

Foreign Sector Macroeconomic Variables and Life Expectancy in Nigeria

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Abstract

The study examined the effect of foreign sector macroeconomic variables on life expectancy in Nigeria. The foreign sector macroeconomic variables include balance of payments, exchange rate, external reserves, foreign direct investment, and external debts for the period from 1981 to 2021. The data were gotten from the Central Bank of Nigeria's statistical bulletin and World Bank data bank. The employed data analysis techniques are the stationarity test, the autoregressive distributive lag technique, and the bounds cointegration test. The study revealed that an increase in gross domestic product per capita will improve life expectancy rates in the short run through the long run; an increase in external debts will reduce life expectancy in both the short run and long run; and the exchange rate result in decline in life expectancy in Nigeria in both the short run and long run. The study concludes that the foreign sector's macroeconomic variables have an unstable effect on life expectancy in Nigeria. The inherent instability is occasioned by the positive effect of gross domestic product, while exchange rate and external debts have maintained their burden on the Nigerian economy and by extension on life expectancy. The study recommends that the positive effect of the balance of payments should be sustained, actions should be taken to ensure that surplus revenues are invested in ventures that will grow the economy, and the increase in Nigeria's external reserves should be sustained through deliberate efforts.

Keywords: *Foreign sector, Macroeconomic variables, Life expectancy*

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Background to the Study

A vibrant foreign sector is a key macroeconomic policy goal of every developing or emerging economy seeking economic development. The importance of the external sector lies in the fact that every nation engages in trade, where payments and receipts are recorded. It is observed that the behaviour of the external sector is partly the outcome of the attitudes and policies of government from time to time towards the sector (Ogbonna, 2018). This is because the external sector is a network of economic transactions a country has with other countries. It reflects the economic transactions between the residents of an economy and the rest of the world. Nigeria's external sector reflects the economic transactions between the residents of Nigeria and the rest of the world. The foreign sector can be in equilibrium or disequilibrium (surplus or deficit). An ideal external sector is one that is stable and maintains equilibrium over time. Equilibrium is achieved when external receipts and payments are equal. However, in more practical terms, such a perfect system hardly exists (Central Bank of Nigeria, CBN, 2013). The main foreign sector macroeconomics variables include the balance of payments, the exchange rate, external reserves, foreign direct investment, and the external debt profile of the country. The performance of these foreign sector macroeconomic variables is an indicator of the performance of the country's economy. How well or poor the economy performs affect the living standard of the citizenry and by extension the life expectancy of the people. When the economy is healthy there will be job creation, provision of social infrastructure, and these will enhance the living standard of the people and by extension improvement in their life expectancy all things being equal. The significant indicators of life expectancy include gender, genetics, access to income, access to health care, hygiene, diet and nutrition, exercise, lifestyle, and crime rates. Evidence-based studies (Roland, Shane & Danielle, 2011, Aladejare, 2023, Bese & Friday, 2021), indicate that longevity is based on two major factors: genetics and lifestyle choices. The average reason behind the decline in life expectancy in Nigeria may be attributed to traumatize economy, poverty, diseases, like Malaria, Tuberculosis, HIV etc. Nigeria is the world headquarter of poverty and suffers the world's greatest malaria burden, with approximately 51 million cases and 207,000 deaths reported annually and bears approximately 30% of the total malaria burden in Africa. According to the National Center for Health Statistics (2023), the current life expectancy for Nigeria in 2023 will be 55.75 years, a 0.57% increase from 2022. The life expectancy for Nigeria in 2022 was 55.44 years, a 0.57% increase from 2021.

With her vast mineral resource endowment, particularly petroleum and gas resources, and the vast arable agricultural lands, Nigeria, from independence until now, would have attained rapid economic development and national transformation. This, however, is not the case. The emergence of and overdependence on oil had created distortions in the structure of the Nigerian economy. A cursory review of data on the pattern and trend of external trade and the balance of payment positions further explains or reveals the overdependence of the economy on oil, which has continued to remain vulnerable to external shocks. Domestic production and consumption are reliant on the availability of foreign exchange, and the fluctuation in exchange rate affect the revenue of the country. This has a negative influence on the health of the citizens, as they may not be able to meet

their daily requirements, and as such, their life span will reduce. The fluctuation in the exchange rate also affects the price of goods and services, the Nigeria's inflation rate rises to 22.04 per cent in 2023 (CBN, 2023). The cumulative effects were a sharp fall in living standard, increase in the prices of goods and services leading to the external borrowing and unsustainable debt service burden on an economy.

