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The Male Migration on Families

Short Run, Long Run Association

Highlights

Empirical Analysis of Agricultural

Exchange Rate and Trade Balance

Discovering Thoughts, Inventing Future

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Globalization in Reverse: The Missing Link in Energy Consumption

By Tarana Azimova
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Abstract- We present a theoretical framework that demonstrates the globalization as a beneficial trend which fosters the movement of advanced technology from developed nations to developing countries leading to the deployment of large scale energy projects on renewable technologies. We explore the implications of this framework with panel data and vector autoregressive (VAR) analyses. These suggest that an increase in social globalization which accounts for the spread of know-how, skilled workers and technology by 1 percent reduces the energy consumption by roughly 21 percent. This lead to increasing the employment of clean and renewable energy sources through the attainment of technological efficiency. However, substantial increase in traditional energy demand from developing countries suggests the trend of anti-globalization.

Keywords: *energy consumption, panel data analysis, globalization, renewable technologies.*

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Globalization in Reverse: The Missing Link in Energy Consumption

Tarana Azimova

Abstract- We present a theoretical framework that demonstrates the globalization as a beneficial trend which fosters the movement of advanced technology from developed nations to developing countries leading to the deployment of large scale energy projects on renewable technologies. We explore the implications of this framework with panel data and vector autoregressive (VAR) analyses. These suggest that an increase in social globalization which accounts for the spread of know-how, skilled workers and technology by 1 percent reduces the energy consumption by roughly 21 percent. This lead to increasing the employment of clean and renewable energy sources through the attainment of technological efficiency. However, substantial increase in traditional energy demand from developing countries suggests the trend of anti-globalization.

Keywords: energy consumption, panel data analysis, globalization, renewable technologies.

I. Introduction

There is substantial amount of academic literature on the energy consumption. However, much of academic research seems to be narrowly focused, covering only a few economies and factors. Moreover, the academic literature is obscure and scarce on whether globalization has amplified or reduced the consumption of traditional fossil fuels to satisfy expansion in energy demand. Therefore, here we venture to bridge the gaps available in the academic literature, by providing an empirical framework that encompasses the change in fossil fuels consumption for 66 developing countries that result from globalization.

In this paper, globalization comes in many flavors, including economic, political and social elements. Because globalization is a multidimensional phenomenon, we focus on different aspects of globalization to provide the empirical modeling that captures volatility in energy need that arise from globalization effect.

Some academic literature suggests that globalization has made the world into a single system and connected countries through the exchange of information, trans border maintenance of produced technology and international technological partnership. Some argue that this flow leads to technological innovation which in turn leads to efficiency and cost-cutting. Thus this paper focuses on whether globalization has amplified the consumption of traditional energy or if there is a successive switching towards clean and renewable energy sources through the attainment of technological efficiency.

We organize the remainder of the paper as follows. Section 1 gives information of how energy consumption has evolved recently in developing economies. It also provides a brief methodology on globalization. Section 2 delivers the academic literature related to globalization and its impact on energy demand. In section 3 we give a brief description of the dataset, and present the results of various statistical specifications and findings. The last section provides findings and discussions.

II. Theoretical Framework

The emerging economies are increasingly becoming substantial actors in international commercial energy demand. Their share of the total energy use has magnified abruptly in the last decades, from 12 percent of worldwide energy use in 1970 to 57 percent in 2014. Notwithstanding that their per-capita is much lower than that of the industrialized countries; developing countries accounted for more than one-half of the total growth in global energy use since 1970 (see Table 1).

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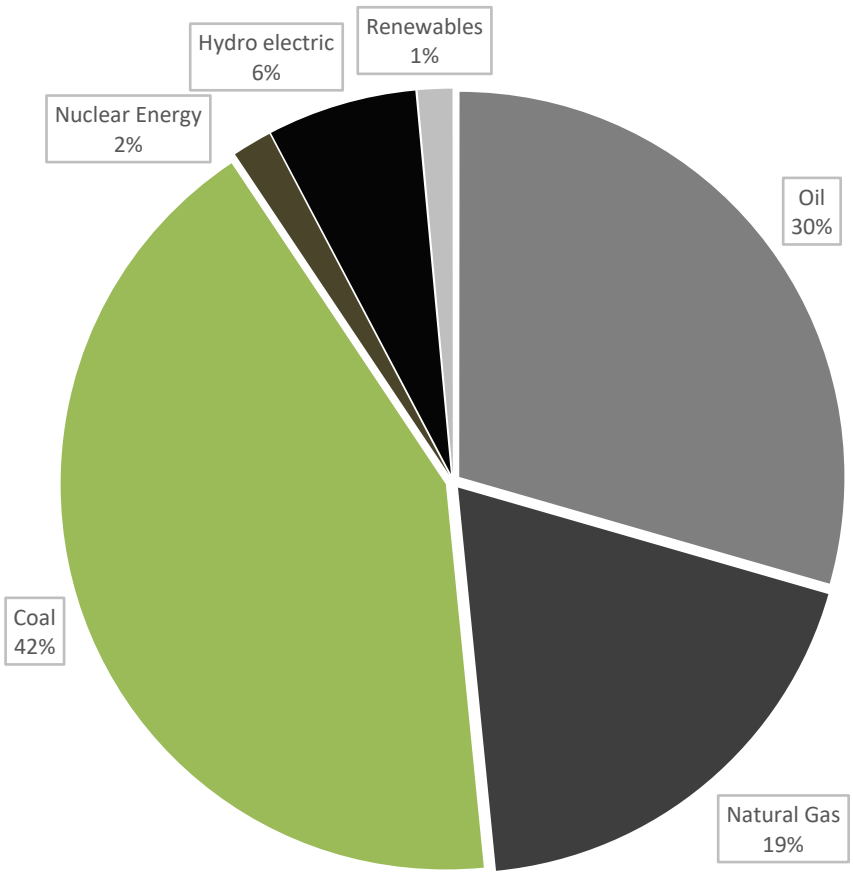
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Table 1: Energy Consumption, million tones oil equivalent

	1970	1980	1990	2000	2010	2011	2012	2013	2014
World	4911.66	6642.30	8141.85	9390.45	12169.98	12455.29	12633.84	12866.01	12988.85
Developing countries	610.52	1201.01	3265.47	3867.34	6490.15	6847.59	7083.04	7253.52	7421.52
Share of Developing countries	12%	18%	40%	41%	53%	55%	56%	56%	57%

Source: BP statistical review of world energy, 2017

Figure1 displays the sources of energy for the developing group of countries. The developing group mostly uses coal and oil to meet their energy demand. Its worth to note that, much of the coal is used in China and India only. Most of the developing countries use oil as a primary source of energy supplies.



Source: BP statistical review of world energy, 2014

Figure 1: Energy Consumption by Fuel, share of total, 2014

China, Russia, India, and Brazil are among the largest consumers of commercial energy in the world. (see Table 2). China alone accounts for more than 22 percent of the global I energy consumption and 40 percent of commercial energy use among developing countries. China's future energy course will potentially change the energy flows in the region and globally.

At the other end of the scale there is a number of the emerging group that together, that justify only a moderate portion of worldwide energy use. For example, countries of South Africa, consume less than 1 percent of overall fossil fuels (see Table 2).

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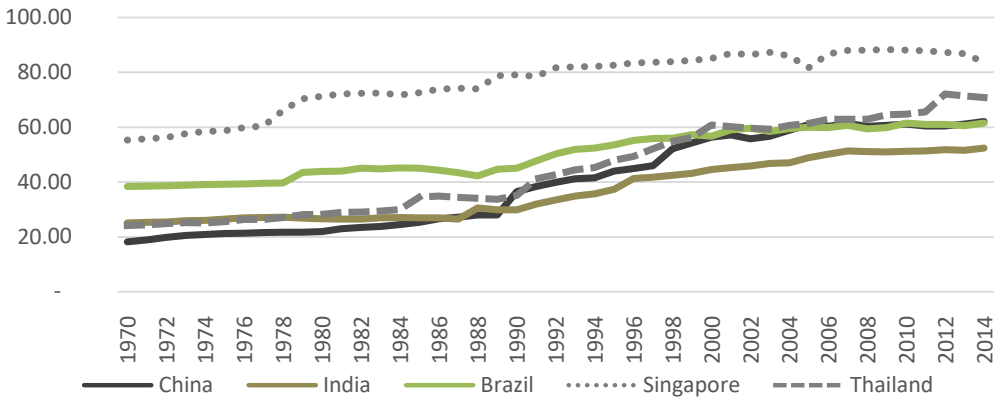
Table 2: Energy Consumption by Country, 2014

Country	Energy Use, million tones oil equivalent	Share in developing countries' energy usage	Share in total usage
China	2970,6	40.17%	22.8%
Russia	689.2	9.3%	5.3%
India	663.6	8.9%	5.1%
Brazil	304.9	4.1%	2.3%
South Africa	125,2	1.7%	0.9%

Source: BP statistical review of world energy, 2014

To analyze in more details how the energy intensity in developing countries changed as a result of the globalization, we focus on different aspects of globalization. Accordingly, to capture the globalization power of developing countries, we use the globalization index Konjunktur for schungs stelle (KOF) developed by the Swiss Economic Institute (Dreher 2006, 2008). The KOF index displays the power of globalization in three dimensions: economic globalization, which estimates business flows with an assumption for confinements to capital and trade; social globalization, which accumulates the dissemination of information, population, ideas, and images and; political globalization, which shows the diffusion of government policies. These three indices are weighted by the weights of variables making up these indices. The weights such as 36%, 37% and 27% are allocated between economic, social and political dimensions of globalization, respectively. These weights are computed based on the values of sub-indices composing the indexes. The three indices are always between 1 and 100, with a greater index indicating on a higher degree of globalization.

Figure 2 illustrates the trend of globalization index for some developing countries. For these, the overall globalization score together with its sub-variables has considerably ameliorated between 1971 and 2014-time span.



Source: World Bank Data Extract

Figure 2: Total Globalization Index, Country Case

By shifting from central economic planning to market reforms, China has made a progress and displayed an increase in globalization index from 18.13 in 1970 to 62.02 in 2014 among developing countries. The data suggests that the overall globalization index of 83.64 for Singapore is the highest among developing countries. For Thailand, the overall globalization index has also been significantly improved reaching 70.76 in 2014.

III. Literature Review

There is surprisingly very scarce literature record connecting globalization and energy demand. To my best knowledge, only one empirical study on energy consumption and globalization exist in the literature. The research conducted by Khalid Ahmed (2015) and others, show that globalization in China diminishes energy demand in the short period. Numerous papers have reviewed the impact of factors such as GDP, financial development, trade openness and energy demand in both developed and developing economies such as Kraf (1978), Al-Iriani M. A. (2006), Ozturk I., Kaplan, M., & Kalyoncu H. (2013), Stern D. I. (1993), Lee, C. C. (2005),Apergis, N. (2009), Asafu-Adjaye J. (2000), Lee C. (2008), Mahadevan R., & Asafu-Adjaye, J. (2007),Yu E. S. (1985), Cheng B. S. (1995), and others.

Moreover, Sari and Soytas (2009), Glasure Y.U. (2002) and others found a long-run relationship between income and energy use in Saudi Arabia. Shu-Chen

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Chang (2014) reports that energy demand grow with income in developing markets, whereas in industrial markets energy demand grow with income beyond a point at which the market attains a threshold level of income. This paper uses the most widely referenced, and more recent contributions works of Dreher, A. (2006) and Dreher, A., Gaston, N., & Martens, P. (2008). The studies of Zobaa, A. F., & Lee, W. J. (2006), Harris, M. C. (2001), Stiglitz, J. E. (2004), Guthrie, D. (2012) and others on globalization and its effect on different macroeconomic frames have been used in this paper. We do not venture to present such a review here, but do use these studies to avoid overlapping and place my analysis within the literature.

IV. Empirical Analysis

The empirical investigation covers annual time series for the 66 developing economies.. Annual data on energy consumption and income are extracted from World Development Indicators. The income time series considered in the model as a control variable connecting energy use and globalization. I extract the data on the three globalization indices from KOF Globalization Index (2013). The time length of an analysis depends on the availability of data; therefore, the empirical period is between 1998–2014. In the statistical analysis, we use natural logarithms of all variables.

a) The stationarity testing

The first estimation of stationarity was conducted with Levine, Lin and Chu (2002) test. According to if the first order serial correlation coefficient is ρ, then the null hypothesis is that H_0: $\rho_i=1$ for i=1…. N, in contrast to homogeneous assumption H_1:-1< ρ_i= ρ<1 for i=1…. N. Therefore, according to the second hypothesis the ρ is expected to be equal in all terms, by keeping them uniform throughout cross-sectional units as follows: $\Delta y_{it} = (p_i - 1)y_{it-1} + \sum_{j=1}^{p_i} O_{ij}\Delta y_{it-j} + \sigma_{mi} d_{mt} + v_{it,}\ \ m = 1,2,3$, where $v_{it,}$ represents the residual term of the autoregressive model $\sigma^2_{ui,LR} = \frac{1}{T}\sum_{t=1}^{T} u_{it}^2 + \frac{2}{T}\sum_{j=1}^{L} w(j,L)\sum_{t=j+1}^{T} u_{it}\, u_{i,t-j}$,where u_{it} is the unobserved noise if there is a coefficient $\varphi_{i=}(\rho_i - 1) = 0\ for\ i = 1 \ldots..N$, then $\varphi = \frac{\sum_{i=1}^{N}\sum_{t=p_{i+2}}^{T} e_{it} f_{it-1}}{\sum_{i=1}^{N}\sum_{t=p_{i+2}}^{T} f_{it-1}^2}$. Im, Pesaran and Shin (1997) unbrace the hypothesis of the LLC test and allow first-order serial correlation coefficients to change across regions as follows: $\bar{Z} = \frac{\sqrt{N}(\bar{t} - E(\bar{t}))}{\sqrt{Var\,(\bar{t})}}$, where $\bar{t} = \frac{1}{N}\sum_{i=1}^{N} t_{y,}$ the terms $Var(\bar{t})$ and $E(\bar{t})$ are the variance and mean of individual t_y statistic, and $\bar{Z}$ statistic approximate to a standard normal distribution. Hadri (2000) estimates a Lagrange ratio with the residuals obtained from the following equation $y_{it} = \delta_{mi} d_{mt} + \varepsilon_{it}\ \ with\ \ m = 2,3$ for i=1,……, N. $LM = \frac{1}{N}\sum_{i=1}^{N} \frac{\frac{1}{T^2}\sum_{t=1}^{T} S_{it}^2}{\bar{\delta}_{\varepsilon}^2}$, where $S_{it} = \sum_{j=1}^{t} \varepsilon_{ij}$ and $\bar{\delta}_{\varepsilon}^2$ is the long-run variance estimate of disturbance terms. Table 3 exhibits the panel unit root estimators. At a 5% significance level, except for the IPS statistic for income and energy use variables with individual intercept and individual intercept and trend, other estimators significantly support that five series are stationary. Using these results, I test the time series with the error components model for evidence of the relationship.

Table 3: Unit root test results

	LL		IPS		Hadri	
Variables	Individual Intercept	Individual Intercept and Trend	Individual Intercept	Individual Intercept and Trend	Individual Intercept	Individual Intercept and Trend
Energy Use	-2.85335 (0.0022)	-3.25674 (0.0006)	2.58404 (0.09951)	-0.68804 (0.2455)	18.5366 (0.0000)	12.0678 (0.0000)
Income	-4.64737 (0.0000)	-0.34169 (0.3663)	5.00188 (1.0000)	1.00225 (0.8419)	19.0378 (0.0000)	12.2460 (0.0000)
Economic Globalization	-5.83036 (0.0000)	-5.13200 (0.0000)	-2.26803 (0.0117)	-1.67088 (0.0474)	17.5286 (0.0000)	13.6618 (0.0000)
Political Globalization	-10.1218 (0.0000)	-11.1036 (0.0000)	-6.58672 (0.0000)	-2.97939 (0.0014)	18.0160 (0.0000)	15.6824 (0.0000)
Social Globalization	-16.1049 (0.0000)	-30.1781 (0.0000)	-7.54469 (0.0000)	-6.94836 (0.0000)	17.3266 (0.0000)	13.3718 (0.0000)

b) The Error Components Model

In this paper, we use the error components model because there is no correlation between the individual effects and the other regressors. This model allows the intercepts for each cross-sectional unit to arise from a common intercept α . Moreover, it is assumed that the global intercept is the same for all cross-sectional units and over time as follows: $EU_{it} = \alpha + \beta Inc_{it} + cEG_{it} + \gamma PG_{it} + \rho SG_{it} + w_{it},\ \ w_{it} = \epsilon_i + u_{it}$, where ϵ_i is a random variable with zero mean and constant over time but varies cross-sectionally. A random variable determines the arbitrary deviation of individual unit's intercept terms from the common intercept term α and is independent of each observation

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error term u_{it} and independent explanatory variables Inc_{it}, EG_{it}, PG_{it} and SG_{it} with $1 \times k$ vector of explanatory determinants (Muthen B. 2000). I estimate the common intercept and β vector using a generalized least squares procedure. This procedure involves demeaning data as $EU_{it}^{*} = EU_{it} - \theta\overline{EU_i}$, $Inc_{it}^{*} = Inc_{it} - \theta\overline{Inc}$, $EG_{it}^{*} = EG_{it} - \theta\overline{EG}$, $PG_{it}^{*} = PG_{it} - \theta\overline{PG}$, $SG_{it}^{*} = SG_{it} - \theta\overline{SG}$. (Hox J.2002 and Laird N. 1982). Where θ is defined as the variance of the country-specific error term and δ_e^2 is the observation error term, as follows $\delta_u^2 = 1 - \frac{\delta_u}{\sqrt{T\delta_e^2 + \delta_u^2}}$. Estimating the data with the panel analysis requires condition on individual and time effects. According to the Likelihood Ratio (LR) test result, there are individual or time effects in the model. The LR also retests the time and individual effects separately; the test result shows the persistence of individual effect in the model (see Table 4).

Table 4: Individual and Time Effects Test Results

Tests	LR Test for Indv. And Time Effects	LR for Ind.	LR for Time.
chi2(2)	2568.00	-	-
Prob.	(0.0000)	(0.0000)	(1.000)
Individual Effect	Yes	Yes	-
Time Effect	Yes	-	No

We use the Hausman Test $H = (\hat{\beta}_{FE} - \hat{\beta}_{RE})'\left[Avar(\hat{\beta}_{FE}) - Avar(\hat{\beta}_{RE})\right]^{-1}(\hat{\beta}_{FE} - \hat{\beta}_{RE})$ to estimate the distance between the random and fixed effects and to test the individual effect of the model. Where FE and RE are fixed and random estimators, and $Avar$ is asymptotic variance-covariance matrices obtained from fixed and random estimations. This test is used in this study to decide which model is statistically appropriate. According to the test results at 5 % significance level, the null hypothesis can be accepted (see Table 5). We conclude that the error component is an appropriate model for the small distance.

Table 5: Hausman Test for Random and Fixed Effects models

Ho: difference in coefficients not systematic
Model Results
chi2(5) = (b-B)'[(V_b-V_B) ^ (-1)](b-B)
= 8.20
Prob>chi2 = 0.0844

With this information, we move further to test the assumptions of the panel data. The first assumption is related to the stability of variance of the error terms. To test this assumption, I use Levene, Brown and Forsythe (1960) test as follows: $W_0 = \frac{\Sigma_i n_i(\bar{Z}_i - \bar{Z})^2/(g-1)}{\Sigma_i \Sigma_j (Z_{ij} - \bar{Z})^2 / \Sigma_i (n_i - 1)}$, where $Z_{ij} = |X_{ij} - \bar{X}_i|$, in this equation X_{ij} is j observation of X variable in group i and n is the number of observations and g is a number of units. From the probability estimators, at 5% significance level I concluded that the error terms are heteroscedastic (see Table 6). If the errors don't have a constant variance their mean value is roughly constant however their variance is rising systematically with the values of dependent variables.

Table 6: Test for Heteroscedasticity

Mean 5.011e-12 and Std. Dev.05232958
Model Results
W_0=23.811554 df(65, 1056) Pr > F = 0.0000000
W_{50} =13.88157 df(65, 1056) Pr > F = 0.00000000
W_{50} =22.88434 df(65, 1056) Pr > F = 0.00000000

I test serial correlation using two alternative techniques: Durbin-Watson $d = \frac{\sum_{i=1}^{N}\sum_{j=1}^{n_i}\left[\tilde{z}_{i,t_{i,j}} - \tilde{z}_{i,t_{i,j-1}} I\,(t_{i,j} - t_{i,j-1} = 1/0)\right]^2}{\sum_{i=1}^{N}\sum_{j=1}^{n_i}\tilde{z}_{i,t_{i,j}}}$ as proposed by Bhargava, Franzini and Narendranathan (1982), where $\tilde{z} = diag(B_i B_i')(Y - X\tilde{\beta})$, $\tilde{\beta}$ is obtained from the estimation by the pooled least squares model $\tilde{Y} = \tilde{X}\beta + u$. The estimators are indicating on the availability of

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positive, consistent correlation in the residuals (see Table 7). This condition shows that the standard error terms can inflate the model as they will be biased downwards relative to the true standard errors. Therefore, the test will belittle its true value with underestimating of the true error variance.

Table 7: Test for Serial Correlation

H_0: No AR(1)) in the following specification for the error terms AR(1) disturbances
Model Results
F test that all u_i=0: F(65,986) = 15.42 Prob > F = 0.0000
Modified Bhargava et al. Durbin-Watson = .2864477
Baltagi-Wu LBI = .49502233

We diagnose that the error component model with time effects has heteroscedasticity and serial correlation. Therefore, to eliminate the deviations from assumptions, I use Arellano (1987, 1993) standard errors technique $Var(\hat{\beta}) = \frac{N-1}{N-k}\frac{M}{M-1}(X'X)^{-1}(\sum_{t=1}^{N} X_i' \hat{u}_i \hat{u}_i' X_i)(X'X)^{-1}$ where $M$and N are a number of groups, $\hat{u}_i$ is i residual in group j. The Table 8 shows the test results. The results show that the model and some coefficients are statistically significant. Moreover, the test displays 36% explanatory power, indicating that dependent variables can explain 36% of the variation in energy use.

Table 8: Error Components Model with Arellano standard errors

Model Results	
Energy Consumption	
Income	-0.1116105** (0.002)
Economic Globalization	0.128989 (0.304)
Political Globalization	-0.156562 (0.199)
Social Globalization	-0.2172409 (0.005)
FTest (4,65)	10.62 (0.0000)**
Number of Obs / Groups	1122/66
R-squared	0.3601

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

c) Vector autoregressive model

We present a VAR model for energy use for a group of n time series $y_t = y_{1t}, y_{2t}, .., y_{nt}$, as follows (Ciccarelli and Canova, 2004,2007, 2009, 2013):

$$y_{it} = A_{0i}(t) + A_1(l)y_{t-1} + A_2(l)y_{t-2} + \cdots + A_i(l)y_{i,t-1} + F_i(l)W_{t-1} + u_t$$

where y_{it} is the vector of dependent variable. The advantage of VAR analysis is that it can be extended to over two and more variables. W_{t-1} is the vector of exogenous variables (if present). $A_{0i}(t)$ are the deterministic components of the time series (constant terms, deterministic polynomial in time and seasonal dummies). Under the assumption of heterogeneity across units $F_i(l)$ and $A_i(l)$ are polynomials in the lag operators. We estimate operators under homogeneous panel VAR model (Gnimassoun and Mignon 2013, 2015). u_t is evenly and independently disseminated white noise with zero mean. VAR panel analysis includes only the variables that proved to be statistically significant in panel data analysis.

Before conducting impulse response analysis, we tested the stationarity of the VAR model. From the figure, we found that all roots reside within the integer circle and are lower than one (see Figure 3). This result indicates on the stationarity of the VAR model.

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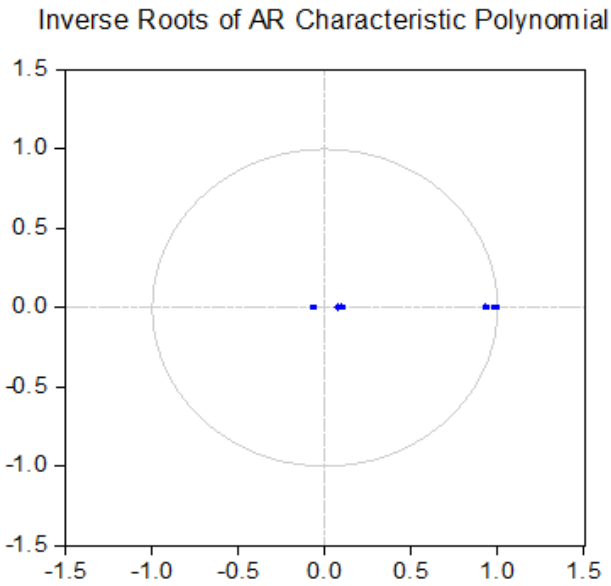


Figure 3: VAR consistency condition verification

We intend to record the time track of the impact of structural shocks on the dependent variables in the model. To estimate the impact of variations in the value of globalization on the structure and the time it will take for the impact to continue across the system, we use impulse response analysis as follows: $\frac{y_t}{z_t} = \bar{X} + \sum_{i=0}^{\infty} \Phi_i \, \mathcal{E}_{t-i}$, where Φ_i are impact factors which follow the impact of a single unit variation in a structural innovation as follows: $\Phi_i = \frac{dy_t}{d\varepsilon_{z,t}}$(Lutz Kilian 1998). Based on the VAR model impulse response analysis shows the destabilization experienced by the variables in response to shocks that arise within other variables. The results from impulse response analysis show that the impact of social globalization on energy use will work till seven lags lengths after which the shocks will die away (see Figure 4).

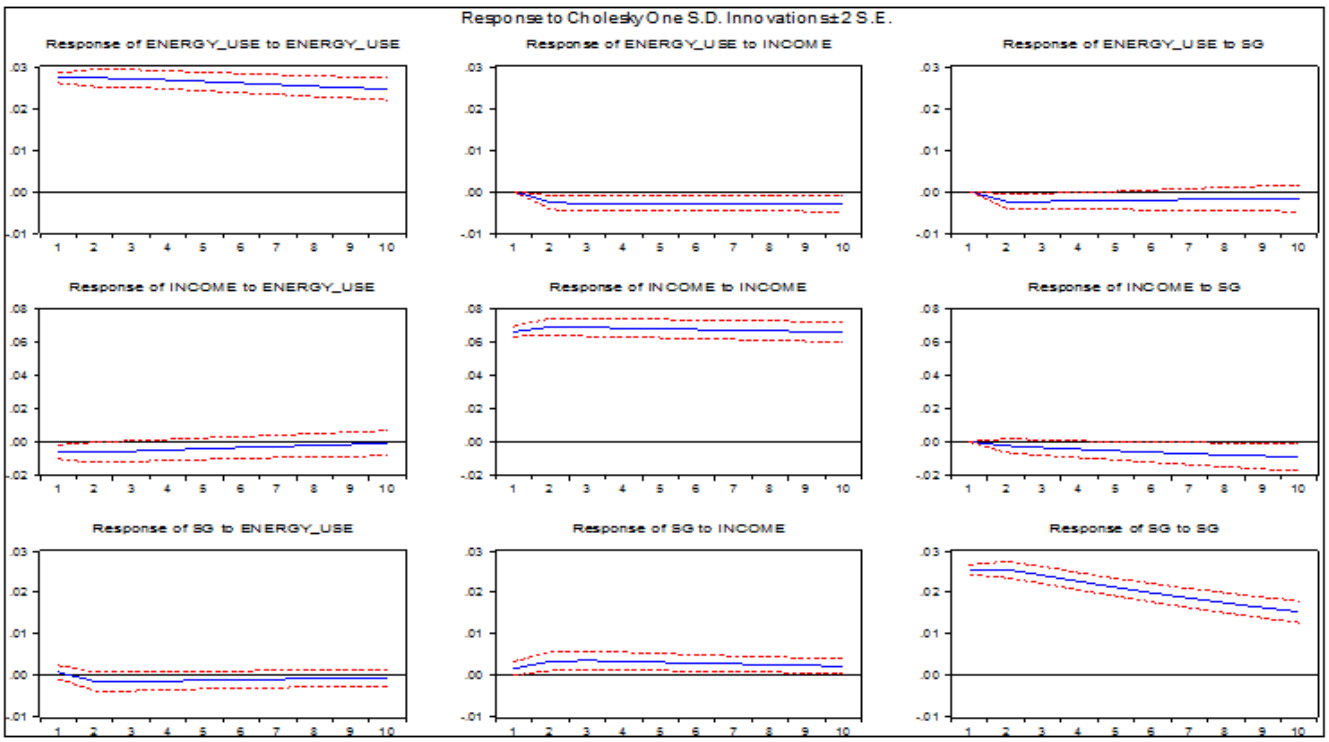


Figure 4: The impulse response of energy consumption, globalization, and income, with panel VAR

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V. Findings and Discussions

The key question we are interested in is whether the change in globalization can explain the energy demand in developing countries. With this question in mind, we constructed error components estimators and carried out an impulse response analysis. As a result of these analyses, we found that economic and political globalization processes don't have an impact on energy demand in developing countries. On the other hand, the error components estimators indicate on the fact that among three broad globalization dimensions only social globalization has a statistically significant impact on traditional energy consumption. Social globalization reveals 21.7 % of the change in energy consumption. The coefficient of social globalization is statistically significant, and its effect is negative. That is a 1% increase in globalization diminishes conventional energy use by 21.7 %. This result is very important, because the literature is still ambiguous on the effect of globalization on conventional energy demand. The coefficient of the income variable is also significant, and its effect is negative. This suggests that the increase in income by 1 % decreases traditional energy demand by 11 %. Indeed, the affluent industrialized countries with the highest income per capita decrease the share of traditional energy and increasingly implement the large scale and costly energy projects on renewable energy technology.

A similar pattern emerges from impulse response analysis. The impulse response functions show that energy consumption responds negatively to the increase in social globalization. The functions also show that the energy use responds negatively to the increase in demand.

Although it is an indisputable fact that there are a lot of debates and opinions on globalization across the world, it is widely accepted that globalization fosters trading and business performance by means of rise in foreign direct investment and the transfer of progressive technology from developed nations to developing countries. In particular, social globalization which accounts for the proliferation of ideas, skilled employees and know-how is expected to have a tremendous benefit to developing countries and increase use of clean and renewable energy sources through the attainment of technological efficiency.

