TRADE OPENNESS, FOREIGN DIRECT INVESTMENT AND LIFE EXPECTANCY IN NIGERIA

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Abstract: *The paper examines the effects of trade openness, particularly, import openness and FDI inflows on life expectancy in Nigeria using annual time series data spanning the period from 1981 to 2017. The methodology involves the ARDL approach to cointegration and error correction modeling. The empirical evidence indicates that while import openness adversely affects life expectancy in the country, the effect of FDI inflows is positive, but not significant. Further evidence are that increase in the level of per capita income and government recurrent expenditure in health enhance life expectancy, while inflation adversely affects it. In view of the empirical evidence, the paper recommends, as measures to enhance life expectancy in Nigeria, imposition of restrictions on some categories of imports especially consumer goods (while encouraging domestic production of same through investment-friendly policies, programmes and initiatives, to meet domestic demand for consumer goods), deliberate and conscious effort to enhance the level of per capita real income through encouragement of investment to boost employment, increases in general government expenditure and, expenditure in health in particular, and control of inflation by the monetary and fiscal authorities using appropriate policy instruments.*

Keywords: *Trade Liberalisation; Globalisation; Import Openness; Foreign Direct Investment; Quality of Life; Life Expectancy.*

JEL Classification: *F21; I31; O24; P33; P45.*

1. Introduction

One of the benefits of international trade (precisely, its import component) is that it enhances access to goods, services and technologies that are not produced locally. It thus has consumption- and welfare-enhancing effects. Improved welfare translates into enhanced life expectancy, all things being equal. However, there is a *caveat* as some imported products could have adverse health consequences if consumed, owing to their chemical composition. For example, in Nigeria, health experts have warned that some imported foreign items such as foreign toothpaste if mistakenly swallowed while being used could have damaging effect on body organs owing to their high chemical contents. In 2007, Nigeria's National Agency for Food and Drug Administration of Nigeria (NAFDAC) placed a ban on importation of all brands of foreign-made toothpaste and declared that only made-in-Nigeria toothpaste registered by the Agency was safe for public use (Alao, 2007).

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Closely associated with international trade in the new wave of globalization is FDI flows. Where FDI inflow is complementary to domestic investment, the stock of capital in the economy increases, employment prospects receive a boost (unemployment is reduced), welfare is enhanced, and these may translate into improvements in quality of life and life expectancy, *ceteris paribus*. However, it has been argued that activities of some multinational corporations (MNCs) through which FDI flows into less developed countries (LDCs) also pose some threats to human life as a result the adverse health effect of their products such as those involved in production of alcohol and tobacco (Deaton, 2004) and the effect of emissions of toxic substances into the environment where there is less stringent environmental regulation. This is a tenet of the pollution haven hypothesis (Seker, Ertugrul & Cetin, 2015).

Mobility of labour (or migration) associated with liberalized cross-border trade and FDI inflow have been linked to spread of pathogens which cause life-threatening diseases that adversely affect life expectancy in less developed countries (Popoola, 2018). Life-threatening diseases "imported" into an economy and environmental pollution as a result of activities of MNCs tends to affect quality of life, which in turn adversely affects life expectancy, all things being equal.

Nigeria formally embraced trade liberalisation policies in 1986 as part of the overall Structural Adjustment Programme (SAP) package. Ever since, cross-border trade flows, particularly importation activities and inflow of FDI especially to the oil and gas sector have increased tremendously (Central Bank of Nigeria, 2017; World Bank, 2018). As at 2018, life expectancy in the country stood at 54.7 years for male, 55.7 years for female while the national average which stood at 55.2 years (for both sexes) was considerably below the global average of 72 years, and the African average of 61.2 years. Thus the country was placed in the 178th position in the World Life Expectancy ranking (World Life Expectancy, 2019). The implication is that the country has one of the lowest life expectancies in the world. Low life expectancy is an indicator of low quality of life. This paper seeks to investigate the implications of import openness and FDI inflows for life expectancy in Nigeria. In doing this, answers shall be sought for the following research questions: Does import openness affect life expectancy in Nigeria? Do FDI inflows affect life expectancy in Nigeria? The following null hypotheses shall be tested: Trade liberalization does not affect life expectancy in Nigeria; FDI inflows do not affect life expectancy in Nigeria.