A number of empirical studies have also looked at the impact of external-sector aggregates on life expectancy. For instance, Ochinanwata, Uzomba, Onodugo, and Anowor (2020,) show that external trade has a negligible or infinitesimal effect on life expectancy among English-speaking West African Countries (EsWACs). Aladejare (2023), with a main focus on West African countries, shows that unsustainable, illiquid, and insolvent external debt and macroeconomic volatility shorten longevity, mainly in the long term, in West African countries. Miladinov (2020) establishes that a positive connection exists between socioeconomic conditions and life expectancy at birth. Greenidge and Stanford (2007), using panel data from 37 countries from 1994 to 2005, show that increases in health expenditure as a ratio of GDP per capita, literacy rate, and urbanization rate have a positive effect on life expectancy. While Roland, Shane, and Danielle (2011) show that the public provision of essential goods and services like health care leads to improved social outcomes, economic growth is directly responsible for the improvement of other life outcomes, and the rise in average income shows that people can purchase relevant social goods and services that enhance health and nutrition, lower mortality rates, and expand life expectancy. However, there is study known to the research that examined the effect of external sector macroeconomic variables on life expectancy in Nigeria, this is what motivated this study.

Other sections of this study are organized as follows: Section two deals with conceptual, theoretical, and empirical literature reviews. Section three deals with research methodology and contains the following: research design, model specification, description of variables, source of data, and method of data analysis. Section four deals with data analysis and interpretation, discussion of findings, a summary, a conclusion, and recommendations.

Literature Review

Conceptual Clarifications

Foreign Sector

Akidi, Tubotamuno, and Obayori (2018), see the external sector as one of the most important sectors in the growth and development process of any economy, be it developed or developing. It reflects the economic transactions between the residents of an economy and the rest of the world. Maurice (2005) defined the external sector performance as the sector of a country's economy that interacts with the economies of other countries in the services and goods markets. This implies that the external sector encapsulates a country's economic transactions or activities with other countries' trading partners. Foreign sector performance measures the performance of an economy with respect to the rest of the world, integrating external sector aggregates into actualizing

growth and development in an economy. It expresses the behavior of a domestic economy's external sector components in relation to their trading counterparts globally.

Foreign Sector Macroeconomic Variables

Mordi, Englama, and Adebusuyi (2010), stated that the major foreign sector macroeconomic variables are the balance of payments (BOP), exchange rate, external debt, external reserve, and foreign direct investment. Other include foreign exchange earnings, imports and exports, the degree of openness, and foreign portfolio investment. However, for the purpose of this study, the foreign sector macroeconomic variables considered include the balance of payments, exchange rate, external debt, and foreign direct investment. These are further discussed below:

Balance of Payment

According to Ahuja (2019), "the balance of payments is a systematic record of the economic transactions of the residents of a country with the rest of the world during a given period of time." The record is so prepared as to provide meaning and measure to the various components of a country's external economic transactions. Thus, the aim is to present an account of all receipts and payments on account of goods exported, services rendered, and capital received by residents of a country, and goods imported, services received, and capital transferred by residents of the country. The main purpose of keeping these records is to know the international economic position of the country and to help the government reach decisions on monetary and fiscal policies on the one hand and trade and payment questions on the other.

Exchange Rate

Gbosi (1995) defines the exchange rate as the price of the domestic currency in terms of other currencies. The value of a country's currency depends on the state of the economy, the competitiveness and volume of exports, domestic production, and the quantum of foreign reserves. According to CBN (2011), the exchange rate is the price of one currency expressed in terms of another currency. The exchange rate has been defined as the price of one currency in terms of another (Mordi, 2006). The exchange rate is the price at which one country exchanges its currency for another. Jhingan (2010) defined the exchange rate as the rate at which one currency exchanges for another.

Foreign Direct Investment

Foreign direct investment is one of the key components of an open and efficient international economic system, as opposed to strictly regulated economies. Foreign direct investment is a direct investment made by an individual or company in another country into a production or business interest, either by directly establishing a business or expanding the operations of an existing business, or by buying a company in the target nation. Foreign direct investment consists of mergers and acquisitions, building new facilities, and reinvesting profits earned from the operations of the foreign business (Adeleke, Olowe, & Fasesin 2014). Foreign direct investment is the net inflow of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than the investor's (World Bank, 2007).