The estimations show that a 1% increase in globalization diminishes energy use by 21.7 %. If globalization increased globally, then the traditional energy use in developing economies should have been decreased. However, the use of traditional energy in developing countries has risen steadily from 4911.66 million tons in 1970 to 12988.85 million tons in 2014. Their share of the entire energy demand in 2014 accounted for more than half of the total increase in worldwide commercial energy use. This controversial result can be explained by two phenomena. Firstly, globalization together with income accounts for 36% and globalization alone accounts for 21.7% change in energy demand. However, there are other factors that affect the energy demand and the pace of change of these factors may have been greater than increase in globalization. In other words, the negative impact from the change in other factors may outweigh the benefits from the increase in globalization causing traditional energy demand to increase.

Secondly, this contradictory result may indicate the trend of globalization in reverse. Some countries benefit from globalization process, but probably there is an uneven development of globalization in clean energy consumption around the world. With normal functioning of social globalization, the ideas, skilled people, information and technology transfer very quickly from advanced economies to developing world leading to deployment of large scale energy projects on renewable technologies and thus decreasing the demand for fossil fuels. However recent trends indicate the trend of de-globalization. While the influence of developing group such as China, India, Mexico, Turkey, Singapore, etc. has grown significantly in recent years, it seems that they couldn't change the process of anti-globalization in energy consumption and benefit from social globalization.

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Short Run and Long Run Association between Real Exchange Rate and Trade Balance: Empirical Evidence from Bangladesh (Johansen Approach and Vector Error Correction Model)

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Abstract- Several studies have tested the j curve phenomenon for Australia, Japan, South Korea, New Zealand and many other countries using non stationary time series data and have provided mixed results. They not only suffer from the aggregation bias problem but also the spurious regression problem. To overcome this problem, in this paper we investigate the short run and long-run effects of real depreciation of the Bangladeshi taka to the trade balance between Bangladesh and her trading partners. In this article first we check the stationary of data set and find the stationary applying the Augmented Dickey Fuller test, then applying the Johansen co integration test in order to find out the long run co integrated equations and last of all try to investigate the short run and long run relationship among the variables, while we use the VECM (vector error correction model) and found that there is long run associations among the variables, and short-run coefficients are statistically insignificant. But for Bangladesh j curve concept have not been tested yet. That's why we have chosen this topic, and we incorporated several others variables to test the linkages on trade balance such as GNI as a proxy of GDP, inflation rate, NODA (net officials development assistance, and we have given more priory on the variable real exchange rate.

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Short Run and Long Run Association between Real Exchange Rate and Trade Balance: Empirical Evidence from Bangladesh (Johansen Approach and Vector Error Correction Model)

Subroto Dey [α], Subrata Saha [σ] & Roksana Akter [ρ]

Abstract- Several studies have tested the j curve phenomenon for Australia, Japan, South Korea, New Zealand and many other countries using non stationary time series data and have provided mixed results. They not only suffer from the aggregation bias problem but also the spurious regression problem. To overcome this problem, in this paper we investigate the short run and long-run effects of real depreciation of the Bangladeshi taka to the trade balance between Bangladesh and her trading partners. In this article first we check the stationary of data set and find the stationary applying the Augmented Dickey Fuller test, then applying the Johansen co integration test in order to find out the long run co integrated equations and last of all try to investigate the short run and long run relationship among the variables, while we use the VECM (vector error correction model) and found that there is long run associations among the variables, and short-run coefficients are statistically insignificant. But for Bangladesh j curve concept have not been tested yet. That's why we have chosen this topic, and we incorporated several others variables to test the linkages on trade balance such as GNI as a proxy of GDP, inflation rate, NODA (net officials development assistance, and we have given more priory on the variable real exchange rate.

I. Introduction

In the era of floating exchange rates, the effects of currency appreciations and depreciation on trade flows have been closely studied. One particular topic of interest is the so-called J curve effect, in which a country's trade balance might deteriorate in the short run after devaluation, before improving in the long run. Because depreciation should help increase a country's exports, while making its imports more expensive, it should, in theory, result in an improvement of the differences between the exports and imports. Because of time lag involved in adjusting contracts, however, the number of exports and imports are temporarily fixed. If the country is paying in foreign currency, it must give up more units of depreciated currency before the quantity can adjust, so the trade balance might briefly deteriorate. Improvement may come only after the passage of sometimes hence the J curve pattern. Due to lag structures, currency devaluations said to worsen the trade balance first and improve it later resulting in a pattern that resembles the latter J, hence, the J curve phenomenon. Since Magee introduced it in (1973, Brooking papers on the Economic Activity, 1, pp.303-25), a large number of studies have attempted to test the phenomenon using different techniques and different model specifications. There have been numerous papers examining the long run and short-run relationships between the terms of trade and trade balance. A deterioration of the terms of trade (devaluation) brings in a long run improvement in the trade balance that ML conditions explained. Since the short run elasticity is usually smaller than the long run elasticity, the trade balance may not improve in the short run. In fact, in the short run, the post-devaluation time path of the trade balance is theoretically ambiguous, as Magee (1973) notes. While there are reasons to believe that the J curve phenomenon characterizes the short-run dynamics, there are also reasons why it may not. Indeed the empirical evidence has been rather mixed or inconclusive.

II. Literature Review

A country that is experiencing deterioration in her trade balance could rely upon currency devaluation or depreciation to reverse the situation. However, due to adjustment lags, currency devaluation or depreciation is said to worsen the trade balance first before improving it, hence the j curve. Ever since the introduction of the concept by Magee (1973) and its empirical counterpart by Bahmani-Oskooee (1995), researchers have tried to verify the concept by using data from individual countries. Bahmani-Oskooee, M., Xu, J., & Saha, S. (2017) distinguished the short run effects from long-run effects of changes in the real bilateral exchange rate on the trade balance of each of the 69 industries and found that the trade balance of 48 industries were affected by exchange rate changes in the short run, from long-run coefficients estimates, they gathered that there were 24

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industries in which the real exchange rate carried a significantly positive coefficient for Korea and Japan. Nusrate Aziz (2008) in his article "The Role of the exchange rate in trade balance: Empirics from Bangladesh" estimated the effect of exchange rate on the balance of trade of Bangladesh. Using the Johansen technique and error correction mechanism he demonstrated that the real exchange rate has a significant positive influence on Bangladeshi trade in both short and long run and the Granger causality test suggests that the real exchange rate does Granger causes the trade balance. Boyd, D., Caporale, G. M., & Smith, R. (2001) used co integrating VAR, co integrating VECM and single equation ARDL model and found the considerable evidence that the real exchange rate does have a significant impact on the trade balance. Hsing, H. M. (2005) used the generalized impulse response function from the vector error correction model to examine whether the j curve effect exists for Japan, Korea and Taiwan. Both bilateral and aggregate cases were considered .this study found that japans aggregate trade is the only case that shows the traditional j curve phenomenon after real depreciation. DOROODIAN Sr, K. H. O. S. R. O. W., Jung, C., & Boyd, R. (1999) in their article examined the hypothesis of the j curve for the US US data for both agricultural and manufactured goods using the Shiller lag model and their statistical result supported the hypothesis that there is a j curve effect for agricultural goods and that the behavior of the trade balance in manufactured goods did not follow a j curve. Petrović, P., & Gligorić, M. (2010) introduced Serbian data, after the consecutive testing procedure they found that a real exchange rate depreciation has a significant positive long-run impact on the trade balance in Serbia and that in the short run trade balance first deteriorates before it later improves. Narayan, P. K. (2004) found that New Zealand's trade balance, Real exchange rate and the domestic income, foreign income are not co integrated, there is no long-run relationship among these variables and also found the existence of the j curve path for the New Zealand trade balance. Bahmani-Oskooee, M. (1991) using quarterly data over 1973-1988 period and applying the co integration analysis he found that the trade balance and the real effective exchange rate of some LDCs are co integrated into the long run. Onafowora, O. (2003) examined the short and long-run effects of real exchange rate changes on the real trade balance for three ASEAN countries-Thailand, Malaysia and Indonesia and cointegration analysis indicated that there is a long run steady state relationship among real trade balance, real exchange rate, real domestic income, and real foreign income.

III. Description about the Variables

While the nominal exchange rate tells how much we exchange foreign currency for a unit of domestic currency, the real exchange rate tells how much the goods and services in the domestic country can be exchanged for the goods and services in a foreign country. In this paper, our dependent variable is trade deficit, and independent variables are real exchange rate, inflation rate, Net official's development assistances, GNI as a proxy of GDP. We want to estimate the coefficients to justify the strength of the relationship, want to investigate the short run and long run association among the variables using the Johnsen cointegration test and VECM (vector error correction model). After that we may conclude about the existence of the j curve in trade balance and real exchange rate. Here our objective is to evacuate the relationship among variables if they are positively related or negatively related. Are they associated in the short run or the long run? That's why our research is unit free, and we have not given more concentrate upon the volume of the coefficient but the sign f the coefficient term.

Actually, in this paper, we want to clarify the determinant of trade balance and want to evaluate the existence of the J curve pattern between trade balance and real exchange rate. We used the time series data to investigate the relationship between the variables from 1983 to 2017.

IV. The Model

$$trade\ defecit_t = \beta_1 + \beta_2\ real\ exchange\ rate_t + \beta_3\ real\ exchange\ rate_t^2 + \beta_4 GNI_t + \beta_5 inflation_t + \beta_6 NODA_t + u_t$$

Where we used the GNI as a proxy of the national income. We know very much well that if a country's income increases then import demand also increases and trade deficit increases, so there is a positive relationship. Also we want to check is there any relationship between the inflation and trade. we, know very much well that if a country's inflation rate increases that means price of the product of her own country is now expensive and people will be reluctant to buy own country's product and import demand also increases and trade deficit increases. Here we also incorporate a new term NODA (net official development assistance), proxy as a foreign aid. From theoretical background, we realize that if foreign aid increases then there may be an impact on exchange rate whereas domestic currency may be appreciated, and import demand may be stimulated, and export may be decreased. Thus we may find a positive impact on trade deficit. Here we also amalgamated the most important independent variable that mostly affects the trade is real exchange rate If the real exchange rate increases that means the currency is depreciates, then foreign product becomes more expensive to people and domestic good becomes relatively cheaper. So there is the possibility to stimulate the export demand and reduction in the import demand.

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So we may find a negative relationship with the trade deficit and real exchange rate.

V. Test for Unit Root

Before we precede our regression, we want to test the data set as they have a unit root or not. Regarding previous literature if the time series data are non stationary and we regress the model disregarding this, then we may find the spurious regressions if the time series data are non stationary then their first difference must be stationary if we want to find an acceptable result. We usually test the unit root by Augmented D K fuller test which is developed in (1979) and has been employed here. First we want to test the data of trade deficit from 1983 to 2017. The probable equations of ADF as follows:

$$\Delta trade\ deficit_t = \alpha + \beta t + \gamma trade\ deficit_{t-1} + \delta_i \sum_{i=1}^{n} \Delta\ trade\ deficit_{t-1} + u_t \quad (1)$$

(This equation involve trend and intercept).we may use the following equations for respective variables.)

$$\Delta inflation_t = \delta inflation_{t-1} + u_t \quad (2)$$

$$\Delta real\ exchange\ rate_t = \gamma real\ exchange\ rate_{t-1} + u_t \quad (3)$$

$$\Delta NODA_t = \theta NODA_{t-1} + u_t \quad (4)$$

Here the null hypothesis in equation (1) is that the data is non stationary, which can be rejected if the computed γ is statistically significant and different from zero. we may conclude that the data is strationary but if the γ coefficient will not be different from zero, then the data set is not stationary. If a time series data set is non stationary, then we take the first difference to make it stationary. Augmented Dickey Fuller follows this procedure. Here the first difference is taken. We check all of my variables like the above- mentioned equation.

VI. Johansen Cointegration test and the Vector error Correction Model(VECM)

We can check the cointegration between the time series by using Johansen test which is developed by Johansen (1988,1991) and Johansen and Huselius if both series are integrated of order one. We estimate the following equation in Johansen multivariate framework. The method starts with a VAR representation of the variables (economic systems we like to investigate. We have a pp-dimensional process, integrated of order d,xt~I(d)d,xt~I(d), with VAR representation.

$$x_t = v + A_k x_{t-1} + \epsilon_t$$

By using the difference operator $\Delta = 1 - L$ $\Delta = 1 - L$, or $L = 1 - \Delta L = 1 - \Delta$, the VAR in levels can be transformed into a vector error correction model (VECM).

$$\Delta x_t = u + \rho_1 \Delta x_{t-1} + \ldots\ldots + \rho_{k-1} \Delta x_{t-k-1} + \pi x_{t-1} + \epsilon_t$$

After transforming the model, using $L = 1 - \Delta L = 1 - \Delta$, we lose one lag at the end, leading to k−1k−1 lags in VECM. The more compact for the VECM becomes:

$$\Delta x_t = v + \sum_{i=1}^{k-1} \rho_1\ \Delta x_{t-1} + \pi x_{t-1} + \epsilon_t$$

The number cointegrating vectors are identical to the number of stationary relationship in the π matrix. If there is no cointegration π, all row in must be filled with zeros. If there are stationary combinations, or stationary variables, some parameter in π will be nonzero. The rank of π matrix determines the number of independent rows in, and the number of co integrated vectors. The rank of π is given by the number of significant Eigen values found in π.Each significant eigenvalue represents a stationary relation. Johansen derived two tests, the λ−max λ−max (or maximum eigenvalue) and the λ−trace−trace (or trace test.)

$$\mu_{trace}\ (r) = -T \sum_{i=r+1}^{g} log(1-\mu_i)$$

$$\mu_{max}\ (r, r+1) = -T \log\ (1-\mu_{t+1})$$

μ is the ordered Eigen value of matrices π and T is the available observations. Both procedures test the null hypothesis of at most r cointegrating vectors against the unspecified or general alternative hypothesis of having more than one cointegrating vector (BROOKS 2008).

Where Δthe first difference operator, x is is the vector of variables, u is the drift parameter, ρ_1 and ρ_{k-1} are coefficient matrices. To determine the rank of the metrics π is an important task in Johansen cointegration test. We actually amalgamate this Johansen cointegration test and VECM in my article in order to verify the co integrated equations and find the short run and long run relationship among the variables. And before doing that we tested the unit root test and finds that the variables are nonstationary at level, but if we take the first difference they become stationary.

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a) Linear Regression

Trade deficit	Coefficient	Standard error	T value	P value	95% confidence interval
Real exchange rate	-.2002137	.0559469	-3.58	0.001	-.3141737 to -.0862536
Real exchange rate^2	.0019778	.0005561	3.56	0.001	.0008451 to.0031106
GNI	.0043303	.000193	22.43	0.000	.0039371 to .0047236
NODA	.043591	.0354123	1.39	0.173	-.0227735 to .1214917
Inflation	.2315748	.0800665	2.89	0.007	.0684846 to .394665
Constant	-2.180341	1.371052	-1.59	0.122	-4.973082 to .6124001

R Squared value =.9448
F (5,32)=157.68

Estimated from stata, time series from 1983 to 2017

Result Explanation: In this regression model we have amalgamated five independent variables, and we have found the expected coefficient sign. Here, the real exchange rate has a positive impact on trade balance and negative impact on the trade deficit, and furthermore, we have found the negative coefficient. Then we used the gross national product as a proxy of gross domestic product. If a country's income increases then the import demand increase and trade deficit will be increased we have found the expected positive sign. NODA (net official development assistance), we incorporate this variable here as foreign aid. If foreign aid increase, then there may be an impact on currency valuation, currency may be appreciated, import demand may be increased and o found here the positive coefficient sign. If the domestic price increases then foreign product will be relatively cheaper to people. Thus if inflation rate increases then foreigner also faces a relatively higher price of your product so export will be decreased. According to the theoretical background, we have found here the expected sign for every variable.

As Rule of thumps according to the t statistics and P value all the variables are statistically significant except the NODA. According to the R squared value this model is able to explain the 94% variation of trade deficit so the incorporated variables are able to explain the trade deficit significantly.

b) Augmented D K Fuller Test for Variable Trade Deficit

Now we want o test the individual data set has unit root or not. If the time series data are non stationary then the regression result will be spurious. For the sake of that we have to test:

$$Null\ hypothesis: Data\ is\ non\ stationary$$

$$Alternative\ hypothesis: Data\ is\ stationary$$

We may decide according to the value of test statistics and critical value comparison. If the test statistics is greater than the critical value, we may reject the null hypothesis and may accept the alternative hypothesis. So, in the level form trade deficit data are non stationary and if we take its first difference the found that they are stationary.

		Test statistics	1% *critical value*	5%*critical value*	10% *critical value*
For level form	Z(t)	-2.403	-4.260	-3.548	-3.209
For first difference form	Z(t)	-3.648	-4.260	-3.548	-3.209

Source: author, results from Stata, time series

c) Augmented D K Fuller test for variable real exchange rate

According to the T test statistics and critical value we found that the level form of real exchange rate is nonstationary and if we take the first difference then at the 5 % significant level they will be stationary.

		Test statistics	1%*critical value*	5%*critical value*	10%*critical value*
For level form	Z(t)	-2.350	-4.316	-3.572	-3.223
For first difference form	Z(t)	-3.501	-4.325	3.576	-3.226

Source: Author, results from stata, time series

d) Augmented D K fuller test for variable GNI

According to the t test statistics and critical value we found that the level form of GNI is nonstationary and if we take the first difference then at the 10% significant level they will be stationary.

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		Test statistics	1%*critical value*	5%*critical value*	10%*critical value*
For level form	Z(t)	-2.670	-4.316	-3.572	-3.223
For first difference form	Z(t)	-4.423	-4.325	-3.576	-3.226

Source: Author, results from strata, time series

e) *Augmented Dickey fuller test for unit root, variable, inflation rate*

According to the t-test statistics and critical value we found that the level form of inflation rate is nonstationary and if we take the first difference then at the 1% significant level they will be stationary.

		Test statistics	1%*critical value*	5%*critical value*	10%*critical value*
For level form	Z(t)	-2.206	-4.288	-3.560	-3.216
For first difference form	Z(t)	-5.237	-4.297	-3.564	-3.218

Source: Author, results from strata, time series

VII. Johansen Test for Cointegration

Trend: constant number of observations 36
Variable: 1982-2017 lags 2

a) *Trace statistics*

Maximum rank	Parma	LL	Eigen value	Trace statistics	5%critical value
0	42	-17.960909		110.3526	94.15
1	53	4.2704517	0.70919	65.8899	68.52
2	62	17.103814	0.50981	40.2232	47.21
3	69	25.300323	0.36578	23.8302	29.68
4	74	31.309343	0.28385	11.8109	15.41
5	77	36.206296	0.23816	2.0182	3.76
6	78	37.215404	0.05452		

b) *Max statistics*

Maximum rank	Parma	LL	Eigen value	Max statistics	5%critical value
0	42	-17.960909		44.4627	39.37
1	53	4.2704517	0.70919	25.6667	33.46
2	62	17.103814	0.50981	16.3930	27.07
3	69	25.300323	0.36578	12.0192	20.97
4	74	31.309343	0.28385	9.7927	14.07
5	77	36.206296	0.23816	2.0182	3.76
6	78	37.215404	0.05452		

Here we tested the Johansen cointegration criteria to find out is there any log run association ship among the variables or not. Software has given me the two criteria one is Max statistics, and another is trace statistics. For trace statistics 0 means there is no cointegration that means null hypothesis is there is no cointegration among the variables and the alternative hypothesis is there is cointegration among the variables .We have to compare the trace statistics and the critical value .if the trace is greater than the critical value then I have to reject the null hypothesis and accept the alternative hypothesis. As the trace statistics 110 is greater than critical value94, then we have rejected the null and decide that they are coinegreted. Now we mean they have one cointegrated equation so, the null hypothesis is the variables that we have incorporated in this model have one cointegration .And we cannot reject this hypothesis. So, our decision is the variables trade deficit, real exchange rate, gross domestic income, inflation all are co integrated into one and they have log-run association and they move together in the long run. As all the variables are nonstationary at level form and stationary at first difference, we can run the co integration test. And as they are coitegrated in one and they have long-run relationship now, we can test the VECM model (vector error correction model).And here the max statistics and the trace statistics have given us the same results and that is the incorporated variables are moving together in the long run.

c) *Vector error correction model*

If the time series data are nonstationary at the level form and stationary at first difference and if they are co integrated into the long run by Johansen co integration test, then we can easily apply the Vector error correction model. We also use this model in to differentiate the short run causality and long-run

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causality. Here in this paper, we have tried a little bit to discover the short run and long run dependency among the variables. We found that all our incorporated variables are stationary at first difference and cointegrated in the long-run, for the sake of that we applied the vector error correction model as follows:

$$\Delta trade\ deficit_t = \alpha + \sum_{i=1}^{k-1} \beta_i \Delta trade\ deficit_{t-i} + \sum_{j=1}^{k-1} \gamma_j \Delta real\ exchange\ rate_{t-j} + \sum_{m=1}^{k-1} \delta_m \Delta GNI_{t-m} + \sum_{s=1}^{k-1} \varepsilon_s \Delta Net\ officials\ development\ assistance_{t-s} + \sum_{n=1}^{k-1} \theta_n \Delta inflation\ rate_{t-n} + \pi_1 ECT_{t-1} + u_{1t}$$

NOTES:

- K-1 =the lag length is reduced by 1.
- $\beta_{i.}, \gamma_j, \delta_m, \varepsilon_s, \theta_n$ =Short run dynamic coefficients of the models adjustment long-run equilibrium.
- π_i =speed of adjustment parameter with a negative sign
- ECT_{t-1} =The error correction term is the lagged value of the residuals obtained from the cointegrating regression of the dependent variable on the regressors. Contains long-run information derived from the long run co integrating relationship.
- u_{it} =residuals

d) Vector error correction model

Sample 1983-2017

Number of observation 35

Beta	Coefficient	Standard error	Z statistics	P value
D_1 trade deficit _ce1 L1	-.2564798	.1166557	-2.20	.028
1 trade deficit				
LD	-.1700934	.1957509	-.87	.385
L2D	.0259511	.1820158	.14	.887
1 rer				
LD	-.1637177	.7614941	-.21	.830
L2D	-.3026621	.679326	-.45	.656
1GNI_PC				
LD	.5141596	1.523708	.34	.736
L2D	3.122934	2.455098	1.27	.203
1noda_pc				
LD	.2370135	.2345446	1.01	.312
L2D	-.1084151	.2246564	-.48	.629
INF				
LD	.013794	.0227982	.61	.545
L2D	.0144075	.0192543	.75	.454
_cons-	-.0221602	.0889259	-.25	.803

e) Johansen normalization restriction imposed

Beta	Coefficient	Standard error	Z statistics	P value
_ce1 1trade deficit	1			
1rer	.4240321	.5282523	.80	.422
1gni_pc	-8.763669	1.121287	-7.82	.000
1noda_pc	1.237545	.3438836	3.60	.000
Inf	-.0570974	.0500508	-1.14	.254
_cons	53.73079			

From the above-mentioned table, it specified that the c_1 coefficient is statistically significant and that is the long run effect and error correctionion term, on the other hand the LD and L2D for several variables are short run coefficient, and results show that they are statistically insignificant. Johansen normalization table shows the long run relationship among trade deficit, real exchange rate, GNI, NODA, and inflation rate.

VIII. Conclusion

The link between the trade balance and the exchange rate has a long history. In the old days,

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researchers sought conditions under which a devaluation or depreciation could improve the trade balance.8 Countries continued to experience deterioration in their trade balance despite repeated devaluations. Improvement did come but only after the passage of time and after completion of pass-through of exchange rates to prices, hence the J-curve effect. Since it is shown that import and export prices adjust to exchange rate changes in an asymmetric manner (Bussiere, 2013), there is no reason not to believe that trade flows will not follow the same. As argued by Bahmani- Oskooee, and Fariditavana (2015, 2016) traders' expectations change when a currency appreciates versus when it depreciates. Therefore, trade balance likely reacts in an asymmetric manner to exchange rate changes. Another factor that could contribute to asymmetric effects is the fact that imports and exports originate from two different countries that are subject to different sets of trade rules, policies, and regulations. In other words, for countries with more bureaucratic red tape, the adjustment lags will be longer, which can contribute to asymmetric effects (Bahmani-Oskooee & Aftab, 2017). Currency depreciation is said to worsen the trade balance first before improving it, resulting in a pattern of movement that labeled the j curve phenomenon. Several studies have employed aggregate trade data and have suffered from the aggregation bias problem. The problem is that a favorable effect of currency depreciation against one country could be offset by its unfavorable effect against another one resulting in a conclusion that depreciation is ineffective .but in my article we have incorporated the stationary time series data and using the Johansen cointegration test and error correction modeling find the long-run association among the variables.

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From Greed to Conscience: Framing a Global System that Works for Everyone

By Sam Agatre Okuonzi

Abstract- Trading to benefit self and unintentionally others became the most revolutionary idea over the past 200 years. It has become not only the core of the global economic system but a creed and way of life. This system is the free-market neoliberalism. But its perils are increasing by the day. Free-market health sector reforms in Uganda and other countries are the cause of health service deterioration not only in Uganda but around the world. Health service crisis in low-income countries is part of a bigger global crisis arising from free-market policies. These crises include the widening economic disparity, an increasing number of poor, hungry and angry people around the world; rising tensions and restlessness, terrorism, mass migration, and unemployment. The earth's natural resources are depleting and ecosystems degrading, resulting in loss of biodiversity, arable land, and water systems. This situation is causing adverse climate change and less than adequate food production. In the face of these challenges, the values of free-market capitalism is becoming untenable and obsolete. A new civilization is emerging and we, the current generation, should guide it with the values of sustainable economic production, equitable wealth distribution, elimination of deprivation, living within the earth's carrying capacity, and human fulfillment. Indeed consensus is now building up to a world-wide compact for a new civilization.

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From Greed to Conscience: Framing a Global System that Works for Everyone

Sam Agatre Okuonzi

Abstract- Trading to benefit self and unintentionally others became the most revolutionary idea over the past 200 years. It has become not only the core of the global economic system but a creed and way of life. This system is the free-market neo-liberalism. But its perils are increasing by the day. Free-market health sector reforms in Uganda and other countries are the cause of health service deterioration not only in Uganda but around the world. Health service crisis in low-income countries is part of a bigger global crisis arising from free-market policies. These crises include the widening economic disparity, an increasing number of poor, hungry and angry people around the world; rising tensions and restlessness, terrorism, mass migration, and unemployment. The earth's natural resources are depleting and ecosystems degrading, resulting in loss of biodiversity, arable land, and water systems. This situation is causing adverse climate change and less than adequate food production. In the face of these challenges, the values of free-market capitalism is becoming untenable and obsolete. A new civilization is emerging and we, the current generation, should guide it with the values of sustainable economic production, equitable wealth distribution, elimination of deprivation, living within the earth's carrying capacity, and human fulfillment. Indeed consensus is now building up to a world-wide compact for a new civilization.

I. Introduction

The economic system of our time has been built around a central idea of human greed. The idea was first expounded on by Adam Smith in his Wealth of Nations published in 1776. He argued that the human urge to increase private profits from capital is the basis for the collective wealth of a nation. This idea has become the single most revolutionary phenomenon in human history to-date (Harari, 2011). Smith concluded that when a person becomes rich, his wealth benefits everybody else. Thus, egoism is altruism; an individual's greed is good for all, he argued. Unlike previous notions, Smith taught that the economy need not be one-win-all but a win-win situation. Therefore, the capitalist creed has become: profits of production must be reinvested to increase production. The creed has led to the concept of "continuous economic growth" as being essential for human survival and livelihood.

Accordingly, expenditure in productive enterprises is expected to increase incomes more broadly, leading to the economic growth of a nation. Today this means that governments will strive to be productive by building new ports or roads to export products to earn revenue or by investing in education to provide skilled labor for high-tech industries. But pension, health care and environmental protection will not be prioritized because these have no direct lead to economic growth. This system has become an impediment for the majority. The system has generated problems that require new solutions. Declining social services, environmental degradation, and economic inequities that foment mass migration, conflict and terrorism, are some of the emerging issues.

Through foreign aid, western countries forced free-market policies on poor and struggling nations over the past forty years. The results have been disastrous. For example, several studies were done to evaluate market-based reforms in Uganda and other countries (Okuonzi 2009; 2008; 20004a; 2004b; Nabyonga and Karamagi, 2008; Sengooba, McPake et al, 2001; Jeppsson and Okuonzi 2000; Okuonzi and Birungi 2000; Birungi, Mugisha et al, 2001). These studies found that the vast majority of the reforms failed to attain both individual reform objectives and the wider health-sector objectives. For the very few reforms that were partially beneficial, the benefits were neither sustainable nor feasible for nationwide use. The reforms added little or no value to the health system, and even undermined it. The reforms added to the growing crises arising from the globalised free-market system.

This paper discusses the current free-market economics paradigm, its origins and how it was propagated. It highlights the problems of the current economic system, the perils it has created and its implications on the very survival of human beings. The paper pieces together an emerging consensus about the desirable world economic and social system. Drawing from historical human transitions, it proposes an approach to a global doctrine and system for a new civilization.

II. Liberalism Under Humanism

Humanism has emerged as a religion in which the world has found itself (Sellers R, Bragg, 1933). In humanism, the uniqueness of human beings has become the most important thing in the world (Harari, 2017). This uniqueness determines the meaning to man of everything that happens in the universe. The supreme good is for human beings. The rest of the world exists solely for the benefit of humans.

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There are three distinct sects of humanism. The most impactful sect today is liberal humanism. Others are socialist and evolutionary humanism (Harari, 2017). In liberal humanism, the liberty of the individual is sacrosanct. The inner core of the human individual is what gives meaning to the world. It is the source of all ethical and political authority. The chief commandments to protect this inner voice from intrusion or harm, are called human rights. The liberal humanism package today consists of 1) individualism, 2) human rights, 3) democracy, and 4) a free-market (Harari, 2011). In democracy, the individual voter chooses his leader. In the free-market, the customer decides what to buy. The freedom is supported by a judicial system and an international human rights code.

Socialist humanism emphasizes the feelings for others, not just for self. It discourages individuals from obsessing about their own feelings but focuses on what society thinks. Socialists argue that peace is not brought about by celebrating our distinctiveness but by unifying our interests. Social harmony is thus brought about by prioritizing the needs and experiences of others over our own. So they advocate for strong collective institutions such as political parties and trade unions. In liberal politics, the voter is always right. In socialist politics, the party knows best, but the trade union has the final word.

Evolutionary humanism, based on Darwin's evolutionary theory, insists that we must applaud conflict among humans because it is the basis for natural selection of survivors. This theory is was summed up by Darwin famously as "survival of the fittest". Thus, evolutionary humanists believe that some humans are superior to other humans (Harari, 2017). That only those who are fit or superior be allowed to survive. They can steamroll everyone else if interests collide. They also insist that if a group has spearheaded much of the human progress, that group should be taken to be superior. Nazism was an extreme form of evolutionary humanism, in which the Nazis, believing themselves to be superior, asserted that "worthless" racial groups be assimilated or eliminated. Today, milder forms of evolutionary humanists include racists, fascists and far-right groups in much of Europe and North America.