2. Literature Review

In this section we review the literature on life expectancy effects of trade and FDI inflow.

2.1. Trade and Life Expectancy
Owen and Wu (2007) examined the relationship between trade openness and health outcomes (infant mortality rates and life expectancy) using panel data on 219 countries. The analysis involved specification and least squares estimation of fixed effect models. The study found that increased openness to trade was associated

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with lower infant mortality rates and higher life expectancy especially in developing countries. These were attributed to knowledge spill overs of international trade.

The effect of trade openness on women's welfare and work life is examined in Bussmann (2009) using unbalanced panel data covering the period from on a sample 134 countries. In the study, health and education variables such as life expectancy for female, and female school enrolment ratio, are used as proxies for women's welfare, while female labour force participation rates are used as indicators or proxies for female employment. Methodologies of the study include fixed effects and system GMM estimations. The study found that women's life expectancy was not directly affected by trade openness. However, women's access to primary and secondary education was slightly improved by trade openness slightly improves. It further found that trade openness enhanced women's professional lives. The evidence from developing countries indicated that trade openness was associated with improvement in women's employment in services sector. Developing countries evidence indicated that trade openness was associated with increase in the number of women employed in industry and agriculture. Thus it could be concluded from the study that trade openness is not a determinant of female life expectancy.

Bergh and Nilsson (2010) assessed the impacts of economic, social and political globalization on life expectancy using panel data covering the period from 1970 to 2005 on 92 countries. The OLS fixed effect estimator was employed for the analysis. The study found that economic globalization (which encompasses trade and capital flows) positively and significantly affect life expectancy in the countries. The effect was found to be consistent even after controlling for income, nutritional intake and other relevant variables, and also when the sample was limited to low-income countries. However, contrary to these findings for life expectancy effect of economic globalisation, the effects of political and socio-cultural globalization on life expectancy were found to be statistically not significant.

Umaña-Peña *et al.* (2014) assessed the effect of liberalization of trade in services sector on three health indicators namely life expectancy, under-5 mortality and maternal mortality in 153 member countries of the World Trade organization using multivariate linear regression analysis. The effects of other variables including per capita income, public health expenditure and income inequality on the health indicators were also assessed. The study period is 1995-2010. The result of the analysis indicated that liberalization of trade in services had no significant effect on health during the period. It however found that per capital income and public health expenditure were more significant explanatory factors of the health indicators. GDP per capita and public expenditure in health were found to enhance life expectancy, and reduce infant and under-five mortalities.

Herzer (2014) examined the long run effect of trade on life expectancy in the United States during the period from 1960 to 2011 using annual time series data. The ARDL approach to cointegration and error correction modeling was employed for the analysis. Alternative estimation techniques including dynamic OLS (DOLS), fully modified OLS (FMOLS) and maximum likelihood (ML) estimation were also employed for robustness checks. The study found that long run relationship exists between trade and life expectancy in the country. It also found that the long run effect

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of trade on life expectancy in the country is positive and significant at the 1% level. Thus international trade plays enhances life expectancy in the country.

Alam, Raza, Shahbaz and Abbas (2015) examined the long-run and the short-run effects of trade openness and FDI on life expectancy in Pakistan using annual time series data spanning the period from 1972 to 2013. The ARDL (bounds) test approach to cointegration and error correction modeling was employed for the analysis. The causal linkages between the variables were tested using the vector error correction modeling approach to Granger causality test. The study found positive and significant effects of trade openness and FDI on life expectation in the long-run. The effects were also found to be positive in the short run, however, only the effect of FDI was significant. The result of the causality analysis showed that trade and FDI Granger cause life expectancy in the short run. Thus international trade and FDI serve to enhance public health (measured by life expectancy) in Pakistan.