External Debt

External debt refers to borrowings from institutions and agencies abroad. Ajie et al. (2014) defined it as the unpaid portion of resources acquired for developmental purposes and the balance of payment support. It is a debt owed by one country to institutions in other countries. According to Oluwofasa et al. (2012), "external debt" refers to the portion of a country's debt that was borrowed from foreign lenders. These include commercial banks, governments, or international financial institutions (Jhingan, 2015), who added that such loans are subscribed to by foreign governments, foreign institutions, foreign individuals, and international financial organizations. According to Siddique, Selvanathan, and Selvanathan (2015), external debt is an important source of finance, mainly used to supplement the domestic sources of funds for supporting development and other needs of a country.

External Reserve

As stated by the Central Bank of Nigeria (2013), external reserves give an indication of a country's credit worthiness and sustenance of external viability. External reserves, according to the IMF (2007), consist of official public sector foreign assets that are readily available to and controlled by the monetary authorities for direct financing of payment imbalances and directly regulating the magnitude of such imbalances through intervention in the exchange markets to affect the currency exchange rate and/or for other purposes. CSEA (2016) revealed that an external reserve is a means by which a nation can manage its exchange rate and also act as a guarantor for external debt.

Life Expectancy

Life expectancy is defined as the average age that members of a particular population group will be when they die, or the number of years a person can expect to live on earth. It is the average length of time a person is expected to live. The life expectancy of a person can be measured through periodical or cohort life tables. Period life expectancy assumes mortality rates remain constant into the future, while cohort life expectancy uses projected changes in future mortality rates. The significant indicators of life expectancy include gender, genetics, access to health care, hygiene, diet and nutrition, exercise, lifestyle, and crime rates. Evidence-based studies indicate that longevity is based on two major factors: genetics and lifestyle choices. The main reasons behind the decline in life expectancy in Nigeria include diseases. Malaria, tuberculosis, and HIV are the leading causes of death. Life expectancy literally represents the probable number of years remaining in the life of an individual or persons, often determined by such factors as nutrition, heredity, physical conditions, lifestyle, access to healthcare, occupation, economic status, gender, and geographical locations. (Rosen & Haglund, 2005; WHO, 2015; Alamgir, Salahuddin, & Manzoor, 2016).

Theoretical Literature Review

The Theory of Open Economy

External sector modelling starts with a simple open economy model, where total spending in the domestic economy is divided into domestic and foreign components.

$$Y = (C + C^*) + (I + I^*) + (G + G^*) - EXP \quad (1)$$

Where C is domestic consumption of goods and services,
 C* is consumption of foreign goods and services,
 I is domestic investment in goods and service and
 I* is investment in foreign goods and services.
 G and G* are government purchases of domestic and foreign goods and services,
 respectively. EXP is exports of domestic goods and services. Further re-arrangement of
 the identity gives:

$$Y = C + G + I + EXP - (C^* + I^* + G^*) \quad (2)$$

(C* + I* + G*) represents total expenditure on imports (IMP), therefore, components of total
 output become:

$$Y = C + G + I + EXP - IMP \quad (3)$$

Interaction between EXP and IMP reflect the external sector performance, if EXP exceeds
 IMP, external sector is said to be in surplus, but where the reverse holds, external sector is
 said to be in deficit.

The Big Push Theory

The big push theory was propounded by Rosentein-Rodan in 1944. The theory is
 basically a model of how market failure can lead to a need for concerted economy-wide
 and probably public action to accelerate development (Todaro & Smith, 2011). It states
 that there cannot be development without growth. For growth to take place in any
 external sector of an economy, the external sector that drives industrialization must be
 developed. The theory emphasizes that the development of the external sector will spur
 growth in the economy, bringing about increased output of goods and services within
 the domestic economy, leading to increased GDP per capita income. All these would lead
 to development in the economy as the condition of the populace improves. However, the
 theory pointed out that coordination failure may make it difficult for industrialization in
 developing countries to be achieved unless there is public intervention to overcome this.
 The core argument is that coordination problems, in the context of increasing returns,
 create the possibility of multiple equilibria. A poor country can be caught below the
 equilibrium poverty line. Government intervention can potentially solve the
 coordination problem, push the economy into better equilibrium, and thereby allow a
 "take off "into sustained growth. The big push idea has returned to the centre of
 development policy in recent years.

The theory opined that proceeding bit by bit will not launch the economy successfully on
 the development path; rather, a minimum amount of investment is a necessary condition
 for this. It necessitates the obtaining and development of the external economies that
 arise from the simultaneous establishment of technically interdependent industries. The
 theory was criticized, as pointed out by Viner, for paying so much attention to
 investment in social overhead as the machinery that drives the realization of external

economies but neglecting investment in exports and marginal import substitutes, such as agriculture. All these are as important in other industries; therefore, neglecting them in such economies will rather retard than accelerate development.