III. Origins and Propagation of the Free-Market

a) The spark-off idea

Capitalism, the surname of free-market system, started as an idea and developed into a theory of how the economy functions and should function (Shutt, 1998). That is, it has become both a descriptive and prescriptive subject. But it has also now become a socio-economic doctrine, encompassing an ethic. It provides a set of teachings about how people should behave, educate children, and even think. The principal tenet is that economic growth is supreme: justice, freedom, happiness all depend on it (Harari, 2011). It has influenced science, where investment in scientific research is justified by the potential to increase production, profits and economic growth. It has given rise to the global free-market economic system. The combination of capital and unencumbered market gives it the name free-market capitalism. "Free" because of the liberal humanism idea of a free customer. Liberals want markets to be truly free, not manipulated or controlled by governments, banks or corporations.

b) Philosophizing the free-market

The rise of the free-market economic system is rooted in the belief that the market is a superior system of production and distribution of goods and services. That it is a just and neutral mechanism, which guarantees the freedom of individuals. The belief is based on the libertarian philosophy of individual freedoms and private ownership of property (Harari, 2011). An individual is viewed as being autonomous, capable of making decisions based on self-interest and pursuit of his own welfare. The philosophy entails that private property is kept outside of the government's control (Gilson, 1988). And that taxation by governments should be regarded as broad-day robbery. Social justice to an individual is seen as the consequence of actions and inactions of that individual. In the market system, differences in social-economic conditions among individuals should be expected and accepted. The government's intervention in people's lives is regarded as interference in the rights and freedoms of individuals, and is taken to be unjustified and unacceptable.

c) Globalization

Free-market capitalism is now globalized (Raskin et al, 2002). Capital, production and markets are now global, and not limited to nations or groups of nations as was the case in the past. Globalization is not new in human experience, having started with the migration out of Africa to the rest of the world at the dawn of humanity. It is the character of the new globalization from the year 2000AD which is different. This new globalization has widened, deepened and accelerated human interconnectedness. All world systems are being integrated and have become increasingly complex. In particular, the global economy is being integrated in production, financing, trade, investment and labour.

d) Rationalization of a new economy

Capitalism is fairly new in human history, having begun only about 200 years ago. Before that wealth was distributed through a system of customary rights and obligations in a stratified social ladder – a system called feudalism (Shutt, 1998). But technological breakthrough with the steam power multiplied manifold the potentials and possibilities of manufacturing, mining, agriculture and transport. With so much production, capital

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accumulated very fast. New rules were needed to manage the large capital; customary rules became inapplicable and irrelevant. New rules created property rights and were rationalized by philosophers and other intellectuals.

Shutt (1998) and Harari (2011) identify credit and the church as critical factors in the propagation of capitalism. Individuals borrowed money from the European aristocracy for economic ventures abroad. The church provided a strong moral support for these adventures. The church at first resisted the lending of money at an interest, arguing this was immoral. But the growing power of emerging merchants enabled them to influence the church to rationalize values associated with moneyed wealth. Calvinist religion in particular and philosopher Locke later rationalized private property rights. This Christian rationale for private property made the founding fathers of USA endorse slavery and the industrial magnates in England to rationalize the displacement of people to make land available for large-scale agriculture.

The accumulation of capital was not without perils (Shutt, 1998). Destitution and cyclic economic disasters plunged Europe into social unrest. In France, this led to Napoleonic wars in 1815. Britain averted similar rebellion by savage and repressive laws. These events prompted Malthus and Ricardo to rationalize the inevitability of cyclic disasters as part of the "invisible hand" of the free-market. This conspiracy and lack of action, which is being repeated today, led to worldwide wars.

IV. Brief Interruption of Capitalism

Detractors of the free-market capitalism, notably Marx and Engels in their Communist Manifesto, warned that capitalism as an economic system was unsustainable. The growth of capitalism led to and was interrupted by two world wars (Shutt, 1998). Two lessons from the wars were: one, that the state should ensure economic security for everyone. Two, international cooperation should be institutionalized to curb the effect of morbid nationalism like that of Adolf Hitler. Although the West was tilted to market orthodoxy, this was now not fully applied. The state played a leading role in wealth creation and distribution. Employment was a key goal under the Keynesian economic doctrine. There was substantial growth of the economy in this period. But the period – called the boom period – lasted for thirty years, from 1945 to 1975 (Shutt, 1998). Then the oil-crisis started and there was a slump in economic growth. Markets became saturated and inflation rates soared. The control of inflation became the number one economic policy. Inflation was identified as the main cause of economic recession.

V. A New Rationalization of the Free Market

After the two world wars, the free-market model was pushed to the periphery. But intellectuals began to rationalize it again by 1950. Most notable is Friedrick von Hayek who published as essay titled "The Intellectuals and Socialism" in 1949 (Alkire and Ritchie, 2007) in which he tells his readers "to have courage to be utopian" by embracing the free-market ideals. Hayek's publication of The Return to Serfdom established him as a high-profile theorist. He and his colleagues used mass communication methods of dissemination of their ideas. These included teachers, news-media, novelists, films and entrepreneurs.

They recruited financiers, formed think-tanks and intellectual community through networking. Notable among these are Mont Pelerin Society, the University of Chicago Economics Faculty, the Institute of Economic Affairs in the UK formed in 1955, and American Enterprises Institute formed in 1943. The intellectual community outlined "fundamental principles" and chose "battle issues" to tackle, which included workers' unions, inflation and privatization. They were supported and financed by corporate firms to polemicize for the market ideology and to carry out technical and empirical studies (Alkire and Ritchie, 2007).

The now widening network of free-market enthusiasts begun to invest in talent: recruiting, training, supporting and rewarding brilliant young people. By 1970s their influence to revive the free-market and neo-classical economics had begun to have effect. Under President Jimmy Carter, USA carried out deregulation of the economy. In 1974, Hayek was awarded the Nobel prize in economics and Milton Friedman one of the bright early recruits in the network got a Nobel prize in 1976 (Alkire and Ritchie 2007). These high profile awards signaled rapid changes towards free-market ideology under Ronald Reagan and Margaret Thatcher in 1980's.

VI. The Return to the Free-Market

There had been a disastrous experiment with communism/socialism from 1914-1989. Achievements attributed to this phase of human history include the discovery of antibiotics and computers, decolonization, welfare state, universal education and health care. But genocide of Jews and similar acts rendered communism/socialism untenable (Harari 2011). Thus, in 1970s there was a return to free-market orthodoxy, prompted by the oil crisis. The policies that evolved were aimed at keeping price stability and balancing budgets. Formerly, under the economic boom period, economist Keynes had propagated the use of control of prices and wages in the control of inflation. But in the new economic dispensation, inflation was to be

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controlled by the control of money supply. This became the monetarist economic policy pioneered by Milton Friedman (Shutt, 1998). But this approach has not, since 1970s, led to a rebounded economic growth. The global economy has been growing at only 2.5-3% at best, whereas in the 1950's and 1960's it grew at around 5% per annum.

Critics of the free-market (for example, Shutt 1998 and Amin 2000) identify redundant and overvalued capital in the west as the root cause of uncontrolled market-globalization. To deal with this huge capital, the West, through its governments and corporations, are opening outlets throughout the world for investment. The public sectors of the Organization for Economic Cooperation and Development (OECD) countries took debt out of the capital to finance their own budget in the face of inadequate revenue generation by the governments. Since 1970s, these countries have not recorded a budget surplus. US, France and Canada, in particular, have been in perpetual budget deficit. On average, an OECD country has a budget deficit of USD700bn in 2000's compared to only USD100bn in 1970's. In addition to investment through expanded outlets, the West privatized state-owned assets and government services. Other ways of coping with the excessive capital accumulation included, mergers and acquisitions, and high risk venture investments such as bonds.

Using international financial institutions, these same measures were prescribed to other countries as a condition for getting aid (Okuonzi, 2004). Typically, the prescribed policies were: decontrol prices, remove import barriers, remove barriers to capital movement, liberalize the financial sector, privatize state-own assets, balance your national budget, and introduce high interest rates to control inflation. With few exceptions (such as China, Poland and Czech Republic) most countries did not succeed in improving their economies. Those that did succeed (e.g. East-Asian Tiger nations) did not follow all the policy prescriptions, defying many.

Easterly WR (2002) argues that for over 70 years since World War II, the rich countries have applied different interventions to make poor countries become rich, but have failed. The central problem seems to be the failure to sustain a high enough economic growth to support the value of existing capital at levels demanded by the capital market. The net result of the market capitalism is that it has increased public/private debt; reduced public services; increased deprivation even in rich countries (25% of the British population was deprived in 2002 compared to only 10% in 1970); increased fraud, corruption, organized crime, loss of state and corporate accountability, all because of deregulation and liberalization; increased conflict and terrorism; and increased unemployment (Shutt, 1998).

VII. The Eminent Collapse of Globalized Capitalism

But the free-market economy began collapsing under its own weight two decades ago. Some (Shutt 1998; Amin 2000; Raskin et al. 2002; Stigliz J 2002; Bello W 2004) predicted that the market capitalist system would run its course over a few more decades and give rise to another economic and political order. The signs of this eminent collapse now occur more frequently. These signs include: trade cycle and market crushes, rising inflation and public debts; rising food prices and food riots; huge surplus capital; increasing knowledge-based economy which will not need huge capital; weakening of states vis-a-vis powerful multinationals; erosion of legality; and lessening of prospects for economic growth recovery.

It has become increasingly clear that first, true free-markets do not exist, but are supported by the state in the West, acting in the interest of the multinationals (Shutt, 1998). Second, contrary to the optimism created by market economic system and globalization, there has not been an appreciable general rise in prosperity; instead, poverty has spread around the world. Third, unacceptable social consequences of market-based capitalism have worsened with the erosion of the power of the state. Fourth, crippling economic policies have made more people worse off, while making the West and multinationals better off. Fifth, in establishing a new and fair economic order, we must address the problems of capital surplus, public-sector deficits, and the huge gaps in living standards between the rich and the poor.

VIII. Perils of Free-Market Capitalism

Many have argued that there is no alternative to the free-market economic system. That within the system, innovation for better and more efficient use of resources can be found. Hence, international development is still firmly structured around the free-market concept. The vision for the market-based development is to have a globally integrated free-market system, with no trade barriers, using market-enabling institutions to spread wealth around the world. The hope is that there will be economic growth around the world, reduction in poverty, achievement of international equity and reduction in conflict (Raskin, 2002; Harari, 2011). But there are inherent contradictions in this model.

Untrammeled free-market globalization has severe consequences on the environment through the uncontrolled use of resources and resource-wasting opulent lifestyles of those with access to resources (Shutt 1998). In addition, the human impact on the atmosphere, land and water is huge. This is caused by toxic industrial and domestic chemicals, loss of species due to degradation of ecosystems, and by the emission of carbon-dioxide, a green-house gas, as an industrial

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waste, bringing about adverse climate change (Raskin at el 2002). This undermines global climate stability, further risking ecological and human health. Increasing inequity has given rise to social polarization, terrorism and conflicts.

The global economic system is hungry for natural resources, new investment opportunities and markets (Harari, 2011). Countries and communities are being rapidly integrated and interconnected through information technology. The majority of the people though are not benefiting from the economic system as much as they desire. There is widening economic disparity, with an increasing number of the poor, hungry and angry people around the world. This is causing rising tensions and restlessness that could trigger a wider conflict. It is also causing increasing cases of terrorism and mass migration.

Huge capital in the west, and now also in the east, especially China, is driving investors to aggressively search for the earth's natural resources (Pilling, 2018). These are being depleted and ecosystems degraded. The result is the loss of biodiversity, arable land and water systems. This is partly contributing to climate change and less than desired food production. The current trajectory is that we are heading for a global resource-insufficiency disaster and / or a major conflict.

The rising number of people with no income or who are jobless has sharply increased globally (Pilling, 2018). This is causing social disharmony, mass migration and posing a threat to international security. Migration of people who are excluded from this new economy, and who are inundated, marginalized, or attracted by images and dreams of affluence in the west, has reached a new peak. The market-driven global economy pays little attention to the rapid population growth. Food supply will increase but will not be met by the food production capacity. It is projected that by 2050, there will still be a billion people unable to get adequate food (Raskin et al 2002).

Terrorism which had been brewing for a while became a global phenomenon after September 11, 2001 attacks in New York, USA (Harari, 2011). These attacks were organized by Jihadists and extremist Islamic organizations that have now become global. Terrorism has two roots: first, the traditionalists who do not want pluralism and assimilation. Second, militant youths in the underdeveloped world who are angry, have became impatient and resorted to violence. Globalization has tantalized them with images of prosperity but has not provided them with the opportunity to achieve that prosperity. Governments in the underdeveloped countries are paying less attention to social services such as health, education and community services. The terms of trade and investment world-over are unfair disfavoring poor countries (The Economist, 2017). It will not be possible for these poor countries to attain the economic status they aspire to.

IX. Failure to Mitigate Free-Market Adversities

Aware of these perils, activists and some global leaders have made efforts to mitigate and reverse these adverse effects. But the results of these efforts are not at the required pace and scale. It is like "climbing up a down-moving escalator" (Raskin et al, 2002). One initiative was the "Inclusive Growth" policy. This entailed promoting the efficient use of resources, renewable energy, environmental protection, and poverty reduction.

A second initiative was the Millennium Development Goals (MDGs). There were 8 MDGs: on poverty eradication; universal education; gender equality; reduction of child, infant and maternal mortality; combating HIV/AIDS and environmental sustainability. While there are outliers in achieving the targets of MDGs (Algiers, Egypt, Madagascar, Rwanda, Seychelles and Tunisia), most developing countries performed unsatisfactorily (Global Thematic Team, 2013).

A third initiative is the Sustainable Development Goals (SDGs) to run from 2015 to 2030. SDGs are just like MDGs, only expanded to cover more development areas. In particular, the following have attained new emphasis: affordable and clean energy, decent work and economic growth, industrialization, reduced inequalities, responsible consumption and production, climate action, peace, justice and strong institutions. SDGs emphasize inclusive growth, investing in people, and building resilience against global shocks. They call for universal solutions and transformative reforms. They discourage vertical programs for implementing SDGs.

These initiatives are stand-alone goals social goals aimed to address the ensuing socio-economic crises. There are no mechanisms of implementing and enforcing the goals. And there is generally little or no political will to implement these universal goals. Just like the MDGs, not much is likely to come out of SGDs by 2030.

X. Transitioning to a new Human Era is Underway

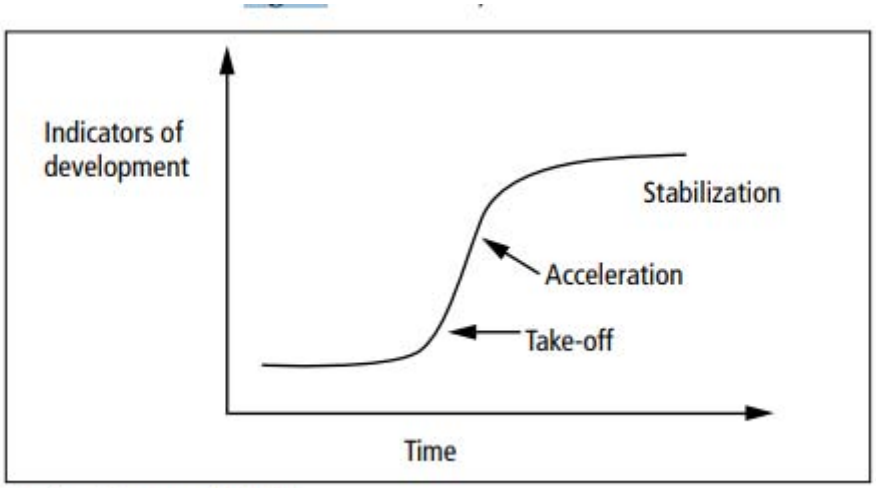
History is the unfolding of change and emergence. Historical time is accelerating as the pace of technological, environmental and cultural change quickens. We are witnessing the shrinking of global space as the integration of nations and regions into a single earth system unfolds. We have reached an historic human transition (Raskin et al, 2002).

a) Historical Transitions

As with physical or biological systems, transitions tend to evolve gradually within a given state

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or organization. Then they enter a period of transformation that is often chaotic and turbulent. And finally they emerge in a stable new state with qualitatively different features. The process of movement from a quasi-stable condition through an interval of rapid change to re-stabilization is found across the spectrum of natural phenomena. These include the forging of matter in the instant after the big bang, the phase shifts between different states of matter as temperature and pressure change; the epigenesis of individual biological creatures; and the evolution of life's diverse forms (Martens et al, 2001).. Figure 1 illustrates the trend of change in a transition.



Based on Martens et al. (2001)

Figure 1: Phase of Transition

Naturally, the course of history is not neatly organized into idealized transitions. Yet, a long view of the broad contours of the human experience reveals two sweeping macro-transformations—from Stone Age culture to Early Civilization roughly 10,000 years ago, and from Early Civilization to the Modern Era over the last millennium (Raskin et al 2002). We are now in the midst of a third significant transition, toward the planetary phase of civilization, which is projected to last 100 years, from year 2000 to 2100.

Historical transitions are complex junctures, in which the entire cultural matrix and the relationship of humanity to nature are transformed. Three critical and interacting aspects at each stage are the form of social organization, the character of the economic system, and the capacity for communication. Novel features for each of these dimensions are shown for four historical eras in Table 1.

Table 1: Characteristics of human era

	Stone-age	Early civilization	Modern Era	Planetary Age
Time span in years	100,000	10,000	1,000	100
Organization	Tribe/ village	City state / kingdom	Nation state	Global governance
Economy	Hunting and gathering	Settled agriculture	Industrial system	Globalization
Communication	Language	Writing	Printing	Internet
Technology domain	Stone tools	Wheels, other metallic tools	Steam engine, electric appliances, automobiles, computing	AI, robots, blockchain, advaced materials biotechnology

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In the Stone Age, social organization was at the tribal and village level, the economy was based on hunting and gathering, and human communication was advanced through the evolution of language. In Early Civilization, political organization moved to the level of the city-state and kingdom, the basis of economic diversification was the surplus generated by settled agriculture, and communication leapt forward with the advent of writing. In the Modern Era, political organization was dominated by the nation-state, the economy became capitalist with the industrial revolution its apotheosis, and gathering agriculture system Communications Language Writing Printing Internet communication was democratized through printing.

b) Evidence that we are in transition

Extending this typology to the Planetary Phase, the emerging political, economic and communications features are, respectively, global governance, globalization of the world economy, and the information revolution. But the primary phenomena that constitute globalization emerged as a cluster over the last three decades. See figure 2 below.

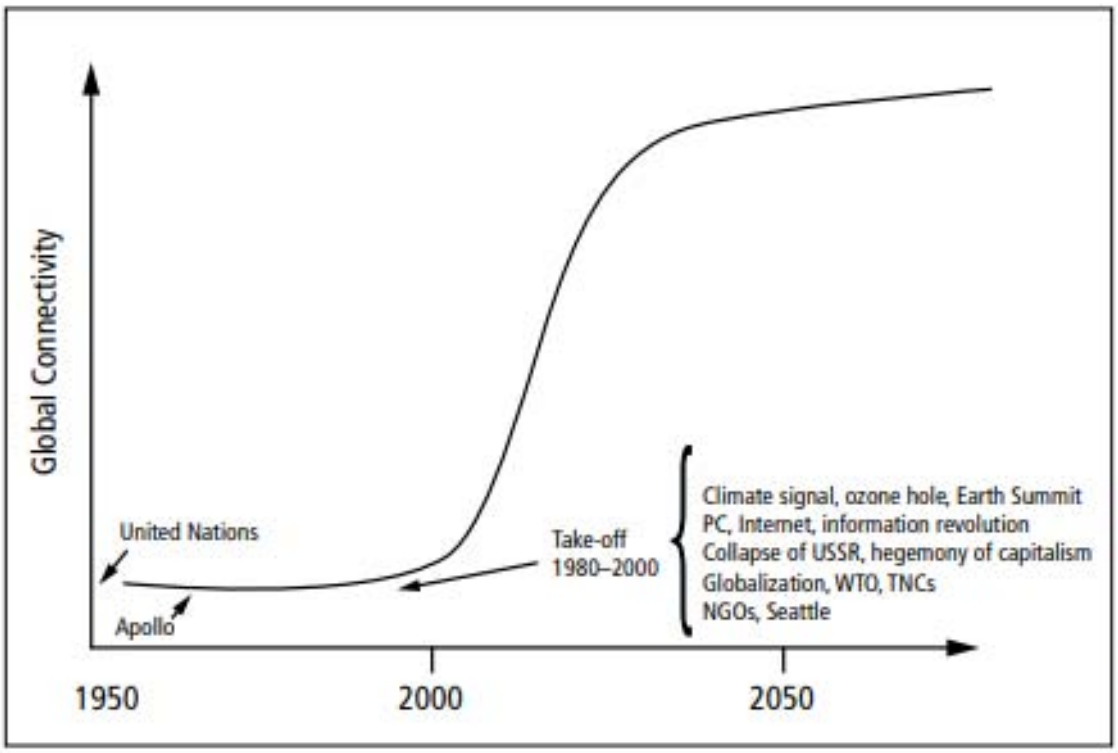


Figure 2

Critical developments between 1980 and the present are seen in:

The global environment: The world becomes aware of climate change, the ozone hole and threats to biodiversity, and holds its first Earth Summit. Many follow-on meetings and actions are on the way.

Technology: The personal computer appears at the beginning of the period and the Internet follows. A manifold communications and information revolution is launched and biotechnology is commercialized for global markets. Artificial Intelligence is spreading, with robotics taking over work from humans, and the emergence of autonomous cars and aircraft. The medical use of cyborgs and computer human-brain interface interactions is picking up rapidly. Attempts are being made to upgrade the human brain and body by DNA manipulation, nano-robots, and AI (Harari, 2017).

Geo-politics: The USSR collapsed, the Cold War has ended and a major barrier to a hegemonic world capitalist system is removed. New concerns appear on the geo-political agenda including environmental security, rogue states and global crime and terrorism. But issues of Syria, North Korea and Iran are being resolved. North Korean leader Kim Kong-un has had a historic meeting with the president of USA, Donald Trump. The Russian president Vladimir Putin has also had several historic meetings with Donald Trump. Osnos, et al, 2017 describe similar less prominent overtures.

Economic integration: All markets—commodity, finance, labour and consumer—are increasingly globalized (Harari, 2011). China has become the second economic power in the world after USA. In fact USA's dominance of the economic space is fast receding with the coalition of Brazil, Russia, India, China and South Africa (BRICS).

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Institutions: New global actors, such as the World Trade Organization, transnational corporations and an internationally connected civil society—and global terrorists, the dialectical negation of planetary modernism—become prominent. Even the rules for digital age management are different now (Bersin, 2017).

Cultural integration: A global culture is being forged. People everywhere aspire to and do similar things (Raskin et al, 2002). These range from women's emancipation and parity with men to the protection of the rights of minorities. Music, art and entertainment are moving without borders. Mass migration is facilitating inter ethnic and interracial mixing and co-existence.

Global development: An attempt to develop the entire world has been initiated through the Millennium Development Goals and Sustainable Development Goals, and through globalised economic integration.

X. A New Paradigm for a Global System

a) The desirable world

A consensus is emerging throughout the world. There are distractions to this development but these are likely to be short-lived. Typical examples are *Trumpism* and *Brexit* (the current inward looking policies of USA and Britain, respectively) (Osnos, Reminick et al, 2017). The desirable world is a shared and sustainable world - a world that ensures peace, freedom and equity, and the preservation and protection of the environment, and the future. This requires a different set of values and world system, a different economic system (Bello 2004; Mooney 2012; Byanyima 2017, Helliwell et al 2018).

It is a world that will ensure enriched lives for all, human cooperation and solidarity, and a healthy planet. These attributes cannot be achieved through the free-market economic system as a key driver of development. The sustainability paradigm must therefore challenge the current values, economic structures and social arrangements (Bello 2004, Mooney 20012, Byanyima 2017). Needs and wants have to be distinguished; values promoting needs over wants will be strengthened at personal, national and global levels. The anxiety and uncertainty about the future due to a possible outbreak of conflict needs to end through building human solidarity and security measures.

b) Caring for others, for the environment and the future

Humanity has to develop and practice an ethical code to care for others, for the environment and for the future (Raskin, 2002). The domination by other people and the loss of freedom and choice, by large populations of disenfranchised people has to be addressed. Local communities need to be encouraged and facilitated to participate in political and cultural life. Nobody should feel alienated by a dominant culture. Individuals and communities will have to be enabled to pursue meaningful and purposeful life. A lifestyle that promotes personal endeavor and connection to nature should be promoted (Meadows, 1972; Colvin 2015).

The envisaged new human civilization is where people everywhere live meaningful and fulfilling lives, in solidarity, and with ecological sensibility. People have to live with the awareness of their connection to one another, to future generations and to the web of life. People need to live peaceful and pluralistic lives in culture, politics, technical innovation and democracy. People need to freely enjoy multiple level affiliations and loyalty of the family unit, through community, region, denominational, up to global organizations (Pilling, 2018). Governance needs to be done through decentralized web of government, CSOs and business partnerships.

c) Local versus global interface

Local solutions need to be promoted and used most. Local products should be the mainstay of the local economy. The economic system needs to become a means of living, but not an end in itself (Shutt 1998, Mooney 2012). Markets need to be controlled and tamed to conform to non-market social goals of equity, peace and environment. The pace of economic growth should be subject to and limited by sustainability criteria. Income distribution should be confined to the richest 20% being within only 2-3 times of those who are poor (Scheidel 2017, Pilling 2018). No obscene differences in wealth distribution like it is today should be allowed. Conspicuous consumption and glitter is to be regarded as vulgar.

d) Values for the new economy

The new economy should mean that production, distribution and decision-making are guided by equity, sustainability and human fulfillment considerations (Shutt 1998, Mooney 2012, Frickle 2017). The idea is to a) eradicate human deprivation everywhere, b) reduce inequality, c) stay within environmental carrying capacity, and d) maintain innovation. The behavior of individuals, firms, governments and international systems will be changed to being sensitive to the ecology, abating consumerism, traveling by public means, increasingly people doing voluntary and non-profit work, and increasing taxation. Businesses can still be driven by some self-interest but has to be eco-efficient, and practice green-marketing and social responsibility. They should be rewarded for adopting this new behavior.

A new science of sustainability needs to be developed. This will enable problems to be defined and solved to promote peace and solidarity, and to protect and promote the environment. Research on early warning systems for social and environmental breakdown will be encouraged and facilitated. The spiraling out of control of population growth has to be

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stopped with appropriate measures (Malthus, 1983). Birth and death rates need to be cut down so as to stabilize the population. Family planning services needs to be made available and the wider reproductive health services accessible to all.

Urban planning should adopt infrastructure for less land, using cheaper and sustainable building materials, and using renewable energy (Raskin et al 2002). Urban dwellings ought to be made habitable, decent, efficient, affordable, and environmentally friendly. At the same time, the rate of urbanization has to be reduced and rural settlements improved with basic services. Settlements need to be constructed such that home, workplaces, commerce and leisure are in close proximity. The urban underclass (slums) should be completely eliminated. The institutionalization of the "rights revolution" needs to become a strong feature of the new sustainable world. Effective measures need to be put in place to uphold all human rights.

Five dividends can be realized from this sustainability doctrine (Raskin et al 2002): First, it provides the green dividend through cost-savings that would have been used to repair the environment. Second, peace dividend reduces military expenditure. Third, human capital dividend fosters creativity and productivity of the millions who will be lifted out of poverty. Fourth, technological dividend provides new opportunities for innovation and wider access to information. And finally, solidarity dividend should be able to reduce security and police costs.

e) Technology for the future

The fourth industrial age has begun. Its technology, still nascent, consists four elements: 1) extending the digital technology through new computing methods, block chain and distributed ledger, and internet of things; 2) reforming the physical world by artificial intelligence and robotics, advanced materials, additive manufacturing, and multidimensional printing; 3) altering the human being through biotechnology, neuro-technology, and virtual and augmented realities; 4) integrating the environment through energy capture, storage and transmission; geo-engineering; and space technology (Schwab 2018). These technologies will disrupt the current institutions and values. Lessons from the previous industrial revolutions have taught us that without addressing humanity and common good aspects, industrial societies are not stable and global systems can break down. The current digital age is bedeviled by rising inequality, increasing political polarization, falling trust levels with every institution and environmental fragility. The leadership and governance of the emerging technology must therefore be proactive to stem out narrow and biased interests, and focus of the common good.

They must be guided by the humanity principles of: 1) reducing inequality of income and wealth; 2) involving developing countries in decisions of governance, 3) protecting people from disruption of labour, 4) promoting collective good in preference to individual freedoms, 5) setting of norms and standards must be through democratic participation, 6) putting in place new measures to protect genders, cultures and communities against technological disruption, 7) ensuring that leadership of technology is agile, adaptive and anticipatory.

Technology for the future is set to be environmentally-friendly (Colvin 2015, Harari 2016, Pilling 2018). This is called eco-technology. This aims to be efficient and renewable, and to promote industrial ecology. Industrial ecology means eliminating waste, recycling, re-using, re-manufacturing, and extension of product life. This minimizes the need for new raw materials. Sustainable energy technology will entail only moderate use of bio-fuels, and increasing dependence on renewable energy. It produces no or little greenhouse gases. The use of solar energy and hydrogen liquid fuels should be encouraged for use in motor vehicles.

Compact settlements are preferred to maximize the use of energy (Raskin et al, 2018). Internet should be the mainstream mode of information-sharing and for communicating. Polluters of the environment will have to pay as will be agreed universally. All businesses need to practice agreed sustainable ecological norms. Industrial ecology ought to be the new standard of industrialization. Technology innovation is stimulated by price signals, public preferences and creative impulses. Robotic production systems are encouraged to liberate people from repetitive and non-creative work (Colvin, 2015). However, labour intensive and high tech economy can run side by side.

The new civilization should be solar-energy dependent. Solar cells, wind, biomass and flowing water become a key source of energy. Solar energy can be converted to hydrogen and used for transportation. Hydrogen has no pollution effect: it is combusted to form water. Biotech will become a key technology in agriculture, medicine and material production (Harari 2016). Ecological farming with high inputs of knowledge and reduced chemicals will become the mainstay of farming. Through a combination of these and other measures carbon dioxide in the atmosphere will be reduced and this will abate global warming. Efforts will be made to restore ecosystems everywhere.

f) Agriculture and the environment

Sustainable agriculture will ensure adequate food for all while preserving the ecosystems (Watson et al, 1998). A new green-revolution is envisaged. Agriculture ought to be knowledge intensive, with much less or no use of chemicals. Nitrogen-fixing plants should be used instead of fertilizers. Pest management should be done without the use of pesticides. Soil conservation can be encouraged through drainage,

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terracing and appropriate tillage practices. Fish farming should be promoted to compensate for the depletion of fish stocks. Biotechnology should be encouraged to promote better yields, reduce chemical input, conserve water, and improve nutritional content. Mitigation of the adverse effects of environmental degradation – reduction of biodiversity and degradation of ecosystem – should be addressed through appropriate scientific methods.

