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An ARDL Bound Approach to the Nexus of Minimum Wage Increase and Economic Growth in Nigeria

Habiba Mohammed-Bello Umar[1], Musa Abdullahi Sakanko[2], Musa Salihu Ewugi[3] & Abubakar Alhaji Sadiq[4]
[1,3]&[4]Department of Economics, Ibrahim Badamasi Babangida University, Lapai, Nigeria
[2]Department of Economics, University of Jos, Plateau State, Nigeria
Corresponding Email: sakanko2015@gmail.com

Abstract
This study examined the impact of the national minimum wage on economic growth in Nigeria. The Autoregressive Distributed Lag (ARDL) model of econometric technique was employed to analyse the data, keeping GDP as the dependent variable and minimum wage as the independent variable. The study revealed that increment in minimum wage was positive and significant in both the long and short run to GDP, implying that an increase in minimum wage will raise the economic growth rate. Therefore, the three tiers of government and the private sector in Nigeria should implement and upgrade to the new National Minimum Wage of ₦30,000 to improve the income and capacity of low-skilled employees to enhance their economic growth.
Keywords: Autoregressive Distributive Lag, Gross Domestic Product, Minimum, Wage
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1. Introduction

All over the World, the issue of minimum wage increase has attracted a range of concerns among labor unions and policymakers in both developed and developing economies (Saleh, Huda & Subagiarta, 2019). It serves as a poverty alleviation and economic growth engine by redistributing workers' income during economic downturns in order to improve their standard of living. Australia and New Zealand were the first countries to introduce a modern minimum wage and compulsory arbitration of labor disputes in the 1890s (Pantea, Sabadash & Biagi, 2017). In 1909, Great Britain set minimum wages by establishing trade boards. Also, in Nigeria, the traditional (mainly rural and informal) and intermediate sector wages are influenced greatly by market forces and wage levels in government establishments (Idiaye , Kuhn & Okoruwa, 2018). A minimum wage rate is determined by collective bargaining or government regulation that specifies

the lowest rate at which labor may be employed. The rate can be defined according to the amount, duration (hourly, weekly, monthly), and scope of coverage (Muhammed, 2013; Pantea et al., 2017).

The Nigerian economy is characterized by income disparity with a widening gap between rich and poor (Alege, Oye, Ogundipe & Adu, 2021), while political office owners have always benefited from jumbo salaries and allowances, workers have always been at the bottom of the pay scale. After agitations, accusations, and counter-accusations between organized labor and the Minister of Labor and Employment, which culminated to threats of an indefinite nationwide strike, a new national minimum wage of ₦30, 000 was approved by the Nigerian President, Muhammadu Buhari (Saleh et al., 2019).

The interaction between minimum wage and economic growth is debatable. Intellectuals have contrastive understandings about the relationship between them. Xu, Huo, & Shang, *2015) and* Sauer (2018) illustrated a positive correlation between minimum wage and economic growth. Contrarily, Idiaye *et al. (*2018), Antonova (2018), Saleh *et al. (*2019) and Alege et al. (2021) reported negative correlations. Similarly, Mankiw (2011) and Sabia (2015) viewed that an increase in the minimum wage affects economic growth by rising labor expenses and output prices, lower company profitability and job training.

Some scholars and economic analysts have documented that minimum wage increases inflation and unemployment (Babalola, 2019) and other macroeconomic aggregates and consequently retards economic growth (Antonova, 2018). Nigeria's economy has been going through stiff times and is just about coming out from the covid-19 pandemic issue (Akpata & Nevin, 2020). Looking at the economic situation in the country before the outbreak, one can say that Nigerian economy is fragile, with 2.5% growth in GDP in the year 2020. Nigerian authorities had been wrestling with weak salvage resulting from shock in oil price from 2014 with about 2.3 percent growth pointed in GDP in 2019 (World Bank, 2020). The review in February 2020 by the International Monetary Fund (IMF) shows the GDP growth rate from 2.5% to 2%, with one of the reasons to be a result of low oil price (IMF, 2021). The country's debt outline has been a basis of worry for officials and development experts. The current estimation places the debt service-to-revenue ratio at 60% (83 million people), this is likely to degrade the economic situation (National Bureau of Statistics [NBS], 2022), fortunately, the economy grew by 3.4% in the fourth quarter of 2021.