Empirical Literature Review

Aladejare (2023), while looking at external debt from the perspectives of sustainability, liquidity, and solvency, assessed the impact of external debt on longevity in developing countries in West Africa from 1981 to 2020 after controlling for inflation and exchange rate variability. The study used cross-sectional augmented autoregressive distributed lag (CS-ARDL), dynamic common correlated effects (DCCE), and the Driscoll-Kraay (D-K) methods to show that unsustainable, illiquid, and insolvent external debt and macroeconomic volatility shorten longevity mainly in the long term in West African countries. Hence, longevity will decline when weak external debt management promotes poverty in developing countries.

Bese and Friday (2021), analysed the direct effect of long-term and short-term debt on life expectancy in Turkey. The general tendency in the literature is to analyse the relationship between growth and life expectancy. According to the results of this study, a long-term relationship is confirmed between the variables. A causal relationship is found from life expectancy to long-term debt and short-term debt, but no causal relationship is found from long-term debt and short-term debt to life expectancy. Ochinanwata, Uzomba, Onodugo, and Anowor (2020), examined the relationship between external trade and life expectancy among English-speaking West African countries (ESWACs). The study employed second-generation panel data econometric techniques to reveal that external trade has not improved life expectancy in ESWACs. This therefore infers that the impact of external trade on healthcare is negligible and has an infinitesimal effect on life expectancy in the subregion. The study recommends, *inter alia*, that countries should pay more attention to variables that improve human capital significantly, as they will help improve longevity.

Miladinov (2020) investigates the effect of socioeconomic development on life expectancy at birth as an indicator of mortality or longevity in five EU accession candidate countries (Macedonia, Serbia, Bosnia and Herzegovina, Montenegro, and Albania). Using aggregate time series pool data on an annual level from UN and World Bank databases for the period 1990–2017 and the Full Information Maximum Likelihood model, it was found that this connection between socioeconomic conditions and life expectancy at birth is a prerequisite for a longer life in all five countries. The study concludes that higher values of GDP per capita and lower values of infant mortality levels lead to higher life expectancy at birth, suggesting that the longevity of people in these five countries is increasing. Roland, Shane, and Danielle (2011), with a sample of 86 developing countries, utilized a graph of life expectancy against consumption per capita to investigate the correlation between human development (life expectancy at birth) and aggregate affluence (gross national production). The relationship is interpreted in three ways: The first is that the public provision of essential goods and services like health care

leads to improved social outcomes. The second view holds that economic growth is directly responsible for improving other life outcomes. For instance, as average income rises, people can purchase relevant social goods and services that enhance health and nutrition, lower mortality rates, and expand life expectancy. It also revealed that economic growth only matters if used to finance suitable public services such as the provision of health care services, education, and other social services, which suggests economic growth leads to better provision of social services. The final explanation is that social outcomes are strengthened once income and poverty are reduced.

Greenidge and Stanford (2007), using panel data from 37 countries from 1994 to 2005, attempted to identify the variables that are statistically important in determining health status in Latin America and the Caribbean. The results imply that increases in health expenditure as a ratio of GDP per capita, calorie availability (calorie intake), literacy rate, and urbanization rate add to a population's health status as measured by life expectancy, while per capita carbon dioxide emissions reduce longevity. Using the two-stage least squares method on 50 developing and transition countries, Gupta, Verhoeven, and Tiongson (2001) concluded that government spending on health care strengthens a country's health status. Accordingly, the authors stipulate that policymakers need to allocate resources in health care liberally and efficiently to advance economic growth and strengthen the well-being of the poor. They found out that health care is also affected positively by per capita income, urbanization, adult literacy, access to sanitation and water, and private spending. They found out that government spending on education aids in the improvement of literacy levels. Consequently, the authors stipulate that policymakers need to allocate resources in education liberally and efficiently to advance economic growth and improve the well-being of the poor. However, they acknowledged that, though public spending is necessary to increase educational attainment, the marginal costs of expanding education are substantial. They also show that education attainment is also directly affected by per capita income, urbanization, adult literacy, access to sanitation and water, and private spending.

In order to assess the social outcomes of government spending on health status, Rajkumar and Swaroop (2008) use annual data for 1990, 1997, and 2003 and an ordinary least squares regression for 91 developed and developing countries. The results from the cross-section of countries indicated that public expenditure on health has a negative impact on child mortality in countries with good governance, a high quality of bureaucracy, and low corruption levels. Therefore, public spending on health care alone does not guarantee improved social outcomes; hence, good-quality governance tools such as well-functioning budget formulation, execution, and monitoring are essential in order to produce a better health position.