Novignon and Atakorah (2016) employed alternative panel estimation techniques including fixed and random effects modeling and system GMM to examine the effect of trade openness on life expectancy, infant mortality and under-five mortality rate in 42 sub-Sahara African (SSA) countries. The study period is 1995 to 2013. The study found that trade openness positively and significantly affects life expectancy in SSA. The effects of trade openness on infant mortality and under-five mortality were also found to be negative. Thus trade openness is associated with enhancement of life expectancy as well as reduction in cases of death of infants and under-five children. These imply that international trade contributes significantly to public health and life quality in SSA, and suggests the need for countries in the SSA to embrace (though cautiously) global trade by way of trade liberalization.

The long-run relationship between international trade and life expectancy was investigated in the study by Palamuleni (2017) using panel dataset for the period 1965 to 2013 on 25 less developed countries (LDCs). Alternative panel data methodologies which correct for endogeneity and cross section dependence were employed for the analysis. The study concluded that long run, bidirectional relationships exist between international trade and life expectancy in LDCs. Thus, while trade positively affects life expectancy, enhanced life expectancy contributes to expansion of international trade in the LDCs.

The health outcome effects of infant mortality and life expectancy in 12 MENA countries during the period from 1970 to 2015 were examined in Jawadi, Gouddi, Ftiti and Kacem (2018). Three proxies were used for trade openness, namely global trade, trade with G7 and trade with non-G7 countries. In the study, the moderating effect of governmental corruption on the health sector was also examined. A fixed effect model was estimated in the analysis. It was found that trade openness positively affects life expectancy and negatively affects infant mortality in the region. Further evidence from the study are that improved international trade and greater control of corruption engenders information and technology spillover which have positive effects on the health sector. Thus trade openness enhances life expectancy and reduces infant mortality rate in the region.

Popoola (2018) examined the impact of economic globalization on life expectancy in Nigeria using annual time series data for the period 1986 to 2016. In doing this, life

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expectancy was expressed as a function of trade openness, FDI and carbon IV oxide (CO_2) emission (which was used as proxy for environmental degradation). The method of Johansen cointegration technique was employed for the analysis. The cointegration test indicates two cointegrating relationships. However, the analysis was inconclusive as the study did not proceed to estimate the long run effects of trade openness and FDI on life expectancy in the country.

Qadir and Majeed (2018) examined the effect of trade openness on life expectancy and infant mortality in Pakistan using annual time series data spanning the period from 1975 to 2016. The analysis involved OLS estimation of a multivariate regression model. The study found that trade liberalization adversely affects health outcomes as it was found to be positively related to infant mortality rate and negatively related to life expectancy in the country. The effect of health expenditure on life expectancy was found to be positive and significant at the 10% level, implying that health expenditure serves to enhance life expectancy, while its effect on infant mortality was negative, but statistically not significant at the conventional levels. The effect of general government expenditure on life expectancy was positive and significant, while its effect on infant mortality was negative and significant.

2.2. Foreign Direct Investment and Life Expectancy

Herzer and Nunnenkamp (2012) examined the long run effect of FDI on health (life expectancy at birth) in 14 developed countries during the period from 1970 to 2009. The panel dynamic OLS estimation procedure which corrects for endogeneity was employed to obtain optimal estimates of the long run coefficients of the specified model. The study found that a point increase in FDI-GDP ratio was associated with 0.028years decrease in life expectancy. Based on this finding, the researchers concluded that FDI generally has a negative effect on health in developed countries.

In contract with the study by Herzer and Nunnenkamp (2012), Burns, Jones, Goryakin and Suhrcke (2017) examined the health effect of FDI in low and middle income countries (LMICs) during the period 1974 to 2012. In the study which involves 85 LMICs, life expectancy at birth is used as proxy for overall health. The methodology applied involved the IV-FE (instrumental variable-fixed effect) estimation which corrects for potential endogeneity. The study found that FDI inflows to LMICs generally enhance life expectancies therein.