Despite the lauding debt on the interaction between minimum wage and economic growth, most studies in Nigeria focused on the effect of minimum wage and unemployment, inflation and poverty, (Babalola, 2019; Philip *et al., 2021).* Consequently, the theoretical claims and empirical

evidence that postulate either positive or negative nexus between minimum wage and economic growth seem missing in the context of Nigeria. Hence, this motivates this study to investigate the influence of a minimum wage rise on the economic growth. Given all these scenarios, the study seeks to answer the following question: To what extent has minimum wage significantly increased economic growth in Nigeria? From the literature reviewed, the relationship between minimum wage and economic growth in Nigeria is an identified research gap that the study aims to fill.

This research work is divided into five sections; section one is the introduction, section two literature review, section three is methodology, section four contains results and discussion and section five is conclusion and recommendations.

2. Literature Review

Previous studies have provided conceptual literature on the minimum wage and economic growth (Xu *et al.,* 2015; Strauss *et al.,* 2017; Idiaye et al., 2018; Saleh *et al.,* 2019). Minimum Wage is the minimum amount that an employer is required to pay wage earners for work performed within a specified time frame, which cannot be reduced by collective bargaining or individual contracts. On the other hand, economic growth is the productive increase of goods and services over time, usually compared from time to time.

The study is built on the efficiency wage theory of Akerlo and Yellen (1986). The theory assumes that workers differ in quality, not just abilities but also shrinking probability. In other words, some people are lazier than others and are therefore less likely to work harder. An employer cares about the cost of labor (the wage rate). However, the cost depends on the productivity of the workers. So, the objective is to minimize the wage divided by productivity (wage per unit produced). There are at least two options to do this: Firstly, employer can increase productivity by increasing wages. As wages increase, the cost shrinking becomes higher because if employees are caught, they are fired, and lose wages. And the higher the wage, the more employee is exposed to be fired. Therefore, if he earns more, he works harder since it is more important not to lose his job. Sequel to this, wage rates and the quality of workers are related.

The theory observed further that a high real wage level creates an excess labor supply. The excess supply does not decrease the wage level because the firms know they need some unemployment to incentivize employed workers not to shrink. The incentive is produced by making the unemployment cost high, which reflects a high unemployment rate. This study adopted the efficiency wage theory of Akerlo and Yellen (1986). The

theory assumes that improving employee working condition/welfare can inherently affect economic growth.

Alege, et al. (2021), supported this theory in their empirical study. They examined the macroeconomic effects of the four episodes of the minimum wage increase in Nigeria by calibrating and log-linearizing a New Keynesian Dynamic Stochastic General Equilibrium (DSGE) model that is extended to include labor heterogeneity. The study found that minimum wage increase neither improves household welfare and living standard, nor does it have any positive growth effect. Another study by Suparta and Murgianto (2021) investigated the relationship between minimum wages and unemployment in Indonesia. The study found that minimum wage has a positive effect on unemployment. Babalola (2019) investigated the impact of the national minimum wage increase on unemployment and inflation rate in Nigeria using the ARDL models, and the findings revealed that national minimum wage has a positive and significant impact on unemployment and inflation rate in both the short and long run in Nigerian economy. Saleh *et al.* (2019) investigated the effect of minimum wage on employment, economic growth, and social welfare in Indonesia using the OLS method. The result revealed that minimum wage positively affects employment and welfare while economic growth shows a decreasing effect.

Idiaye et al. (2018) used the computable general equilibrium (CGE) to analyse the effects of 12%, 30%, and 68% minimum wage increases in Nigeria's economy and the welfare of households. With a 12% increase in the minimum wage, the results revealed that domestic output declined in all sectors except the crude oil and mining sectors. Likewise, with 30% and 68% increases in the minimum wage, the labor employment, investments, household utility, GDP, and real GDP declined. While the household savings and inflationary pressures increased. This is indicative that minimum wage policies, in the long run, do not result in better household welfare, rather they are left worse off. Similarly, the same method of analysis was employed by Antonova (2018) and, the study that confirmed that higher minimum wage underreports national income. Sauer (2018) used the GSGE model to investigate the macroeconomic impact of minimum wage and obtained that minimum wage increase can cause an economic expansion.