Water resource management is critical for the sustainable world. Water is for human use, for economic production and for maintaining nature. Water for irrigation must be used efficiently. "Crop-by-drop" practice will be the preferred method of irrigation (Raskin et al, 2002). Non hydro-power generation ought to be encouraged and preferred source of energy. All these measures can be instituted to prevent carbon sequestration, to conserve water and soil, to make use of renewable energy, and to prevent climate change and air pollution.

There is need to enhance or create new institutions of global governance: institutions to administer one global currency, to collect surpluses from rich countries, to set and enforce free-trade rules, and to administer environmental tax. To foster global stability and to maintain peace, there is need to break up the current monopolies by a few countries of the financial system, culture, technology, media, and military power.

g) Global culture

The quality of life should be measured by creativity, new ideas, culture, human relations, and harmony with nature (Colvin, 2015; Harari, 2016). Integrated settlements should be the mainstay of living, where homes, work, shops, hospitals, schools and leisure are close-by. Rural people should have access to digital links. Private vehicles should be compact and pollution free. Walking, cycling and public transport should be encouraged. Large private vehicles can be used for special purposes such as touring. Advanced public transportation of goods and passengers will link all major hubs.

h) Human contentment, not GDP

A key element of development is human contentment, recently approximated as human happiness (Helliwell et al, 2018). It measures six variables for human happiness. There could be more variables for human contentment. These variables include income, healthy life expectancy, social support, freedom, trust, and generosity. A study of the Bhutan's idea of Gross National Happiness reveals three additional elements: use of time, culture tolerance and co-existence, and ecological resilience. These indices differ vastly from what the gross domestic product (GDP) measures. Income measured under the new approach is to capture what every person earns not simply an average as reflected in GDP. Average income is misleading because in reality it is usually only about 10 percent of the population who control 90 percent of the wealth of a country. Median income figure is more representative (Pilling 2015).

Likewise, healthy life expectancy captures the periods when a person is well and not well. This identifies a person who lives long with a chronic disease, as having a compromised quality of life. Every human being cherishes freedom. Any curtailment of freedom by the government or society reduces human contentment. Trust and generosity are relationships qualities. These are determined by culture and history. But contentment indices can be improved by public policy and good leadership. Denmark, Switzerland, Norway and Finland always score high in these indices because of their social policy (Pilling, 2016). A World Values Survey also identifies one more element (in addition to those mentioned here) of human fulfillment: family relationship. Countries in the same wealth bracket, typically USA, which emphasizes the free-market, ranks at the bottom of the contentment ranking.

In general, the formula below, derived from the ensuing discussion, can guide in the development of new economics:

$$\text{Sustainability} = \text{EP} \times \text{HF} / \text{EQ} \times \text{EC}$$

Where, EP = Economic Production; HF = Human Fulfillment; EQ = Equity; Earth's Capacity.

The key emerging aspects of human happiness/ fulfillment are income, healthy life expectancy, social support, freedom, trust, and generosity. These indices differ vastly from the gross domestic product (GDP) currently used as a measure of development.

Thus, human fulfillment (HF) can be mathematically expressed as follows:

$$\text{HF} = \text{income} \times \text{health} \times \text{social support} \times \text{freedom} \times \text{trust} \times \text{generosity}$$

XI. Conclusion

The current global socio-economic crises associated with the free-market globalization are changes towards a new human era. History informs us that human transitions from one civilization to another are unplanned and sometimes disastrous. As the saying goes, each human era sows the seeds of its destruction. The free-market system has sown its seeds, potential causes of its demise, which include conflict, injustice, environmental degradation and resource depletion. Luckily, today we are better equipped with knowledge and technology to plot a desirable trajectory of the world into the future. We can and have to choose to avert the impending disasters by adopting a sustainable world order and civilization based on different values than those of the free-market. The

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current free-market economic system is the product of human imagination. A new global system can be designed by human imagination to support a sustainable, peaceful and enriching world.

Declarations

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Does China's Currency Swap Agreements have Impact on the U.S-dollar's Exchange Rate in Nigeria?

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Does China's Currency Swap Agreements have Impact on the U.S-dollar's Exchange Rate in Nigeria?

Abiodun Sunday Olayiwola[α] & Kazeem Fasoye[σ]

Abstract- This study examines the impact of China's currency swap agreements with Nigeria on U.S. dollar's exchange rate with naira between 1999 and 2017 using Robust Least Squares (ROBUSTLS) technique. The results of the finding reveal that China's currency swap agreement with Nigeria tends to have a reasonable impact on the exchange rate (value) of U.S. dollar. Since the existing works on bilateral currencies swap agreements between China and other countries(excluding Nigeria) reveal that the U.S. dollar dominates all other international currencies in trade settlement and with the aim of bypassing the U.S. dollar in international trades, this study therefore provides fresh empirical evidence on the impact of China's currency swap agreements with Nigeria on the U.S. dollar's exchange rate and concludes that China's currency swap agreement with Nigeria will raise the exchange rate of naira and lower the value of the U.S. dollar with respect to Nigerian naira.

Keywords: exchange rate, currency-swap, output, dollar, naira.

I. Introduction

The evolution of the foreign exchange market in Nigeria has been under the influence of some factors; changing patterns of international trade, political changes in the economy and structural shifts in production. Nigeria has adopted two main exchange regimes since the era of the oil boom in the 1970s: Direct administrative control exchange rate before 1986 and market regulated system introduced during Structural Adjustment Programme in 1986. Since then, the country is still experimenting various market arrangements (Auction System, Dutch Auction System, Wholesale Dutch Auction System, and Rental Dutch Auction System) in determining the exchange rate of naira to US dollar (CBN, 2011; Umar and Soliu, 2009; Mojekwu, Okpala and Adeleke, 2011). Over the past 20 years, the Central Bank of Nigeria (CBN) has been intervening in the foreign exchange market because Nigerian naira- US dollar exchange rate has considerable influence on other socio – economic variables in Nigeria and part of this intervention has led to the recent bilateral currency swap agreement between the Peoples Bank of China (PBC) and the Central Bank of Nigeria (CBN).

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By definition, currency swap deal consists of an agreement between at least one or two international central banks to swap their currencies, to ease trade transactions between both countries and this is devoid of exchange rate challenges. The central bank's party to the swap transaction can lend the proceeds of the swap, against collaterals they deem adequate, to the commercial banks within their jurisdiction, to provide them with temporary liquidity in a foreign currency. Basically, this implies that a particular country would set aside certain amount of its currency(say Yuan) from which People or importers from the other country could directly exchange their currency (say Naira) at pre-determined exchange rates, without first procuring any standard or vehicle currency(dollars/ pounds) to complete the transaction. Therefore, currency swap is designed to assist both countries in their foreign exchange reserves management, enhance financial stability, and protect business people from the harsh effects of vehicle/standard currency fluctuations.

For instance, the People's Bank of China (PBOC) signing of a RMB16-billion (amounting to nearly $2.4 billion or N720 billion) swap agreement with the Central Bank of Nigeria (CBN) on April 27, 2018 in Beijing, China implies that China will exchange RMB16 billion and receive Nigeria naira at a specified exchange rate (N720 billion). Subsequently, CBN will inject RMB16 billion, and PBOC will inject N720 billion into their financial systems, which will be borrowed by domestic traders to pay for their imports from each other country. And when the agreement expires, PBOC and CBN will exchange the other nation's currency at the same exchange rate. This currency swap deal between Nigeria and China (Naira and Yuan swap deal) has implications. According to Banwo and Ighodalo (2018), this will ease trade transactions between both countries, prevent exchange rate challenges with the United State dollar and significantly reduce the increasing pressure on the U.S. dollar, which has gone haywire in the foreign exchange market. Beyond this, the move by the Nigerian government will make trade between Nigeria - China less reliant on the US dollar and will ultimately strengthen our reserves (CBN, 2018).

Likewise, China has actively implemented measures of promoting the cross-border use of its currency (Renminbi RMB) in order to reduce its reliance

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on the US dollar and to prevent dollar squeeze, and the danger of operating a US-centric global financial system (Chen and Cheung, 2011). Some economists have considered this aggressive policy move as a clear signal of China's efforts to internationalize RMB (Cheung, Ma, and McCauley, 2011). Therefore, Nigeria- China currency swap decision has the capacity of bringing double investment to the country from China and the U.S. because it is expected that the pressure on the US-dollar and the value of the dollar to naira will come down, and as such, American investors will be willing to invest in the Nigerian economy. A lot of studies have considered the dangers and benefits as well as evaluating the impact of China's currency swap agreements with other nations on the U.S. dollar's exchange rate, but none of these studies on currency swap agreements, so far, have looked into the impact of such swap deal on the Dollar – Naira exchange rates (Adhikari, 2016). For example, Ibrahim Yelwa and other bureau de change operators in 2016 explain that the currency swap agreement will eliminate the challenges arising from dollar exchange transaction and promote business flexibility between Nigeria and China. According to them, the impact of the currency swap agreement between Nigerian and China will reduce trade imbalances and thereby boost the Nigerian economy, but their views lack empirical findings of the impact of the swap deal on US- dollar exchange rate in Nigeria. Likewise, Atkins (2016) concludes on both the costs and benefits of Nigeria's currency swap agreement with China that increase in trade with China is a benefit to Nigeria, but a possible political turmoil is a danger that may arise from the swap agreement. Against this background, this study seeks to evaluate the impact of China's currency swap agreements with Nigeria on the U.S. dollar's exchange rate with naira.

This study is organized into five sections: Section one is the Introduction, Section 2 focuses the literature review; section 3 deals with Methodology, variable measurement and sources of data. Section 4 discusses the results with their detailed analysis. Finally, Section 5 attempts to bring together the main findings for concluding remarks.

II. Literature Review

Since 2009, the People Bank's of China (PBoC) has signed Bilateral Currency Swap Agreements (BCS) with many central banks, including both emerging and some other industrialized countries. The objective of these Bilateral Currency Swap Agreements (BCS) according to the PBoC is to promote the use of the Chinese currency in trade and investment around the globe (PBoC, 2012). Many authors (such as Aizenman, Jinjarak, and Park, 2011; Liao and McDowell (2015); Zhitao, Wenjie and Cheung, 2016; Garcia-Herrero and Xia,2013) have concluded that the predominant reason for the choice of swap agreements are to insulate the trading nations from international liquidity shocks and reduced transaction costs of cross-border exchange rate for local firms, trade intensity, economic size, strategic partnership, free trade agreement, corruption, and stability. Others opine swap agreements by China will only have limited effect in terms of establishing Renminbi (RMB) as a substitute to other reserve currencies (Liao and McDowell, 2015).

However, there have been several studies on swap agreements, but none of these studies has empirically examined the impact of such currency swap agreement on the value of U.S. dollar in Nigeria but the only related empirical analysis we are aware of recently is that of Adhikari (2016), who examines the impact of Indonesia - China's swap agreements on the value of the U.S. dollar and conclude that the currency swap agreement turned out to be insignificant, meaning that China's swap agreement with Indonesia has no effect on the exchange rate (value) of the U.S. dollar and It should be noted that Adhikari (2016) conclusion cannot be directly extended to the Nigeria economy or other countries, given the differences in the objectives of the respective central banks currency swap agreements with China and socio – economic factors in these countries. While considering the impact of Nigeria's currency swap agreement with China on Nigerian economy, Yelwa's opinion in 2016 and other newspaper articles conclude that currency swap agreement will boost the Nigerian economy but failed to state by how much the swap agreement will affect the economy empirically since imports from China account for some percent of Nigeria's annual imports, meaning that the swap deal will have effects on remaining percent of Nigeria's total import which may definitely require dollar exchange rate. Atkins (2016) analyzes both the benefits and dangers of Nigeria's swap agreement with China. To him, while increased trade with China is a benefit to Nigeria, a possible political turmoil is the danger of the swap agreement.

VanNess (2014), argues that the impact of China's currency swap agreements with other countries on U.S. economy will have significant impact on dollar because international community will rely less and less on the dollar, thereby eliminating the dollar's reserve currency status resulting in higher interest rates, a rise in prices, and a difficulty servicing the debts for the United States. In the same vein, Durden (2014) opines that China's currency swap agreement may endanger U.S dollar and argues that as many countries, through currency swap agreements, begin to reject the dollar due to the exported inflation that is growing in nations that are relegated to having to hold them for global oil purchases, alternatives such as the Chinese Yuan will become a more viable option. On the contrary, authors like Murphy and Yuan (2009) conclude that China's currency swap agreements pose no danger to US-

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dollar since the United States still remains number one destination for Chinese exports and, as such the US will continue to build its dollar reserves because all transactions are still denominated in US-dollars.

III. Methodology

a) Model Specification

This study adopts a modification approach of Irving Fisher's equation as used by Adhikari (2016), given as

$$MV = PQ \quad ---------- (1)$$

Here M is the quantity of money supply in the economy, V is the velocity of domestic currency, P is the general price level, and Q is the real domestic output (GDP).

Dividing both sides of the equation (1) by Q yields

$$P = \frac{MQ}{Q} \quad ---------- (2)$$

Since the relationship shown in equation (2) is universal for any country of the world, thus, the specific equation for U.S. can be rewritten as

$$P^* = \frac{M^*V^*}{Q^*} \quad ---------- (3)$$

Where, P^*, M^*, V^* an d Q^* represent U.S.price level, money supply, the velocity of money, and real domestic output respectively.

By substituting equations (2) and (3) in Absolute Purchasing Power Parity equation, $R = \frac{P}{P^*}$, and it becomes

$$R = \frac{MVQ^*}{M^*V^*Q} \quad ----------(4)$$

Where, R is the exchange rate between the U.S. dollar and Nigerian naira, which is defined as number of the U.S. dollar needed to purchase one naira.

By taking the natural logarithm of both sides of equation (4), it becomes

$$lnR = lnM + lnV + lnQ^* - lnM^* - lnV^* - lnQ \quad --- (5)$$

Irving Fisher assumes that velocities of money are constant over time, then, $lnV + lnV^* = \alpha_0$. Therefore, equation (5) becomes

$$lnR = \alpha_0 + lnM + lnQ^* - lnM^* - lnQ \quad ------(6)$$

Stochastically, equation (6) takes an estimable form as:

$$e_t = \alpha_0 + \beta m_t + \delta q_t^* - \theta m_t^* - \rho q_t + \varepsilon_t \quad ------(7)$$

The a priori expectation is that, β will to be positive, because when domestic money supply (m_t) rises, the domestic interest rate falls, causing a capital outflow and thereby forcing a surge in the exchange rate of domestic currency (e_t). Also, δ is expected to be positive, because when the foreign real GDP (q_t^*) rises, the demand for money in the foreign country also rises, causing the interest rate in the foreign country to rise, which, in turn, causes a capital inflow into the foreign country and out of the domestic country, thereby forcing the exchange rate of domestic currency (e_t) to rise. On the contrary, the sign of θ is expected to be negative, because when foreign money supply (m_t^*) soars up, the interest rate there falls, causing a capital outflow from the foreign country and into the domestic country, and thereby forcing the exchange rate of domestic currency (e_t) to fall. Similarly, the sign of ρ is expected to be negative, because when domestic real GDP (q_t) rises, the transaction demand for money rises causing the interest rate at home to rise, which in turn, causes a capital inflow and forcing the exchange rate of domestic currency (e_t) to fall.

To capture the effect of previous value of the dependent variable on its current value, we include a one-period lagged value of the dependent variable, e_{t-1}, as an additional explanatory variable of interest. Also, since the purpose of this study is to examine the effect China's swap agreements on the value (exchange rate) of U.S. dollar with Nigerian naira, we include a swap dummy in equation (7). The swap dummy takes a value of 1 for the years since 2008 – the year in which China's Bilateral Swap Agreements with Other Countries (Nigeria inclusive) began – and zero otherwise (see Appendix B). With the inclusion of the lagged value of the dependent variable and the swap dummy, equation (7) is re-specified as follows:

$$e_t = \alpha_0 + \vartheta e_{t-1} + \beta m_t + \delta q_t^* - \theta m_t^* - \rho q_t + \pi \text{Ð} + \varepsilon_t \quad ---------- (8)$$

If π turns out to be negative and significant, we will conclude that China's swap agreements will raise the exchange rate (lower the value) of the U.S. dollar concerning Nigerian naira.

b) Estimation Techniques

This study practically employs both descriptive and econometric techniques to achieve the stated objective. Descriptive statistics which involves the use of graph and tables and the econometric technique employed is Robust Least Squares (ROBUSTLS). The choice of this technique is as a result of the fact that Ordinary least squares estimators are sensitive to the presence of observations that lie outside the norm for the regression model of interest. The sensitivity of conventional regression methods to these outlier observations can result in coefficient estimates that do not accurately reflect the underlying statistical relationship. Thus, Robust Least Squares (ROBUSTLS) is designed to be robust, or less sensitive, to outliers. It is also designed to overcome some limitations of traditional parametric and non-parametric methods. There are three different methods for robust least squares: M-estimation (Huber, 1973), S-estimation

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(Rousseeuw and Leroy, 1987), and MM-estimation (Yohai 1987). The three methods differ in their emphases:

- M-estimation addresses dependent variable outliers where the value of the dependent variable differs markedly from the regression model norm (large residuals).
- S-estimation is a computationally intensive procedure that focuses on outliers in the regressor variables (high leverages).
- MM-estimation is a combination of S-estimation and M-estimation. It addresses outliers in both the dependent and independent variables.

The study, therefore, made use of MM-estimation method of Robust Least Squares (ROBUSTLS) technique so as to account for the outliers that exist in both the exogeneous and endogenous variables.

c) Data: Measurement of Variable and Sources

We made use of annual secondary data on the U.S. and Nigeria's real gross domestic product (GDP). Also, data on the average exchange rate of the U.S. dollar with Nigerian naira as well as U.S. and Nigerian money supply. The information on China's swap agreements with other countries is obtained from the data base of the People's Bank of China (see Appendix A). Thus, the data sources are tabulated below:

Variables	Source(s)
Nigeria's real gross domestic product (GDP)	World Development Indicators (WDI, 2018)
U. S. real gross domestic product	World Development Indicators (WDI, 2018)
Exchange rate of U.S. dollar with Nigerian naira	International Financial Statistics (IFS, 2018)
Nigerian money supply	Central Bank of Nigeria (CBN) Statistical Bulletin (2018)
U. S. money supply	Federal Reserve Bank of St. Louis (2018)

IV. Data Analysis and Discussion of Results

a) Descriptive analysis

The relative interactions existing among the variables are displayed by the graphical illustration in Figure 1 below:

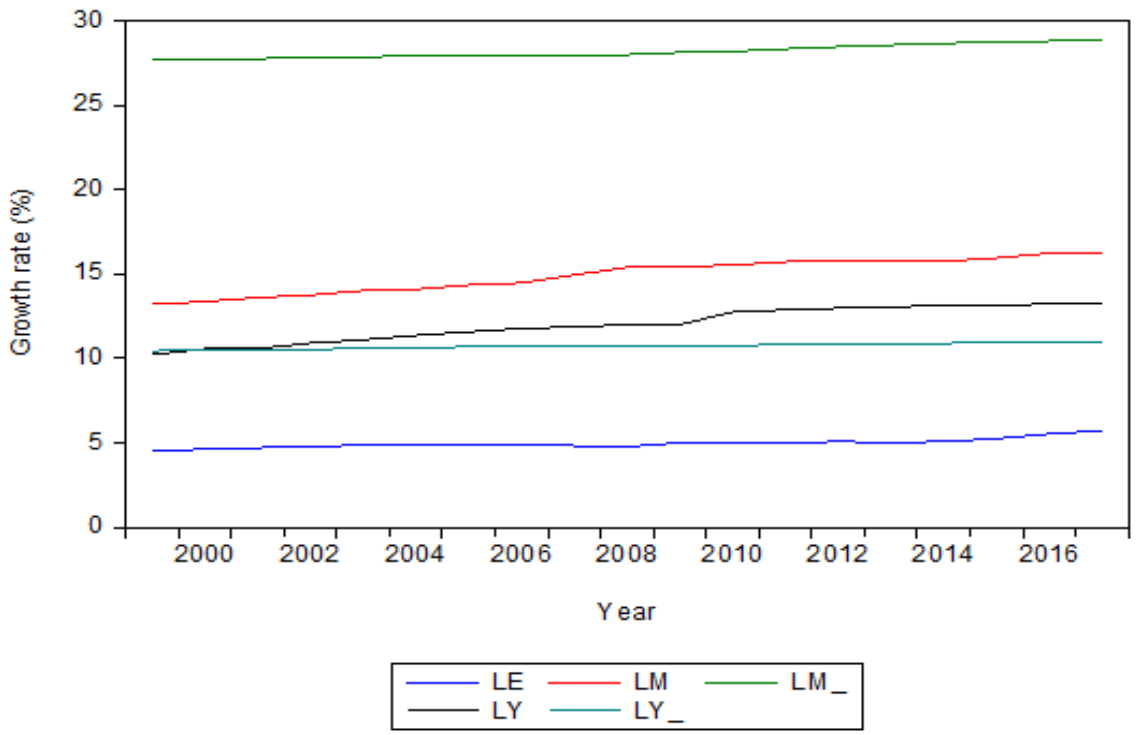


Figure 1: The interactions among Nigeria - U.S. exchange rate, money supply and outputs (1999-2017)

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Figure 1 above reveals that the rate of growth of exchange rate (LE) over the sampled period remains minimally low and falls below 8 percent. Also, the growth rate of domestic output in Nigeria (LQ) began to rear above that U.S. economy in 2001 and maintained the pace throughout the study period. Nigeria's money supply growth rate was between 13 and 15 percent between 2000 and 2016. But U. S. money supply growth rate maintained a higher 27 to 29 percent than that of Nigeria. Thus, this noticeable greater growth rate of money supply in the U.S. economy portrays the variable as an outlier among variables of interest in the study and this necessitates the use of an appropriate econometric technique to achieve the objective of the study.

b) Correlation Analysis

The correlation analysis coefficient measures the strength of the linear relationship between variables and bounds between -1 and +1 inclusive. Thus, correlations close to zero indicate no linear association between the variables, whereas correlations close to -1 or +1 indicate strong negative or positive relationship respectively between the variables. For a negative perfect correlation, the coefficient is -1 while for positive perfect correlation, the coefficient is +1. The results in Table 1 indicate that all the variables have a strong positive relationship with each other.

Table 1: Correlation matrix of the log of the variables in the model of the equation (7)

Variables	*e*	*m*	*m**	*q*	*q**
e	1.000000				
m	0.823292	1.000000			
*m**	0.909562	0.902364	1.000000		
q	0.829241	0.977828	0.930758	1.000000	
*q**	0.861633	0.971310	0.924016	0.972935	1.000000

In summary, the results of the correlation analysis above imply that there is no multicollinearity among the variables; therefore, the research can proceed with the estimations procedure.

c) Robust Least Squares (ROBUSTLS) results

Table 2 below reports the Robust Least Squares results using MM-estimation method which accounted for the outliers that existing in the study variables.

Table 2: Dependent Variable: Exchange rate (e)

Method: Robust Least Squares (ROBUSTLS)				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
m	0.576554	0.187066	3.082081	0.0021
*m**	0.647420	0.193268	3.349852	0.0008
q	-0.072166	0.117737	-0.612940	0.5399
*q**	-1.932966	0.619578	-3.119810	0.0018
Ɗ	-0.491099	0.149244	-3.290574	0.0010
R-squared = 0.634387			Adjusted R-squared = 0.529926	

The results reveal that all the variables but except of U. S. real output (q) are significant at 5 percent level. Also, Nigeria and U.S. money supplies (*m* and *m**) have a positive relationship with the Nigeria-U.S. exchange rate (*e*) which implies that an increase (decrease) in Nigeria and U.S. money supplies raises (lowers) the U.S. dollar's exchange rate. On the other hand, the negative signs associated with the variable, q and q* *indicate* that an increase (decrease) in Nigeria's and U.S.real output lowers (raises) the U.S. dollar's exchange rate. Also, the variation of the dependent variable {exchange rate (*e*)} is accounted for by 63 percent of the changes of the independent variables.

However, our interest is in swap dummy which turned out to be significant at 5 percent, indicating that China's swap agreement with Nigeria (in April 2018) tends to have a significant impact on the exchange rate (value of) U.S. dollar.

V. Conclusion

China began signing bilateral swap agreements with other countries of the world in December 2008. As at today, the Asian country has signed Currency Swap Agreements with 35 countries, Nigeria inclusive. In this spectacular bilateral swap agreement, two trading partners agree to exchange a stipulated amount of domestic currency for a foreign currency in the amount determined by a specified exchange rate within a specified period. And when the swap agreement expires, the two nations would make a reverse exchange of the remaining amount of the foreign currency at the same exchange rate. Initially aimed at bypassing the

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U.S. dollar in international trades and thereby keeping bilateral trades unaffected by the fluctuations in the value of the dollar, China's bilateral swap agreements (BSAs) are also seen as China's attempt to establish its domestic currency (Yuan) as an international currency.

From the findings of this study, the swap dummy appeared significant; indicating that China's swap agreement with Nigeria tends to have a reasonable effect on the exchange rate (value) of the U.S. dollar. The results of the findings are indeed contrary to the findings of Adhikari (2016) which reveal that China's swap agreement with Indonesia does not affect the exchange rate (value) of the U.S. dollar.

The findings of our study are not unconnected with the fact that Nigeria is an import-dependent economy and the country imports heavily from China. So, if the U.S. dollar is by-passed and the China domestic currency (Yuan) takes center stage, Nigerian economy stands a better chance due to the fact that Nigeria's real output and the value of swap dummy variables are both negative in Table 2. Since the coefficient of swap dummy variable turns out to be negative and significant, we will conclude that China's swap agreements will raise the exchange rate of naira and lower the value of the U.S. dollar with respect to Nigerian naira.

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Appendix A

China's Bilateral Swap Agreements with Other Countries							
S. No.	Country	Swap Agreement Date	Swap Amount (Billions of RMB)	S. No.	Country	Swap Agreement Date	Swap Amount (Billions of RMB)
1	South Korea	12 December 2008	360	19	Ukraine	26 June 2012	15
2	Hong Kong	20 January 2009	400	20	Brazil	26 March 2013	190
3	Malaysia	8 February 2009	180	21	United Kingdom	22 June 2013	200
4	Belarus	11 March 2009	7	22	Hungary	9 September 2013	10
5	Indonesia	23 March 2009	100	23	Albania	12 September 2013	2
6	Argentina	29 March 2009	70	24	European Union	9 October 2013	350
7	Iceland	9 June 2010	3.5	25	Switzerland	21 July 2014	150
8	Singapore	23 July 2010	300	26	Sri Lanka	16 September 2014	10
9	New Zealand	18 April 2011	25	27	Qatar	3 November 2014	35
10	Uzbekistan	19 April 2011	0.7	28	Canada	8 November 2014	200
11	Mongolia	6 May 2011	15	29	Nepal	23 December 2014	0.6
12	Kazakhstan	13 June 2011	7	30	Suriname	18 March 2015	1
13	Russian Federation	23 June 2011	150	31	South Africa	10 April 2015	30
14	Thailand	22 December 2011	70	32	Chile	25 May 2015	22
15	Pakistan	23 December 2011	10	33	Tajikistan	5 September 2015	3.2
16	United Arab Emirates	17 January 2012	35	34	Belarus	May 2016	7
17	Turkey	21 February 2012	10	35	Nigeria	27 April, 2018	2.5
18	Australia	22 March 2012	200				

Source: People's Bank of China data base (2019).

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Appendix B

Real GDP, Money Supply, and Exchange Rate with Naira						
Year	Exchange rate (₦/ $)	Nigeria's GDP($)	U.S. GDP($)	U.S. Money Supply (M1) ($ Millions)	Nigeria Money Supply (M1) (₦ Millions)	Swap Dummy
1999	92.3381	27757.66	34620.93	1102275000000.00000	547436.9	0
2000	101.6973	38555.41	36449.86	1103600000000.00000	637731.1	0
2001	111.2313	39131.13	37273.62	1140300000000.00000	816707.6	0
2002	120.5782	55400.52	38166.04	1196700000000.00000	946253.4	0
2003	129.2224	66245.96	39677.2	1274041666666.67000	1225559	0
2004	132.888	86219.74	41921.81	1344591666666.67000	1330658	0
2005	131.2743	106055.7	44307.92	1371950000000.00000	1725396	0
2006	128.6517	131,192	46,437	1375000000000.00000	1935005	0
2007	125.8081	143,022	48,062	1373008333333.33000	3116272	0
2008	118.546	164,055	48,401	1435200000000.00000	4857545	1
2009	148.9017	163,444	47,002	1638058333333.33000	5017116	1
2010	150.298	349,792	48,374	1742691666666.67000	5571270	1
2011	153.8616	391,175	49,791	2010508333333.33000	6771581	1
2012	157.4994	433,956	51,450	2315500000000.00000	7420946	1
2013	157.3112	471,456	52,787	2549725000000.00000	7032839	1
2014	158.5526	510,805	54,599	2815158333333.33000	6919549	1
2015	192.4403	525,316	56,469	3021900000000.00000	8571701	1
2016	253.492	551,511	57,638	3250708333333.33000	11271507	1
2017	305.7901	600,411	59,792	3512025000000.00000	11175574	1

Source: i. International Monetary Fund, "International Financial Statistics." (IFS, 2018)
ii. World Bank, "World Development Indicators" (WDI, 2018)
Note: Gross Domestic Product (GDP) is measured as GDP, PPP (Current international $)

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Economic and Social Impacts of the Male Migration on Families left behind

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Abstract- Some of the major streams of temporary migrant workers come from Asian countries. Almost all these migration flows involve the division of migrants from their families. Consequently, transnational families in which one or more members are abroad for several years are increasingly common in the Asian region. Moreover, there is an increasing number of migrant families with one or both parents who are migrated overseas for work for a substantial part of their children's growth. While the issue of families and children left behind by migrant men has not yet been intensively studied and it remains under-researched and indeed little understood in Sri Lanka, which is one of the major suppliers of overseas domestic workers. Currently, the Sri Lankan government faces a dilemma. On one hand, remittances from overseas migrant workers are the second largest source of foreign export earnings. On the other hand, there is a growing concern with the social effects of that movement on the children and wives left behind by migrant men. So this study has identified the impacts of male migration on left-behind families. While, it is impossible to conclude that the effects of international male out migration are only positive or negative, social impact is greater than economic benefits, or economic benefits are greater than social costs since the study has found mixed results of positive impacts, as well as negative, social impacts.

