An Empirical Assessment of the Effects of Minimum Wage Increases on Unemployment during Democratic Governance in Nigeria

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Abstract

Conventional economic theorizing posits that increases in minimum wages depress employment. Using Ordinary Least Squares estimating technique, Granger Causality, CUSUM and CUSUM Squares stability tests on Nigerian data during the democratic governance (1999 to 2012), we find that minimum wage was highly positively correlated with unemployment with correlation coefficient of 0.8328, but there was no evidence to support the existence of causality between minimum wage and unemployment. Empirical result suggests consistent evidence that minimum wage hikes were associated with increases in unemployment. It shows that a 1% increase in the federal minimum wage decreased employment by about 6.4 percent in the current year and 9.9 percent in the subsequent year. However, the null hypothesis of stability of the empirical results could not be rejected. Our finding implies that minimum wage hikes were detrimental to employment creation policy of the Nigerian government during her 13 years of democratic governance.

Keywords: Minimum wage, Unemployment, Ordinary Least Squares, Granger Causality, Stability Tests, Nigeria, Democratic Governance

JEL Classification Codes: CO1, C12, E24, C51. J08, J31

1. Introduction

Numerous governments around the world set a minimum wage in order to raise wages of workers whose wages are relatively low. Currently, fixing of National Minimum Wage is one of the topical issues that is being extensively debated in the ongoing National Conference in Abuja, the Nigeria's Federal Capital Territory**.** Minimum-wage laws dictate the lowest price for labor that any employer may pay (Mankiw, 2011). Hence, requiring that firms or organisations pay minimum wages are illustrations of government interventions designed to raise the income of specific groups; the purpose of which is to provide a 'wage floor' that will help less-skilled workers earn enough income to escape poverty (McConnell, *et al*, 2009). Minimum wage policy supported by a strong social policy is an efficient mechanism against poverty and income erosion of the poorest households. Herr and Kazandziska (2011) assert that minimum wage is one of the instruments which can control wage dispersion and in this way reduce income inequality. It can also help to prevent a general decline in the level of nominal wages and deflationary developments.

According to ILO (1970), the elements to be taken into consideration in determining the level of minimum wages include (a) the needs of workers and their families, taking into account the general level of wages in the country, the cost of living, social security benefits, and the relative living standards of other social groups; (b) economic factors, including the requirements of economic development, levels of productivity and the desirability of attaining and maintaining a high level of employment. How high the minimum wage should be treated as a country-specific issue. In many countries the amount of the minimum wage to average wage is set in practice at around 40 per cent (ILO, 2009:10).

As vaguely defined as it is, minimum wage has been extensively studied and debated by economists over time, each with divergent views. For instance, in a survey of 210 members of the American Economic Association, Whaples (2006) found that about 47 percent of the economists surveyed believed that the federal minimum wage in the United States should be eliminated, while about 38 percent believed that the minimum wage should be increased.

Some economists oppose increases in the minimum wage on grounds that such increases boost unemployment. Other economists argue that the demand for unskilled labor is relatively inelastic, so a higher minimum wage boosts the incomes of unskilled workers as a group.

That gain, they say, justifies the policy, even if it increases unemployment. Some policy analysts contend that the government may respond to low wages for some workers not by imposing the minimum wage, but by attempting to increase the demand for those workers, or by subsidizing the wages of workers whose incomes fall below a certain level (Rittenberg and Tregarthen, 2011).

Card and Krueger's (1994) study of the impact on employment resulting from an increase in New Jersey's minimum wage in the early 1990s, found that the increase in New Jersey's minimum wage did not decrease employment. As provocative as it was, Card and Krueger's study is said to have presented a finding that is at odds with the implications of the analysis of the minimum wage usually presented in microeconomics textbooks (Besanko *et al*, 2011).

Over time, the Nigerian workers have been asking for a general upward review of wages and an increase in the National Minimum Wage. The government has always set up Ad hoc Commissions to consider bonuses or wage revisions during period of labour discontents. Collective bargaining has never played any significant role in wage fixing and labour relations especially in the public sector in Nigeria. Fixing of wages and salaries were based on the recommendations of Wage Review Commissions. As indicated in Table 1 below, since the first Wage Review Commission was set up in 1934, there have been several of such Commissions and Panels.

Minimum wage can also be set through Decree (usually during military regime) and Acts of Legislation. President Olusegun Obasanjo in 1999 fixed minimum wage at ₦7,500 while the current ₦18,000 minimum wage which took effect from January 2011 was approved by president Goodluck Jonathan in August 2010. Unfortunately, the National minimum wage of ₦18, 000 was objected by many State Governors on the ground that it would have macroeconomic effects on the economy. Hence, many states of the federation are yet to fully implement it. However, available records from the Office of the Head of Service, Abuja show that some states in the country even pay higher than the current Federal Minimum Wage of ₦18, 000. These states and their minimum wages are Abia (₦20, 100), Borno (₦18, 229), Edo (₦20, 100), Imo (₦20, 100), Ogun (₦20, 250), and Ondo (₦20, 100, effective April 2013).