Research Methodology

Research Design

This study adopted the quasi-experimental research design. To actualize the aim of this study, the researcher utilized both descriptive statistics and an econometric approach to

investigate the effect of the foreign sector macroeconomic variables on life expectancy in Nigeria. The descriptive research design used is meant to measure only the outcome and establish a relationship if any associations exist between variables. While time series data obtained from secondary source is use in testing the effect of external sector macroeconomic variables on life expectancy using E-views software.

Model Specification

This research work adopted the modified version of Bese and Friday (2021) study that analysed the direct effect of long-term and short-term debt on life expectancy in Turkey. The adopted model takes this form:

$$\ln(\text{LEP})_t = w_0 + w_1 \ln(\text{FDI})_t + w_2 \ln(\text{EXTS})_t + w_3 \ln(\text{EXTL})_t + u_t$$

Where:

LEP is life of expectancy at birth for Turkey.

FDI is net inflows in current\$. The variables are used in log form in the analysis.

EXTL is long-term external debt stocks in current\$.

EXTS is short-term external debt stocks in current\$.

Model Specification

The modified version of the equation has life expectancy (LER) as the dependent variable, while foreign direct investment, external reserve, balance of payment, external debt, and exchange rate serve as explanatory variables.

The functional form of the models is presented as:

$$LER_t = \alpha_0 + \beta_1 BOP_t + \beta_2 EXR_t + \beta_3 EXTR + \beta_4 EXD + \beta_5 FDI_t$$

The Econometrical model is expressed as thus:

$$LER_t = \alpha_0 + \beta_1 BOP_t + \beta_2 EXR_t + \beta_3 EXTR + \beta_4 EXD + \beta_5 FDI_t + \mu_t$$

Where:

LER = Life Expectancy Rate

BOP = Balance of Payment.

EXR = Exchange Rate

EXTR = External Reserve

FDI = Foreign direct investment

EXD = External Debt

The apriori expectation is that $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5 > 0$

Description of Variables

The variables contained in the model is divided into dependent and independent variables.

Dependent Variable

Life Expectancy: A statistical measurement of the estimated length of a life is called life expectancy.

Independent Variables

Balance of Payment: It is a periodic report that summarizes the flow of economic transactions with foreigners. It provides information on the nation's exports, earnings of domestic assets owned by foreigners, international capital movements, and official transactions by the Central Bank of Nigeria and the government. It is expected that the surplus balance of payments will have a positive effect on life expectancy.

Exchange Rate: Is the annual exchange rate (naira/US dollar) valued in rate? It is the number of units of the naira that can purchase a unit of the US dollar. From a theoretical point of view, exchange rates are expected to have a positive effect on life expectancy.

Foreign Direct Investment: Is an investment made by an individual or a company from other countries in Nigeria in business interests, in the form of either establishing business operations or acquiring business assets in Nigeria, such as ownership or a controlling interest in a Nigerian company. Based on theory, FDI is expected to have a positive effect on life expectancy.

External Debt: Is the portion of a country's debt that is borrowed from foreign lenders, including commercial banks, governments, or international financial institutions. Based on theory, external debt if judiciously utilize is expected to have a positive on life expectancy.

External Reserve: The International Monetary Fund (IMF) defined foreign reserves as foreign assets available to the state monetary authorities, which they use to settle balance of payments imbalances and manage the size of these imbalances by intervening in the exchange market to influence the exchange rate of the national currency or for other purposes, it is expected to have positive effect on life expectancy.

Sources of Data

Secondary data for this study is sourced from the Central Bank of Nigeria (CBN) statistical bulletin and statement of account 2022 edition, and World Bank indicators. The data required for this study are real gross domestic product (RGDP) per capita as dependent variables, while balance of payment (BOP), exchange rate (EXR), FDI inflows, external reserve, and external debt are the explanatory variables spanning from 1981–2021.

Data Analysis

Table 1: Descriptive Statistic Result

	RGDP	BOP	EXR	EXTR	EXTD	FDI
Mean	1785.775	1746207.	100.4670	201928.2	1928.551	1.553011
Median	1594.500	524604.1	106.4650	87166.10	640.9750	1.159070
Maximum	2564.000	7905599.	347.0000	653090.9	9978.500	5.790847
Minimum	1324.000	1401.200	0.620000	4828.775	2.330000	0.257422
Std. Dev.	445.1284	2178440.	99.97069	194741.3	2602.724	1.233527
Skewness	0.513185	1.030082	0.859678	0.648215	1.848251	1.738206
Kurtosis	1.632209	2.909479	2.897929	1.909348	5.753225	6.070248
Jarque-Bera	4.873807	7.087452	4.944337	4.783757	35.40728	34.95678
Probability	0.087431	0.028905	0.084402	0.091458	0.000000	0.000000
Sum	71431.00	69848294	4018.680	8077129.	77142.02	60.56744
Sum Sq. Dev.	7727431.	1.85E+14	389771.4	1.48E+12	2.64E+08	57.82038
Observations	40	40	40	40	40	39