Maku and Ajike (2015) examined the welfare effect of financial flows using panel dataset for the period 1980 to 2012 on 16 SSA countries. Various health indicators including life expectancy, infant mortality rate, human development index, etc. were used as proxies for human welfare. The results of estimation of fixed effect models indicated that FDI positively and significantly affect life expectancy in SSA. Contrary to this, the effect of foreign portfolio investment on life expectancy was negative and significant. This suggests that emphasis should be on attracting more FDI rather than portfolio investment in the region's quest to attract foreign finance.

Nagel, Herzer and Nunnenkamp (2015) investigated the effect of FDI on overall population health (using life expectancy as proxy) using panel data covering the period from 1980 to 2011 on 179 countries. The system GMM estimator was employed for the analysis. A nonlinear relationship between FDI and life expectancy was found. FDI positively affects life expectancy at low level of income. However,

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the effect reduces as income rises and turns negative at very high income levels. These findings tend to corroborate findings from previous studies such as those of Herzer and Nunnenkamp (2012) and Burns, Jones, Goryakin and Suhrcke (2017).

Spinova and Ougate (2017) investigated the effect of FDI on socio-economic development in developing countries of Europe, by estimating fixed effect models to *inter alia*, evaluate the effect of FDI on life expectancy. The study found no significant effect of FDI on life expectancy in the countries. Furthermore, it found that the effects of interaction of FDI with other variables such as trade openness, corruption perception index, health expenditure and government expenditure in education, on life expectancy remained statistically not significant. Thus for developing countries of Europe, FDI is not a determinant of life expectancy.

The causal relationship between FDI and poverty reduction in South Africa was investigated in the study by Magombeyi, Odhiambo and Watson (2017). In the study, three variables were used as proxies for poverty reduction. The variables are life expectancy, infant mortality rate and household consumption. Annual time series data covering the period from 1980 to 2014 on the variables were employed for the study. The methodologies of the study include ARDL bounds test approach to cointegration and the ECM-based causality test. Among other findings, the study found unidirectional causality running from life expectancy to FDI. This suggests that FDI is not a significant predictor of life expectancy in the country.

Magombeyi and Odhiambo (2017) also investigated whether or not FDI inflows reduce poverty in Tanzania. The study covered the period 1980 to 2014, and as in their other studies, three proxies were used for poverty reduction namely life expectancy, infant mortality rate and household consumption. ARDL approach to cointegration and error correction analysis was employed as in their previous studies. Among other findings, empirical evidence indicates that FDI has no significant short run and long run impacts on life expectancy in Tanzania.

The impact of FDI inflows on poverty reduction in Botswana during the period from 1980 to 2014 was also examined by Magombeyi and Odhiambo (2018). As in the previous study by Magombeyi *et al.* (2017), life expectancy, infant mortality rate and household consumption were used as proxies for poverty reduction. The ARDL (Bounds) test approach to cointegration and error correction modeling was employed for the analysis. The study found, amongst others, that for the economy of Botswana, using life expectancy as proxy for poverty reduction, FDI negatively and significantly impacts life expectancy in the long run, but positively affects it in the short run.

Tsaurai (2018) examined the effect of FDI on poverty reduction efforts in Africa using panel dataset covering the period from 2002 to 2012 on 16 countries in Southern and Western African regions. As in the studies by Magombeyi and Odhiambo, three variables namely life expectancy, infant mortality rate and household consumption expenditure (as percentage of gross national product) were used in separate models as proxies for poverty reduction. The study employed alternative techniques of panel data analysis including pooled OLS, fixed effect, random effect and system GMM. The study found, inter alia, that FDI into the countries was associated with improvement in life expectancy.

Martin and Anguelov (2018) did a comparative analysis of the effects of foreign aid (official development assistance, ODA) and FDI on quality of life (under-five mortality

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and life expectancy). In doing this, countries were grouped into two: 30 with the highest FDI-GDP ratio, and 30 with the highest ODA-GNI ratio. The analyses involved dynamic panel data estimations. The study found, amongst others that FDI has no significant effect on life expectancy. ODA was however found to positively and significantly affect life expectancy.