Table1: Wage Review Commissions in Nigeria, 1934 to 2010

Commissions	Year
The Hunt Commission	1934
Bridges Committee of Enquiry	1941
The Tudor Davis Commission	1945
The Harragin Commission	1946
The Miller Commission	1947
Phillipson - Adebo Commission	1948
The Gorsuch Commission	1954
Mbanefo Commission	1959
The Morgan Commission	1963
Eldwood Commission	1966
The Adebo Commission	1970/1971
Udoji Commission	1972
The Cookey Commission	1981
Dotun Phillips Commission	1985
The Allison Ayida Review Panel	1994
Philip Asiodu Committee	1998/1999
Ernest Shonekan Committee	2000
Justice Alfa Belgore Committee	2009/2010

Source: National Salaries, Incomes and Wages Commission (2010)

Although the goals of the minimum wage are widely accepted as proper, there is great disagreement as to whether the minimum wage is effective in attaining its goals. As earlier alluded, from the time of its introduction, minimum wage laws have been highly controversial politically, and have received much less support from economists than from the general public. Despite decades of experience and economic research, debates about the effects of minimum wage increase continue today.

The main objective of this study, therefore, is to empirically examine the effects of minimum wage increases on unemployment in Nigeria. This study is quite justified given the fact that the Nigerian economy is characterized by low wages with high rate of unemployment. It is envisaged that the findings from this study would be useful to policy makers, human resource managers and the private sectors.

The study is a short run analysis, covering thirteen years of smooth democratic rule in Nigeria, 1999 to 2012. The choice of this period is based on the seeming belief that the military rule is no more welcome and the civilian government allows more freedom and civil rights. Labour unions now have the freedom and more rights to bargain for wage increase in the country. Also during this period, the Nigerian Labour Congress (NLC) had frequently agitated for minimum wage increases across the country. Above all, this study is a partial equilibrium analysis, based on simplifying assumptions that the quality of labor did not change as the minimum wage hiked (employers were able to hire better workers at higher wages). We also ignore the fact that a minimum wage law in one market may have affected wage rates in other markets, ultimately affecting the prices of many goods and services. Like most other studies, our effort is not that of finding the philosopher's stone, but a contribution to the existing literature on the effects of minimum wage hikes on ~~and~~ employment generation.

Following this introduction, the rest of the paper is structured as follows: Section 2 provides the theoretical framework and the empirical literature review. Section 3 describes the analytical methodology, covering the sources of data, scope, characteristics of variables, model specification, and causality tests. Empirical findings and analysis are discussed in section 4, while the policy implications and concluding remarks are contained in section 5.

2. Theoretical Nexus and Literature Review

The Classical economists attribute unemployment to a situation where labour market does not equilibrate because real wage is set at an inappropriate level. For most types of skilled labor, the minimum wage set by the government will be well below the equilibrium wage rate in a free market. A minimum wage law will have no effect in such a market. The upward sloping supply curve *S* (Figure 1)shows how many hours workers will supply at any wage rate, while the downward sloping demand curve *D* indicates how many hours of labor employers will hire. With no minimum wage law, equilibrium occurs at the point where the demand curve and the supply curve intersect. Here, every worker willing to supply labor at the equilibrium wage rate will find work, and every employer willing to pay that rate will be able to hire all the workers he wants.

But for the market for unskilled labor, the minimum wage requirement may be above the wage level in a free market. Figure 1 illustrates impact of a binding minimum wage in the market for unskilled labor. Because the minimum wage is a price floor, it decreases the demand for labor and causes an excess labor supply. Thus, a minimum wage that is set above the equilibrium wage would create a surplus of unskilled labor. The result is unemployment, which measures more than just the decrease in the demand for labor; it measures the excess supply of labor as well. Since unskilled workers are a substitute for skilled workers, forcing the price of unskilled workers higher would increase the demand for skilled labor and thus increase their wages (Rittenberg and Tregarthen, 2011).

The impact of the minimum wage depends on the skill and experience of the worker. Highly skilled and experienced workers are not affected because their equilibrium wages are well above the minimum. For these workers, the minimum wage is not binding (Mankiw, 2011). The minimum wage has its greatest impact on the market for teenage labor.

The equilibrium wages of teenagers are low because teenagers are among the least skilled and least experienced members of the labor force. In addition, teenagers are often willing to accept a lower wage in exchange for on-the-job training. Some teenagers are willing to work as "interns" for no pay at all (Mankiw, 2011).
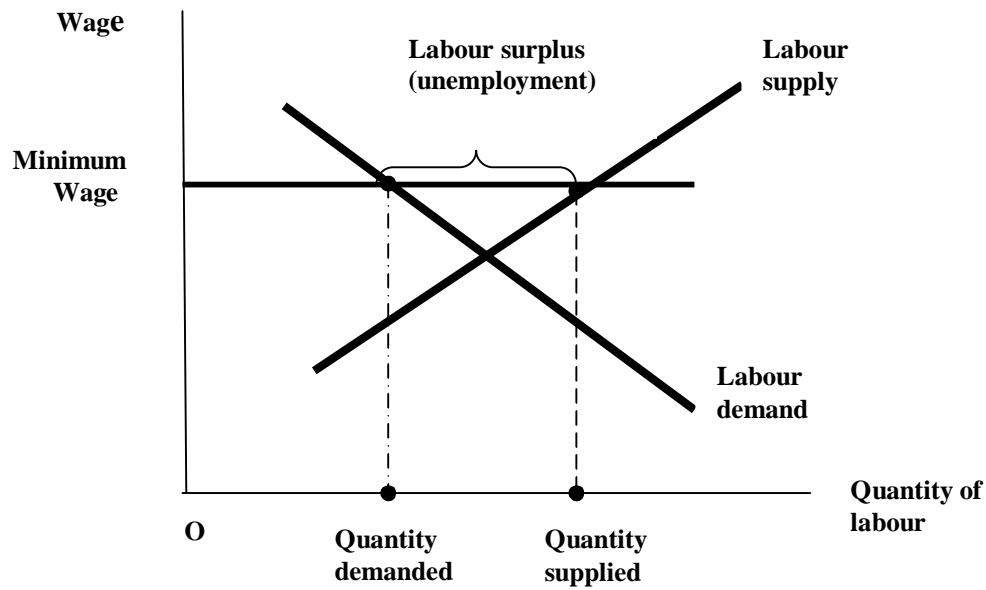
Figure 1: A Labor Market with a Binding Minimum Wage