Keywords: *male migration, left-behind family, benefit, cost, impact.*

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Economic and Social Impacts of the Male Migration on Families left behind

Ishanka Dias

Abstract- Some of the major streams of temporary migrant workers come from Asian countries. Almost all these migration flows involve the division of migrants from their families. Consequently, transnational families in which one or more members are abroad for several years are increasingly common in the Asian region. Moreover, there is an increasing number of migrant families with one or both parents who are migrated overseas for work for a substantial part of their children's growth. While the issue of families and children left behind by migrant men has not yet been intensively studied and it remains under-researched and indeed little understood in Sri Lanka, which is one of the major suppliers of overseas domestic workers. Currently, the Sri Lankan government faces a dilemma. On one hand, remittances from overseas migrant workers are the second largest source of foreign export earnings. On the other hand, there is a growing concern with the social effects of that movement on the children and wives left behind by migrant men. So this study has identified the impacts of male migration on left-behind families. While, it is impossible to conclude that the effects of international male-out migration are only positive or negative, social impact is greater than economic benefits, or economic benefits are greater than social costs since the study has found mixed results of positive impacts, as well as negative, social impacts.

Keywords: male migration, left-behind family, benefit, cost, impact.

I. Introduction

Migration is known as human mobility from one place to another. (Channa, Pathan, & Shaikh, 2016). This involves change of residence across a considerable distance from one spatial boundary to another. Migration is one of the most significant and pressing global problems of our time. The current global estimate is that there were around 244 million international migrants in the world in 2015, equivalent to 3.3% of the world's population. Asia, home to 4.4 billion people, was the source of more than 40% of international migrants worldwide.

Sri Lanka, is one of the main suppliers of skilled and unskilled labour to the world (Siriwardhana, Jayaweera, Wickramage, & Adikari, 2013). Sri Lankan labor migration is a widely discussed area where many scholars have come up with various peaks and valleys. As of 2016, remittance from the migrated employees account for almost 10 percent of Sri Lankan GDP. So, Sri Lankan government has become more flexible in promoting foreign jobs and it has also in fluenced to a visible increase of departures from 14, 456 in1986 to 242, 930 in 2016 Sri Lanka Bureau of Foreign Employment, 2008).

During the past decade the male share of total departures was increased steadily and it reached 66 percent in 2015. It was 41 percent in 2005, and in 2016, it has exceeded around 65 percent. Though the economic benefits of migration can be visualized through for exearnings and the GDP percentage, the social impact of migration to the left behind families is often hard to visualize and given less attention in migration literature. A number of Government agencies have initiated number of programmes and schemes on improving the status of women migrant workers (Dias & Jayasundere, 2004). But the status and problems faced by male migrant workers receives little attention although it is an issue that threatens to become. So it is important to understand the socio economic impact on wife and children of male migrants which represents a considerable gap in Sri Lankan migration literature which is the main purpose served through this research.

II. Material and Method

a) Research Design and Sampling

A qualitative technique is used to collect and interpret the data and the study findings are based mainly on the empirical data where constructivism philosophy is appreciated. The researcher uses the interview schedule, direct observation and content analysis methods for the collection and analysis of data. The survey respondents are women and children who reside in Colombo district of Sri Lanka and their husbands / fathers migrate abroad. The Colombo district is selected as the majority of migrants are from Colombo district which represent 12% of total migrants in 2015. In migrant families, the criteria adopted for participation in the survey were the duration of migration (more than 1 year), marital status (married) and age of woman (20-60 years). Thus, women left behind are considered those whose men have been migrants for at least a year. In all, 15 left-behind wives of migrants are interviewed using an unstructured questionnaire. The questions were asked in the local language, Sinhala using local terminology. The interviews that take place in Sinhala are translated into English. Both secondary and primary data are used in the study. When addressing

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the primary objective. The sample is selected through convenient and purposive sampling techniques.

b) Data collection and Analysis

In this research data collection is mainly done through interviews and direct observation which are the primary data sources to the research. Collecting data through interviews with participants is a feature of many qualitative studies. Secondary data sources include the reports published by government departments such as reports of foreign employment bureau and central bank reports which are transparent and published with the direct involvement of Sri Lankan government. Data gathered as interview transcripts, notes, video and audio recordings, images and text documents is analyzed using narrative as a case study method. This method involves the summarizing and formulating of stories presented by respondents taking into account context of each case and different experiences of each respondent. In other words, narrative analysis is the revision of primary qualitative data by the researcher. Each respondent is given a code and transcripts are prepared with information gathered by interviews. By understanding trends and patterns such as word and phrase repetitions and primary and secondary data comparisons data is analyzed to achieve the purpose of the research.

c) Trustworthiness and ethical consideration

Credibility of the research is achieved through triangulation which is accomplished by asking the same research questions of different study participants and by collecting data from different sources and by using different methods to answer these research questions. Purposive sampling is used in this research to address the issue of transferability as specific information is maximized in relation to the context in which the data collection takes place. Also pictures are taken of the living places of respondents to confirm data validity is also effective in ensuring the trustworthiness of the research.

The consent from each respondent is taken prior to the interview and the aim of the study was well explained as their information is only used for academic purpose. Also, each respondent was taken care to ensure that the participants fully understood the nature of the study and the fact that participation is voluntary. A statement is made that confidentiality of recovered data will be maintained at all times, and identification of participants will not be available during or after the study. For example, all data collected was anonymized by replacing the participants' names with ascending code numbers (A – J) in the order of the initial interviews. Compliance is shown with protection of human subjects as required by University of Kelaniya and the study is deemed to be one of minimal risk to participants and that the probability and magnitude of interruption or discomfort anticipated in the research will not be greater than any ordinarily encountered in daily life, or during the performance of routine physical or psychological examinations or tests. Participants are well informed that they could withdraw from the study at any time without questions being asked.

III. Results and Discussion

In this study the importance is given to understand the impacts to the left-behind family when husband/father migrates to another country. These impacts can be broadly categorized into economic and social impacts (Ndlovu, 2018; Ukwatta, 2010). So, under the impacts to left-behind families, two main themes as economic impacts and social impacts can be derived.

a) Economic impact to the left behind family

There are contradictions among the existing views as some findings revealed that there were little economic and social gains to the families left behind because the quality of their lives never significantly changed (Ndlovu, 2018). On the other hand, there are evidences to prove that foreign employment has positive implication in economically. Remittances can alleviate poverty or reduce the risk of falling into poverty and remittances sent by migrants increase domestic consumption and improves access to basic goods (Nufile, 2014). So, it is important to understand the real impact to the left behind families.

"We have bought a land in Gampaha and the construction of our house is almost done…."

"Now we have a better life here. If he stayed here, we would never be able to build a house of our own. But now we have a house and lands in Gampaha and our children have a better tomorrow..."

According to respondent A, earlier with the little income it was hard for them to even dream about building a house of their own. But now with the increased income they have purchased several land plots and built a house which was their primary objective of going abroad. So, there's a significant change in the lives of left behind family in the case of A. similar evidence was found in the case of B.

"We have settled our debts and bought a new car. Now I take children to school and tuition classes by myself… our lives has become much easier now…"

"We both worked hard, so we could manage all the expenses. But now even without my job we have a better life and income here…."

So, there was a significant positive impact for the household from migration to B's household. According to her, previously both of them were employed and they got a sufficient income to cover up their expenses but now with husband's earnings alone they have settled the debts, bought a car and increased their standard of living. Respondent C also mentioned a similar point. According to her, their earnings were sufficient for them to cover up expenses. But after

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migration their standard of living has increased positively.

"We both were employed in different companies and we earned enough to survive. But now we have a better income and even we have bought a vehicle… our income has increased, and we have given all the facilities to our child"

According to C, her husband's migration had a positive impact toward their household. Though both of them were employed they didn't have a car and enough savings. But with the migration their income level has been increased significantly and they have bought a vehicle as well. So, it's obvious that, their standard of living has increased with the migration decision. Their house was properly maintained with modern luxury furniture and their vehicle costs more than 6 million in today's market. These observations also supports that they are economically stable. Respondent E also mentioned that her live has positively changed economically, after her husband's migration.

"My husband sends me money each month and I have my salary. When he went to Australia after 2, 3 months he started sending me money. So now I can save money as well…"

"Back then we had no savings but after his migration now I can save after settling the expenses of household…"

Before the migration of E's husband, they were struggling to cover up the expenses. But now E has a sufficient income for her expenses. So there's a positive impact for household from the migration of E's husband. It was obvious that they have all the facilities in the apartment. Similar evidence was found in the case of F.
"We stayed with my husband's parents without a job for a long time… Now we have solved our main problem and living in our own house…"

According to F, they didn't have a house of their own so they stayed in husband's ancestral home because her husband didn't have proper job. But after her husband migrated to Kuwait, they were able to build their own house.

"We gave all the facilities for our child. We never let her feel our difficulties. Now we have saved enough to send her abroad for her higher studies…"

With the remittances sent by her husband, E managed to educate her child well and they have also planned to send her abroad for higher studies. Their family is solely dependent on the remittances sent by the migrant as F is a housewife. So the decision of migrating was a life changing one for their family. It's obvious that migration has resulted in significant positive impact in the case of F. In the interview with G, it was clear that the migration of her husband has resulted in a positive economic impact to the household and their lives have significantly changed ever since.

"We were so helpless without a house. Sometimes house owners yelled at us to leave the place saying that they need to repair the house. So we had to give the house immediately and we were homeless and had to move these sewing machines and equipment so many times… But now we have a house of our own… this is not a big palace but at least we have a place to live…"

As respondent G said, they had a tough time living in rented rooms. Sometimes land owners asked them to leave the place without any prior notice. So they were helpless without a house of their own. But few years after migration they were able to afford a land in Kadawatha and build a small house. So, remittance sent by the migrant had significantly changed their economic condition. In the visit to her place I witnessed the half-built small house with 2 rooms. In the case of I, it was obvious that I is living with all the facilities. She has a 2 stories house and a vehicle worth more than 6 million. Even before the migration of his husband their earnings were sufficient for them as both of them were working and they had properties from both sides. But after migration her standard of living has increased positively.

"We had all the facilities we need. But now I'm staying alone in this big house and he is sending me money every month… even I get all the income from his property. So I do have much higher income now…"

With her husband's migration, "I" has become the owner of all the properties. So her level of income and standard of living has increased. So, it's obvious that, her standard of living has increased with the migration decision. A similar evidence was found in the case of J as well.

Before migration F and her husband had faced several financial difficulties and they lacked money for the treatments of their son. So, in the interview with J, it was clear that her husband's decision of migrating to another country was a great relief for her as their lives have significantly changed ever since. They are living in a 2 story house built near Homagama town.

"After he migrated to Oman he found a good job and he sent me money every month. With the help of my brother we went to meet several doctors and finally we were able to cure his illness completely… and now he is in good health and doing his studies… our economic condition also improved…"

As a result of remittance generated through migration "J", was able to cure his son and their economic condition also has improved. So, it is obvious that migration has generated a positive impact to the left-behind family of migrant.

So most of the respondents including A, B, C, E, F G, I and J stated that economic condition of the left-behind family has significantly improved after their husbands migrate to another country. It was obvious that their living condition has improved as many of their houses were with good facilities and some were under construction as seen in appendix 4. So these cases support the argument brought up by Nufile which says,

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remittances sent by migrants act as a source of alleviating poverty and improve the standard of living of families left behind (Nufile, 2014).

Some respondents stated that their economic condition has not significantly changed as a result of migration.

"Income levels are not that different then and now. We earn little more but it did not make a big difference in our income…"

So as D mentioned their economic condition has not significantly changed as a result of migration. They have a two stories house which is properly maintained with a vehicle worth 4 million in current market price. So it was obvious that they have all the facilities they need. Similar evidence was found in the case of H. H and her husband were both qualified doctors and after their marriage they moved to house in Borelesamuwa which was given to them by H's parents as the dowry. So, they had their own house and never faced severe economic hardships.

"My father gave this land and house to us. We both were working as doctors in the general hospital… even before he migrated, we had a good income and it was sufficient to us to live….."

They have never face severe economic hardships because both of them had highly-paid jobs. So their income was sufficient for them to live a satisfactory life. Also E is currently living in their two story house with a big garden and it was obvious that they have all the facilities they need. So as H mentioned their economic condition has not significantly changed as a result of migration. They have a two stories house which is properly maintained with a vehicle worth 8 million in current market price. So the cases of D and H supports the view of Ndlovu, which says migration doesn't significantly increase the standard of living though there can be small economic and social gains (Ndlovu, 2018).

b) Social impact to the left-behind family

Under social impacts, respondents stated about the impact to their child's behavior, children's educational achievements, stress and increased responsibilities and autonomy in decision making. So several sub topics are derived under social impact to left behind families.

IV. Behavior of Children

Many respondents commented on the impact to children from the displacement of their dad. Most of them stated that they didn't notice a significant difference in the behavior of children and children have adopted to the change with time.

"My daughter was 3 years old when he left. So she didn't get much time to be with her dad….. It didn't make a big difference to them because I was always with them and played the role of father as well."

As a described, her husband's departure hasn't made a significant difference to the behavior of their children. She has taken a good care of children ever since her husband left and has fulfilled all the responsibilities that should be completed by her husband. So because of her care taking, children hasn't feel the absence of their father. A similar evidence was found in the case of B.

"They were too small when he left. So it does not make a significant difference to them… He came to Sri Lanka when my elder son was born and spent couple of months here… They became so close and when he left I managed to fill that gap…"

As B mentioned her husband left the country 8 years back and came back to Sri Lanka when her first son was born. Her husband was so attached to the child. But when he went back she was able to void the gap because kid was too small to feel the change much. So when children grow up, absence of their father, didn't make a significant difference to them. C mentioned a similar point.

"My husband was really busy with his work. So he didn't get much time to spend with our child… from his childhood he was so attached to me, still at the age of 15, he prefers to sleep with me… my husband was not much close to the child. So, his departure didn't impact him much"

According to C, her husband was a busy person and he got only a handful of time to spend with them. So, her kid is more attached to mother and because of that, husband's migration didn't make any significant impact to the behavior of child. A similar evidence was found in the case of G.

"I didn't see a big difference because she is closer to me than to her dad… I always took care about her and encouraged her to do her studies well. I regularly met her teachers and talked to them and I always looked forward to motivate her to study well… and I provided all the facilities to the best I can..."

As G mentioned she haven't noticed a significant change in her daughter's behavior after her husband migrated to Qatar. She has taken a good care of her daughter ever since her husband left and has fulfilled all the responsibilities that should be completed by her husband. Since she was so committed for her child, her daughter hasn't feel the absence of their father. Since G has taken a good care of her daughter, migration of her husband hasn't made a considerable impact to children. Respondent H expressed a similar view,

"Both me and my husband had a busy life. Sometimes we both had to do nights… we had a little time to be with our kids… our maid is like a family member for us, she is taking a good care of our children.. They are really close to her… we had a little time to spend with them. That's why I decided to discontinue my higher studies and spend more time with our kids… so they didn't feel the absence of their father much…"

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As H mentioned she and her husband were both busy with their job and they had no time to spend with their children. But their maid was so close to them and looked after them well. After her husband's migration she discontinued her higher education to spend more time with children so that they won't feel the absence of their father much. So, her husband's migration didn't make any significant impact to the behavior of child. These cases supports the argument raised by (Asis, 2007), which emphasizes that, Child's well-being is not seriously weaken by the departure of one or two parents to another country suggests the capacity of that particular family to adjust for the change and the credit should be given to the parent who stays with children or the care-taker for voiding that gap.

Some respondents expressed contradictions to the previous argument as they mentioned they see a significant behavioral change in their children and they miss their fathers a lot. As D mentioned her husband was with her when her children was born and he stayed with children for one or two months and that made him so attached to the children.

"My husband is so attached to kids. Even he handles them better than me. He loves his kids a lot. We call him each day through skype and my elder son is waiting to see his face each day. He can't sleep well without seeing his face…"

"The infant was so close to him when he left and in the first few days it was hard for me to make him sleep without the help of my husband…"

According to D, her husband is so close to their kids and he regularly check on them though he was away from the country. Their elder son waits to call him each day as he can't sleep without seeing his dad's face. Even the 3 months old baby was so attached to him which made it hard for D to void his absence. This clearly shows the attachment between the father and kids. Children are so small in age but still they miss their dad a lot. Similar evidence was found in the case of E.

"Our son was so close to him. He loved to play with him even he looks like his dad…."

"After he was gone, I had many sleepless nights because baby was used to sleep with both of us. He must has felt the absence of dad…"

According to E, her husband was so attached to son. After he migrated to Australia her son felt the absence of his dad, even though he is 8 months old. So this indicates the negative social impact to the left behind-children. A similar point was brought up by F's daughter regarding the migration of her father.

"I was so small when my father went abroad. I hardly remember it. He calls me whenever he can and I know that he loves me a lot. I miss him so much. But I can understand his situation… he does everything because of me, for my future..."

"When we have projects in the school and late classes, fathers come to pick my friends… So I feel really helpless…"

As F's daughter started to explain, she was so emotional. She likes to be with her dad and she misses him but she understands the reason of his migration. It was obvious that she wasn't happy about her father being away from her but she had to accept it as it was the only solution for them to earn a sufficient income. She felt the absence of her dad and she was worried about that so many times. This reveals the negative social effects of migration as children of migrants feel lonely and stressed in the absence of their fathers. J expressed a similar view.

"My son was my husband's life… They were so close to each other. Even when he was small he preferred to be with his dad. He loves his dad more than me… even after my husband migrated my son is waiting to talk to him… my husband can't sleep without listening to his voice… He asks him every day to come home…"

As "J" said, her husband and her son is so attached. Her son is waiting to talk to his dad and he loves his dad more. So it is clear that their son misses his dad a lot and badly wants to be with him. This clearly shows the attachment between the father and kids. These findings shows the significant impact to children from the migration of their dad. As Khan mentioned in his research, father's role is really important in children's life. From childhood to early adolescence father will be the guide for children and his presence make children mentally strong (Khan, 2017). So it is obvious that there's a significant impact for children from the absence of father which supports the argument which says, children with migrant parents likely to be unhappy than the children living with both parents (Gao et al., 2010).

V. Educational Achievements of Children

Most of the respondents had small children but some children were aged more than 18. Respondent F's daughter explained that sometimes she was really depressed without her dad but when she understood the situation of her family, she made this situation a motivation to study hard. She wanted to find a good job and look after their parents. Now she has come a half way in her journey being a undergraduate in University of Kelaniya.

"In my childhood I have cried sometimes asking for dad. But now I know his intentions and it motivated me to do my education well. My mother and father lived a hard life because they wanted to create a better life for me... So I'm doing my best to find a good job and look after them well..."

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Some studies revealed that the children of migrants have reported poor performance as they are lonely and not given enough care (Yeoh & Lam, 2006). But in the case of F, the situation is completely different as her daughter has taken the displacement from her dad, positively as a motivation to complete his studies well. So, it can be identified as a positive social impact over left-behind children in Sri Lankan context. A similar evident was found in the case of G.

"My daughter never complained me about anything. She never asked me for expensive things and when my husband came home for vacation she promised him to study well and get good grades in the exam… she knows that her dad is working hard to create a better life for her. So she had converted his absence to a motivation to study hard… I'm so proud of my daughter…"

According to respondent E, her daughter has never asked for expensive gifts or unnecessary things, rather she has understood the situation of her family, and made this situation a motivation to study hard. She's working hard to get through the advance level examination with flying colours.

VI. Social Pressure for Left-behind Wife

In many cases negative social impacts to the left-behind wife can be identified as people in the society try to take the advantage of women when their husbands are away from home.

"When constructions of our house were going on, workers asked me for extra money forging the actual price in the market. But I knew the prices well. It is not that easy for anyone to trick me..."

"That's how I lived without husband all these years. If we acted like we don't know and we are weak, people try to overrule us. I've never let that happen. Otherwise people won't allow a woman to live alone with dignity…"

According to A, when husband is away people try to take the advantage out of the situation and try to mislead women. But in her case, she was well aware about market rates so the workers couldn't trick her to steal money. She further emphasized that women should be strong enough to stand alone against these injustices. Otherwise the society will keep on being unfair to women. So she clearly mention the requirement of being strong for women to live in a corrupted society with dignity. Similar evidence was found in the case of B.

"When women like us stays alone with kids, people tend to take the advantage of the situation...Some people came to my house claiming that my husband has taken loans from them. Sometimes they came and threaten me. I was really terrified and called the police… Those things happen when a woman stays alone... Society is so corrupted these days..."

She opened up about the difficulties she faced in the absence of her husband. Some people have tried to threaten her asking for money. As B described, these incidents are common when a woman stays alone in a house without her husband. So it is visible that she is so stressed about the corrupted society and women's role in the absence of men. So it is visible that there's a significant social impact to her which has made her worried about being alone in the house. Respondent E also expressed her stress and pressure she gets from her in- laws.

"My in-laws wanted me dead. Sometimes they came to visit me and ask me to divorce their son. We weren't married according to Muslim law, so they wanted to take my son and divorce me as soon as possible. Without my husband I felt so helpless…"

Since E and her husband were from different religious backgrounds, there was a big pressure for E from the parents of her husband. She seemed like so depressed about her condition. She had no help from her parents and she was living in a separate house alone.

"Sometimes I feel like suicide, but I have to live for my child…."

"Ramani akka in the next door takes care of my son when I'm working… she is like my own sister. Even my own sister never came to visit me after my marriage. Nobody in my family helped me except my neighbors and friends…"

According to E, she is so fed up with her life and her son is the only reason for her to live. She has no one to help except neighbors and friends. Her husband's migration has resulted in many negative social impacts to her. These findings supports the argument that, left behind wives of migrants have a greater chance of having stress and reporting symptoms of reproductive morbidity (Nangia & Roy, 2013). Also, this clearly indicates the negative social impact over left-behind wives because they are feeling insecure as they believe society is not safe and it makes them further stressed and terrified which impact negatively to their mental well-being.

VII. Women Empowerment

Not only the negative social impacts, some positive social impacts can be identified as left-behind wives have grown confident over themselves and they have developed new skills to face the problems in day today life.

"I don't usually ask people for help. I feel it like a debt and a huge burden for them. I'm used to handle everything alone. I'm really happy about myself because I don't need anyone to help me and I'm strong enough to stand on my own feet."

Here, she has emphasized that she understood her ability to stand alone no matter what. So husband's

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migration has changed her into a different, strong person. She is so confident that she can face any problem without the help of anyone. She feels that asking for help is a burden for others. That makes her even stronger to face problem without any fear. Migration of men is an opportunity for women to take on new tasks and learn new skills that can transform gender relations and improve women's status and empowerment (Petrzelka, Schmook, & Radel, 2012). So the research can be obviously related to the argument that men-out migration allows women to grow and empower that makes them stronger to take decisions for themselves and stand alone to face challenges without any fear.Similar evidence was found in the case of G,

"Now I have used to do thing on my own. I never beg for anyone's help. If a lonely woman asks for help people try to take the advantage of it. Even they try to sleep with that woman…"

According to G, now she is used to do things without help on anyone and she is capable of living on her own. Further she stated that it is not safe to take help from anyone today because they might take the advantage of a lonely woman. These findings, supports the argument that women develop new skills and they will be empowered to take on new challenges in the absence of their husbands (Petrzelka, Schmook, & Radel, 2012).

VIII. Increased Responsibilities and Stress

Many respondents complained about the huge responsibilities that they have to take in the absence of their husbands.

"I can't say I'm happy. I'm a working woman and my office environment is very stressful. My husband is also far away from home. We are running in a rat race..."

"We earn but we are growing old without enjoying our lives. I sometimes think about the meaning of our lives… it's like we are missing ourselves in the middle of our daily chaos..."

According to C, she is not happy about her life. Though they earn a lot, she is worried about her life and being away from her husband. From her expression it was obvious that she is stressed about her life and the responsibilities she has. She is exhausted to balance both her work life and family life. She sounds depressed and with the absence of her husband she is even worried about her life. This clearly shows the negative social impact of migration. Though their economic condition is positive there's a significant negative impact on the social well-being of wife after husband's migration in the case of C. Respondent D mentioned a similar point.

"Without my husband, I have to face so many responsibilities, especially in the problems of our children. I normally get scared over little things. So small changes in kids make me so nervous and I start to panic…"

According to D, she gets stressed over little things and start to panic. When her husband is not around it is hard for her to bear up so many responsibilities which make her nervous. Even when she was talking it was obvious that she is stressed with all the responsibilities.

"My mom and dad stay here with me. I can't drive so when I need to go somewhere, dad takes me. I can handle all the housework with the help of my mom… I miss him always. I wish he was here with us…."

D's parents are staying with her in her house and whenever she needs help they are ready to help her. But she always miss her husband and the absence of her husband makes a great impact on her. So it is obvious that in the case of D, she is frustrated as her husband is away from the country even without any financial difficulty. She wants him to be around with her and their kids and his absence makes her even stressed over little things even though she is living with her parents. A similar evidence was found from F.

"I had a very hard time when my husband left. My daughter was really small and I had to manage everything alone. My parents lived in Matara and I had to live alone with the kid in Colombo. I was really stressed with all the responsibilities at that time…"

When her husband migrated, E had a hard time in a rented house with her daughter. Her parents lived in Matara. So she had to live alone in the rented house in Colombo. She was so stressed with a small child and increased responsibilities. Similar view was expressed by respondent H.

"After my husband left, I had to manage my job, housework and daughter's work… Sometimes I have cried alone remembering the days we struggled. Though we faced so many difficulties at least we were together…"

Respondent G was emotional when she explained how he managed without her husband even she started to shed tears. .According to her she had to take a lot of responsibilities to manage everything alone. Though they struggled in the past they were able to stay together but now they are in two different places and she's worried about it. Similar evidence was found in the case of H.

"In our busy schedules we somehow managed to go to dinner outs, take our children on picnics and visit our ancestral homes. But when he left I had to take care of his patients and our coconut estate in Kurunegala… It was a huge burden for me because I was so stressed with all the work and sometimes I gave up on everything and stayed at home for couple of days…"

She had a busy lifestyle managing both housework and work life. But with his husband's

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migration her responsibilities further increased and she was so stressed. From her expression it was obvious that she is stressed about her life and the responsibilities she has. She is exhausted to balance both her work life and family life. She sounds depressed and with the absence of her husband. This clearly shows the negative social impact of migration. Though their economic condition is positive there's a significant negative impact on the social well-being of wife after husband's migration in the case of I.

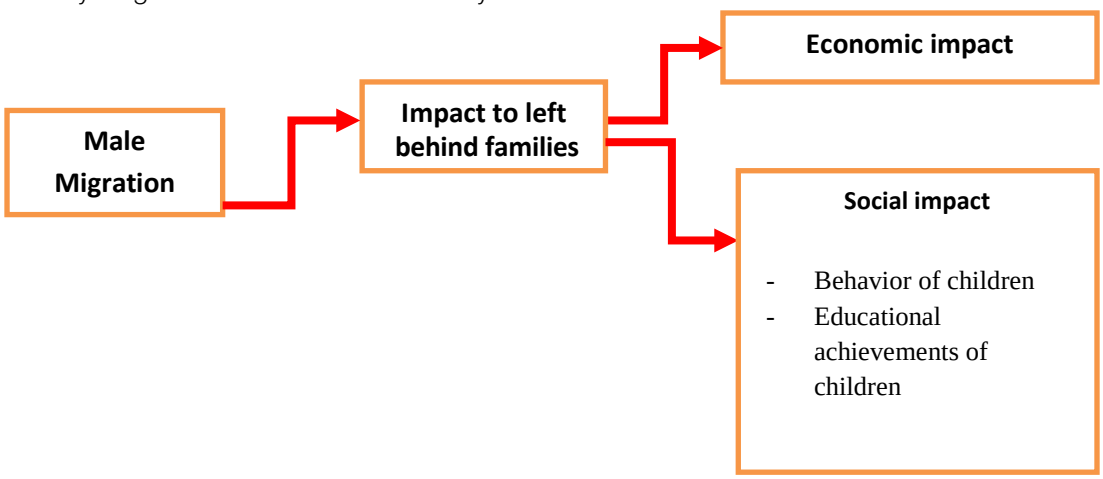
"I have all the facilities I need but I don't have any children and I don't have any meaning to my life. Even my husband left me… I don't blame him even I'm not ashamed to tell this because everyone must know that it isn't my fault… so what is the point of having all these luxuries… Now I understand that all attachments end in sufferings…"

She sounded depressed and she took our conversation to release her pressure and stress. According to her, her life has no meaning and she is not impressed about the luxuries she has. She is frustrated about her life. She emphasized the fact that material things or financial stability is not what people need to be happy but the presence of their loved ones.

"I don't need to do a job. I have good income to live… but if I stayed too long for this house I will get mad….. even my neighbors and other teachers say that my husband went abroad because I was having another affairs… that is the nature of people… they always try to let other people down.."

She further explained that her job is a method for her to release her stress otherwise she had to live inside the house whole day. Many people have tried to let her down, talking behind her back. It was obvious that she was in a heavy mental pain. When she started talking, she never stopped for a second. It was a great relief for her to have someone to talk. This finding supports the argument of (Nangia & Roy, 2013) which states that for economic gains, left-behind wives of migrants pay a heavy price as their physical and mental well-being is seriously undermined by the migration of their husbands. So in this case it is clear that there's a significant negative social impact over male migration on families left-behind.

As findings reveal, that male migration results in both positive and negative outcomes. It is impossible to conclude that the effects of international male-out migration are only positive or negative, social impact is greater than economic benefits, or economic benefits are greater than social costs since the study has found mixed results of positive impacts, as well as negative, social impacts Based on the above findings following model can be developed.



Source: Author's work on the available literature

Figure 1: Proposed model

Most of the respondents stated that the reason for their husband's migration is economic in nature. So economic factors can be derived as a main theme in analyzing the factors affecting for migration. Under that, buying a house, provide better education for children, treating child's illness, unavailability of proper job and higher demand and better opportunities can be seen as sub categories. Not only the economic reasons, some respondents reported non-economic reasons that triggered the migration of their husbands but desire to migrate, parents' coercion to migrate, higher studies and unhappy married life can be identified non-economic sub themes that triggered the male migration. Also under the main objectives of research it is important to understand the impacts to the left-behind family when husband/father migrates to another country. These impacts can be broadly categorized into economic and social impacts. Under social impacts, respondents stated about the impact to their child's behavior, children's educational achievements, stress and increased responsibilities and autonomy in decision making. So several sub topics are derived under social impact to left behind families.