Furthermore, Strauss *et al.* (2017) adopted global policy model (GPM) to analyse the impact of minimum wage increase on the South African economy and discovered that minimum wage increase has a rebalancing effect on the national income. Santos, Fernando and Jose (2017) used content analysis to investigate the effects of the minimum wage on employment and other macroeconomic variables in Spain from 1970 to 2015. The results showed that some labor policies considered the effects of

austerity strategies, shifting the attention towards implementing minimum wages or their updating to reduce the growing inequalities in the distribution of income and poverty levels.

Correspondingly, Xu *et al.* (2015) analysed the effect of minimum wage and economic growth in China using the simulation method and obtained a positive relationship between minimum wage and economic growth.

3. Methodology

The study used secondary data obtained from the Central Bank of Nigeria Statistical Bulletin, National Bureau of Statistics (NBS), and Database of Nigerian Labour Congress. The variables sourced are annual GDP growth rate, minimum wage (MW), unemployment rate (UNEMP), and inflation rate (INF) from 1987-2020. All the variables obtained were in percentage with the exception of the minimum wage, they are in absolute values (thousand), to have the same unit of measurement, the natural log was applied. The periodic scope of the study was informed by the fact that the first minimum wage increment was implemented in 1987 and the last implementation took effect in 2020.

First, the Augmented Dickey-Fuller [ADF], 1981 unit root tests were conducted to determine the level of integration. If the variables were found to be mixed in the level of integration, the Autoregressive Distributive Lag (ARDL) bound test for co-integration will be conducted. The uniqueness of this co-integration test is that it assumes at a most one co-integrating equilibrium involving the dependent variable. Then, if the ARDL bounds test reveal existence of long-run relationship, the ARDL method of analyze will be employed. These techniques (ARDL) were first familiarized by Pesaran and Shin (1999). Pesaran, Shin and Smith (2001) extended it to capture both the short-run and long-run estimation. The ARDL is used for forecasting, it measures both the short-run and long-run effect of the variables, it incorporates both level and first order of integration I (0) and I (1), and it recognizes small sample size variables compared to other techniques that emphasize large sample sizes (Narayan, 2005). The study adapted Xu *et al.* (2015) methodology, given as:

$$Y = \alpha + \beta W + \delta X \quad (1)$$

Where; Y is the economic growth, α is constant; β and δ are coefficients; W denotes minimum wage, and X denotes included exogenous variables that influence the economic growth. Based on the objective of this study, the functional model is stated as:

$$LGDP = F(LMW, LUNEMP, LINF) \quad (2)$$

The estimated model is specified in the equation (3) where, LGDP represent economic growth, γ and δ are the coefficient estimated, log of minimum wage LW, unemployment rate and inflationary rate is the LUNEMP and LINF. μ is the error term. .

$$GDP = \alpha + \gamma LW + \delta UNEMP + \beta INF + \mu \quad (3)$$

$$\Delta GDPt = \beta_o + \beta_1 GDP_{t-1} + \beta_2 LMW_{t-1} + \beta_3 UNEMP_{t-1} + \beta_4 INF_{t-1} + \sum_{i=0}^{p} \Psi_1 \Delta GDP_{t-1} + \sum_{i=0}^{p} \Upsilon_1 \Delta LMW_{t-1} + \sum_{i=0}^{p} \varphi_1 \Delta UNEMP_{t-1} + \sum_{i=0}^{p} \lambda_1 \Delta INF_{t-1} + \mu_t \quad (4)$$

The coefficient β denotes the parameters of the variables in question. The subscript $_{t-1}$ denotes period of lag.

Δ denotes the differential operator or change

These coefficients $\psi, \gamma, \varphi, \lambda, \delta$ denote the parameters of each variable given the change or first differences, while μ denotes error term.

t represents time period.