From the review of the literature, it was observed that most of the previous studies were panel data studies which examined separately the life expectancy effects of trade openness and FDI inflows. Quite a few studies jointly examined the effects of trade openness and FDI on life expectancy. The current study is a country-specific study focusing on Nigeria, as country-specific effects may differ from regional or sub-regional effects as a result of country-specific conditions. The study also focuses on the effect of import openness on life expectancy, instead of the broader measure of trade openness comprising export openness and import openness as done in previous studies except Owen and Wu (2007) who employed import openness as a proxy for trde openness for robustness check in their panel data study. To the best of our knowledge (from our search of the literature), apart from the study by Popoola (2018) which attempted to examine the effect of trade openness and FDI on life expectancy, which was found to be inconclusive as the study only stopped at the cointegration test, no study has yet comprehensively examined the effects of import openness and FDI on life expectancy in Nigeria. A gap therefore exists in the literature, and this study intends to fill it. This study is significant as its outcome will guide policymakers in contriving policies aimed at enhancing life expectancy in the country.

3. Methodology

Following the theoretical frameworks developed in Herzer (2014) and Alam *et al*. (2015) and Jawadi *et al.* (2018) the model to be estimated to achieve the objectives of the study was specified functionally as:

$$LEBT = f(FDI, IMOPN, RGDPPC, GINI, HEAEX, INF) \qquad [1]$$

Where LEBT = Life expectancy at birth (male and female); IMOPN = Import openness measured total imports as a percentage of GDP; FDI = foreign direct investment net inflows, Dollar; RGDPPC = Real GDP per capita; GINI = Gini coefficient (measure of income inequality); HEAEX = Government recurrent expenditure in health sector, INF = inflation, measured as annual percentage change in consumer price index.

The ARDL modeling approach to cointegration and error correction analysis developed by Pesaran, Shin and Smith (2001) was adopted in this study to analyse the relationship between life expectancy and the hypothesized determinants. The choice of this approach was informed by its flexibility in application in that it can be applied in cases of mixed order of integration of data, and the fact that it yields consistent and efficient long run coefficient estimates with valid t-statistics even in

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the presence of regressor endogeneity peculiar with cointegrated regressors. The ARDL model was specified as:

$$\Delta LEBT_t = \beta_0 + \sum_{j=1}^{p}\left(\delta_{1j}\Delta LEBT_{t-j}\right) + \sum_{j=0}^{p}\left(\delta_{2j}\Delta\ln(FDI_{t-j})\right) + \sum_{j=0}^{p}\left(\delta_{3j}\Delta IMOPN_{t-j}\right)$$

$$+ \sum_{j=0}^{P}\left(\delta_{4j}\Delta\ln(RGDPPC_{t-j})\right) + \sum_{j=0}^{P}\left(\delta_{5j}\Delta GINI_{t-j}\right)$$

$$+ \sum_{j=0}^{P}\left(\delta_{6j}\Delta\ln(HEAEX_{t-j})\right)$$

$$+ \sum_{j=0}^{p}\left(\delta_{7j}\Delta INF_{t-j}\right) + \Psi_1\ln(FDI_{t-1}) + \Psi_2 IMOPN_{t-1}$$

$$+ \Psi_3\ln(RGDPPC_{t-1}) + \Psi_4 GINI_{t-1} + \Psi_5\ln(HEAEX_{t-1}) + \Psi_6 INF_{t-1}$$

$$+ \mu_t \qquad (2)$$

The parameters Ψ_1 to Ψ_6 are the corresponding long run parameters, while the parameters $\delta_2 \ldots \delta_7$ are the respective short run coefficients of the underlying ARDL model. Δ is the first difference operator, μ is the residual term, j is the optimal lag order of the ARDL to be empirically determined. Implementation of the ARDL bounds test begins with the OLS estimation of equation 4, and testing the joint significance of the lagged levels of the explanatory variables using the F-test.

The null hypothesis of no cointegration ($\Psi_1 = \Psi_2 = \Psi_3 = \ldots = \Psi_6 = 0$) is tested against the alternative hypothesis of cointegration (($\Psi_1 \neq \Psi_2 \neq \Psi_3 \neq \ldots \neq \Psi_6 \neq 0$).