Source: Eviews 10 output. 2023

The mean values for the series RGDP, BOP, EXR, EXTR, EXTD, and FDI are 1785.775, 1746207, 100.4670, 201928.2, 1928.551, and 1.553011, while the median values are 1594.500, 524604.1, 106.4650, 87166.10, 640.9750, and 1.159070. The maximum and minimum of the distribution are 2564.000, 7905599, 347.0000, 653090.9, 9978.500, 5.790847, and 1324.000, 1401.200, 0.620000, 4828.775, 2.330000, and 0.257422. The presence of a normal distribution is validated by the Jacque-era statistic values of 4.873807, 4.944337, and 4.783757 for RGDP, EXR, and EXTR, while others show the absence of a normal distribution.

Stationarity Test

Table 2: Summary Compilation of Stationarity Test (ADF) for the Model

Statistics Variable	Level			First Difference			Comment
	T.Statistic	5% Level	Prob	T.Statistic	5% Level	Prob	
GDPPC	-0.331992	-2.938987	0.9107	-3.957299	-2.941145	0.0041	I(1)
EXTR	-3.731583	-3.529758	0.0318	-	-	-	I(0)
FDI	-2.928856	-3.533083	0.1653	-19.25509	-3.536601	0.0000	I(1)
EXR	2.149200	-2.938987	0.9999	-4.201560	-2.941145	0.0021	I(1)
EXTD	-2.571616	-3.529758	0.2946	-4.736893	-3.533083	0.0026	I(1)
BOP	-2.570324	3.529758	0.2951	-15.03931	-3.533083	0.0000	I(1)

Source: Extract from EViews 10 Output 2023

Where: **PP** - Phillips-Perron test statistic. **While Prob** - Probability Level
Using the Phillips-Perron test statistic as compared with the Test Critical Value of 5%, we can observe that all variables in the model became stationary after they were subjected to first differencing, except external reserve. The external reserve is stationary at level and reverted to its mean value. Given, the mixed order of integration the study adopted the Autoregressive distributed lag technique in analysing the data.

Table 3: Bounds Test Cointegration Result

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	K
F-statistic	10.66121	6

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

Source: Author compilation from EViews 10. 2023

Inferences drawn from table 3 show that the f-statistical value of 10.66121 is greater than the upper bound of the critical value of 3.61 at 5 per cent. Therefore, we reject the null hypothesis of no long-run relationship and accept the alternative hypotheses of the existence of a long-run relationship among the variables in the model. By implication, there is a long-run cointegration among the series in the hypotheses, and in the long run, there will be convergence. Since there is a long-run association, we then proceed to ascertain their long-run and error correction regressions.

Table 4: ARDL Long Run Result

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(EXTD)	-0.463163	0.162257	-2.854503	0.0084
LOG(EXTR)	0.044028	0.267310	0.164707	0.8704
LOG(FDI)	-0.117504	0.209609	-0.560583	0.5799
EXR	-0.011684	0.003342	-3.495871	0.0017
LOG(BOP)	0.300538	0.173823	1.728991	0.0957
LOG(GDPPC)	9.123728	1.227413	7.433299	0.0000
C	-20.234828	8.310213	-2.434935	0.0221

Source: Authors computation from EViews 10. 2023

The coefficient of external debt has a negative effect on life expectancy and is significant at 5 percent. Therefore, an increase in external debt will, all things being equal, amount to a -0.463163 reduction in life expectancy in Nigeria. This implies that, when the volume of debts contracted by the Nigerian federal or state government's increases, it will reduce the number of years a person is expected to live. The influence of external debts on life expectancy has a channel of transmission, and the sign of its impartation is consistent

with the a priori expectation. According to economic theory, an increase in external debts will increase the burden on the domestic economy through debt service and other payments. In such a situation, government operations will be negatively affected, and that will have a reducing effect on investment and personal disposable income, which will in the long run reduce the number of years expected of an average Nigerian since he or she may not have the required money to take care of his or her health or the money to eat the appropriate quality and quantity of nutrients. External reserve (EXTR) has a positive effect on life expectancy, but it is not significant. This may be as a result of the dwindling nature of the country's external reserve. Foreign direct investment has a negative effect on life expectancy, but it is not significant. This may be attributed to inadequate inflow of foreign direct investment into the country.