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IX. Conclusion

Male-out migration's social impact is significant as it is given a less importance in the existing literature. It is impossible to conclude that the effects of international male-out migration are only positive or negative, social impact is greater than economic benefits, or economic benefits are greater than social costs since the study has found mixed results of positive impacts, as well as negative, social and economic impacts. Male-out migration has resulted an increase in the decision-making power of women in both financial and household affairs as a result of their husbands' migration. Increasing the decision-making power in financial activities is more important than in household activities. Before migration they were not active in dealing with people and problems faced. But migration of their husbands has made them strong to face problems on their own. This has been also mentioned in the existing literature that migration of men is an opportunity for women to take on new tasks and learn new skills that can transform gender relations and improve women's status and empowerment which helps to further understand how and why women's mobility is associated with empowerment (Petrzelka, Schmook, & Radel, 2012). With the migration of their husbands, many left behind wives have to take increased responsibilities and when a woman is staying alone with kids people try to take advantage of it. So, people in the society try to mislead women when their husbands are away. These findings supports the argument that, left behind wives of migrants have a greater chance of having stress and reporting symptoms of reproductive morbidity (Nangia & Roy, 2013). Also, this clearly indicates the negative social impact over left-behind wives because they are feeling insecure as they believe society is not safe and it makes them further stressed and terrified which impact negatively to their mental well-being. Also, many respondents stated that they are stressed about the responsibilities that they have to take and they get confused and terrified with the problems affecting to their children.

Many respondents commented on the impact to children from the displacement of their dad. But most of them stated that they didn't notice a significant difference in the behavior of children. Children have adopted to the change with time, mainly because their mother or their care takers have taken a good care of children. This finding supports the argument raised by (Asis, 2007), which emphasizes that, Child's well-being is not seriously weaken by the departure of one or two parents to another country suggests the capacity of that particular family to adjust for the change and the credit should be given to the parent who stays with children or the care-taker for voiding that gap. There's a significant improvement in the well-being of left-behind children in their education and health but in some cases, respondents expressed contradictions to the previous argument as they mentioned there's a significant behavioral change in their children and they miss their fathers a lot. This was found in the cases where dads are more attached to children. As Khan mentioned in his research, father's role is really important in children's life. From childhood to early adolescence father will be the guide for children and his presence make children mentally strong (Khan, 2017). So it is obvious that there's a significant impact for children from the absence of father which supports the argument which says, children with migrant parents likely to be unhappy than the children living with both parents (Gao et al., 2010).

Also, some studies revealed that the children of migrants have reported poor performance as they are lonely and not given enough care (Yeoh & Lam, 2006). But surprisingly findings provide evidence that in some cases children have taken the displacement of their dad, positively as a motivation to complete their studies well. All in all, it was obvious that left- behind families have gained positively in economic terms but they are not happy about their lives as they have to stay away from their husbands.

This research analyses the economic and social impacts to left behind families and a model is presented for further research purposes. As the practical contribution, the model can be used as a foundation to understand the male-out migration impacts to left-behind families and it facilitate further research in quantitative approach. Policy makers can use the findings of this research to take effective policy decisions on labour force and to implement several other social programs to assist and help lives of left behind families. Also, several programmes as stated in recommendations can be taken into action to support let-behind families to enhance the quality of life.

This thesis has produced a wealth of information for a deeper understanding of the impacts of migration of men into the families and children left behind. However, there are limitations that limit a comprehensive analysis of some aspects of the study. The impacts of migration of fathers to children may vary according to the age of children. When considering changes in child behavior, it was found important to analyze changes in behavior by age. Moreover, the size of the small sample and the process of selecting respondents via personal networks instead of using a sample framework are not allowed to generalize results in the general population of migrants. Also social impacts mainly deal with emotional content and personal feelings of respondents so they were reluctant to expose their true problems which limited further analysis of the problem. This study has collected data from male migrant families. When analyzing data on migration impacts it was found necessary to compare results with non-migrant families with similar socio-

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economic levels. Cost and time factors prevented the collection of data from these control groups. This has seriously limited a comparative analysis of male migrant families with the control groups, as well as making strong conclusions about the impacts of migration and child wellbeing.

The model presented in the research can be further verified using quantitative approaches and there's a need to conduct more studies in the area with increased sample sizes. Also the findings obtained from migrant families need to be compared with non-migrant families to take a better picture about the impacts on the left-behind families. Different demographic profiles need to be tested in order to verify the findings of this research.

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An Empirical Analysis of Agricultural Production: The Sway of Economic Growth in Nigeria

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Abstract- The study examined the impact of agricultural output on economic growth in Nigeria from 1985 to 2015. The econometrics methods of Ordinary Least Squares, Cointegration, and Granger causality test were employed as the main analytical techniques. The Co-integration results revealed that there exists a long-run relationship between the variables. The short run regression result revealed that Commercial Banks' credit to the agricultural sector and the interest rate has a significant relationship with economic growth in Nigeria during the period of study. While, agricultural output has no significant relationship with economic growth in Nigeria during the studied period. The study therefore concluded that suitable or effective agricultural output enhancement policy should be put in place by the government. There should be appropriate interest rate policies that would bring about the stability of the economy and economic growth. Without agricultural produce to keep the people alive as well as lubricating our machines with agricultural oil, there can be no growth. Everything is sustained by agriculture and without it, there shall be no true living. Also, conscious efforts should be made by the monetary authorities with the emphasis on funding agriculture in order to increase economic growth in Nigeria. This can be achieved if the government avoids mismanagement, and diversifies the economy.

Keywords: agricultural sector, agricultural output, agriculture productivity economy, economic growth, commercial banks' credit, interest rate.

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An Empirical Analysis of Agricultural Production: The Sway of Economic Growth in Nigeria

Dr. Abomaye-Nimenibo, Williams Aminadokiari Samuel [α], Mr. Usanga, Samuel Udoffia [σ] & Miss Ikpe, Mary David [ρ]

Abstract- The study examined the impact of agricultural output on economic growth in Nigeria from 1985 to 2015. The econometrics methods of Ordinary Least Squares, Co-integration, and Granger causality test were employed as the main analytical techniques. The Co-integration results revealed that there exists a long-run relationship between the variables. The short run regression result revealed that Commercial Banks' credit to the agricultural sector and the interest rate has a significant relationship with economic growth in Nigeria during the period of study. While, agricultural output has no significant relationship with economic growth in Nigeria during the studied period. The study therefore concluded that suitable or effective agricultural output enhancement policy should be put in place by the government. There should be appropriate interest rate policies that would bring about the stability of the economy and economic growth. Without agricultural produce to keep the people alive as well as lubricating our machines with agricultural oil, there can be no growth. Everything is sustained by agriculture and without it, there shall be no true living. Also, conscious efforts should be made by the monetary authorities with the emphasis on funding agriculture in order to increase economic growth in Nigeria. This can be achieved if the government avoids mismanagement, and diversifies the economy.

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I. Introduction

a) Background to the Study

The agricultural sector is considered as one of the most important sectors of an economy, and this sector is particularly important in terms of its employment generation, contribution to the gross domestic product (GDP) and export revenue earnings as well as sustenance of live and machinery. How important is this sector in Nigeria which is generally agreed to be the giant and largest country in Africa, with a total land area of 923,768 square kilometres and has an estimated population of about 126 million in 2006 (2006 census). This nation lies wholly within the tropics along the Gulf of Guinea on the western coast of Africa. Nigeria is a nation with highly diversified agro ecological vegetation, which makes possible the production of a wide range of agricultural products throughout the year for food and lubrication.

Despite Nigeria's rich agricultural resource endowments, the agricultural sector is seen to be growing at a very low pace; and less than 50% of the country's cultivable agricultural land is under-cultivated (CBN 2008). The country is found to be bedevilled will small-scale peasants and traditional farmers who use rudimentary production techniques and tools, with resultant low yields. The small- scale farmers are constantly constrained by many problems including those of poor access to modern inputs of farm implements, poor access to credit facilities, poor infrastructure, inadequate access to markets, land and environmental degradation, and inadequate research and extension services.

Moreover, with the collapse of the oil boom of the 1970s (CBN 2000), there has been a dramatic increase in the incidence and severity of poverty in Nigeria, arising in part from the dwindling performance of the agricultural sector where a greater majority of the poor are employed. Furthermore, poverty in Nigeria has been assuming wider dimensions including household income poverty, food poverty, poor access to public services and infrastructure, unsanitary environment, illiteracy and ignorance, insecurity of life and property, and poor governance.

In response to the dwindling performance of agriculture sector in the country, various governments have, over the decades, initiated copious policies and programs aimed at restoring the agricultural sector to its place of pride in the economy of our nation have not yielded much fruit; no significant success has been achieved due to the several persistent constraints inhibiting the performance of the sector. From all indications irrespective of the sustainable agricultural growth and development plans put in place in Nigeria, yet, the most fundamental constraint found is the peasant nature of the production system, with its low productivity, poor response to technological adoption strategies, and poor returns on investment. However, it is recognized that agricultural commercialization and

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investment are the key strategies for promoting accelerated modernization, sustainable growth and development and, hence, poverty reduction in the sector. Real investment in agriculture is vital so that those constraints inhibiting the performance of the sector are identified with a view to unleashing them and creating a good and conducive atmosphere for investment in the sector.

One of the important objectives of macroeconomic policy has been the rapid economic growth of an economy. Economic growth being considered as the process whereby the real per capita income of a country over a long period of time is achieved; and is measured by the increase in the number of goods and services produced in a country. A growing economy produces more goods and services in each successive period of time. Therefore, growth occurs when an economy's productive capacity increases which in turn is used to produce more goods and services. In its wider spectrum, economic growth implies raising the standard of living of the people and reducing Inequalities of the income distribution. Economic growth is a desirable goal for a country; but, there is no agreement over the annual growth rate which an economy should attain (Jhingan, 2005).

Economists generally believed in the possibility of continual growth. This belief is based on the presumption that innovations tend to increase productive technologies of both capital and labour over time, and there is every possibility that an economy may not grow despite technological innovations. Production might not increase further due to lack of demand which may retard the growth of the productive capacity of the economy. The economy may not also grow further than it is if there is no improvement in the quality of labour in keeping with the new technologies.

Economic growth is, as a matter of fact, usually measured in terms of an increase in real gross national product (GNP) or gross domestic product (GDP) over time or by an increase in income per head over time. GDP measures increase in total output to a change in population. Thus, if total output rises higher as compared to population, then there's an improvement in the average living standards. Growth is desirable because it enables the community to consume more private goods and services and the provision of a greater quantity of social goods and services such as health, education, etc. thereby improving living standards. The government can also stimulate economic growth by increasing its current spending, and through tax cuts (fiscal policy), and by increasing the money supply and reducing interest rates (monetary policy). Principally, there are three main determinants of economic growth, which are; the growth of its labour force, the growth of its capital stock, and technical progress.

Nigeria used to be heavily dependent on the agricultural sector prior to the oil boom. In the early 1950's up to the early 1970's before the discovery of crude oil, agriculture was the mainstay of the economy, employing about 70 percent of the total population (CBN, 2000). Although subsistence farming was predominant, it was a major revenue earner for the country. In the early 1980's, it became more apparent that the agricultural sector could no longer perform its traditional role of meeting domestic food supply, providing raw materials for industries and major foreign exchange earner through exports for obvious reasons.

Nigeria's soil and climate allow cultivation of a wide variety of food crops, including cassava (of which Nigeria is the largest world producer), millet, sorghum, and maize. Agriculture is Nigeria's biggest employer of labour, accounting for about 60 percent of the workforce, working mainly in small- holdings using basic tools. Together with livestock rising, it provides a third of gross domestic product.

Growth in agricultural output is higher than the population growth rate, as it averaged 3.5 percent over the 1993-1997 period, and 4.0 percent, 5.2 percent, 5.1 percent from 1998-2000 respectively (CBN, 2000). This compares with a period of stagnation in the first half of the 1980's when growth averaged just 0.5 percent, due to low producer prices, marketing restrictions and a drought (CBN, 2007). Agriculture picked up after the economic reforms introduced in 1986, which included trade liberalization, dissolution of price-fixing marketing boards and improved producer prices facilitated by the devaluation of the naira. Growth in the sector averaged 3.8 percent in 1986-92, and there was a boost of activity in the cash crop sector, with many farmers returning to previously abandoned fields. However, the renewed interest was not sustained, nor did it result in increased investment in cash crop production, mostly carried out by smallholders. Improved food crop production contributed to a sharp fall in food imports, from 19.3 percent of total imports in 1983 to 7.1 percent in 1991, although this crept back up to 13.1 percent in 1996 (CBN, 2000). Much of the increase in agricultural output in recent years has resulted from the expansion of the area under cultivation, rather from increased productivity. The sector has been hampered by lack of investment in improved farming techniques. There has also been the case of over-farming of fragile soil which has worsened over the years.

The share of agricultural products in total exports has dropped from over 70 percent in 1960 to less than 2 percent in the present time. The decline was largely due to the phenomenal rise of oil shipments, but also reflected the fall in the output of products like cocoa, palm oil, rubber, and groundnuts, of which Nigeria was once a leading world producer. For example, production of cocoa, currently Nigeria's

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biggest non-oil export earner, has remained around 160,000 tons per year since 1995, compared with an annual average of 400,000 tons at its peak before the oil boom. The government has made some effort to encourage private investment in agriculture and agro-industries by providing incentives, including tax breaks, finance credit and extension services, but without much success.

In response to the dwindling performance of agriculture in the country, governments have, over the decades, initiated numerous policies and programs aimed at restoring the agricultural sector to its pride of place in the economy. But, as will be evident from analyses in subsequent chapters, no significant success has been achieved, due to the several persistent constraints inhibiting the performance of the sector.

From the perspective of sustainable agricultural growth and development in Nigeria, the most fundamental constraint is the peasant nature of the production system, with its low productivity, poor response to technology adoption strategies and poor returns on investment. It is recognized that agricultural commercialization and investment are the key strategies for promoting accelerated modernization, sustainable growth and development and, hence, poverty reduction in the sector. However, to attract investment into agriculture, it is imperative that those constraints inhibiting the performance of the sector are first identified with a view to unlocking them and creating a conducive investment climate in the sector. The development challenges of Nigeria's agriculture are, therefore, those of properly identifying and classifying the growth and development constraints of the sector, unlocking them and then evolving appropriate strategies for promoting accelerated commercialization and investment in the sector such that, in the final analysis, agriculture will become one of the most important growth points in the economy.

b) Statement of the Problem

Agriculture is a major source of food, clothing, and shelter, but the literature has reported that in spite of Nigeria's rich agricultural resource endowment, there has been a gradual decline in agriculture's contributions to the nation's economy (Manyong et al., 2005). In the 1960s, agriculture accounted for 65-70% of total exports; it fell to about 40% in the 1970s and crashed to less than 2% in the late 1990s. The decline in the agricultural sector was largely due to rising in crude oil revenue in the early 1970s. Less than 50% of Nigeria's cultivable agricultural land is under cultivation. Even then, smallholder and traditional farmers who use rudimentary production techniques, with resultant low yields, cultivate most of this land. The smallholder farmers are constrained by many problems including those of poor access to modern inputs and credit, poor infrastructure, inadequate access to markets, land, and environmental degradation, and inadequate research and extension services. The inability to capture the financial services requirements of farmers and agribusiness owners who constitute about 70 percent of the population is inclusive (Lawal, 2011). Low agricultural output has a negative effect on the Nigerian economy as a whole. Several factors have been identified to enhance or retard growth in the agricultural sector. These factors include education, infrastructure, and inflation. (Yee et al. 2000).

c) Objectives of the Study

The main objective of this study is to examine the impact of agricultural output on the growth in Nigerian. Specifically, other objectives are:

i. To examine the relationship between agricultural output and economic growth in Nigeria;
ii. To examine the relationship between commercial bank's credit to the agricultural sector and economic growth in Nigeria; and
iii. To examine the relationship between interest rate and economic growth in Nigeria.

d) Statement of the Hypotheses

In an attempt to achieve the above objectives, the research work is guided by the following null and alternative hypotheses:

Ho1: There is no significant relationship between agricultural output and economic growth in Nigeria.
$H_1$1: There is a significant relationship between agricultural output and economic growth in Nigeria.
Ho2: There is no significant relationship between commercial bank's credit to the agricultural sector and economic growth in Nigeria.
$H_1$2: There is a significant relationship between commercial bank's credit to the agricultural sector and economic growth in Nigeria.
Ho3: There is no significant relationship between interest rates and economic growth in Nigeria
$H_1$3: There is a significant relationship between interest rates and economic growth in Nigeria.

e) Definition of Terms

Agriculture: Agriculture or farming is the cultivation and breeding of animals, plants, and fungi for food, fibre, bio fuel, medicinal plants and other products used to sustain and enhance human life. Agriculture was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that nurtured the development of civilization. The study of agriculture is known as agricultural science.

Agriculture Productivity: Agriculture productivity is a measure of the amount of agricultural output produced for a given amount of inputs, such as an index of multiple outputs divided by an index of multiple inputs (e.g., the value of all farm outputs divided by the value of all farm inputs). The index-number approach to

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studying productivity estimates total factor productivity (TFP), which measures levels and changes in agricultural output relative to changes in an aggregated index of multiple inputs. Agricultural productivity is measured as the ratio of agricultural outputs to agricultural inputs. While individual products are usually measured by weight, their varying densities make measuring overall agricultural output difficult. Therefore, the output is usually measured as the market value of final output, which excludes intermediate products

Economic Growth: Economic growth is defined as the achievement of yearly increases in both the total and per capita output of goods and services in a country (Akpakpan 1987).

Economic Development: Economic development is defined quantitatively as a process of improvement in the general welfare of the entire society usually manifested in desirable changes in various aspects of the society such as; reduction in the level of unemployment, regional inequalities, absolute poverty; rise in real output of goods and services and improvement in the technique of production; improvement in literacy, housing condition, health and government services; improvement in the level of social and political consciousness of the people; greater ability to draw on local resources both human and materials to meet local needs(self-reliance) and a reduction in pollution and or environmental degradation (Akpakpan, 1999).

Gross Domestic Product: Gross domestic product (GDP) is a monetary measure of the market value of all final goods and services produced in a period (quarterly or yearly). The gross domestic product is the best way to measure a country's economy. GDP is the total value of everything produced by all the people and companies in the country. It doesn't matter if they are citizens or foreign-owned companies. If they are located within the country's boundaries, the government counts their production as GDP.

Interest Rate: It is defined as the proportion of an amount loaned which a lender charges as interest to the borrower, normally expressed as an annual percentage. It is the rate a bank or other lender charges to borrow its money or the rate a bank pays its savers for keeping money in an account. An interest rate, is the amount of interest due per period, as a proportion of the amount lent, deposited or borrowed (called the principal sum). The total interest on an amount lent or borrowed depends on the principal sum, the interest rate, the compounding frequency, and the length of time over which it is lent deposited or borrowed.

Commercial Banks: A commercial bank is a type of financial institution that provides services such as accepting deposits, making business loans, and offering basic investment products. A commercial bank can also refer to a bank, or a division of a large bank, which more specifically deals with deposit and loan services provided to corporations or large/middle-sized business - as opposed to individual members of the public/small business - retail banking, or merchant

II. Literature Review and Theoretical Framework

The study reviewed some relevant literature that relates to the subject matter of this research work. For a clearer overview of the various kinds of literature on the study, this chapter discussed the conceptual framework, theoretical framework, empirical literature and summary of the literature reviewed.

a) Conceptual Framework

i. *The Concept of Agriculture*

The term Agriculture is derived from two Latin words 'ager' or 'agri' meaning soil and 'cultura' meaning cultivation. Agriculture is an applied science which encompasses all aspects of crop production including horticulture, livestock rearing, fisheries, forestry, etc. Agriculture is defined as an art, science, and business of producing crops and livestock for economic purposes. As an art, it embraces the knowledge of the way to perform the operations of the farm in a skilful manner but does not necessarily include an understanding of the principles underlying the farm practices. As a science, it utilizes all technologies developed on scientific principles such as crop breeding, production techniques, crop protection, and economics etc. to maximize the yield and profit. As long as agriculture is the way of life of the rural population, production is ultimately bound to consumption. But agriculture as a business aims at maximum net return through the management of land, labour, water, and capital, employing the knowledge of various sciences for production of food, feeds, and fuel. In recent years, agriculture is commercialized to run as a business through mechanization.

Agriculture is defined in the Agriculture Act (1947), as including 'horticulture, fruit growing, seed growing, dairy farming and livestock breeding and keeping, the use of land as grazing land, meadow land, osier land, market gardens and nursery grounds, and the use of land for woodlands where that use ancillary to the farming of land for Agricultural purposes". Agriculture has seven branches viz; Agronomy which deals with the production of various crops which includes food crops, fodder crops, fibre crops, sugar, oilseeds, etc.; Horticulture which Deals with the production of fruits, vegetables, flowers, ornamental plants, spices, condiments and beverages; Forestry which deals with production of large scale cultivation of perennial trees for supplying wood, timber, rubber, etc. and also raw materials for industries; Animal husbandry

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which deals with agricultural practice of breeding and raising livestock in order to provide food for humans and to provide power (draught) and manure for crops; Fishery science which deals with practice of breeding and rearing fishes including marine and inland fishes, shrimps, prawns etc. in order to provide food, feed and manure; Agricultural Engineering which deals with farm machinery for filed preparation, inter-cultivation, harvesting and post-harvest processing including soil and water conservation engineering and bio- energy; and Home science which deals with application and utilization of agricultural produces in a better manner in order to provide nutritional security, including value addition and food preparation.

ii. *Types of Agriculture*

Since the development of agriculture, many different types of production have been implemented. Currently, agriculture is divided into two different types, including industrialized agriculture and subsistence agriculture.

Industrialized (commercial) Agriculture: Industrialized agriculture is the type of agriculture where large quantities of crops and livestock are produced through industrialized techniques for the purpose of sale. The goal of industrialized agriculture is to increase crop yield, which is the amount of food that is produced for each unit of land. Crops and livestock made through this type of agriculture are produced to feed the masses and the products are sold worldwide. Industrialized agriculture is able to produce large quantities of food due to the farming methods used. Instead of using animal and manpower to work the fields, industrialized agriculture utilizes large machines, which are more powerful and can work faster and harder. The shift towards machines has increased the use of fossil fuels on industrial farms, and, therefore, the price of food can fluctuate as the price of oil changes. Industrialized agriculture also increases crop yield by investing in large irrigation systems and by using chemical fertilizers and pesticides. The chemical fertilizers that are used in industrialized agriculture often add inorganic nutrients to the soil to increase yield and plant size. The use of pesticides is also common in industrialized agriculture, and most pesticides help increase yield by killing pests that are harming or consuming the crops. Another farming technique that is used in industrialized agriculture is the method of growing monocultures, which is when a single crop is planted on a large scale. Although planting monocultures can increase overall yield, this method of farming is also more susceptible to disease and causes a reduction in the dietary variation of consumers.

Subsistence Agriculture: Subsistence agriculture is when a farmer lives on a small amount of land and produces enough food to feed his or her household and have a small cash crop. The goal of subsistence agriculture is to produce enough food to ensure the survival of the individual family. If there is excess food produced, it is sold locally to other families or individuals. Subsistence agriculture varies a great deal from industrialized agriculture in terms of the farming methods used. This type of agriculture is labour-intensive because all of the work is done by humans and animals and only hand tools and simple machines are used to work the land. Subsistence agriculture does not rely on chemical fertilizers or pesticides and instead utilizes more natural techniques. Most farmers have animals, including chickens, goats, and cows, and the manure from these animals is used to fertilize the plants. The crops produced are then consumed or sold, and the inedible parts of the plants are used to feed the livestock. This creates a closed circuit within the farm where nothing goes to waste. Instead of using chemical pesticides, subsistence farmers rely on natural predators of pests to control the pest population. Subsistence agriculture is often divided into three different types, including intensive subsistence, which is the traditional method, shifting cultivation, which relies on clearing forest to create new farm plots every few years and pastoral nomadism, which relies on traveling with herds of animals.

iii. *Importance of Agriculture*

The following facts clearly highlight the importance of agriculture in this country.

Source of Livelihood: The main occupation of Nigerian population is agriculture. About 65 percent of our population is directly engaged in agriculture. In advanced countries, this ratio is very small being 5 percent in U.K., 4 percent in USA., 16 percent in Australia, 14 percent in France, 21 percent in Japan, and 32 percent in USSR. Whereas, 70 percent of India's population like Nigeria is engaged in agriculture.

Contribution to National Income: Agriculture is the premier source of our national income. According to the National Income Committee and C.S.O., in 1960-61, 52 percent of national income was contributed by agriculture and allied occupations. In 1976-1977, this sector alone contributed 42.2per cent while in 1981-1982, its contribution was to the tune of 41.8 per cent. In 2001-2002, it contributed around 32.4 percent of national income. This was further reduced to 28 percent in 1999-2000. (CBN 2000)

Supply of Food and Fodder: Agriculture sector also provides fodder for livestock. Cow and buffalo provide protective food in the form of milk and they also provide draught power for farm operations. Moreover, it also meets the food requirements of the people. Import of food grains has been very small in recent years, rather export avenues are being sourced and utilized.

Importance in International Trade: The agricultural sector is another area or source of feeds for the country's

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trade. If the development process of agriculture is smooth, export increases and imports are reduced considerably. Thus, it helps to reduce the adverse balance of payments and save our foreign exchange. This amount can be well utilized to import other necessary inputs, raw- materials, machinery and other infrastructure which is otherwise useful for the promotion of economic development of the country.

Marketable Surplus: The development of the agricultural sector leads to a marketable surplus for the country. As a country develops more and more people are to be engaged in mining, manufacturing, and other non-agricultural sectors. All these working populace depend upon the food production which they can meet from the marketable surplus. As agricultural development takes place, output increases and marketable surplus expands and keep on increasing.

Source of Raw Material: Agriculture has been the potential source of raw materials to our industries like cotton and jute textiles, sugar, tobacco, edible and non-edible oils etc. We also have many other industries like processing of fruits and vegetables, milling, rice husking, fur making depending on agriculture for their raw materials.

Feeding of the Transport Sector: Agriculture is the main support for railways and roadways which transport the bulk of agricultural produce from the farms especially those in the hinterlands to the factories in Townships. Internal trade and transportation is mostly in agricultural products.

Contribution to Foreign Exchange Resources: Agricultural sector occupies an important place in the country's export trade. Agricultural commodities like tobacco, oil bean seeds, raw cotton, cocoa, groundnut, hides and skins accounted for about 20 percent of the total value of Nigeria's exports. This shows that agriculture products still continue to be a significant source of earning foreign exchange.

Vast Employment Opportunities: The agricultural sector is significant as it provides greater employment opportunities. With the fast-growing population and high incidence of disguised unemployment in Nigeria, it is only the agriculture sector which provides more employment chances to the labour force, hence, the significance of agricultural sector. In terms of economic development, agriculture employs majority of our population; meaning that, agricultural section has raised the level of the national income and standard of living. The rapid" rate of growth in agriculture sector is a source of motivation for development; it helps to create the enabling atmosphere for the general economic development of the economy. Thus, indicating that economic development highly depends on the rate at which agriculture sector grows.

Therefore, agriculture occupies an important place in the development of an economy and in fact, a pre-condition for economic development.

b) Agricultural Development in Nigeria

Agricultural development is an aspect of development that is related to agrarian reforms being an integral part of national development. A lot of scholars have postulated theories linking agriculture with national development as a result of its contribution towards the socio-economic development of many countries. Development paradigms postulated in the field of agriculture, communication, sociology, and economics have ample evidence to show that changes are taking place in the agricultural sector across the globe; which changes can be viewed from contributions of agriculture to the national economies of various countries in form of Gross Domestic Product (GDP). The broad-spectrum goal of development initiatives is a total transformation of the quality of life of the people or the targeted beneficiaries of the development program.

According to Olawoye and Ogunfiditimi (1989), people are not only the most important means transforming process of development but also the ultimate end of development. Agricultural development can therefore be viewed as another arm of development, which connotes improvement in the principles, and practices of agriculture given both human and material resources that will result in a maximum output from a combination of minimum inputs.

Development is a multi-dimensional perspective paradigm that is related to politics, economics, and psychology, socio-cultural and ecological phenomena at all levels of human endeavours. Hence, Chauvin (1993) has stated that several schools of thought have continued to view development from the economic, social or modernization and technological perspective. Thus, development should be defined in relation to sustainability and of course its relevance to the socio-cultural circumstances of the people affected by changes inherent in the process. It is sad to note that in Nigeria, the rural sector suffers more neglect and under development with ever increasing cases of population growth, unabated rural migration of able- bodied youths, malnutrition, lack of basic necessities of life (health care centres, schools, good roads, portable and safe drinking water, electricity, irrigation), total marginalization, etc. Consequently, what we're left are multiple negative forces in the social system such as armed robbery, advanced fee fraud (419) and general dishonesty, cheating and stealing. This justifies the need for urgent actions and interventions to address the myriads of problems of the rural areas and set the nation on the path to glory and excuse a larger proportion of the nation's population from inhuman living circumstances in order achieve greatness.

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Successive governments of Nigeria have executed several agricultural development programmes aimed at improving the level of agricultural production that will ensure self-sufficiency in food production. These intervention programmes can be viewed from two perspectives that are based on Policy and Nature of the Agency. Some of these programmes are as enumerated below:

i. *Policy-Based Intervention Programs*

National Accelerated Food Production Program (NAFPP): This program was designed in the early 60s by both the Federal and state governments to accelerate the production of grains (maize, rice, guinea corn, millet, wheat, cassava, and cowpeas). It was the opinion of the initiators of this program that target crops for accelerated production are major staple foods of Nigerians and if produced in abundance, by introducing high yielding variety seeds, applying appropriate fertilizers, agrochemicals, and providing good storage and processing facilities, with the provision of credit as well as marketing outlets will reduce hunger and related food crisis to the barest minimum. In addition, several research institutes were set-up with a mandate to develop improved crop varieties through research and development.

Operation Feed the Nation (OFN) was introduced in 1976 by the Obasanjo administration to address the problem of rising food crisis, rural-urban migration and escalating food import bills. The OFN program attempted to mobilize the general public to participate actively in agricultural production and ensure self- sufficiency in food production. The program actually aroused the interest of Nigerians to farm through various strategies. Some of these strategies included subsidized production inputs, increased bank credit to farmers, the establishment of commodity boards and fixing of attractive prices for agricultural produce but, with less success.