Two sets of asymptotic critical values at different levels of significance for the computed F-statistics are provided by Pesaran *et al.* (2001) The first set are critical values for the lower bound which assumes all variables of the model are I(0), while the second set are critical values for the upper bound which assumes the variables are I(1). Computed F-statistic greater than the upper bound critical value at a given level of significance, signifies existence of cointegration relatioships as the null hypothesis of "no cointegration" is rejected; computed F-statistic less than the lower bound critical value at a given level of significance implies absence of cointegration relationships as the null hypothesis of "no cointegration" cannot be rejected. No conclusion is drawn if it is between the lower bound and the upper bound critical values. If the null hypothesis of no cointegration is rejected, the short run (error correction) model is derived from the ARDL as:

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$$\Delta LEBT_t = \beta_0 + \sum_{j=1}^{p}\left(\theta_{1j}\Delta\ln(LEBT_{t-j})\right) + \sum_{j=0}^{p}\left(\theta_{2j}\Delta\ln(FDI_{t-j})\right) + \sum_{j=0}^{p}\left(\theta_{3j}\Delta IMOPN_{t-j}\right)$$
$$+ \sum_{j=0}^{P}\left(\theta_{4j}\Delta\ln(RGDPPC_{t-j})\right) + \sum_{j=0}^{P}\left(\theta_{5j}\Delta GINI_{t-j}\right)$$
$$+ \sum_{j=0}^{P}\left(\theta_{6j}\Delta\ln(HEAEX_{t-j})\right) + \sum_{j=0}^{p}\left(\theta_{7j}\Delta INF_{t-j}\right) + \varphi ECT_{t-1}$$
$$+ \ \varepsilon_t \qquad\qquad (3)$$

φ is the error correction coefficient which measures the speed of adjustment to equilibrium in the event of short run deviation therefrom. ECT is the error correction term derived as the residual of the long run model (equation 3). The error correction coefficient is expected to be negatively signed and statistically significant to play the role of error correction (restoration of equilibrium) in the model. ε is the error term. The negative sign is a further indication that the variables are cointegrated.
The corresponding long run model is specified as:

$LEBT_t = \eta_0 + \eta_1\ln(FDI_t) + \eta_2 IMOPN_t + \eta_3\ln(RGDPPC_t) + \eta_4 GINI_t + \eta_5\ln(HEAEX_t) + \eta_6 INF_t + \xi_t$ (4).

The *a priori* expectations are $\eta_1 > 0$, $\eta_2 > 0$, $\eta_3 > 0$, $\eta_4 < 0$, $\eta_5 > 0$, $\eta_6 < 0$.
In light of economic theory, imports and FDI are expected to enhance life expectancy as both enhance knowledge spillover effects (Owen & Lu, 2001) and access to foreign goods and technology which are not locally available. Per capita income is expected to be positively related to life expectancy. Increase in per capita income (which is also an indication of decrease in poverty on the assumption that income is evenly distributed) is expected to enhance life expectancy. The gini index which measures income inequality is expected to be negatively related to life expectancy, as concentration of a country's income in a small fraction of the population especially where there is huge income gap may adversely affect life expectancy in the country. Increased government expenditure in health is expected to raise life expectancy all things being equal. Inflation hinders access to be necessities of life as it raises the cost of living which is associated with decreases in standard of living and life expectancy.
Prior to estimation of the models, the variables were tested for unit root to determine their time series properties. The Augmented Dickey Fuller (ADF) and the Dickey-Fuller Generalised Least Squares (DF-GLS) unit root testing techniques were adopted for this.
Annual time series data spanning the period from 1981 to 2017 were used for the study. The data were obtained from the WDI 2018 database, CBN Statistical Bulletin, 2017, and the Global Consumption and Income Project (GCIP) 2018. Specifically, data on life expectancy at birth (male and female), net FDI inflows, real GDP per capita, import openness and inflation were obtained from the WDI, data on

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government recurrent expenditure on health were obtained from the CBN and data on income inequality were obtained from the GCIP.

