

**MACROECONOMIC EFFECTS OF MINIMUM WAGE IN NIGERIA: A GENERAL
EQUILIBRIUM ANALYSIS**

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Abstract

This paper examines the macroeconomic effects of minimum wage (MW) policy in Nigeria using a static computable general equilibrium. Data for the study is drawn from year 2005 National Account of the country. The data is used to construct a 22 x 22 social accounting matrix (SAM) for the economy. The calibration exercise shows that the model's parameters are able to replicate the baseline data with acceptable precision. Simulation results show that a rise in MW would lead to increased productivity in all economic sectors. 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. In terms of price effect, an increase in MW would lead to a significant rise in general price level. A rise in MW has positive effects on household income and consumption, as well as on government balances.

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Macroeconomic Effects of Minimum Wage in Nigeria: A General Equilibrium Analysis**Introduction**

Income policy is usually used as a principal component of welfare boosting and poverty reduction macroeconomic policy framework in Nigeria. Minimum wage (hereafter MW) legislation is a major income policy readily employed in this regard. Although MW policy has both negative and positive effects on the overall economy, policy makers, especially politicians, have used it more often for political purposes than for socio-economic reasons. MW legislations in the country have been preceded by high inflation rates that erode purchasing power and bring reduction in welfare (Adams, 1987). Consequently, the need for MW legislation, which normally leads to a rise in nominal wage, is justified as a means of adjusting wages and salaries to match with the rise in costs of living.

It is, however, notable that wage increase brought about by MW is usually counter-productive. Apart from leading to a rise in general price level, wage increases, are always followed by threat of reduction in government workforce, and in some cases, such threats have resulted into massive laid-off in the civil service (Olaleye, 1974; Owoye, 1994). Also, wage increases in Nigeria do not match up with the rate of increase in prices. As a result, there are always agitations from the labour unions for persistent wages and salaries increase. This regular call for rise in wages is at times based on the wide gap between public sector's and private sector's wages. The gap between public sector's and private sector's wages has often been given as one reason for the inefficiency and corruption in the public sector. It is argued that public sector workers deserve adequate compensation commensurate with their labour, in order to bring about efficiency (Obasanjo, 1999).

In view of the above, many stakeholders, particularly the labour union organisations, have severally called for wage indexation. However, given the problem with wage indexation, government has found a convenient mean of raising wages by setting up Wage and Salary Commissions (WSCs)

over the years. Although WSCs are meant to provide a wide-ranging solution to civil service problems, increment in wages and salaries is normally embedded in the recommendations of such commissions.

In spite of the differing effects of MW legislation, its macroeconomic impact has found little interest in empirical study in Nigeria. Although there are ample studies that have tried to examine the impact of MW in an economy across different parts of the world, such studies have often employed a partial analysis, with focus on specific economic effects of MW in the economy. As pointed out by Adams (1987), the impact of MW could only be adequately captured within a macroeconomic model framework. This study, therefore, analyses macroeconomic effects of MW using a computable general equilibrium (CGE) model. The static CGE model developed in the paper allows for an analysis of the impact of MW across several sectors and variables within an economy. In particular, the study examines the impact of MW policy on household income, consumption, general price level, productivity (output), employment and government balances.

The rest of the part is divided into five sections. In section 2 a review of increment in wages and salaries increases in Nigeria is made. Section 3 provides a brief review of literature on the impact of MW. Section 4 lays out the model and methodological framework for the study. Section 5 deals with estimation and discussion of result. Finally, concluding remarks are contained in Section 6.

2. Wage and Salary Reviews in Nigeria, 1934 – 2005

Issue of wage negotiation and increment in Nigeria is dated back to the period of colonial rule and it is associated with civil service reform programmes. Civil service in Nigeria is characterised by ineptitude, mismanagement and inefficiency (Efe, 2006), which is entrenched in official bureaucracy. Efforts have been made over the years by successive governments to enhance civil service efficiency. Such efforts have often resulted in setting up Civil Service Reform Commissions (CSRCs) that are usually mandated to provide recommendations for reforming the civil service.

Thus, Public Sector Reform (PSR) programmes are direct outcomes of CSRCs. Although recommendations from CSRCs are meant to bring about improvement in overall facet of civil services, wages and salaries increase has become an integral part of such recommendations. Once recommendations for increase in wages are made, wage negotiation committees, that is, Wages and Salaries Committees (WSCs) are then set up, which would come up with a collectively agreed salary structure. Wage negotiation committees are bi-partite in nature where government representatives engage in dialogue with representatives from unionised sectors (Owoye, 1994). In most cases, government set MW affects private sector's wages, as workers' salaries in unionised private sector are usually adjusted in response to MW in the public sector.