In addition to altering the quantity of labor demanded, the minimum wage alters the quantity supplied as well. Because the minimum wage raises the wage that teenagers can earn, it increases the number of teenagers who choose to look for jobs. Studies have found that a higher minimum wage influences which teenagers are employed. When the minimum wage rises, some teenagers who are still attending high school choose to drop out and take jobs. These new dropouts displace other teenagers who had already dropped out of school and who now become unemployed (McConnell *et al*, 2009).

Varian (2010) has noted however that things are very different if the labor market is dominated by a monopsonist. In this case, it is possible that imposing a minimum wage may actually increase employment. If the government sets the minimum wage equal to the wage that would prevail in a competitive market, the "monopsonist" now perceives that it can hire workers at a constant competitive (equilibrium) wage. Since the wage rate it faces is now independent of how many workers it hires, it will hire until the value of the marginal product equals the competitive wage. That is, it will hire just as many workers as if it faced a competitive labor market. Setting a wage floor for a monopsonist is just like setting a price ceiling for a monopolist; each policy makes the firm behave as though it faced a competitive market (Varian, 2010).

Empirical studies of the effects of minimum wages in some industries have suggested that the effects of a minimum wage law may not be as predicted with the competitive market analysis presented in Figure 1 above. The competitive market model predicts that an increase in the minimum wage law should lead to a decrease in employment in a market with an upward-sloping supply curve and a downward-sloping demand curve for labor (Besanko, *et al*, 2011). However, in their study of the effect of an increase in the minimum wage from $4.25 to $5.05 in New Jersey in 1992, using data from the fast-food industry, Card and Krueger (1994) found no indication that the increase in the minimum wage led to any decrease in employment in the industry. The authors suggest that this industry may not have been perfectly competitive, perhaps because employers did not act as price takers in the labor market, or perhaps for other reasons.

As Figure 1 above suggests, a union's success in achieving above-equilibrium wage tend to be accompanied by a decline in the number of workers employed. That result acts as a restraining influence on union wage demands. Critics, reasoning in terms of Figure 1 above, contend that an above- equilibrium minimum wage will simply cause employers to hire fewer workers, as depicted by the down-sloping labour demand curve. In some cases, the higher labour costs may force some firms out of business. Consequently, some of the poor, low-wage workers whom the minimum wage was designed to help will find themselves out of work. Critics point out that a worker who is unemployed and desperate to find a job at a minimum wage is clearly worst off than he would be if employed at a market wage rate (McConnell et al, 2009).

It has been argued that low-wage earners have a higher propensity to consume than richer households and thus higher minimum wages increase aggregate demand and output. (Herr and Kazandziska 2011)

Critics also point out that much of the benefit of the minimum wage accrues to workers, including many teenagers, who do not live in impoverished households. However, in a less competitive, low-pay labour market where employers possess some monopsony power, the minimum wage can increase wage rates without causing significant unemployment. A higher minimum wage may even produce more jobs by eliminating the motive that monopolistic firms have for restricting employment (McConnell *et al*, 2009).

Several aspects of the impact of minimum wage have been investigated in the literature using varying methodologies. Grossman (1983) explored how changes in minimum wage affect various occupational wages. He postulated that other wages would increase in two ways: i) as firms seek to cushion the effect of deteriorating workers' wages on their productivity wages would rise; and ii) minimum wage would lead to an initial increase in the demand for non- minimum wage workers, a compression in white- collar occupations, and eventually rise in average wage.

Adams (1987) investigated the macroeconomic effects of minimum wage in the USA by employing a macro-econometric model to simulate the effect of change or increase in minimum wage on economic variables such as real wage, employment, unemployment, price level and real gross national product (GNP). He found that an increase in minimum wage would have a corresponding increasing effect on price level and unemployment. Adam's findings are similar to those of Brown *et al* (1982), who used time series regression to analyse the effects of minimum wage on employment and unemployment. They found that the magnitude of the impact of minimum wage on employment and unemployment is dependent on the prevailing economic situation, though the finding indicated a positive relationship between minimum wage and unemployment, and a negative relationship between minimum wage and employment.

Studying the industry-based British Wages Councils between 1975 and 1992, Dickens *et al* (1999) found that minimum wages significantly compress the distribution of earnings but do not have a negative impact on employment. While analyzing the potential economic impact of increasing the Minimum Wage in Massachusetts, Sasser (2006) estimated that increase the minimum wage could have a negative impact on employment ranging from 2,100 to 10,500 jobs.