Green Revolution Program (GR): The Green Revolution Program replaced the Operation Feed the Nation of the Federal Military Government by the civilian government in 1979 by the Shehu Shagari administration. This was an attempt to bring about radical changes in Nigerian Agricultural production and eliminate inherited food problems of successive governments. Large, medium and small- scale farmers received a number of incentives to boost their production level during the implementation of the program. Livestock and crop components were introduced while the research institutes were re-organized to make them more responsive to the needs of the program (Williams, 1981).
Agency-Based Intervention Programs

National Agricultural Land Development Authority (NALDA): This development authority executed a national agricultural land development program aimed at moderating the problems of low utilization of abundant farmland, thereby increasing food production level of farmers through expansion of farmers' farmlands. A survey conducted by the Central Bank of Nigeria in 1998 indicated that the agency was able to develop 16,000 hectares of land. Out of this, 12,984 (81.1%) was cultivated with various crops. It also provided extension services to farmers at project sites. The overall goal of NALDA was to encourage farmers to plant above what they can consume so that the surpluses can be sold at the local markets or exported to other countries for foreign exchange earnings.

River Basin Development Authority (RBDA): The existing abundant water resources in the country and its potential for increasing agricultural production prompted the establishment of River Basin Development Authority (RBDA). The scheme became necessary because of persistent short rainy seasons in many parts of the country which has continued to restrict cultivation to single cropping pattern the year round. However, the establishment of various large-scale irrigation facilities the country witnessed unprecedented multiple cropping patterns. In addition, larger areas were put into cultivation, while livestock and fisheries production were intensified. Available statistics from eight River Basin Development Authorities showed that there was an increase in the tempo of activities in 1998 when the total land area developed by the authorities rose from 30.3 thousand hectares in 1994 to 47.7 thousand hectares in 1998.

Agricultural Development Programs (ADPs): The Agricultural Development Programs is a concept of integrated agricultural and rural development. It started in 1972 in Northern Nigerian towns of Gombe and Gusau with two pilot projects assisted by the World Bank. This became necessary because of the need for the application of knowledge and skills in all the relevant areas of agriculture. This concept involves the provision of Infrastructural facilities such as roads, schools, water supply in the rural areas at the right times in required quantity to farmers. The ADP is the implementation organ of the state ministry of agriculture and natural resources. It is semi-autonomous and focuses on the small farmer. It adopts the integrated rural development strategy in its operations (Jibowo, 2005). The success of the Gombe and Gusau projects encouraged other state governments to embark on more of such projects with the assistance of the World Bank. Since then, Nigeria has continued to witness agricultural development programs of various dimensions. It is against this background that effective extension services have been established. The closest assistance ever realized by farmers in Nigeria have come from contact with various Agricultural Development Programs (ADPs) and the extension agents working under the Training and Visit (T and V) system. The Activities of ADPs in Nigeria spread over three thematic areas; provision of infrastructural

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rural facilities, conducting worthwhile training on improved agricultural technologies and supply of farm inputs.

Directorate of Food, Road and Rural Infrastructure (DFRRI): Trends in the transformation of the rural sector shows that despite the huge investment in the agricultural sector, which was assumed will automatically bring about the eradication of rural poverty and isolation has not been achieved. This is partly due to the deplorable conditions of rural areas, enormous size and dwindling economic resources to address the problem of rural underdevelopment in Nigeria. In 1987, the Babangida administration established the Directorate of Foods, Road and Rural Infrastructure (DFRRI) to open up the rural areas through the construction of access roads, and provision of basic amenities of modern living. This is inevitable because it has long been realized according to Otubanjo (1992) that the economic future of Nigeria depends on the development of rural areas. Therefore, the potentials of rural areas were seen to be both immediate and long-term. The idea of opening up of rural areas with feeder roads and integrating it with other parts of the country provide the basis for food that could be evacuated to enhance the quantity of food and raw materials consumption. Consequently, there will be more food at a cheaper rate. On the other hand, the improved rural condition will stem the rate of rural-urban migration; improve quality of rural life and by implication, its productive capacity that would ensure a greater exploitation of the potentials of rural areas. The problem of DFRRI was hardly one of enthusiasm and relevance but of variation between the enormity of rural underdevelopment and the quantum of resources available to subdue the problem.

ii. *Development Challenges in Nigerian Agriculture*

Identification of the development constraints in the agricultural sector is a necessary step to unlock the factors inhibiting performance of the sector toward designing policy strategies that would create a conducive climate for promoting accelerated commercialization and growth of the sector. In this connection, the following factors are very important.

Storage and Processing: The traditional storage facilities is what was commonly found in Nigeria which have certain deficiencies, including a low elevated base giving easy access to rodents, wooden floors that termites could attack, weak supporting structures that are not moisture-proof, and inadequate loading and unloading facilities. The lack of adequate storage and processing facilities accounts for the divergence between national food security and household food security. At the aggregate level, there happens to be inadequate production of food which brings no significant improvement in food security and there is that need to provide food for consumption at the right time and in the right form. However, a common sight is the perishing of harvested products due to lack of storage and processing facilities. Simple, efficient, and cost-effective technologies for perishables, such as roots, tubers, fruits, and vegetables, are not as highly developed in the country compared to the storage technologies for cereal grains and legumes.

Infrastructural Inadequacies: The Low level of development of infrastructure has greatly affected agricultural performance in Nigeria. Inadequate infrastructure constitutes a major constraint to agricultural investment, and production as well as trade. In many parts of the country physical and marketing infrastructure is poorly developed, storage facilities are primary and access to information and markets is highly restricted. The situation represents the urban bias in the pattern of development in the country. Infrastructure inadequacy is mirrored by restricted access to the markets, which limit the availability of agricultural products in many areas, and reduces farmers' income. The Infrastructural constraints have continued due to government neglect, poor governance, poor political leadership, poor maintenance culture, and poor funding.

Unstable Input and Output Prices: The rising prices of inputs leading to instability in macroeconomic policy actions have led to inflationary pressures, high-interest rates, and volatile exchange rate. Invariably, the deficiency in the macroeconomic policy environment constituted a major constraint to the growth of investment in the production of agricultural products. This has a tendency to cause high factor cost to the farmers cultivating agricultural crops. The rising costs of farm inputs combined with a dearth of investible funds pose a serious constraint to investment in agriculture. This could lead to a reduction in production and domestic supplies of agricultural products. The prices of many commodities also increased due to wide fluctuations which can cause persistent rise in the profitability of farm enterprises.

Agricultural Labour: Availability of labour affects the use of farmland in the traditional farming system. Since agriculture in Nigeria is not virtually mechanized, human labour becomes vital in all production systems, accounting for about 90 percent of all farm operations. Although farming is largely labour- intensive, farmers, generally often experience seasonal labour shortages. The supply of labour is affected by the unending migration of able-bodied youths from the rural to urban areas creating labour shortages, especially at peak periods when labour is required for land preparation, weeding, and harvesting. Hired labour shortages have driven up the cost of labour making such labour unprofitable to the average smallholder.

Technical Constraint: Technical constraint in Nigeria affects both the upstream and the downstream segments of agriculture. The constraint manifests in

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poor technology, poor quality of raw materials and inadequate supply of modern inputs. The main causes of the constraint include low support from the government, poor government policy, poverty, low level of awareness, lack of adequate research and increases in the prices of inputs. Poor government support and policy prevents the emergence of innovations from research institutes, thereby curtailing the level of available technically feasible and efficient agricultural practices. There are also communication gaps existing between farmers (end-users of research efforts) and the researchers. Furthermore poor coordination is divergent between researchers, extension agents, and farmers. Thus, farmers are unable to take up new innovations aimed at boosting their productivity and, by extension, their output. The low level of productivity translates to a vicious cycle of poverty, thereby leading to a low level of production. The technical constraint is further sustained by high input prices, which are a consequence of inflation in the economy as well as the dependence of the agricultural economy on foreign inputs.

c) Historical Background of Agriculture in Nigeria

Nigeria as a country, shifted focus from agriculture-dependent to oil exports in the 1970s and thereabout, came into slow economic growth. There is therefore, a need to refocus on agriculture if our economy shall have a steady growth rate. With the pressure to attain the MDGs, it is important to investigate the contribution of the sector to Nigeria's economic growth. Agriculture contributes 40% of the Gross Domestic Product (GDP) and employs about 70% of the working population in Nigeria (CIA, 2012). Agriculture is also the largest economic activity in the rural area where almost 50% of the population lives.

Given the enormous resource endowment both in human capital and natural resources, the performance of the Nigerian economy has been far below expectation and in-fact suffers from resource curse according to Aluko (2004) and Otaha (2012). Nigeria being the most populous nation in Africa, with a population of over 150 million and a labour force of 53.83million (2012 estimates; CIA, 2012), is blessed with ample resource of labour to fuel economic growth. Besides being Africa's largest producer of oil, Nigeria's gas reserves ranks 6th globally and it has the 8th largest crude oil reserve in the world (Sanusi, 2010). About 31 million hectares of the land area is under cultivated.

Coexistence of vast wealth in natural resources and extreme personal poverty cultivation and the diverse climates makes the production of a variety of products, from tropical and semitropical areas of the world possible (Chauvin, Mulangu and Porto, 2012). Yet, besides these natural endowments, the nation ranks one among the world's poorest economies. The agriculture sector has been the mainstay of the economy since independence and despite several bottlenecks; it remains a resilient sustainer of the populace. In the 1960s, Nigeria was the world's largest exporter of groundnut, the second largest exporter of cocoa and palm produce and an important exporter of rubber, cotton (Sekunmade, 2009). More recently, CIA, 2013, and Sekunmade, 2009 stated that agriculture employs about two-thirds of Nigeria's labour force, contributes significantly to the GDP and provides a large proportion of non-oil earnings.

The agricultural sector irrespective of the abundant resources, yet has several untapped potentials for growth and development in terms of availability of land, water, labour, and its large internal markets. It is estimated that about 84 million hectares of Nigeria's total land area have the potential for agriculture; however, only about 40% of this is under cultivation (FMARD, 2012). Productivity in the cultivated lands is also low due to small farm holdings and primitive farming methods. Nigeria has, therefore, become heavily dependent on food importation. In addition to diverse and rich vegetation that can support heavy livestock population, it also has the potential for irrigation with a surface and underground water of about 267.7 billion cubic meters and 57.9 billion cubic meters respectively (Chauvin, Mulangu and Porto, 2012; Lipton 2012). Nigeria's large and growing population provides a potential for a vibrant internal market for increased agricultural productivity.

In spite of these opportunities, the state of agriculture in Nigeria remains poor and largely underdeveloped. The sector continues to rely on primitive methods to sustain a growing population without efforts to add value. This has reflected negatively on the productivity of the sector, its contributions to economic growth as well as its ability to perform its traditional role of food production among others. This state of the sector has been blamed on oil glut and its consequences on several occasions (Falola & Haton, 2008). In 1960, petroleum contributed 0.6% to GDP while agriculture's contribution stood at 67%. However, by 1974, shares of petroleum had increased to 45.5% almost doubling that of agriculture which had decreased to 23.4% (Yakub, 2008). It should be clarified that this pattern was not an outcome of increased productivity in the non-agricultural sectors as expected of the industrialization process (Christaensen & Demery, 2007); rather it was the result of low productivity due to the negligence of the agriculture sector.

Furthermore, the nation was self-sufficient in food production and exports major crops which accounted for over 70% of total exports in 1960. However, due to a fall in local production among other things, importation of food began to increase and food items like bread made from imported wheat flour began to replace cheap staple foods. In 2012 alone, the importation of wheat was valued at $1billion (Nzeka, 2013). Largely due to significant fall in the output of export products like cocoa, palm oil, rubber, and

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groundnuts, and the share of agricultural products in total exports decreased to less than 2% in the 1990s (Olajide, Akinlabi & Tijani, 2012).

The subsectors of the agriculture sector in Nigeria have potentials that give the sector an opportunity for growth. According to CBN (2012), between 1960 and 2011, an average of 83.5% of agriculture in GDP was contributed by the crops production subsector making it the key source of agriculture sector growth. The food production role of the agriculture sector depends largely on this subsector as all the staples consumed in the nation comes from crop production, 90% of which is accounted for by small-scale, subsistent farmers. The major crops cultivated include yam, cassava, sorghum, millet, rice, maize, beans, dried cowpea, groundnut, cocoyam, and sweet potato. The second largest is the livestock subsector contributing an average of 9.2% between 1960 and 2011. This sector is the largest source of animal protein including dairy and poultry products. The economic importance of the subsector is therefore evident through food supply, job, and income creation as well as provision of the hide as raw material. Despite this, the sub-sector has been declining in its contribution to economic growth, according to Ojiako and Olayode (2008). Between 1983 and 1984, the share of livestock in agricultural contribution to GDP was about 19% but this dropped as low as 6% between 2004 and 2005 (CBN 2009). In the fishery subsector, local production is inadequate for domestic demand and consumption. Nigeria imports 700,000 MT of fish annually which is 60,000 MT more than total domestic production (Ibru, 2005 in Essien & Effiong, 2010). However, the subsector has recorded the highest average growth rate of 10.3% between 1961 and 2011 as compared to the 6% recorded in crop production in the same period (CBN, 2012). Gabriel et al., 2007; Essien & Effiong, 2010 went on to say that, with an average contribution of 4.3% to total agriculture GDP between 1960 and 2011 and provision of at least 50% animal protein, fisheries contribute to economic growth by enhancing food security and improving the livelihood of fish farmers and their households. Forestry is the smallest sub-sector in Nigerian agriculture, contributing only 3.0% between 1960 & 2011; and the subsector plays a major role in providing industrial raw materials (timber), providing incomes as well as preserving biodiversity.

In these subsectors, productivity is low and contributions to the economy are below expectation. Among other constraints, low productivity has been identified as a major contribution to the declining growth rate in the Nigerian agriculture sector. Iyoha and Oriakhi (2002) findings revealed that, slow growth in capital per worker and not slow Total Factor Productivity (TFP) is responsible for slow growth in the agriculture sector. This was further explained to be due to inadequate capital investment and rapid growth of the population and labour force.

Muhammad-Lawal and Atte (2006) recommends an increase in per-capita productivity through the introduction of improved technology in agricultural production. They also indicated a positive and consistent relationship between GDP growth rate, population growth rate, and the Consumer Price Index as factors affecting domestic agricultural production in Nigeria. However, it is estimated based on the prospects of the sector that by 2015, it was possible to provide 3.5 million jobs within the agricultural value chain, increase farmers" incomes by $2 billion and also reduce food insecurity by 20 million metric tons (MT), with an increase in food supply (FMARD, 2012). This can only be achieved by intensified efforts in increasing productivity and developing the agriculture value chain.

III. Theoretical Literature

a) *Boserup Theory of Agricultural Development*

Boserup theory of agricultural development was developed as a concept by a female Danish economist named Ester Boserup in 1965 in Denmark. Boserup occupies the place of pride in the task of discussing the problems and processes of agricultural development. Boserup attributed agricultural development to the factor which so far has been described as irrelevant but it demolished a theory propounded by the classical economist Malthus.

Boserup in her attempt tried to probe into the causes of agricultural development. She maintained the view that agricultural development is due to some kind of compulsion. This compulsion relates to the rising trend of the population. It means the basic force behind agricultural development is the pressure of population; and the development of patterns and techniques of cultivation is governed by the population growth.

According to the Malthusian theory of population, if at any time food supply increases, population will increase and a new equilibrium will be established between population and food supply. In a sense, if the population is less than the existing food supply, the population will increase and wipe out the excess food supply. But, if the population is already beyond the means of subsistence, the population will itself come down to reach equilibrium through the positive checks instituted.

Boserup has tried to refute these aspects of the Malthusian theory. She criticized first part of the theory on the ground that few observers would like to suggest that the tremendous increase in the rates of population growth witnessed throughout the underdeveloped world in the two post-war decades could be explained as a result of changes in the conditions for food production.

It is reasonably clear that the population explosion is a change in basic conditions which must be regarded as autonomous in the sense that the

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explanation is to be sought not in the improved conditions of food production but in medical inventions and some other factors which the student of agricultural development would regard as independent variables.

As regards the second part of the Malthusian theory, the refutation is more direct and emphatic. Thus her theory of agricultural development cannot be sustained so long as Malthusian contention holds. Prof. Boserup contends that, "whenever, there is a population pressure, the population does not go down. It rather leads to various technical and other changes which result in agricultural growth and an increase in food supply."

b) Criticisms of Boserup's Theory of Agricultural Development

Unlike other agricultural development models, Boserup theory of agricultural development is also not free from criticism. The main points of criticism are understated:

i. The major criticism levelled against Boserup theory is that it is not applicable to those economies where the urban industrial sector is less developed.

ii. Though, Boserup has attempted to show that cultivation becomes more intensive when population increases and becomes extensive in character when population falls; but, this assertion is not fully convincing. It is due to the reason that the sequence of intensification of cultivation and accompanying technical, institutional and social set up enumerated by her is not fully reversible.

iii. Boserup has absolutely ignored the unfavourable effects of growing population on agriculture. In backward economies where land frontiers have already been reached, the sub-division and fragmentation of holdings must follow. Thus, small farmers, in turn, will obstruct the use of improved technology and the growing population may adversely affect the process of capital formation.

iv. Finally, Boserup model is said to only have an academic value; and that its applicability to the modern day world is completely uncertain. The various stages of intensification of cultivation are only a matter of history and it is a history which is not likely to repeat itself.

Despite these criticisms, the Boserup's theory is important because it reveals that necessity is the mother of invention because people only made advances when they realized they needed to, yet, the theory describes how increased food supply can come after a high population growth, and with an increased technological advances. Being optimistic about the future of agricultural and population development, the theory shows how the rate of food supply may vary but never reach its carrying capacity because every time it gets near, a new advancement causes supplies to increase.

c) Lewis Theory of Agriculture

The Lewis theory of agriculture explains the growth of a developing economy in terms of a labour transition between two sectors, the capitalist sector and the subsistence sector. The dual-sector model is a model in developmental economics commonly known as the Lewis model which was named after its inventor W. Arthur Lewis. The model assumes that a developing economy, there shall be a surplus unproductive labour in the agricultural sector; and these workers are attracted to the growing manufacturing sector where higher wages are offered. It also assumes that the wages in the manufacturing sector are more or less fixed; and that, Entrepreneurs in the manufacturing sector makes profits because they charge a price above the fixed wage rate. The model assumes that these profits will be reinvested in the business in the form of fixed capital. An advanced manufacturing sector means an economy has moved from a traditional to an industrialized one.

W. A. Lewis divided the economy of an underdeveloped country into 2 sectors: The capitalist sector was defined as "that part of the economy which made use of reproducible capital and pays capitalists thereof". The use of capital is controlled by the capitalists, who hire the services of labour in manufacturing, plantation farms, mines etc. The capitalist sector may be either private or public which sector is "that part of the economy which is not using a reproducible capital". It can also be said to be the indigenous traditional sector or the "self-employed sector". The output per head is comparatively lower in this sector which is not fructified with capital. The other sector being the "Dual Sector Model" which is a theory of development in which surplus labour from the traditional agricultural sector is transferred to the modern industrial sector whose growth over time absorbs the surplus labour, promotes industrialization and stimulates sustained development.

In the model, the subsistence agricultural sector is typically characterized by low wages, an abundance of labour, and low productivity through a labour-intensive production process. In contrast, the capitalist manufacturing sector is defined by higher wage rates, higher marginal productivity, and a demand for more workers. Also, the capitalist sector is assumed to use a production process that is capital intensive, so investment and capital formation in the manufacturing sector are possible over time as capitalists' profits are reinvested in the capital stock. Improvement in the marginal productivity of labour in the agricultural sector is assumed to be a low priority as the hypothetical developing nation's investment is going towards the physical capital stock in the manufacturing sector.

d) Relationship between the Two Sectors

The primary relationship between the two sectors is that when the capitalist sector expands, it

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extracts or draws labour from the subsistence sector to the capitalist sector. Lewis assumes that the supply of unskilled labour to the capitalist sector is unlimited as a result of the overpopulated surplus labour; giving rise to the possibility of creating new industries and expanding existing ones at the existing wage rate. A large portion of the unlimited supply of labour consists of those who are in disguised unemployment in agriculture and in other over-manned occupations such as domestic services, casual jobs, petty retail trading, etc. Lewis went further to say that two other factors also causes an increase in the supply of unskilled labour, that is to say women in the household and population growth.

The agricultural sector has a limited amount of land to cultivate, so, the marginal product of an additional farmer is assumed to be zero as a result of the law of diminishing marginal returns which has a fixed input i.e. land. However, the agricultural sector has a good number of farm workers that are not contributing to agricultural output since their marginal productivities are zero; and termed surplus labour who could move to other sectors with no effect on agricultural output. Surplus labour is not used in the Marxist context but only refers to the unproductive workers in the agricultural sector. Due to wage differentials, workers will tend to transit from the agricultural to the manufacturing sector over time to reap the reward of higher wages even though; the marginal product of labour is zero. No matter the quantity of workers who moves from the subsistence to the capitalist sector as surplus labour, the general welfare and productivity will rather improve; the total agricultural product will remain unchanged while total industrial product will increase as a result of the additional labour, even though marginal productivity and wages in the manufacturing sector will decline. However, at the long run, as this transition continues to take place and investment results in increases in the capital stock, the marginal productivity of workers in the manufacturing sector will be driven up by capital formation and driven down by additional workers entering the manufacturing sector. Eventually, the wage rates of the agricultural and manufacturing sectors will equalize as workers leave the agriculture sector for the manufacturing sector, increasing marginal productivity and wages in agriculture sector, whilst driving down productivity and wages in te manufacturing sector. The final result of this transition process is that the agricultural wage will equal the manufacturing wage, and the agricultural marginal product of labour will also equal the manufacturing marginal product of labour; and with no further manufacturing sector enlargement taking place, workers will no longer have a monetary incentive in transition. Although Lewis model has provided a deep and perceptive analysis of the various problems of underdeveloped countries yet it is not free from criticism.

e) The criticism levelled against Lewis model on theoretical and practical grounds are as follows:

i. Limited Supply of Skilled Labour: One of the limitations of this model is that if we assume an unlimited supply of unskilled labour, then, the supply of skilled labour is definitely limited in underdeveloped countries. This will create difficulties in carrying out programs of industrialization and economic development. However, the truth is that the problems of skill labour are not easily overcome especially in backward and underdeveloped economies.

ii. Unrealistic Assumption: The theory assumes a constant wage rate in the capitalist sector until the supply of labour from subsistence sector is exhausted. This is unrealistic as the wage rate rises continuously over time in the industrial sector of an underdeveloped economy.

iii. One-Sided Theory: Prof. Lewis theory is a one-sided theory as it does not consider the possibility of progress in the agricultural sector, but the industrial sector which develops with the transfer of surplus labour, thereby making demand for food and raw materials to rise, which will ultimately lead to growth in the agricultural sector.

iv. Neglects of Aggregate Demand: Prof. Lewis neglects the problem of aggregate demand, as he thinks that whatever that is produced in the capitalist sector is consumed by itself or is exported. Hence, he fails to consider the demand for products of the capitalist sector by the subsistence sector; and if there is a shortage of demand for the products of the capitalist sector, the growth process may come to a halt.

v. Lack of Entrepreneurs: Lewis theory of unlimited supply of labour is based on the assumption that a capitalist class exists in underdeveloped countries; and that the entire process of growth depends upon the resistance of such a class which has the necessary skill to accumulate capital. In reality, the rising level of profits in underdeveloped countries does not necessarily induce a rising level of reinvestment. However, speculative activities where a large number of existing entrepreneurs may turn to speculators to reap extra gains from the emerging shortage in the economy may exist.

vi. Less Developed Countries hardly experience Multiplier Effect: For the fact that, this model assumes that capital accumulation takes place when the capitalist class reinvests profits meaning that a presupposition of investment multiplier which is not applicable for UDC has taken place. The Prof. Lewis does not take cognizance of the fact that, if the profits are reduced or the price of wage goods rises, the process of capital formation will stop before the entire surplus labour is absorbed.

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IV. Empirical Literature

To keep abreast of our dynamic world as regards existing literature and breakthroughs in every field of endeavours, we need to see works of other eminent researchers and the various methods and approaches these scholars have employed and various findings.

Titus (2008) Taking advantage of recent developments in time series econometric methods, re-examined the question of whether agriculture could serve as an engine of growth. Results from the empirical analysis provided strong evidence indicating that agriculture is an engine of economic growth. Furthermore, the study discovered that trade openness has a positive effect on GDP growth.

Matthew and Adegboye, (2010) examined the role of the Agricultural sector in Economic Development. The empirical data used for the study was from 1970 to 2008, the Johansen Co-integration technique of regression was used to analyse the data. The results showed that there is no significant impact of the agricultural sector on economic development in Nigeria. The study recommended that research and technology would drive agricultural development and increase agricultural productivity and that the Government should establish an agricultural fund to finance and facilitate medium/large-scale agricultural production, to enhance employment, production for local consumption and for export. The study concluded that any policy thrust that addresses poverty would inevitably focus on agriculture, by increasing rural opportunities that could generate agricultural induced development. Hence, the development of agriculture is a sine qua non for the alleviation of poverty and the achievement of sustainable development.

Enoma (2010), presented the study on an empirical analysis of the impact of agriculture credit on economic growth in Nigeria. The study highlighted the problems of agricultural production in Nigeria and the strategies for agricultural transformation of the economy after review of the various policies of the government. His findings revealed that agricultural variables have an impact on economic growth and their contribution to export growth has been encouraging.

Using time series data, Lawal (2011) attempted to verify the amount of federal government expenditure on Agriculture in the thirty-year period 1979 – 2007. Significant statistical evidence obtained from the analysis showed that government spending does not follow a regular pattern and that the contribution of the agricultural sector to the GDP is in direct relationship with government funding of the sector.

Iganiga and Unemhilin (2011) studied the effect of federal government agricultural expenditure and other determinants of agricultural output on the value of agricultural output in Nigeria. A Cobb Douglas Growth Model was specified and the variables used included commercial credits to agriculture, consumer price index, annual average rainfall, population growth rate, food importation and GDP growth rate. The study performed a comprehensive analysis of data and estimated the Vector Error Correction model. Their results showed that federal government capital expenditure was found to be positively related to agricultural output.

Jadalla, et. al (2013) studied the impact of independent variables on the performance of agricultural extension management in eastern Libya: toward reorganization for sustainable agricultural development. A questionnaire was used to collect the data and analysed using descriptive statistics. The result showed the implications for sustainable agricultural development which were categorized into two groups consisting of: (a) The Decentralization (b) The Pluralism. The results of the multiple correlation coefficient measures indicated that the relationship between decentralization and continuous independent variables is moderate and positive. The study recommended that to achieve this participation, extension organizations would need to formally take off decentralization and Pluralism or transfer the control of specific program planning and management functions to the system levels of local Agricultural extension, Private sector organizations, Farmers organizations and Education organizations where extension programs are actually implemented.

Oni (2013) studied the Challenges and Prospects of Agriculture in Nigeria: The Way Forward. The paper identified the constraints and proffered policy prescriptions to be implemented to remove them so as to fast-track the attainment of poverty reduction and rapid economic development in the country. The identified constraints included a marketing problem, infrastructure inadequacies, and unstable input and output prices. Policy actions for removing the constraints include improvement in downstream commodity activities, environmental management, increased funding and efficiency in agricultural spending. The study recommended that government must invest heavily in rural infrastructure and such investment must ensure the development of infrastructure in the rural area.

Oyinbo and Rekwot (2014) carried out research to provide empirical information on the relationship between agricultural production and the growth of the Nigerian economy with a focus on poverty reduction. The study employed Time series data in the research and the analyses of the data were done using unit root tests and the bounds (ARDL) testing approach to cointegration. The result of the data analysis indicated that agricultural production was significant in influencing the favourable trend of economic growth in Nigeria. They also discovered that despite the growth of the Nigerian economy, poverty is still on the increase and

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this calls for a shift from monolithic oil-based economy to a more plural one with agriculture being the lead sector. The study recommended that pro-poor policies should be designed for alleviating rural poverty through increased investments in agricultural development by the public and private sectors.

Ihegboro (2014), analysed the impact of agricultural credit on agricultural productivity in Nigeria. The ex-post facto research design was adopted to enable the researcher to make use of secondary data and determine cause-effect relationship during the period, 1978-2008. The Ordinary Least Square (OLS) estimation technique was adopted, using SPSS statistical software to test the hypotheses, where Total Agricultural Credit Guarantee Scheme Fund (TACGSF), Agricultural Credit Guarantee Scheme Fund to crop production (ACGSFCP), Agricultural Credit Guarantee Scheme Fund to livestock (ACGSFLSP) and Agricultural Credit Guarantee Scheme Fund to fisheries (ACGSFP) were used as the independent variables while Agricultural Production (AP), Gross Domestic Product Agricultural Crop Production (GDPACP), Gross Domestic Product Agricultural Livestock Production (GDPALS) and Gross Domestic Product Agricultural Fisheries Production (GDPAFP) were used as the dependent variables. The study found that Agricultural Credit guarantee scheme fund for crop production, livestock production and fisheries had a significant positive impact on crop, livestock and fisheries productivity in Nigeria for the period of the study and also, the total agricultural credit guarantee scheme fund had a significant positive impact on agricultural output in Nigeria. The study, therefore, recommended that stakeholders in the scheme (the farmers, lending institutions and government) must show greater commitment and dedication for the scheme to achieve its laudable objectives.

Nnamocha and Charles (2015), studied Bank Credit and Agricultural Output in Nigeria from 1970 – 2013; using an Error Correction Model (ECM) Approach. This work investigated the effect of Bank Credit on Agricultural Output in Nigeria using the Error Correction Mode (ECM). A yearly data (1970- 2013) obtained from the Central Bank of Nigeria was used for the analysis. The analysis showed that all the variables were integrated of order one I (1) and long-run relationship existed among them. However, the empirical findings of the study revealed that in the long-run bank credit and industrial output contributed a lot to agricultural output in Nigeria, while; only industrial output influenced agricultural output in the short-run.

Ojeka et. al (2016), studied the constraints to agricultural development in Nigeria. The study investigated the constraints to agricultural development in Nigeria using time series data spanning the period 1970 – 2010 and contemporary econometric methods of unit root test, co-integration an error-correction mechanism. The Empirical findings revealed that rainfall, exchange rate and food export (lag one) are the most significant positive determinants of agricultural output in Nigeria. However, food imports, diversion of funds meant for agricultural purposes and low technology diffusion in agriculture are among the factors identified as constraints to agricultural development in Nigeria. The study recommended, maintenance of stable and favourable exchange rate regime, and the pursuance of programs that will bolster partnerships between research institutions and other stakeholders in agriculture as a route to facilitating agricultural development and hence, economic development in Nigeria.