Beginning from 1934 to 2005 about 12 CSRCs have been set up by different administrations, with a view of achieving the best from the Nigeria's civil service (Table 1). Each of these Commissions has come up with different wide-range prescriptions for transforming the civil service¹. Two of the commissions, the Adebo led Commission of 1970 and Udoji led Commission of 1972, actually set the pace for persistent review of wages and salaries. These Commissions, especially Udoji's Commission, recommended comprehensive salary review for all categories of government workers in the form of a basic minimum, and further put forward framework for regular updates of wages and salaries. An aftermath of implementation of the Udoji's recommendation was a jump in general price level, which eventually eroded the increase in nominal wages and brought about reduction in workers' purchasing power. Consequently, rather than solving the problem within the civil service, implementation of each CSRC recommendations has always led to new wave of agitation for salary increase².

¹ For a comprehensive review of the various civil service reform commissions see Salisu, 2001.

² Although private sector wages greatly exceed government set minimum wage, an announcement of increase in public sector wages usually triggers a rise in private sector wages, thereby, further widening the public-private wage gap.

Table 1: Civil Service Reform and Wage Commissions in Nigeria, 1934-2005

Commission	Year
Hunts Commission	1934
Harragin Commission	1945
Pillipson-Adebo Commission	1948
Gorsuch Commission	1954
Mbanefo Commission	1959
Morgan Commission	1963
Eldwood Commission	1966
Adebo Commission	1971
Udoji Commission	1972
Dotun Phillips Panel	1985
Ayida Review Panel	1994
Ernest Shonekan Committee	2005

Another way by which MW is set in Nigeria is through government Decree (usually during military regimes) and Act of legislation. Government often promulgates Decrees and uses Acts of legislation to set the MW for the civil service. Since 1973 and 2003 there have been about seven of such Acts and Decrees (see Table 2). Of particular interest is the MW Act 2000 that raised the minimum basic salary of the lowest cadre worker in the Federal civil service to 5,500 naira (Nigeria local currency), while the MW for State and Local government workers was set at 4,500. The MW Act also made provision for a review of the MW every two year. Towards the end of 2001, the MW was again reviewed upward to 7,500 naira and 6,500 naira for Federal and State Government workers respectively³. In year 2002 when the government reneged on its promise to review salaries of workers, the Nigerian Labour Congress (NLC), the umbrella organisation for all labour unions, called for a nation-wide strike, demanding for a 25 per cent salary increase for Nigerian workers. After a prolonged industrial dispute and work stoppages, in September 2003 Federal Government announced a regressive wage increment for Federal Government civil servants. The new salary scale took the form of 12.5 percent increase for lowest paid workers, while those at the top were to

³ The 6,500 and 5,500 naira minimum wage for Federal and State Government workers in 2000 equivalent to US\$50.20 US\$41.10 based on average exchange of naira to US dollar, 109.55 naira = US\$1.00. Given the exchange rate of 132.28 naira to US\$1.00 in 2002, the minimum wage of 7,500 and 6,500 naira for the two tiers of government translated to \$56.70 and \$49.14 respectively.

get 4 percent. The State and Local Government were given the freedom to negotiate with salary increment with their workers, based on their ability to pay.

Table 2: Minimum Wage Acts and Decrees

Wage Board and Industrial Council Act 19774 (Cap.466) (No. 1 of 1973, L.N. 55 of 1974)
National Minimum Wage Act 1981 (No. 6 of 1981)
National Minimum Wage Decree No. 43 1988
National Salaries Incomes and Wages Commission Decree 1993 (No. 99 of 1993)
National Salaries, Incomes and Wages Commission (Amendment) Decree (No. 17 of 1999)
National Minimum Wage (Amendment) Act, 2000 (No. 1)
National Minimum Wage (Amendment) Act, 2003

Further, as a means of finding permanent solution to the perennial problem of low and uncompetitive compensation in the public sector, with the attendant low productivity, in November 2005 the Federal Government set up a Presidential Committee on the Consolidation of Emoluments (PCCE) headed by Ernest Shonekan, former interim Head of State. Among other things, the Panel was mandated to:

- examine the current salaries and allowances in the public sector with a view to consolidating into single personal emolument, to determine their adequacy or otherwise, in the light of the current economic realities and cost of living index and recommend a Consolidated Personal Emolument regime that is capable of attracting and retaining the best brains in the public services;
- to examine the collective bargaining principle and recommend a mechanism that will ensure the periodic adjustments in the emoluments of Public Servants in accordance with the economic realities prevailing at any particular time without recourse to empanelling a committee to look into the matter; and
- to make any other recommendations that in the opinion of the Committee will ensure stability and sustainability of emoluments in the Public Service and guarantee peaceful and harmonious industrial relations in the country.