In a similar study Newmark *et al* (2004), used a panel time series adjustment in minimum wage on wages, labour hour, employment and labour income within the USA economy. They found that low-wage workers are the most beneficiaries of minimum wage, while higher- wage workers derived little or no benefits from policies that raised minimum wage. The study revealed that though low-wage workers income increased with the raising of minimum wage, their hours and employment declined, leading to overall negative effects on minimum wage policy.

A study conducted by the U.S' Fiscal Policy Institute (FPI) (2004) claims that increases in the minimum wage at the state level has had no adverse employment effects. But Fuchs *et al*. (1998) assert that the FPI's study challenges the widely shared view among labor economists that minimum wage hikes cause unemployment of low-skilled workers. Sabia (2006), while refuting the findings of the FPI in his study, found that increases in the minimum wage decrease employment, particularly for low-skilled and entry-level employees. Sabia concludes that "A 10 percent increase in state minimum wages is consistently associated with a 1 percent reduction in retail employment and a 1 percent reduction in small business employment" (p. 15). Studies by Neumark *et al*. (2005) and Burkhauser and Sabia (2004) suggest that raising the minimum wage is a poor policy tool to aid low-skilled workers.

Folawewo (2007) examined the macroeconomic effects of minimum wage (MW) policy in Nigeria using a static computable general equilibrium. He found that the impact of MW increase on employment is mixed; while it leads to marginal rise of employment in agricultural sector, there is a marginal fall in services sector's employment, and no significant effect in manufacturing and mining and oil sectors.

3. Analytical Methodology

Our analysis of the effects of minimum wage increase on unemployment in Nigeria is based on a time series data spanning from 1999 to 2012, compiled from various issues of the Central Bank of Nigeria (CBN) Annual Reports, National Bureau of Statistics (NBS), Minimum Wage Legislation Acts, Wage Board and Industrial Council Acts and the National Minimum Wage Bill (2011).

The research work made use of the econometric procedure in estimating the relationship between the variables. The Ordinary Least Square (OLS) technique was employed to obtain the numerical estimates of the coefficients of the equation. The OLS method was chosen because it is intuitively appealing; possesses some optimal statistical properties, with fairly simple computational procedure and also an essential component of most other estimation techniques. A multiple regression equation was specified for this study. The dependent variable is unemployment rate while the main independent variable is the Minimum Wage rate. The resulting estimated model was assessed based on both economic and statistical/econometric inferences.

3.2 Model Specification

The following econometric model has been specified to determine the impact of minimum wage increases on unemployment in Nigeria.

$$UNEM_t = \beta_0 + \beta_1 MW_t + \beta_2 MW_{t-1} + \beta_3 RGDP_t + \beta_4 INFLA_t + \beta_5 MSG_t + u_t \ldots \quad (1)$$

Where,

Un_t= unemployment rate (ratio of unemployed to population) at time t.

MW_t= natural logarithm of the Federal Government minimum wage rate at time t; expected to have positive relationship with unemployment (i.e., $\beta_1 > 0$).

MW_{t-1} = natural logarithm of the lagged Federal Government minimum wage at time t, to capture the lagged minimum wage effect (i.e., $\beta_2 > 0$).Neumark *et al* (1994), observe that firms may respond to minimum wage hikes following their implementation.

$RGDP_t$ = natural logarithm of real Gross Domestic Product, a control variable, included because it is believed to have a negative effect on unemployment (i.e., $\beta_3 < 0$).

$INFLA_t$ = inflation rate at time t, also, a control variable to capture the unanticipated effects of price instability on unemployment. Inflation and unemployment are inversely related (i.e., $\beta_4 < 0$).

MSG_t = Growth rate of money supply at time t, a control variable, capturing the quantity theory paradigm. Money supply is believed to have a negative effect on unemployment (i.e., $\beta_5 < 0$).

u_t = white noise, stochastic elements, with zero mean and constant variance. We assume that the random variables are uncorrelated with each other. .

$\beta's$are parametric estimates.

As can be seen from the above specified models, the main independent variable for this study is the Federal Government of Nigeria's Minimum Wage rate. State government minimum wages are not used because they vary from State to State, depending on statutory allocation and internally generated revenues. It should be noted however that the omission of the control variables in the two models may result in biased estimate of the impact of minimum wage increases (Sabia, 2006; Gujarati and Sangetha, 2008). The resulting estimated models were assessed based on both economic and statistical/econometric inferences.

3.3 Causality Test

We conducted causality tests to explore the transmission mechanisms between minimum wage and unemployment using the following equations:

$$UNEM_t = MW_t + \aleph \sum MW_{t-1} + \gamma \sum MW_{t-2} + \delta \sum MW_{t-3} + \mu_{1t} --- (2)$$

$$MW_t = UNEM_t + \tau \sum UNEM_{t-1} + \varphi \sum UNEM_{t-2} + \omega \sum UNEM_{t-3} + \mu_{2t} --- (3)$$

Where,$\aleph$, γ, δ , τ, φ, and ω are parametric coefficients; μ_1, μ_2, μ_3 and μ_4 are assumed to be 'white noise' or error terms with zero mean and constant variance.