Exchange rate has a negative influence on life expectancy in Nigeria and is significant at 5 percent. Thus, fluctuation of the exchange rate will, all things being equal, amount to a 0.011684 decline in life expectancy in Nigeria in the long run. This causation is not consistent with the economic expectation, and it could be caused by overreliance on foreign products since the prices of foreign goods and services are higher and this affect the living standard of the people negatively and by extension their life expectancy. Balance of payment has a positive effect on life expectancy in Nigeria, but it is not statistically significant. This may be because of the import dependent nature of the Nigerian economy. Gross domestic product per capita, which is the unit production per population in Nigeria, will lead to 9.12 increase in life expectancy in the long run. This causation is consistent with the a priori expectations of the study. By implication, an increase in productivity will increase savings and investment relations, and in such a situation, disposable income will increase, leading to an increase in life expectancy. With increase in the income of the people they can take care of their medical bills and to afford their daily dietary requirements which will lead to improvement in their life expectancy.

Table 5: ARDL Short Run Result

Included observations: 37

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(EXTD)	-0.095636	0.027895	-3.428462	0.0020
DLOG(EXTR)	-0.009091	0.054602	-0.166497	0.8691
DLOG(FDI)	-0.024263	0.045272	-0.535932	0.5966
D(EXR)	-0.004996	0.001614	-3.094873	0.0047
DLOG(BOP)	0.010057	0.025910	0.388137	0.7011
DLOG(BOP(-1))	-0.057338	0.030172	-1.900342	0.0685
DLOG(GDPPC)	1.883907	0.421714	4.467262	0.0001
CointEq(-1)	-0.206484	0.041639	-4.958879	0.0000

Cointeq = LER - (-0.4632*LOG(EXTD) -0.0440*LOG(EXTR) -0.1175
*LOG(FDI) + 0.0117*EXR + 0.3005*LOG(BOP) +
9.1237*LOG(GDPPC)
-20.2348)

R-squared	0.858799	Mean dependent var	48.36127
Adjusted R-squared	0.838337	S.D. dependent var	2.945620
S.E. of regression	0.120115	Akaike info criterion	-1.158965
Sum squared resid	0.375116	Schwarz criterion	-0.680044
Log likelihood	32.44086	Hannan-Quinn criter.	-0.990123
F-statistic	21.62427	Durbin-Watson stat	1.853038
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model Selection.

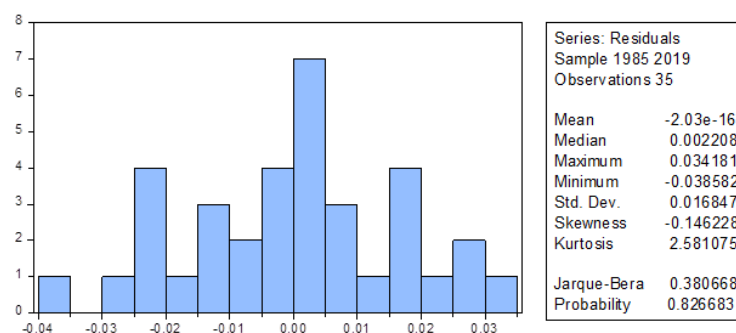
Source: Authors computation from EViews 10. 2023

From table 5 the R-square is 0.858799, while the R-square adjusted is 0.838337. Therefore, 84 percent of the variation in life expectancy is associated with the interplay of variables in the model, while the remaining 16 percent is exogenously determined by variables captured in the error term. The Durbin-Watson statistic value of 1.853038 indicates the absence of first-order autocorrelation in the residual. While the F-statistic value of 21.62427 and its probability value of 0.000000 indicate that the entire model has a good fit, econometrically, the coefficient of the error term appeared with the normal sign (-) and it is statistically significant at 5 percent. Hence, the past disequilibrium will herald a long-run equilibrium at a speed of 0.206484 (21%) percent annually.

In the short run, the coefficient of external debt has a negative effect on the dependent variable and is significant at 5%. Therefore, a percentage increase in external debts will, all things being equal, amount to a -0.095636 decrease in life expectancy in Nigeria. This implies that, when the volume of external debts increases, it will cast a burden on the domestic economy through debt repayments and debt service plans, and this has the capacity to decrease the number of years an average Nigerian is expected to leave on

earth because he or she may not have what it takes to meet his daily dietary intake. Exchange rate has a negative and significant coefficient -0.0049 . This implies an inverse relationship exist between exchange rate and life expectancy in Nigeria. A percentage increase in exchange rate will lead to 0.0049 decline in life expectancy in Nigeria all things being equal. An increase in gross domestic product per capita will, all things being equal, amount to a 1.883907 improvement in life expectancy in Nigeria. This relationship is consistent with economic theory and explains the reason behind the marginal increase in life expectancy in Nigeria over the course of the study. By implication, when the unit production of Nigerians increases, it will increase their disposable income, and if that occurs, they will have all that is required to take care of their health, which is the major requirement for a long life.