The PCCE in its report submitted in August 2006 recommended an increase of 25 per cent in salary and an annual increase of 10 per cent plus cost of living adjustment over a period of 10 years,

subject to government's ability to pay. However, during budget presentation to the National Assembly in October 2006 the Federal Government announced an increase of 15 per cent in the salary of all workers, beginning from January 2007.

The trend of income and wage policy in the country suggests that the latest announcement of salary increase would not be the last. One of the reasons for rejection of the 25 per cent wage increase is that it would make government spend 35-45 per cent of its revenue on wage bills. Previous wage increases have not only resulted in a rise government recurrent expenditure, but have been followed by different reactions from various economic sectors. This study, therefore, analyses the macroeconomic wide impact of MW policy in Nigeria.

3. Brief Literature Review on the Impact of MW

Several aspects of the impact of MW have been investigated in the literature using varying methodologies. One of the earliest works in this regard is the study by Stigler (1946) that analysed the effects of bidding MW on average wage within an economy when such economy is at equilibrium. Stigler argued that given full employment and competitive labour market in which wage is determined by productivity, a bidding MW that is set above the equilibrium rate would bring about a truncated effects on average wage within the economy. The truncated effect would result in job loss, especially those jobs whose wages are affected by the set MW. A similar result was also found by Grossman (1983) who explored how changes in MW affect various occupational wages. Grossman postulated that other wages would increase in two ways: 1) as firms seek to cushion the effect of deteriorating workers' wages on their productivity wages would be raised; and 2) MW wage would lead to an initial increase in the demand for non-minimum wage workers, a compression in white-collar occupations, and eventual rise in average wage.

Adams (1987) investigated the macroeconomic effects of MW in the USA by employing a macroeconometric model to simulate the effect of changes in MW on economic variables such as real wage, employment, unemployment, price level, and real gross national product (GNP). He found that an increase in MW would have a corresponding increasing effect on price level and unemployment, while it would lead to marginal declining effect on real wage, employment and real GNP. Adams's findings are similar to that of Brown et al (1982), who used time series regression to analyse the effects of MW on employment and unemployment. They found that the magnitude of the impact of MW on employment and unemployment is dependent on the prevailing economic situation, though the finding indicated a positive relationship between MW and unemployment, and a negative relationship between MW and employment. Card and Krueger (1994) used industry level data of fast food industry in New Jersey, USA and found no effect of MW on unemployment. However, Neumark and Wascher (2002) applied a reduced-form equation to state-level data in the United States of America (USA), using a disequilibrium approach, to analyze the impact of MW on employment. The study showed that the disemployment effect of binding MW in an economy could be underestimated subject to data and methodological approach. This reduction effect has been corroborated by other studies such as Abowd et al (1999) and Currie and Fallick (1996).

Yuen (2003) investigated the effects of binding MW on low-wage worker and other groups of worker in Canadian economy using a panel data over 1988-1990. The results of the study suggested a near zero effect on low-wage workers, though disemployment effect on different subgroups of low-wage workers is significant, especially for those with longer low-wage employment histories. In a similar study Neumark et al (2004), using a panel time series, examined the labour market impact of adjustment in MW on wages, labour hours, employment, and labour income within the USA economy. They found that low-wage workers are the most beneficiaries of MW, while higher-wage workers derived little or no benefits from policies that raise MW. The study revealed that though low-wage workers income increased with the raising of MW, their hours and employment declined, leading to overall negative effects of MW policy. In a further study, Neumark et al (2005)

applied a non-parametric estimation method to decompose the distributional effect of minimum wages on family incomes. The results of the study indicated that although MW policy raises the incomes of poor families, the effect is more on the household whose incomes are below the stipulated minimum wages.