4. Empirical Findings and Analysis

We begin the empirical investigation with the plots of the variables used in the study in order to have preliminary insights into the behavior and characteristics of the series. They are displayed in Figure 2: Some of the variables are found to have increased in the long run, i.e. they have positive trends, while some, such as inflation rate, shows irregular periodic fluctuations.
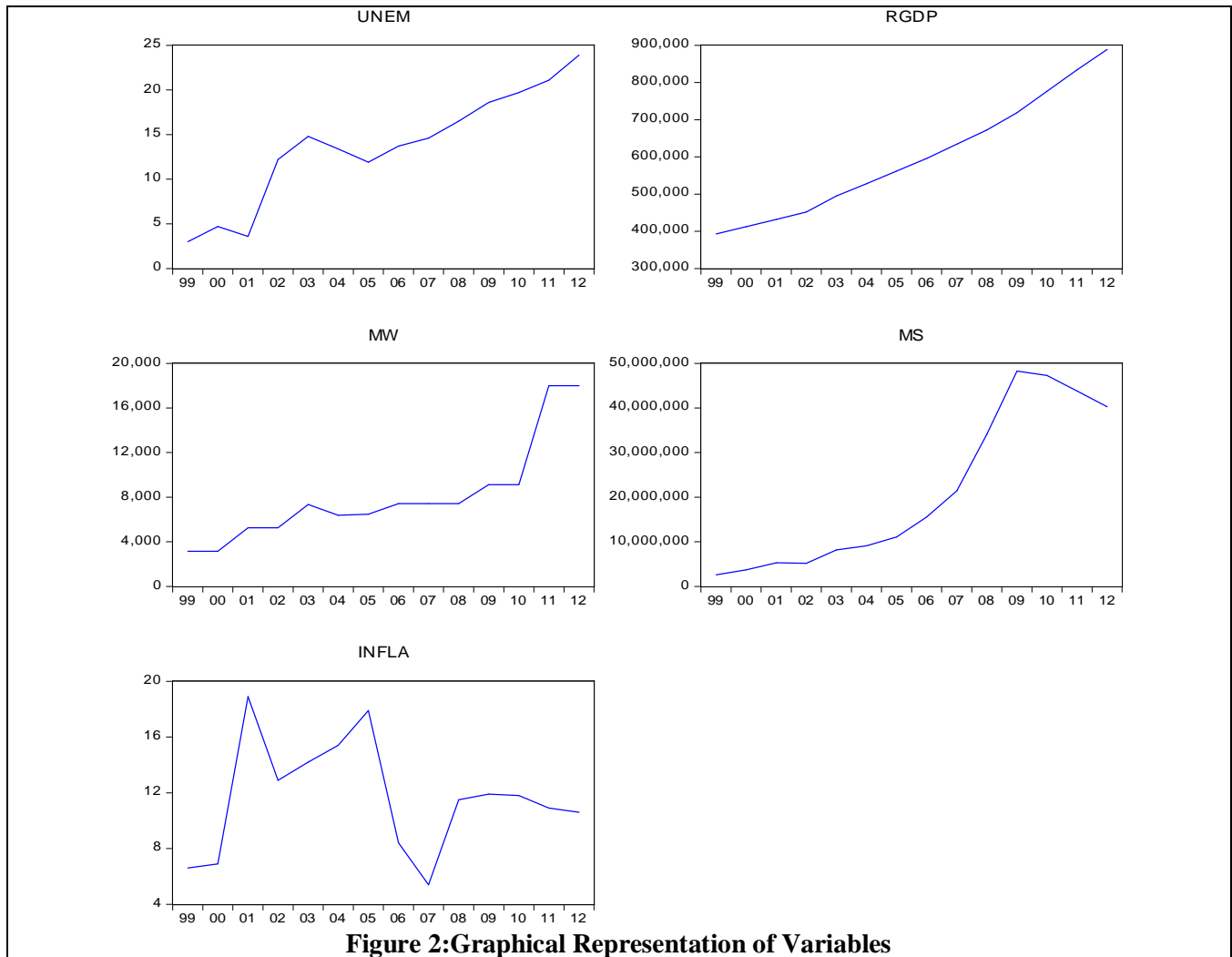
Figure 2:Graphical Representation of Variables

4.1Summary Statistics

The summary statistics of the dependent and independent variables used in the study are shown on Table 2. Average unemployment rate in Nigeria within the period of the study (1999 – 2012) stood at 13.69 percent and varied between 3.0 and 23.9 percent with a standard deviation of about 6.39; real gross domestic product averaged ₦599, 571.5 billion and varied between ₦393107.2 and ₦888893.0 million. With a mean minimum wage of ₦8108.18 and average growth in money supply of ₦21, 129,257 billion, inflation rate averaged 11.66 percent, varying between 5.4 and 18.9 percent.