4. Results and Discussion

The results of the unit root and cointegration tests are presented in Table 1 and Table 2 respectively, while the results of estimation of the ECM and long run model are presented in Table 3.

4.1. Unit Root Tests and Cointegration Test
The unit root test results involving ADF and DF-GLS processes are presented in Table 1.

Table 1. Unit Root Test

Variables	Levels			First Difference		
ADF Unit Root Test						
	ADF test stat	Critical Value (5%)	Inference	ADF test stat	Critical Value (5%)	Inference
LEBT	-3.67	-3.56	Stationary	-	-	-
ln(FDI)	-5.47	-4.34	Stationary	-	-	-
IMOPN	-2.76	-3.54	Nonstationary	-5.51	-3.55	Stationary
Log(RGDPPC)	-1.49	-3.55	Nonstationary	-3.68	-3.54	Stationary
GINI	-2.15	-3.55	Nonstationary	-6.09	-3.55	Stationary
HEAEX	-0.01	-3.56	Nonstationary	-5.17	-3.56	Stationary
INF	-3.89	-3.54	Stationary	-	-	-
DF-GLS Unit Root Test						
	Levels			First Difference		
Variables	DF-GLS test stat	Critical Value (5%)	Inference	PP test stat	Critical Value (5%)	Inference
LEBT	-3.84	-3.19	Stationary	-	-	-
ln(FDI)	-3.60	-3.19	Stationary	-	-	-
IMOPN	-2.85	-3.19	Nonstationary	-7.59	-3.19	Stationary
ln(RGDPPC)	-1.48	-3.19	Nonstationary	-3.46	-3.19	Stationary
GINI	-1.65	-3.19	Nonstationary	-6.20	-3.19	Stationary
HEAEX	-1.07	-1.95	Nonstationary	-1.28	-1.95	Stationary
INF	-3.07	-3.19	Nonstationary	-5.43	-3.19	Stationary

Source: Author's computations using EVIEWS 9.

The unit root test results indicate that the variables are of mixed order integration. The ADF unit root test shows that while life expectancy natural logarithm of net FDI inflows and inflation series are stationary at levels, other series are stationary at first difference. The DF-GLS test indicates that life expectancy and natural logarithm of net FDI inflows are stationary at levels, and the other series are stationary at first difference. These notwithstanding, there exists the possibility of a linear combination of the variables to be stationary; that is the possibility longrun convergence; the

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possibility for the variables to be cointegrated. This was determined by the cointegration test. Given that the variables are of mixed order of integration, the ARDL (bounds) test approach was adopted to test for cointegration relationships. The result of the test is presented in Table 2.

Table 2. ARDL (Bounds) Test for Cointegration

Sample: 1982 2015		
Included observation: 34		
Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	26.53	6
Critical Value Bounds		
Significance	I0	I1
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

K = Number of explanatory variables

Source: Author's Estimation using Eviews 9

The bounds test for cointegration shows that the null hypothesis that no long run relationships exists among the variables is rejected even at the 1% level. This is indicated by the F-stat which is greater than the critical value of the upper bound. In view of this we infer that the variables are cointegrated. Given that the variables are cointegrated, the short run relationship between them can be represented with an error correction model.

4.2. Model Estimation Results
The estimated error correction representation and the corresponding long run estimates are presented in Table 3.
The results presented in Table 3 shows that the effect of FDI on life expectancy is positive in the short-and long-run, but not statistically significant. This suggests that the amount of FDI that flows into Nigeria's economy has not been sufficient enough to improve the quality of life of the people measured in terms of life expectancy. The effect of import openness on life expectancy in Nigeria is negative, and statistically significant in the short- and long-run, though the long run effect is more sizeable and significant. The implication is that importation generally adversely affects life expectancy in the country. Several reasons could be adduced for this. The (chemical) composition of the products being imported especially the consumer goods (processed foods) may pose serious threat to health. This was recently buttressed by the current Director General of Nigeria's NAFDAC who noted that processed food contained monosodium glutamate, excess sugar and excess salt all of which were harmful to health and posed serious threat to life (Akinselure, 2019). The adverse effect of high rate of importation on local producers could also have adversely affected domestic producers' competitiveness, profits, employment and

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income thereby reducing affected individuals' capacity to access basic necessities of life which enhance life expectancy.