Other aspects of welfare effect of MW policy have also been investigated in the literature, for example, Golan et al (2001) analysed the effect of MW and other government policies on inequality and poverty. In the study, a cross-section time series data set of USA economy was used. It was found that unlike many other government transfer programmes, MW policy lowered welfare in the 1980s and 1990s. While the studies by DiNardo et al (1996) and Lee (1999) showed that real minimum wages have significant effect on inequality. In the same vein, other studies that have taken a macroeconomic wide look on the impact of MW have done so by applying a variety of econometric methods. For example, L'Horty and Rault (2004) applied a vectorial error correction model to estimate the interdependence between the formation of wages, prices and MW using French data. Their study revealed that the process of MW formation greatly reduced wage disparity in the French economy, although it always led to inflationary pressure on other wages, as well as prices.

In a more recent study Falk et al (2006) used behavioural hypotheses to perform experiments that tested the effects of MW laws on perceptions and reservation wages. The result from the study's experiments showed that a temporary introduction of MW would lead to a rise in reservation wages, and that the rise would persist even after the removal of the MW. Further, the study indicated that firms are forced to pay higher than the required minimum wages both at the time of the introduction of the MW and after it is removed, though the employment effect MW after the removal of MW laws is often lower than its effect at the time of introduction.

The review of literature above reflects that enormous research has been undertaken in regard to issues on the effects of minimum wages. An important issue is the analytical framework adopted so far in the literature, while some previous studies have used a disequilibrium models, others have adopted the use of partial equilibrium. The literature has established that MW policy has effects on several macroeconomic variables, thus, the analysis of its macroeconomic effects requires the use of an equilibrium macroeconomic-wide model. Consequently, in this study, a computable general equilibrium model is developed to track the effect of MW policy of employment, output, prices, income and government balances.

4. The Model

To appropriately capture the economy-wide effects of MW policy in Nigeria, a simple static general equilibrium is developed. The static general is considered sufficient to track reactions to and feedback effects from the rest of the economy as a result of changes in minimum wages through the imposition of legislations. The model is built on de Melo and Robinson (1990) and Devarajan et al (1997). The model consists of four distinct aggregated activity sectors within the economy; agricultural sector, manufacturing sector, mining and oil sector, and services sector, and. These sectors produce different goods which are either consumed domestically or exported. In the model, a representative consumer (household) is assumed. The goods and services available in the economy can be classified into three: domestic goods – which are assumed to be sold domestically alone; export goods – produced but not consumed domestically; and imports. The product differentiation assumption with regards to imports and exports is carried to each of the four sectors. In the model, minimum wage imposed by government is assumed to be a tax on labour price that is binding on all economic sectors. This allows for tracking the feedback effect of MW policy on economic activities across sectors and institutions.

The model consists of seven major different blocks namely: production block; factor demand block; prices block; export supply and import demand block; savings and investment block; trade balance

block; and income and government revenue block. Further, a model closure is imposed by adding market-clearing rule. In the production block, described by equations (1) to (4), a Cobb-Douglas production function describes production process in each sector. Sectoral outputs are produced using two inputs, that is, labour and capital, and technical progress is assumed fixed. Value added is given by the flow of intermediate inputs across the sectors, the production of composite goods in the economy is subject to a constant elasticity of substitutions (CES), and total output is subject to a constant elasticity of transformation (CET).

$$X_i = \overline{AX}(K_i^{\alpha_i} L_i^{(1-\alpha_i)}) \quad (1)$$

$$V_i = \sum_j a_{ij} X_j \quad (2)$$

$$Q_i = CES(D_i, M_i, \beta_i, \sigma_i, \overline{AQ}) \quad (3)$$

$$X_i = CET(D_i, E_i, \Omega_i) \quad (4)$$

Demand for factors of production is described by equations (5) to (9). The demand for capital is droved by its marginal productivity. On the other hand, the demand for labour is given by labour output ratio based on the distorted price of labour, which reflects the existence of bidding minimum

$$K_i^D = \frac{\alpha_i PV_i X_i}{\lambda_i^k w_k} \quad (5)$$

$$L_i^D = \frac{(1-\alpha_i) PV_i X_i}{(1+\theta) \lambda_i^L w_L} \quad (6)$$

$$\sum_i L^D = \overline{L} \quad (7)$$

$$\sum_i K^D = K^e \quad (8)$$

$$K^e = \overline{K} \quad (9)$$

wages. Total demand for factors is constrained by their fixed endowment. The supply of export and the demand for import are determined on the basis of elasticities of transformation and substitution respectively, subject to export and import prices, as described by equations (10) and (11). Prices of

inputs and products are given by equations (12) to (19). In the prices block, price of value added is the difference between value of total output and intermediate product. The price of

$$\left[\frac{D_i}{E_i} \right] = \left[\frac{\delta_i PD_i}{(1 - \delta_i) PE_i} \right]^{\Omega_i} \quad (10)$$

$$\left[\frac{D_i}{M_i} \right] = \left[\frac{\beta_i PD}{(1 - \beta_i) PM_i} \right]^{-\sigma_i} \quad (11)$$

capital is determined as its contribution to the composite product, while price of labour is given as the product of the minimum wage tax and the marginal productivity of labour. Export and import prices are subject to the fixed world prices. Price of composite goods is the average price of domestic and import goods, while the price of total product is average price of domestic and export goods.