Table 2: Summary Statistics of the Variables

	UNE	RGDP	MW	MS	INFLA
Mean	13.69286	599571.5	8108.179	21129257	11.66429
Median	14.15000	578876.5	7380.465	13319817	11.65000
Maximum	23.90000	888893.0	18000.00	48288569	18.90000
Minimum	3.000000	393107.2	3149.200	2599317.	5.400000
Std. Dev.	6.395607	160736.7	4565.049	17684112	4.049807
Skewness	-0.353383	0.381852	1.373147	0.490282	0.205944
Kurtosis	2.268479	1.948429	3.912298	1.555230	2.254179
Jarque-Bera	0.603541	0.985276	4.885080	1.778506	0.423443
Probability	0.739508	0.611012	0.086940	0.410963	0.809190
Sum	191.7000	8394001.	113514.5	2.96E+08	163.3000
Sum Sq. Dev.	531.7493	3.36E+11	2.71E+08	4.07E+15	213.2121
Observations	14	14	14	14	14

Source: Author's computation.

The probabilities of Jarque-Bera for the variables, except for minimum wage are not significant; hence we fail to reject the null hypothesis that the series are normally distributed.

4.2 Granger Causality Results

The results of the Granger Causality tests are presented in Table 3. The results do not show any evidence to support the existence of causalities between minimum wage and unemployment or between inflation and minimum wage. However, the results provide evidence of unidirectional causalities running from unemployment (UNEM) to real gross domestic product (RGDP) at 1 percent level of significance, RGDP to money supply (MS) at 5 percent as well as from MS to minimum wage (MW) at 1 percent as judged by their respective probability values. There is also no existence of causality between the remaining pairs of variables.

Table 3: Pairwise Granger Causality Results

Sample: 1999 – 2012 Lags: 2			
Null Hypothesis	**Obs**	**F-Statistic**	**Prob.**
RGDP does not Granger Cause UNE	12	1.98095	0.2081
UNEM does not Granger Cause RGDP		9.77918	0.0094**
MW does not Granger Cause UNE	12	1.25744	0.3415
UNE does not Granger Cause MW		0.32667	0.7318
MS does not Granger Cause UNE	12	1.16359	0.3662
UNE does not Granger Cause MS		0.33113	0.7288
INFLA does not Granger Cause UNE	12	1.05672	0.3972
UNE does not Granger Cause INFLA		0.82992	0.4749
MW does not Granger Cause RGDP	12	0.50031	0.6265
RGDP does not Granger Cause MW		0.68113	0.5367
MS does not Granger Cause RGDP	12	0.63659	0.5572
RGDP does not Granger Cause MS		4.06411	0.0674*
INFLA does not Granger Cause RGDP	12	1.45748	0.2957
RGDP does not Granger Cause INFLA		2.30602	0.1701
MS does not Granger Cause MW	12	31.3002	0.0003**
MW does not Granger Cause MS		1.61873	0.2643
INFLA does not Granger Cause MW	12	0.06419	0.9384
MW does not Granger Cause INFLA		0.70114	0.5278
INFLA does not Granger Cause MS	12	0.81461	0.4808
MS does not Granger Cause INFLA		1.09898	0.3845

(*) (**) indicate 0.05 and 0.01 statistical level of significance.

4.3 Correlation Matrix

The correlation matrixes of the variables used in the study are shown in Table 4. It shows that minimum wage (MW) is highly positively correlated with unemployment ($r^2 = 0.8328$), money supply ($r^2 = 0.7419$), real GDP ($r^2 = 0.8943$), and least negatively related with inflation ($r^2 = -0.0212$). Corollary, unemployment is highly positively correlated with money supply $r^2 = 0.8406$) and real gross domestic product ($r^2 = 0.9242$), but lowly negatively related with inflation ($r^2 = -0.0239$). Theoretically, a higher level of output should result in a lower level of unemployment. The high positive relationship between money supply and real GDP in the country during the period of the study reveals itself in the value of the partial correlation coefficient between them ($r^2 = 0.9305$). We found that money supply is insignificantly negatively correlated with inflation ($r^2 = -0.1195$), but economic theory posits that the inflation rate depends primarily on growth in the quantity of money, controlled by the Central Bank.

Table 4: Correlation Matrix of the Variables

Correlation coefficients, using the observations 1999 – 2012
5% critical value (two-tailed) = 0.5324 for n = 14

MW	UNEM	INFLA	RGDP	MS	
1.0000	0.8328	-0.0212	0.8943	0.7419	**MW**
	1.0000	-0.0239	0.9242	0.8406	**UNEM**
		1.0000	-0.1040	-0.1195	**INFLA**
			1.0000	0.9305	**RGDP**
				1.0000	**MS**

Source: Author's computation

4.4 Empirical Results

The regression results based on Ordinary Least Square (OLS) estimating technique is shown in Table 5. It shows that the coefficients of both the current and lagged estimated minimum wages are rightly signed (positive); the lagged minimum wage coefficient was found to be statistically significant at 5 percent level whereas the current minimum wage coefficient was not. We therefore rejected the null hypothesis and concluded that minimum wage increases is significant to explain unemployment rate in Nigeria. The result suggests consistent evidence that minimum wage hikes are associated with increases in unemployment, especially in the lagged period. It shows that at 5 percent level of significance, a 1% increase in the federal government minimum wage decreases employment (and hence increases unemployment) by about 9.9 percent in the subsequent year. Neumark *et al* (1994), observe that firms may respond to minimum wage hikes following their implementation.