Fig. 1: Post Estimation Test for the Model



In testing the validity of regression, researcher check the normality of the regression residual. This post estimation test enables the researcher check if the estimated equation is in line with the basic assumption of the ordinary least square. Given the value of the Jarque- Bera statistic to be 0.380668 and its probability value of 0.826683 , we assert that the residual is normally distributed.

Table 6: Serial Correlation Result.

Breusch-Godfrey Serial Correlation LM Test:

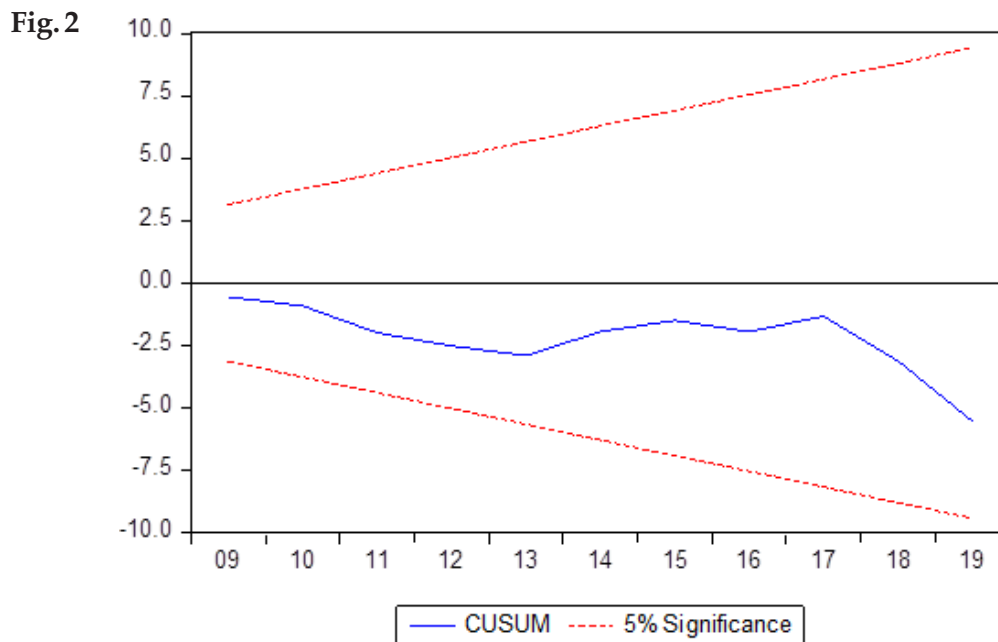
F-statistic	1.020811	Prob. F(2,9)	0.3985
Obs*R-squared	6.471583	Prob. Chi-Square(2)	0.0393

In testing the serial independence of the error term, we employed Breusch- Godfrey Serial Correlation LM Test. Given the fact that the F- statistic value of 1.020811 and observed R-square value of 6.471583 are statistically insignificant with probability values of 0.3985 and 0.0393 . we assert that there is no evidence of serial correlation in the residual of the study and we conclude that the estimated equation is BLUE.

Table 7: Homoskedasticity Test:

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.691393	Prob. F(23,11)	0.7811
Obs*R-squared	20.68882	Prob. Chi-Square(23)	0.6001
Scaled explained SS	1.615502	Prob. Chi-Square(23)	1.0000



Conclusion

The study examined the effect of foreign sector macroeconomic variables on life expectancy in Nigeria. It therefore concludes that the foreign sector macroeconomic variables have unstable effect on life expectancy in Nigeria. The inherent instability is occasioned by the positive effect of gross domestic product and the balance of payment factor, while external debts and exchange rate have maintained their burden on the life expectancy of an average Nigerian.

Recommendations

Considering the observed findings, it is recommended that:

- i. The positive effect of the balance of payments should be sustained, and actions should be taken to ensure that surplus revenues are invested in ventures that will grow the economy.
- ii. The increase in Nigeria's external reserves should be sustained through deliberate efforts.
- iii. The inflow of foreign direct investment should be channeled to sectors that will increase economic growth.

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