Table 3. ARDL Cointegrating and Long Run Form

Dependent Variable: LEBT			
Selected Model: ARDL(1, 0, 1, 1, 0, 1, 1)			
Sample: 1981-2017			
Included observations: 34			
Cointegrating Form			
Variable	Coefficient	t-Stat	Prob.
DLOG(FDI)	0.03	0.64	0.53
D(IMOPN)	-0.01	-1.74	0.10
DLOG(RGDPPC)	0.63	1.46	0.16
D(GINI)	-0.03	-0.04	0.97
DLOG(HEAEX)	0.04	2.11	0.05
D(INF)	-0.00	-1.44	0.16
CointEq(-1)	-0.14	-3.97	0.00
Long Run Coefficients			
Variable	Coefficient	t-Stat	Prob
LOG(FDI)	0.20	0.64	0.53
IMOPN	-0.11	-3.14	0.00
LOG(RGDPPC)	9.64	4.85	0.00
GINI	-0.24	-0.04	0.97
LOG(HEAEX)	0.55	3.71	0.00
INF	-0.03	-2.69	0.01
C	-25.4	-1.66	0.11

Source: Author's Estimations using Eviews 9.

The short run and the long run relationships between real GDP per capita and life expectancy are positive as expected, but the relationship is only significant in the long run. Thus increase in real GDP per capita will enhance life expectancy in the long run in Nigeria. Income inequality is negatively signed, though not statistically significant. This variable is therefore not a key factor affecting life expectancy in the country. The effect of recurrent expenditure in health is positive and significant in both short- and long-run, though it is more significant and sizeable in the long-run. This implies that increase in government recurrent expenditure in healthcare will enhance life expectancy in the country. Whereas the effect of inflation on life expectancy is negative in the short-and long-run, it is only significant in the long-run. Consistent or permanent rise in inflation will therefore adversely affect (or reduce) life expectancy in the country.

The estimated coefficient of the error correction term is negatively signed, as expected, and highly significant even at the 1% level. This further confirms existence of cointegration relationship between the explanatory variables and the dependent variable. Its size which is quite low implies that the speed of adjustment is quite low as only about 13% of the short-run deviation from equilibrium of the system is adjusted annually to restore equilibrium therein.

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In view of the outcome of estimations (specifically, the t-ratios of the estimated long run coefficients), the null hypothesis that import openness does not affect life expectancy in Nigeria is rejected at the 5% significance level, while the null hypothesis that FDI inflows do not affect life expectancy in Nigeria cannot be rejected at the 5% significance level.

5. Conclusion and Recommendations

The paper examined the effects of import openness and FDI inflows on life expectancy (a measure of quality of life) in Nigeria during the period from 1981 to 2017. Based on the results of the empirical analysis involving the ARDL approach to cointegration and error correction it can be concluded that import openness adversely affects life expectancy in the country, while the effect of FDI inflows on life expectancy is positive, but not statistically significant. Thus FDI does not contribute significantly to life expectancy in Nigeria. Apart from these variables, life expectancy in Nigeria is also affected by the level of real per capita income, government recurrent expenditure in the health sector and inflation. While life expectancy is enhanced by increase in per capital income and health expenditure, it is adversely affected by inflation. The effect of income inequality on life expectancy is negative, but not significant. Income inequality is therefore not a key determinant of life expectancy in the country.

In view of the empirical evidence, the recommendations of the paper include imposition of restrictions on some categories of imports especially consumer goods (while encouraging domestic production of same through investment-friendly policies, programmes and initiatives, to meet domestic demand for consumer goods), deliberate and conscious effort to boost the level of real per capita income through encouragement of investment to boost employment, increases in general government expenditure and, expenditure in health in particular, and control of inflation by the monetary and fiscal authorities using appropriate policy instruments.

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