Table 5: Regression Results

Method: OLS, using observations 2000-2012 (T = 13)
Dependent variable: UNEM

Variable	Coefficient	Std. Error	t-ratio	p-value
Const	135.974	158.574	0.8575	0.41957
Log MW	6.38009	3.44072	1.8543	0.10610
Log MW(-1)	9.90117	3.33328	2.9704	0.02080**
Log MS	5.86398	3.11238	1.8841	0.10155
Log RGDP	-27.1396	18.5407	-1.4638	0.18666
INFLA	-0.15576	0.15427	-1.010	0.3463

Mean dependent var	14.51538	S.D. dependent var		5.835359
Sum squared resid	22.25950	S.E. of regression		1.783236
R-squared	0.945525	Adjusted R-squared		0.906614
F(5, 7)	24.29975	P-value(F)		0.000274
Log-likelihood	-21.94203	Akaike criterion		55.88406
Schwarz criterion	59.27375	Hannan-Quinn		55.18732
Rho	-0.037338	Durbin-Watson		2.002703

(**) indicates statistical significance at 0.05 level

On the other hand, the coefficients of real gross domestic product (RGDP) and inflation rate (INFL) were found to be negative, which are in agreement with economic theory; meaning that real gross domestic product and inflation rate are negatively related to unemployment. As it shows, a one (1) percent increase in real GDP reduced unemployment by approximately 27.1 percent. However, the coefficients of both variables (RGDP, INFLA) were not statistically significant as indicated by their respective p-ratios.

The estimate of the intercept (constant) was found to be positive (135.974) but statistically insignificant as indicated by the p- value (0.41957). This could imply the natural rate of unemployment which depends on various features of the labor market.

The explanatory power or coefficient of determination (R^2) indicates that about 94.5 percent of total variation in unemployment in Nigeria during the period of the study was explained by the various explanatory variables included in the model or regression equation, while the remaining 5.5 percent represents the total variation in unemployment that was unaccounted for by the regression line and was attributed to the factors incorporated in the stochastic error term. The goodness of fit of the regression remained robust and low even after adjusting for degree of freedom (df) as indicated by the adjusted R^2 (0.906614), implying that the actual impact of the explanatory variables on unemployment was 90.66 percent.

The F–statistic (24.29975) which is a measure of explanatory power of the overall unemployment model indicates that the parameters are jointly significant at one (1) percent level as indicated by its probability value (0.000274). This further confirms the significance of the goodness of fit (R^2) of the model, as high values of F- statistics would suggest significant relationship between unemployment and the included explanatory variables. The Durbin – Watson statistics of 2.0027 indicates that there is no problem of autocorrelation. The fact that the computed Durbin-Watson statistic (2.00027) in Table 5 is greater than R^2 value (0.945525) indicates that the model is not spurious or nonsensical and hence can be used for policy decisions. Both the regression residuals and fitted/actual estimated unemployment model are depicted in Figures 3 and 4 respectively.

4.5 Stability Tests

The empirical results were also subjected to stability tests (CUSUM and CUSUM Squares tests), as shown in figures 3 and 4. According to Brooks (2008; pp. 187-188), "the CUSUM statistic is based on a normalized (i.e. scaled) version of the cumulative sums of the residuals. The null hypothesis of perfect parameter stability, the CUSUM statistic is zero; however, many residuals are included in the sum (because the expected value of a disturbance is always zero). The standard error bands are usually plotted around zero and any statistic lying outside the bands is taken as evidence of parameter instability.
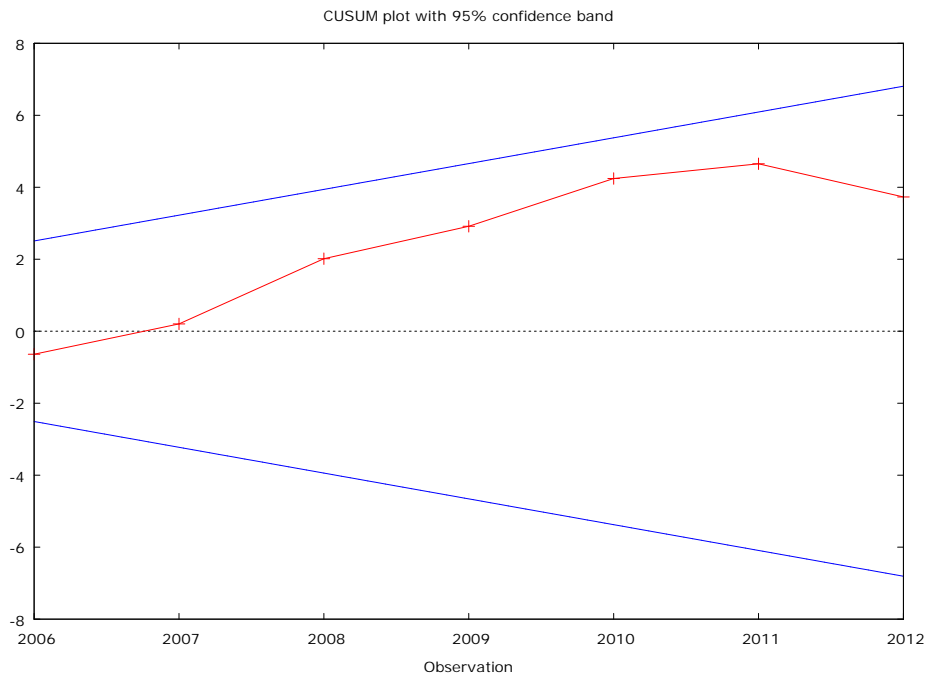
Figure 3: Diagnostic tests - CUSUM

Similarly, the CUSUMSQ test is based on a normalized version of the cumulative sums of squared residuals. Under its null hypothesis of parameter stability, the CUSUMSQ statistic will start at zero and end the sample with a value of 1. Also, a set of ±2 standard error bands is usually plotted around zero and any statistic lying outside these is taken as evidence of instability". Therefore, since the lines are well within the confidence bands in both CUSUM and CUSUM Squares tests, the null hypothesis of stability is not rejected.