Equation (4) represents the Long run model and the equation (5) below is the short-run model considered for estimation.

$$\Delta GDPt = \beta_o + \beta_1 GDP_{t-1} + \beta_2 LMW_{t-1} + \beta_3 UNEMP_{t-1} + \beta_4 INF_{t-1} + \sum_{i=0}^{p} \Psi_1 \Delta GDP_{t-1} + \sum_{i=0}^{p} \Upsilon_1 \Delta LMW_{t-1} + \sum_{i=0}^{p} \varphi_1 \Delta UNEMP_{t-1} + \sum_{i=0}^{p} \lambda_1 \Delta INF_{t-1} + ECM_{t-1} + \mu_t \quad (5)$$

ECM_{t-1} is the short-run speed of adjustment. All the subscript of the variables are as earlier explained

4. Results and Discussion

The section presented the empirical estimation results of all the techniques of analysis used. The ADF and PP unit root test result is conducted to determine the series behavior, followed by the ARDL bounds test of co-integration and the ARDL estimation result.

Table 1: Augmented Dicky-Fuller (ADF TEST)

Variable	Level	1st Difference	Level	1st Difference
	Constant		Constant And Trend	
GDP	-3.487747***	-10.34188***	-5.634621***	-7.020404***
LM	-1.837506	-8.327007***	-1.701595	-8.529592***

W				
UNEMP	-1.001679	-7.219056***	-3.174836*	-7.119217***
INF	-3.321512**	-6.061946***	-3.792401**	-5.982921***

Note: ***, **, and * represent significance levels at 1%, 5%, and 10%, respectively. The length of the lag is calculated automatically using Schwartz information criterion.
Source: Authors Computation Extracted from Eviews (2022)

The unit root test results in Table 1 shows that GDP and INF integrated at the order I (0) whereas, the constant with the trend GDP, INF and UNEMP were integrated at the order I (0). However, the LMW integrated after the first differences I(1) in the constant and constant with the trend. Therefore, rejection of null hypothesis (H0) implies that the series has unit root as against the alternative hypothesis the series has no unit root. In order to determine the appropriate technique of analysis to be used, the ARDL bounds test for co-integration is conducted, the result is given as;

Table 2: The Result of ARDL Co-integration Test

Bound Test to Co-integration		
F (GDP, LMW, UNEMP, INF,)		
Optimal lag structure	ARDL (1, 0, 0, 0,)	
F-statistic 11.65324	K=3	
Significant level	critical value {Lower bound 1(0)}	critical value {upper bound 1(1)}
10%	3.47	4.45
5%	4.01	5.07
2.5%	4.52	5.62
1%	5.17	6.36

Source: Authors Computation Extracted from Eviews (2022)

Table 2 presents the ARDL bounds test result. The F-statistics value (11.653) is greater than the upper bound critical value at all significance levels. The ARDL bounds test result shows that there is a long-run relationship among the variables employed. Therefore, the ARDL estimation became visible for estimation. The unit root test results showed mix order of integration, and the ARDL bounds test result revealed a long-run relationship. The long-run and short-run ARDL estimations are illustrated in Table 3. T-statistics values given in the bracket, panel A presented long-run results and panel B displayed short-run results.

Table 3: The Long-run and Short-run Results

Dependent variable (GDP)		**PANEL "A"**		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LMW	2.014462	0.478959	4.205912	0.0005***
INF	0.290546	0.145131	2.001950	0.0506**
UNEMP	-1.768773	0.922906	-1.916526	0.0613*
C	6.717823	1.416933	4.741101	0.0002***
	ppp	**PANEL "B"**		
LΔMW	1.502256	0.482999	3.110266	0.0060***
ΔINF	0.261053	0.118781	2.197765	0.0413**
ΔUNEMP	-2.758694	0.918943	-3.002028	0.0077***
ECM(-1)	-0.898491	0.172052	-5.222196	0.0001***

Source: Authors Computation Extracted from Eviews (2022)

Table 3 showed the long-run and short-run ARDL estimation results. Panel A and B presented the long-run and short-run results. Both panels (long and short-run) reveal that the national minimum wage (MW) was positively and statistically significant on economic growth in Nigeria within the study period. With a 1% increase in the national minimum wage (MW), the economic growth would appreciate by 2.0% in the long run and 1.5% in the short run. This finding supports (Xu *et al., 2015;* Sauer, 2018) that minimum wage improves national income growth but contrasts the negative reported by (Idiaye *et al.,* 2018; Antonova, 2018; Saleh *et al.,* 2019; Philip *et al.,* 2021).