V. Summary of Literature Reviewed

Agriculture has been identified as an important sector of the Nigerian economy and a number of studies have been carried out on different aspects of this subject; all pointing to the fact that agricultural output could be stimulated if adequate funding of the sector by other sources and that of the government. Irrespective of these studies, the problem of inadequate agricultural output still persists and economic growth has not accelerated at the rate needed to reduce poverty and unemployment in Nigeria. However, in as much as the above studies carried out by some other scholars are commendable; yet the basic questions remain as:

1. What is the relationship between agricultural output and economic growth in Nigeria?
2. What are the relationship between commercial banks' credit to the agricultural sector and economic growth in Nigeria?

Answers to these questions are the major concern of this research work. In addition, none of the scholars examines the agricultural output and economic growth in Nigeria from 1985 to 2015 using OLS, Co-integration and Granger causality methods of econometrics. This study therefore, stands out to fill in this gap by employing OLS, Co-integration and Granger causality methods of econometrics to showcase the impact of agricultural output on economic growth in Nigeria from 1985 to 2015.

VI. Method of Study

The method of study adopted in this research, comprises of research design, model specification, data collection and sources, types and data analysis technique.

a) Research Design

A research design according to Onwumere (2005), is a kind of blueprint that guides the researcher in his or her investigation and analyses. The research design adopted for this research is the ex-post facto research design. This is because according to Kerlinger (1970), the ex-post facto research design also called

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causal- comparative research is used when the researcher intends to determine a cause- effect relationship between the independent and dependent variables with a view to establishing a causal link between them. As a fact-finding study, we focused on reporting economic growth as a result of agricultural output, interest rate and commercial banks credit to agriculture.

b) Model Specification

This section specifies the econometric model that was used in this study. The econometric model aimed at capturing the relationship between agricultural output and economic growth in Nigeria in line with the conceptual, theoretical and empirical literature reviewed was developed being guided by the model of Oyinbo and Rekwot (2014) with slight modifications. The model for this study is presented thus:

GDP= f (AGO, CBCA INR)

GDP= a0+ a1AGO+ a2CBCA+a3INR+ ux

a0 = Constant

a1, a2, a3 = Coefficient of the Independent variables ux = Error Term

Where;

GDP = Real Gross Domestic Product AGO= Agricultural Output

INR = Interest Rate

CBCA= Commercial Banks' Credit to Agriculture

Therefore, in line with the model specification above;

GDP =a0 + a1 AGO + a2INR + a3CBCA + μ

a0, a1-a3- parameters to be estimated

c) Apriori Expectation

On the apriori;

a1 is expected to have a positive sign because in macroeconomic theory, the higher the level of agricultural output, the higher the level of economic growth and development in the economy. (i.e. a1 > 0).

a2 is expected to have a negative sign because in macroeconomic theory, the larger the interest rate, the lesser would be the demand for credit. (i.e. a2< 0).

a3 is expected to have a positive sign because when commercial bank's credit to agricultural sector increases, investment into the agricultural sector is also increased thereby stimulating economic growth. (a3 > 0).

i. *Explanation of variables in the model*

Dependent Variable: The dependent variable in this study is economic growth and it is measured with GDP. The dependent variable is subject to change as a result of a change in any of the independent variables in the model. GDP is expected to be positively influenced by agricultural output and commercial bank's credit to the agricultural sector.

Independent variables used in this study are agricultural output, interest rate and commercial bank credit to the agricultural sector. Agricultural output is measured as the ratio of agricultural outputs to agricultural inputs. The interest rate is the amount gained for parting with liquidity for a period of time; while commercial banks' credit is the amount given to the agricultural sector for investments in order to facilitate productivity. These variables will cause a change in the economic growth.

ii. *Data Required*

The data required for the study are the various values of agricultural output, interest rates, and commercial banks credit to agriculture sector from the period of 1985-2015.

iii. *Data Collection and Sources*

The study employed the use of secondary data obtained from the Central Bank of Nigeria statistical bulletin of various issues. The study was designed to cover a period of 30 years (1985-2015).

iv. *Method of Data Analysis*

In order to investigate the relationship that exists between the dependent variable and independent variables, this research adopted the Ordinary Least Squares, Co- integration and Granger Causality methods of econometrics to analyse the data.

v. *Unit Root Test*

The study conducted the unit root test on the variables by employing the Augmented Dickey-Fuller (ADF) statistics to test the characteristics of the variables with a view to determining the order of integration.

vi. *Granger Causality Test*

Granger causality test shows the direction of effect between two-time series; which effect could be bilateral, bidirectional, unidirectional and independence causality.

vii. *Co-integration Test*

In order to ascertain if there was a long-term relationship existing among these variables, a co-Integration test was carried out using the Johansen co-integration test.

viii. *Regression Analysis*

This was used to determine factors influencing agricultural output in Nigeria. However, all the above-mentioned techniques were analysed using E-view version 8.0 for the data spanning from 1985 to 2015.

VII. Data Presentation and Analysis of Results

The study on the impact of agricultural output on economic growth in Nigeria from 1985-2015 is very important; as we present the explanation of the data used in carrying out the study as well as the presentation of analysis of regression results. Thus, this section begins with the data presentation and thereafter analysis of the results.

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a) Data Presentation

The main objective of this study is to examine the impact of agricultural output on economic growth in Nigeria from 1985 to 2015. The study made use of data on the gross domestic product (GDP) as the dependent variable while agricultural output (AGO), commercial bank's loan to agricultural sector (CBCA) and interest rate (INR) are the independent variables. The data for the analysis are attached in the first appendix.

b) Unit Root Test (Test for Stationarity)

A test of stationarity which has become widely popular over the past several years is the unit root test (Gujarati, 2007). The assumption of stationarity of dependent and independent variables is crucial for the properties of the OLS estimators. In this case, the usual statistical results for the linear regression model showed consistency of estimators. You may know that, when variables are non-stationary, then the usual statistical results may not hold sway. In other words, the test for stationarity is the very foundation for co-integration test to be carried out. Also, Granger (1969) opined that most time series variables are non-stationary and using a non-stationary variable in the model might lead to spurious regression. Stationary test is therefore a must if we do not want spurious answer.

Table 4.1: Unit Root Test (Augmented Dickey-Fuller)

Variables	ADF Test	Critical Value			Order of integrat ion
		1% critical value	5%critical value	10%critical value	
GDP	-4.849536	-3.689194	-2.971853	-2.625121	1(2)
AGO	-5.040088	-3.670170	-2.963972	-2.621007	1(0)
CBCA	4.409101	-4.416345	-3.622033	-3.248592	1(0)
INR	-6.830144	-3.769597	-3.004861	-2.642242	1(1)

Source: Authors' Computed Result from (E-views 8)

The stationarity test result presented in Table 4.1 above shows that at various levels of significance (1%, 5% and 10%), the variables were stationary. AGO and CBCA were stationary at level (integrated of order zero). However, GDP was stationary at the second difference (integrated of order two). While INR was stationary at first difference (integrated of order one). Hence, the entire variables in this study are stationary. The test for the long-run relationship between the variables was conducted using the Johansen co-integration framework. For detail result of the Johansen co-integration, see the table 4.2 below.

Table 4.2: Johansen Co-integration Test

Eigen value	Trace Statistic	5% critical value	Prob. **	Hypothesis of CE(s)
0.759522	81.82081	47.85613	0.0000	None *
0.516335	40.49216	29.79707	0.0020	At most 1 *
0.389396	19.42762	15.49471	0.0121	At most 2 *
0.161894	5.121723	3.841466	0.0236	At most 3 *

Source: Computed Result Using (E-Views 8)

Table 4.3 reveals that there are four cointegrating equations at 5% level of significance. This is because the Trace Statistic is greater than critical values at 5%. Therefore, there exists a long-run relationship or equilibrium between the variables (GDP, AGO, CBCA and INR).

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Table 4.3: Short Run Result: GDP = f (AGO, CBCA and INR)

Variable	Coefficient	t-Statistic	Prob.
C	790274.2	6.448715	0.0000
AGO	0.187661	1.759288	0.0899
CBCA	0.427653	2.703614	0.0117
INR	-31578.78	-3.726324	0.0009
R^2=0.540882, F-Statistic= 10.60281, DW=0.774510, Prob.(F- stat=0.000000)			

Source: Authors' Computed Result from (E-view 8)

The short-run result as reported in Table 4.3 reveals that the coefficient of determination - R2 is 0.54, indicating that the variation in the gross domestic product (GDP) was explained by the agricultural output (AGO), commercial banks' loan to agricultural sector (CBCA) and interest rate (INR) is 54 percent. Therefore, the explanatory power of the model estimated is 54 percent.

Moreover, the coefficient of agricultural output (AGO) is positively signed and this conforms to apriori expectation; meaning that an increase in agricultural output or productivity (AGO) will lead to 0.187661 million increases in economic growth. Moreover, the absolute value of the t-statistic for the slope in coefficient is not significant at 5% level. This is because the t-calculated value of 1.759288 is less than the t-table of 2.045. Thus, we accept the null hypothesis which states that "there is no significant relationship between agricultural output and economic growth in Nigeria". The implication of this result is that agricultural output has impacted on economic growth of Nigeria during the period of study but not significantly; meaning that agricultural productivity has the ability to increase economic growth in Nigeria if it is well managed.

Furthermore, the coefficient of commercial banks' loan to the agricultural sector (CBCA) is positively signed and this conforms to our apriori expectation; meaning that an increase in commercial banks' loan to the agricultural sector (CBCA) will lead to 0.427653 million increases in economic growth. Moreover, the absolute value of the t-statistic for the slope's coefficient is significant at the conventional level (i.e., 5%). This is because the t-calculated of 2.703614 is greater than the t- table of 2.045. Thus, we reject the null hypothesis and accept the alternative hypothesis which states that "there is a significant relationship between commercial banks' loan to the agricultural sector and economic growth in Nigeria". The implication of this result is that commercial banks' loan to the agricultural sector has significantly impacted on economic growth of Nigeria during the period under study.

At the same time, the coefficient of interest rate (INR) has a negative sign implying a negative relationship between interest rate and economic growth. This also conforms to our apriori expectation; meaning that a percentage increase in interest rate (INR) will decrease economic growth. Moreover, the absolute value of the t-statistic for the slope's coefficient is significant. This is because the t- calculated of 3.726324 is greater than the t-table of 2.045. Thus, we reject the null hypothesis and accept the alternative hypothesis which states that "there is a significant relationship between interest rate and economic growth in Nigeria". The implication of this result is that interest rate variable has significantly impacted on economic growth of Nigeria during the period under study.

The entire regression model is significant given the f-value of 10.60281 with the probability (F-stat=0.000088). The Durbin Watson value of 0.774510 depicts the presence of serial autocorrelation.

Table 4.4: Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
AGO does not Granger Cause GDP	30	1.02336	0.3207
GDP does not Granger Cause AGO		1.63507	0.2119
CBCA does not Granger Cause GDP	30	12.9860	0.0013
GDP does not Granger Cause CBCA		5.50629	0.0265
INR does not Granger Cause GDP	30	0.10661	0.7465
GDP does not Granger Cause INR_	_	5.90150	0.0221

Note: AGO, GDP, CBCA and INR as earlier defined.
Source: Computed Result Using (E-Views 8)

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Granger causality test which reveals the direction of causality between agricultural output and economic growth in Nigeria was conducted. The results of Table 4.4 revealed that there exists independence in causality between AGO and GDP. There is a unidirectional causality between CBCA and GDP; but, there is bidirectional causality between INR and GDP. This also reveals that the variables such as banks' credit to the agricultural sector (CBCA) and interest rate (INR) used in this study are necessary variables for achieving an increase in economic growth in Nigeria.

VIII. Summary

This study empirically examined the impact of agricultural output on economic growth in Nigeria from 1985-2015. Therefore, the broad objective of the research is to ascertain the impact of agricultural output on the economic growth of Nigeria from 1985 to 2015.

Furthermore, to achieve our objectives, we utilized data collected from secondary sources, particularly the CBN Statistical Bulletin on agricultural output, gross domestic product, interest rate, and commercial bank's credit to agriculture sector. The study adopted the ordinary least square (OLS), Co-integration, and Granger Causality methods of econometrics to analyse the data and showcase the relationship that exists between the variables.

The major findings in the study include:

1. There is no significant relationship between agricultural output and economic growth in Nigeria.
2. There is a significant relationship between interest rate and economic growth in Nigeria.
3. There is a significant relationship between commercial banks' loan to the agricultural sector and economic growth in Nigeria.
4. The long-run dynamic result (co-integration result) demonstrates that there is a long-run relationship or equilibrium between the variables.
5. The Granger result also revealed that there exists a unidirectional causality between CBCA and GDP, bidirectional causality between INR and GDP and independence Causality between AGO and GDP.

Policy Implication

The policy implication of the results of the research includes:

1. That, agricultural output has not contributed significantly to enhance the economic growth from 1985-2015 but has a tendency to do so. Hence, effective agricultural output enhancement policy should be put in place by the Government.
2. That, interest rate policy has enhanced economic growth from 1985-2015 meaning that interest rate has the potential to stabilize economic growth if it is properly managed by the monetary authorities.
3. Furthermore, we found yet another policy implication revealing that commercial banks' credit to the agricultural sector has been well enunciated and harmonized towards raising the economic growth of the country from 1985 to 2015 meaning that with the emphasis on funding; agriculture can bring about the desirable economic growth and eventually economic development.

IX. Conclusion

This study on the impact of agricultural output on economic growth in Nigeria from 1985-2015 is an important study as we examined empirically the degree to which agricultural output influenced economic growth in Nigeria from 1985 to 2015. With the utilization of data on GDP, AGO, INR and CBCA from CBN Statistical Bulletin and we use ordinary least square (OLS), Co-Integration, Granger Causality methods of econometrics to analyse the data so as to find out the relationship that exists between the variables. The regression results revealed that there is no significant relationship between agricultural output and economic growth in Nigeria; but rather, there is a significant relationship between interest rate and economic growth in Nigeria. There is also a significant relationship between commercial banks' credit to the agricultural sector and economic growth in Nigeria. The long-run dynamic result (co-integration result) also demonstrated that there is a long-run relationship or equilibrium between the variables. The study, therefore, concludes that suitable or effective agricultural output enhancement policy should be put in place by the Government. There should be appropriate interest rate policies that would bring about the stability of the economy and economic growth. Moreover, concerted efforts should be made by the monetary authorities with the emphasis on funding agriculture in order to increase economic growth in Nigeria.

X. Recommendations

It is necessary to provide a set of policy recommendations that would be applicable to the economy of Nigeria, hence, the following recommendations are postulated:

1. That, the agriculture sector of Nigeria should be paid more attention in order to increase the agricultural output which will lead to increased consumption (demand), investment, employment and eventually economic growth.
2. That, the monetary authority should re-evaluate her interest rate policies to stimulate investment and increase economic growth.
3. It is our recommendation that there should be a conscious effort by the monetary authorities to develop policies that would maintain and stimulate commercial banks' credit to the agricultural sector in order to further increase economic growth.

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4. The government should partner with the private sector carry out industrialized farming by intentionally shifting away from subsistence farming.
5. The Government of Nigeria should make consorted efforts to acquired farming implements, tractors; harvesters etc. and distribute to farmers at a subsidized rate.
6. The Government of Nigeria should increase output of agricultural products and make them available in the local market which will in turn reduce prices of these goods when purchased, so as to improve the standard of living of the populace.

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Appendix: I

Table 4.1: Data on AGO, CBCA, INR and GDP

YEAR	AGO(₦'M)	CBCA(₦'M)	INR%	GDP (₦ million)
1985	65748.40	1310.2	10	201036.3
1986	72135.20	1830.3	10	205971.4
1987	69608.10	2427.1	12.8	204804.5
1988	76753.70	3066.7	12.75	219875.6
1989	80878.00	3470.5	18.5	236729.6
1990	84344.60	4221.4	18.5	267550
1991	87503.50	5012.7	14.5	265379.1
1992	89345.40	6978.9	17.5	271365.5
1993	90596.50	10753.0	26	274833.3
1994	92833.00	17888.8	13.5	275450.6
1995	96220.70	25278.7	13.5	281407.4
1996	100216.2	33364.1	13.5	293745.4
1997	104514.0	27939.3	13.5	302022.5
1998	108814.1	27180.7	14.31	310890
1999	114570.7	118518.3	18	312183.5
2000	117945.1	146504.5	13.5	329178.7
2001	122522.3	200856.2	14.31	356994.3
2002	1901334.	227617.6	19	433203.5
2003	203409.9	242185.7	15.75	477533
2004	216208.5	261558.6	15	527576
2005	231463.6	262005.5	13	561931.4
2006	248599.0	239752.3	12.25	595821.6
2007	266477.2	149578.9	8.75	634251.1
2008	283175.4	106151.8	9.81	672202.6
2009	299823.9	165161	7.44	718977.3
2010	317281.7	140297.2	6.13	776332.2
2011	335180.1	137203.3	9.19	834161.9
2012	348490.8	147553.8	12	902794
2013	348600.4	97418.1	9.12	964184
2014	365332.8	127391.7	10.1	969969.1
2015	354141.3	1241212	10.41	945,649.00

Source: *CBN Statistical Bulletin (Various Issues)*

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Appendix II: Regression Result

Dependent Variable: GDP

Method: Least Squares

Date: 18/07/18 Time: 20:05

Sample: 1985 2015

Included observations: 31

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	790274.2	122547.6	6.448715	0.0000
AGO	0.187661	0.106669	1.759288	0.0899
CBCA	0.427653	0.158178	2.703614	0.0117
INR	-31578.78	8474.514	-3.726324	0.0009
R-squared	0.540882	Mean dependent var		471742.1
Adjusted R-squared	0.489869	S.D. dependent var		258085.4
S.E. of regression	184333.5	Akaike info criterion		27.20680
Sum squared resid	9.17E+11	Schwarz criterion		27.39183
Log likelihood	-417.7053	Hannan-Quinn criter.		27.26711
F-statistic	10.60281	Durbin-Watson stat		0.774510
Prob(F-statistic)	0.000088			

Appendix III: Unit Root Test GDP @ level

Null Hypothesis: GDP has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.019106	0.7328
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(GDP)

Method: Least Squares

Date: 18/07/18 Time: 20:06

Sample (adjusted): 1987 2015

Included observations: 29 after adjustments

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	-0.019682	0.019313	-1.019106	0.3175
D(GDP(-1))	0.879523	0.202796	4.336992	0.0002
C	11332.43	7416.455	1.528011	0.1386
R-squared	0.499660	Mean dependent var		25506.12
Adjusted R-squared	0.461173	S.D. dependent var		24997.98
S.E. of regression	18349.73	Akaike info criterion		22.57031
Sum squared resid	8.75E+09	Schwarz criterion		22.71176
Log likelihood	-324.2696	Hannan-Quinn criter.		22.61461
F-statistic	12.98235	Durbin-Watson stat		1.930220
Prob(F-statistic)	0.000123			

GDP @ 1ST DIFF.

Null Hypothesis: D(GDP) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.770787	0.3868
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(GDP,2)

Method: Least Squares

Date: 18/07/18 Time: 20:08

Sample (adjusted): 1987 2015

Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-0.261957	0.147933	-1.770787	0.0879
C	5936.978	5197.382	1.142302	0.2634
R-squared	0.104052	Mean dependent var		-1008.800
Adjusted R-squared	0.070869	S.D. dependent var		19050.27
S.E. of regression	18362.83	Akaike info criterion		22.54052
Sum squared resid	9.10E+09	Schwarz criterion		22.63481
Log likelihood	-324.8375	Hannan-Quinn criter.		22.57005
F-statistic	3.135686	Durbin-Watson stat		1.661326

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Prob(F-statistic)	0.087887

GDP @ 2ND DIFF.

Null Hypothesis: D(GDP,2) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.849536	0.0006
Test critical values:	1% level	-3.689194	
	5% level	-2.971853	
	10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(GDP,3)

Method: Least Squares

Date: 18/07/18 Time: 20:08

Sample (adjusted): 1988 2015

Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1),2)	-0.993634	0.204892	-4.849536	0.0000
C	-827.0933	3731.060	-0.221678	0.8263
R-squared	0.474938	Mean dependent var		-857.2571
Adjusted R-squared	0.454744	S.D. dependent var		26736.85
S.E. of regression	19742.88	Akaike info criterion		22.68772
Sum squared resid	1.01E+10	Schwarz criterion		22.78288
Log likelihood	-315.6281	Hannan-Quinn criter.		22.71681
F-statistic	23.51800	Durbin-Watson stat		1.872261
Prob(F-statistic)	0.000050			

AGO @ LEVEL

Null Hypothesis: AGO has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.040088	0.0003
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	

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	10% level	-2.621007

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(AGO)
Method: Least Squares
Date: 18/07/18 Time: 20:09
Sample (adjusted): 1986 2015
Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
AGO(-1)	-0.948989	0.188288	-5.040088	0.0000
C	229143.6	75312.21	3.042582	0.0051

R-squared	0.475680	Mean dependent var	9613.097
Adjusted R-squared	0.456954	S.D. dependent var	456651.8
S.E. of regression	336514.2	Akaike info criterion	28.35501
Sum squared resid	3.17E+12	Schwarz criterion	28.44842
Log likelihood	-423.3251	Hannan-Quinn criter.	28.38489
F-statistic	25.40249	Durbin-Watson stat	2.010607
Prob(F-statistic)	0.000025		

CBCA @ LEVEL

Null Hypothesis: CBCA has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 7 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.409101	0.0102
Test critical values:	1% level	-4.416345	
	5% level	-3.622033	
	10% level	-3.248592	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CBCA)
Method: Least Squares
Date: 18/07/18 Time: 20:10
Sample (adjusted): 1993 2015
Included observations: 23 after adjustments

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
CBCA(-1)	-5.980302	1.356354	-4.409101	0.0007
D(CBCA(-1))	4.716814	1.228746	3.838721	0.0021
D(CBCA(-2))	3.014632	1.287082	2.342222	0.0357
D(CBCA(-3))	3.720849	1.172000	3.174787	0.0073
D(CBCA(-4))	3.507607	1.213083	2.891480	0.0126
D(CBCA(-5))	2.217474	1.241579	1.786012	0.0974
D(CBCA(-6))	5.620902	1.117489	5.029941	0.0002
D(CBCA(-7))	2.738219	1.689949	1.620296	0.1292
C	-729524.5	173250.0	-4.210819	0.0010
@TREND("1985")	73443.82	15604.78	4.706495	0.0004
R-squared	0.799723	Mean dependent var		53662.31
Adjusted R-squared	0.661069	S.D. dependent var		234142.9
S.E. of regression	136312.8	Akaike info criterion		26.78231
Sum squared resid	2.42E+11	Schwarz criterion		27.27601
Log likelihood	-297.9966	Hannan-Quinn criter.		26.90647
F-statistic	5.767780	Durbin-Watson stat		1.626864
Prob(F-statistic)	0.002479			

INR @ LEVEL

Null Hypothesis: INR has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.766854	0.0751
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(INR)

Method: Least Squares

Date: 18/07/18 Time: 20:11

Sample (adjusted): 1986 2015

Included observations: 30 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INR(-1)	-0.426701	0.154219	-2.766854	0.0099

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C	5.735154	2.159425	2.655871	0.0129
R-squared	0.214707	Mean dependent var		0.013667
Adjusted R-squared	0.186661	S.D. dependent var		3.778357
S.E. of regression	3.407523	Akaike info criterion		5.354189
Sum squared resid	325.1140	Schwarz criterion		5.447602
Log likelihood	-78.31284	Hannan-Quinn criter.		5.384073
F-statistic	7.655482	Durbin-Watson stat		2.124008
Prob(F-statistic)	0.009914			

INR @ 1ST DIFF.

Null Hypothesis: D(INR) has a unit root

Exogenous: Constant

Lag Length: 7 (Automatic - based on SIC, maxlag=7)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.830144	0.0000
Test critical values:	1% level	-3.769597	
	5% level	-3.004861	
	10% level	-2.642242	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(INR,2)

Method: Least Squares

Date: 18/07/18 Time: 20:11

Sample (adjusted): 1994 2015

Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(INR(-1))	-4.243304	0.621261	-6.830144	0.0000
D(INR(-1),2)	2.620777	0.561206	4.669898	0.0004
D(INR(-2),2)	2.231555	0.508428	4.389124	0.0007
D(INR(-3),2)	1.876144	0.428113	4.382357	0.0007
D(INR(-4),2)	1.654110	0.357419	4.627926	0.0005
D(INR(-5),2)	1.196410	0.290492	4.118561	0.0012
D(INR(-6),2)	0.896085	0.202056	4.434846	0.0007
D(INR(-7),2)	0.490427	0.127922	3.833792	0.0021
C	-1.455488	0.456223	-3.190298	0.0071
R-squared	0.943110	Mean dependent var		-0.372273

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Adjusted R-squared	0.908101	S.D. dependent var	6.524771
S.E. of regression	1.977975	Akaike info criterion	4.494113
Sum squared resid	50.86102	Schwarz criterion	4.940449
Log likelihood	-40.43525	Hannan-Quinn criter.	4.599256
F-statistic	26.93894	Durbin-Watson stat	1.014766
Prob(F-statistic)	0.000001		

Appendix IV: Johansen Cointegration Test Result

Date: 18/07/18 Time: 20:12

Sample (adjusted): 1987 2015

Included observations: 29 after adjustments

Trend assumption: Linear deterministic trend

Series: GDP AGO CBCA INR

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.759522	81.82081	47.85613	0.0000
At most 1 *	0.516335	40.49216	29.79707	0.0020
At most 2 *	0.389396	19.42762	15.49471	0.0121
0.161894	5.121723		3.841466	0.0236

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.759522	41.32866	27.58434	0.0005
At most 1	0.516335	21.06453	21.13162	0.0511
At most 2 *	0.389396	14.30590	14.26460	0.0492
At most 3 *	0.161894	5.121723	3.841466	0.0236

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

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Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

GDP	AGO	CBCA	INR
-4.87E-06	-3.76E-06	1.33E-07	-0.005775
-4.95E-06	4.30E-06	-2.34E-06	-0.282663
-1.13E-06	-2.21E-06	8.53E-06	-0.261526
1.87E-06	-3.64E-07	-1.56E-05	-0.062900

Unrestricted Adjustment Coefficients (alpha):

D(GDP)	5674.056	2981.818	7009.430	-3779.062
D(AGO)	117422.2	-137052.1	188969.9	17301.67
D(CBCA)	-160454.9	-27839.50	21821.11	21542.72
D(INR)	0.350857	1.384327	1.249937	0.885862

1 Cointegrating Equation(s):	Log likelihood	-1180.005

Normalized cointegrating coefficients (standard error in parentheses)

GDP	AGO	CBCA	INR
1.000000	0.772764	-0.027235	1186.563
	(0.14795)	(0.42201)	(7762.28)

Adjustment coefficients (standard error in parentheses)

D(GDP)	-0.027613
	(0.01578)
D(AGO)	-0.571447
	(0.37187)
D(CBCA)	0.780870
	(0.11896)
D(INR)	-1.71E-06
	(3.6E-06)

2 Cointegrating Equation(s):	Log likelihood	-1169.473

Normalized cointegrating coefficients (standard error in parentheses)

GDP	AGO	CBCA	INR
1.000000	0.000000	0.208262	27514.95
		(0.39300)	(7120.91)
0.000000	1.000000	-0.304746	-34070.43
		(0.49184)	(8911.73)

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Adjustment coefficients (standard error in parentheses)		
D(GDP)	-0.042360	-0.008509
	(0.02208)	(0.01818)
D(AGO)	0.106351	-1.031256
	(0.49172)	(0.40497)
D(CBCA)	0.918552	0.483649
	(0.16475)	(0.13568)
D(INR)	-8.55E-06	4.64E-06
	(4.7E-06)	(3.9E-06)

3 Cointegrating Equation(s):	Log likelihood	-1162.320

Normalized cointegrating coefficients (standard error in parentheses)

GDP	AGO	CBCA	INR
1.000000	0.000000	0.000000	35382.88
			(7442.73)
0.000000	1.000000	0.000000	-45583.43
			(9996.22)
0.000000	0.000000	1.000000	-37779.00
			(10198.8)

Adjustment coefficients (standard error in parentheses)

D(GDP)	-0.050279	-0.024023	0.053595
	(0.01987)	(0.01732)	(0.02502)
D(AGO)	-0.107135	-1.449480	1.949242
	(0.41409)	(0.36097)	(0.52137)
D(CBCA)	0.893900	0.435355	0.230148
	(0.16382)	(0.14281)	(0.20627)
D(INR)	-9.97E-06	1.87E-06	7.47E-06
	(4.4E-06)	(3.9E-06)	(5.6E-06)

Pairwise Granger Causality Tests
Date: 18/07/18 Time: 20:16
Sample: 1985 2015
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
AGO does not Granger Cause GDP	30	1.02336	0.3207
GDP does not Granger Cause AGO		1.63507	0.2119
CBCA does not Granger Cause GDP	30	12.9860	0.0013
GDP does not Granger Cause CBCA		5.50629	0.0265

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INR does not Granger Cause GDP	30	0.10661	0.7465
GDP does not Granger Cause INR		5.90150	0.0221
CBCA does not Granger Cause AGO	30	6.40261	0.0175
AGO does not Granger Cause CBCA		0.12959	0.7217
INR does not Granger Cause AGO	30	0.56743	0.4578
AGO does not Granger Cause INR		0.75673	0.3920
INR does not Granger Cause CBCA	30	0.40868	0.5280
CBCA does not Granger Cause INR		2.40960	0.1322

	GDP	AGO	CBCA	INR
Mean	471742.1	235292.5	134893.2	13.31194
Median	329178.7	117945.1	106151.8	13.50000
Maximum	969969.1	1901334.	1241212.	26.00000
Minimum	201036.3	65748.40	1310.200	6.130000
Std. Dev.	258085.4	327046.7	224212.3	4.069842
Skewness	0.746080	4.438162	4.013573	0.863025
Kurtosis	2.121989	23.22242	20.47466	4.356925
Jarque-Bera	3.871704	629.9916	477.6569	6.226477
Probability	0.144301	0.000000	0.000000	0.044457
Sum	14624004	7294068.	4181689.	412.6700
Sum Sq. Dev.	2.00E+12	3.21E+12	1.51E+12	496.9085
Observations	31	31	31	31

	GDP	AGO	CBCA	INR
GDP	1.000000	0.297001	0.523076	-0.554079
AGO	0.297001	1.000000	0.240209	0.060337
CBCA	0.523076	0.240209	1.000000	-0.189624
INR	-0.554079	0.060337	-0.189624	1.000000

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FELLOWS

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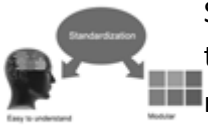
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"

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"

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Acknowledgments

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- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
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- Author name in font size of 11 in one column.
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- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
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c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
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g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
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11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.
Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

19. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

20. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

21. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

22. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

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Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.



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Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.



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Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

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Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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