CUSUMSQ plot with 95% confidence band
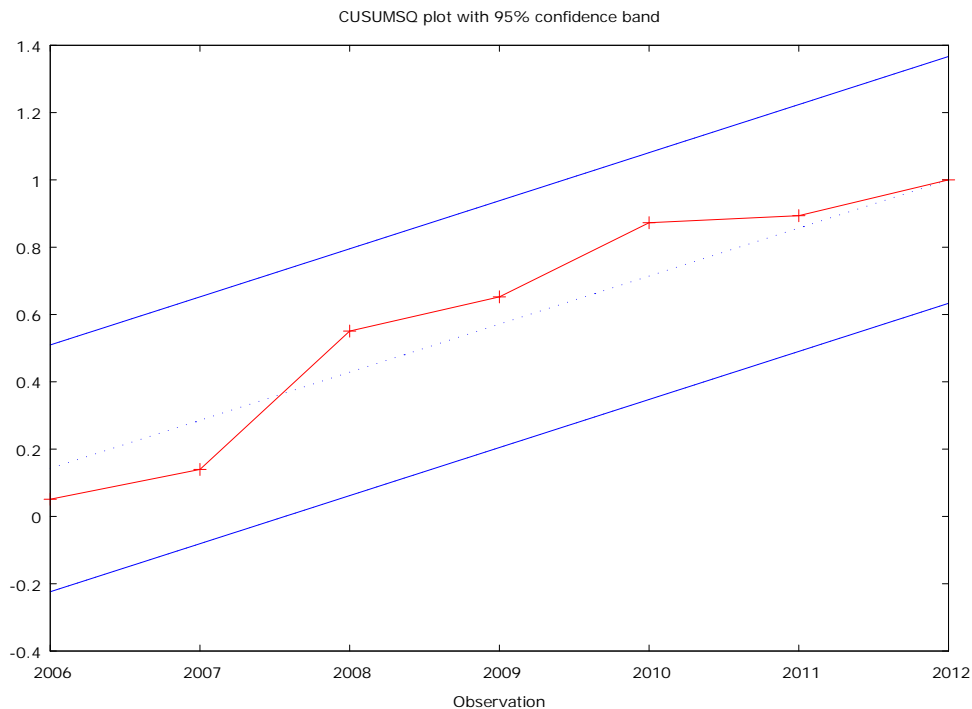
Figure 4: Diagnostic tests – CUSUM of Squares

Generally, our finding is consistent with orthodox economic theory, which predicts that minimum wages cause unemployment (especially among low-skilled and entry-level workers). Our finding also supports Neumark and Wascher (1994) findings, and Sabia's (2006) study, which found that increases in the minimum wage decrease employment. Our results however demystify the claims by Card and Krueger's (1994), Card and Krueger (1998), Machin and Manning (1994) and the Federal Policy 'Institute (2004) report's findings. These studies found that increase in minimum wage did not decrease employment. Our finding implies that minimum wage hikes in Nigeria are detrimental to employment creation policy of the government.

5. Concluding Remarks

In this paper, we have used the Ordinary Least Squares (OLS) estimating technique and the Granger Causality test to empirically examine the effects of minimum wage increases on unemployment during the 13 years democratic governance (1999 – 2012) in Nigeria. The data stemmed from the Statistical Bulletins of the Central Bank of Nigeria (CBN) and National Bureau of Statistics (NBS) publications. With a mean minimum wage of ₦8108.18, unemployment rate averaged 13.69 percent during the period.

Our main findings are that: (i) minimum wage was highly positively correlated with unemployment, money supply, real GDP, and least negatively related with inflation ii) real gross domestic product and inflation rate were insignificantly inversely related to unemployment; (iii) there was no evidence to support the existence of causality between minimum wage and unemployment; however the results provide evidence of unidirectional causalities running from unemployment (UNEM) to real gross domestic product (RGDP) at 1 percent level of significance; RGDP to money supply (MS) at 5 percent as well as from MS to minimum wage (MW) at 1 percent; (iv) minimum wage hikes during the specified period were associated with increases in unemployment, especially in the lagged period; (v) a one (1) percent increase in the federal minimum wage decreased employment by about 6.4 percent in the current year and 9.9 percent in the subsequent year. Our finding implies that minimum wage hikes were detrimental to employment creation policy of the Nigerian government during her 13 years of democratic governance.

Since minimum wage increase is found to be an employment- destruction policy as evidenced in our result, this paper recommends that government and labour leaders should always exercise restraints when deciding on increasing the minimum wages of the poor and low income employees. As also remarked by Herr and Kazandziska (2011), this paper does not however claim to have found the philosopher's stone, but serves as a contribution to the burgeoning debate on minimum wage policy and its macroeconomic effects..

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