANALYSIS AND INTERPRETATION OF RESULTS

Here, the regression results shall be presented. The objectives and hypotheses stated earlier shall be evaluated based on the findings in the econometric software. Note that these findings shall be subjected to economic interpretation, especially as it relates to the present day realities.

Stationarity, Lag Length Criteria and Bounds Test

Our result reveals that all our series, Labour output (LO), Wage and Brain Drain proxied by Net Migration (BRD) were all integrated of order 1, meaning the series were stationary after first difference. Only Labour Force Participation Rate (LFPR) was integrated of order 0, meaning the series were stationary at level form. The decision rule for no unit root is that the Philips Perron Test statistic must be greater than the Mackinnon critical value (in absolute value) for the series to be stationary (see table 4.1).

Table 4.1 Unit Root Test (Result)

VARIABLE	Phillips-PerronTEST AT LEVEL	5% VALUE AT LEVEL	Phillips-PerronTEST AT FIRST DIFFERENCE	5% VALUE AT FIRST DIFFERENCE	INTEGRTON ORDER
LFPR	**21.55464**	-2.902358	0.734614	-3.052169	I(0)
BRD	**-1.649772**	-2.902953	**-3.569813**	**-2.903566**	I(1)
WAGE	**-1.112406**	-3.040391	**-3.523552**	**-3.052169**	I(1)
LO	**-2.200337**	-3.040391	**-5.271990**	**-3.052169**	I(1)

Source Researcher's computation using Eviews 9.0

4.2 Lag Length Criteria: The study adopted akaike information criteria because of its consistency in selecting the optimal lag length.

Table 4.2 ARDL Bounds test for cointegration (Result)

F-Statistic	5% sig. at I0 Bound	5% sig. at I1 Bound
11.24167	3.23	4.35

Source: Researcher's computation using Eviews 9.0

From the result of the bounds test in table 4.2 above, we found that there exists a long run relationship among variables of interest suggesting there is cointegration in the model. This implies that the coefficients of the long run equation are not equal to zero. We can see that the f- statistic value is greater than the 5% critical value bounds. As a result of this, this study had to employ the Autoregressive Distributed lag (ARDL) model and error correction model (ECM) which account for both the short run and long run dynamics to capture the three objectives of the study.

4.3 PRESENTATION AND INTERPRETATION OF RESULTS
Table 4.4: ARDL (2, 1, 1, 1) MODEL (Result)

VARIABLE	COEFICIENT	STD. ERROR	T-STATISTIC	PROB.
LO(-1)	1.464194	0.081121	18.04956	0.0000
LPO-2)	-0.647044	0.074701	-8.661806	0.0000
LFPR	1.83E-06	9.10E-07	2.007677	0.0490
LFPR(-1)	-1.86E-06	9.17E-07	-2.029600	0.0467
BRD	4.16E-06	1.33E-06	3.118725	0.0028
BRD(-1)	-4.43E-06	1.39E-06	-3.181051	0.0023
WAGE	-0.108934	0.067157	-1.622097	0.1099
WAGE(-1)	0.155098	0.071764	2.161218	0.0345
R-SQUARE				0.975099
ADJUSTED R-SQUARE				0.971886
F-STATISTIC				303.4794
PROB(F-STATISTIC)				0.000000
DURBIN-WATSON STAT				2.006450
CONSTANT				0.830744

Source: Researcher's computation using Eviews 9.0

The result in table 4.3 above is Auto Regressive Distributed Lag (ARDL) model which was introduced because we have a combination of I(0) and I(1) series.

The study found that one and two previous years of Labour output have significant positive and negative effects on current Labour outputin the long run. It implies that Labour output at

one and two year period significantly contributes on current Labour output in Nigeria. The impact was positive at one year period while at two year period it was negative.

Brain Drain and Labour Productivity

The study found that current and one previous years of Brain Drainproxied by Net Migration significantly impact on Labour output in the long run. Each additional unit of Brain Drain in the previous year 1, led to a decrease in Labour output by 0.00044 percent. This result implies that Labour Productivity will reduce if one unit of labour checks out of the country. The results conform to aprori expectation.

Labour Force Participation Rateand Labour output

The study also discovered that current and one previous years oflabour force participation rate significantly impact on Labour output in the long run. The result shows that a 1 percent increase inlabour force participation increases Labour output by 0.000186 percent. So this result implies that Labour output will increase if the rate of labour force participation rate increases. The results also conform to apriori expectation that if the number of active population consistently participating in the labour force increases, the unit of output produced by labour will increase.

Wage and Labour output

It was also discovered that Wage significantly influenced Labour output for the study period in the long run. Wage has a positive and significant impact on Labour output at previous one year period.If the wage rate of labour is increased by one percent in Nigeria, Labour output will increase by 15.50%.

3. Recommendation and Conclusion

A study such as this has so many policy implications which, if carefully identified and treated appropriately, could contribute to the development of all sectors of the economy. To this effect, the following policy recommendations emanating from the findings of this study are in order.

1. Since it is evident that brain drain has a negative impact on labour output in Nigeria then the government should create more job opportunities, increase workers salary/wage and create conducive environment for her youth and graduates so as to discourage people especially the youth and graduates from migrating out of the country.
2. Government should invest more in Education in order to improve the performance of educational sector so as to discourage the student migration.
3. Government should put some restrictions on her youth and graduate international migration so that they will participate actively in the labour force.
4. Government should improve the standard of living so as to discourage her citizens from seeking improved standard of living elsewhere.

Conclusion

This is a country specific study centered in Nigeria, with the information about them gathered by the World Development Indicator (WDI). The study covers the period of 1999 to 2017 using quarterly data. The focus of the study centered on brain drain or knowledge loss and its impact on labour output. This is because such information will reveal how to minimize brain drain in Nigeria by bringing possible recommendation on brain drain vis a vis labour productivity in Nigeria.

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