Similarly, the inflation estimation reported positive and statistically significant in both periods. Especially, a percentage increase in the inflationary rate would cause economic growth expand in Nigeria by 0.3% and 0.3%. This supports the discovering of Idiaye et al. (2018); Babalola (2019). However, it contradicts the study's prior expectation of the previous study (Alege *et al., 2021*), which shows that increase in inflation negatively affect the country's economic growth.

Correspondingly, the unemployment coefficient has a negative and statistically significant effect on the economic growth in both panels. Indicating that with a 1% increase in the unemployment rate, the economic growth would deflate by1.8% in the long run and 2.8% in the short run. This could be associated with negative employment, low output and profitability of the minimum wage implementation thereby declining economic growth,

although the result satisfies the theoretical expectation of the study, it contradicts the findings of (Babalola, 2019; Suparta and Murgianto, 2021). The speed of adjustment has the vital sign (negative) and is statistically significant. Implying a short-run fluctuation will be adjusted to equilibrium in the long run with an average speed of 89% annually.

The residual and stability tests are shown in Tables 4, 5 and 6 respectively. These tests were conducted to ascertain the conformity of the techniques of analysis and adopted assumption of the OLS.

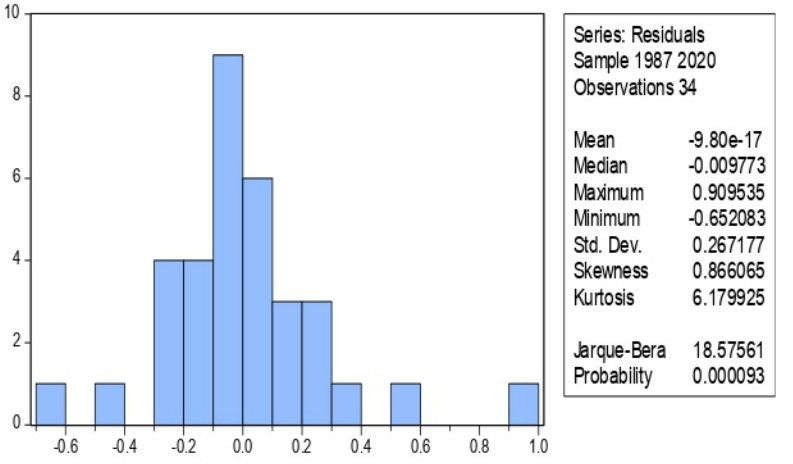

Figure 1: Normal distribution
Source: Authors Computation Extracted from Eviews (2022)

Table 4: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.300670	Prob. F(2,32)	0.7424
Obs*R-squared	0.719366	Prob. Chi-Square(2)	0.6979

Source: Authors Computation Extracted from Eviews (2022)

Table 5: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.611272	Prob. F(4,34)	0.6574
Obs*R-squared	2.616494	Prob. Chi-Square(4)	0.6239
Scaled explained SS	19.15799	Prob. Chi-Square(4)	0.0007

Source: Authors Computation Extracted from Eviews (2022)

The probability values of the various diagnostic tests given in the tables above. The result shows that the error term is not normally distributed

with zero mean and constant variance. The required probability value should be greater than 5% while homoscedastic and not serial correlated.

5. Conclusion and Recommendations

Interestingly, it is argued that increase in the national minimum wage caused labour expenses and output prices, lower company profitability and job training, and have negative employment, while the extremists opined that it destroyes savings, raised inflation and unemployment, hence stagnates economic growth. However, this study is built based on the former argument, and it empirically investigated effect of the National Minimum Wage on the economic growth of Nigeria using the ARDL techniques of analysis on the time series data collected. Therefore, it recommends that the three tiers of government and the private sector in Nigeria should implement and upgrade to the new national minimum wage of ₦30,000 to improve the income and capacity of low-skilled employees. Again, the government should continue to pursue macroeconomic objectives of price stability, employment and growth in domestic products to enhance the income stability of workers.

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