$$PV_i = PX_i - \sum_j a_{ij} PQ_i \quad (12)$$

$$PK_i = \sum_j PQ_i b_{ij} \quad (13)$$

$$PL_i = (1 + \theta) \lambda_i^L w_L \quad (14)$$

$$PM_i = \overline{PWM}_i R(1 - tm_i) \quad (15)$$

$$PE_i = \overline{PWE}_i R(1 - te_i) \quad (16)$$

$$PT_i = PQ_i(1 + ts_i) \quad (17)$$

$$PQ_i = \frac{PM_i M_i + PD_i D_i}{Q_i} \quad (18)$$

$$PX_i = \frac{PD_i D_i + PE_i E_i}{X_i} \quad (19)$$

The behaviour of savings and investment is expressed from equations (20) to (22). In the economy saving is solely undertaken by household and it is a proportion of income. Total investment is the sum of household savings; government balance and external sector balance. Consumption is based on an extended linear expenditure function. The balance of trade is fixed, and it is derived as the sum of the difference between import and exports. Government revenue is given as the summation

of all taxes. Market equilibrium and closure rule is obtained from the addition of value added, investment, consumption, and government demand. In all, equilibrium in the model is driven by investment.

$$\tilde{S} = \beta_0 Y \quad (20)$$

$$Z_i = \beta_i + \tilde{G} + \overline{BOP} * R \quad (21)$$

$$PQ_i C = PQ_i \gamma_i + \frac{\beta_i}{\sum_j \beta_j} (YD - \tilde{S} - \sum_j ts_j PQ_j \gamma_j) \quad (22)$$

$$\sum_i (\overline{PWM}_i M_i - \overline{PWE}_i E_i) = \overline{BOP} \quad (23)$$

$$T = \sum (tm_i \overline{PWM}_i M_i - te_i \overline{PWE}_i E_i) R + ts_i PQ_i Q_i^D + ty \tilde{Y} \quad (24)$$

$$\tilde{Y} = w_L \sum_i (1 + \theta) \lambda_i^L L_i^D + w_K \sum_i \lambda_i^K K_i^D \quad (25)$$

$$YD = \tilde{Y} - ty \tilde{Y} \quad (26)$$

$$\tilde{G} = T - \sum_i PQ_i GD_i \quad (27)$$

$$Q_i = V_i + Z_i + C_i + GD_i \quad (28)$$

4.1 Data and Social Accounting Matrix

The data for the empirical analysis of the CGE model is obtained from National Account of Nigeria and the input-output table both published by the Nigeria National Bureau of Statistics (NBS). This is complemented by data from the Central Bank of Nigeria Statistical Bulletin and Annual Report and Statement of Account.

The data is structure in such a way that fit into the 2005 base year Social Accounting Matrix (SAM) for Nigeria using the 1995 input-output coefficient⁴. The SAM is an n x n matrix vector consisting of 23 rows and column respectively. The SAM describes flow of income among the four different

⁴ The 1995 input-output table is the most current in the country. This is used because the input-output coefficients for the economy are relatively constant over years.

actors in the economy namely; the household; government; firms; and rest of the world (ROW).

Table A1 shows the description of the basic structure of the empirical SAM for the model. Given a double entry accounting format, each row is balanced with the corresponding column. The empirical SAM shown in Table A2 is constructed to reflect the structure of the CGE model. Both government and private firm's net balances go to the household in form of transfers. Also, since there is no distinction between private and government savings, only the representative household makes savings out of which fixed sectoral investment is made. Finally, given the static nature of the model, capital accumulation is not reflected in the SAM as it is assumed fixed.

5. Empirical Analysis

Given the simple static CGE nature of the empirical model, the analysis is conducted using a once-for-all adjustment in MW tax. The simulations are carried out under the assumption of fixed labour and capital supply. The analyses of the study are focused on the impact of changes in MW on principal macro variables in the empirical model. The principal variables are output, employment (labour demand), prices, household income and consumption, and government balances. The MW changes experiments are carried out by using a revenue neutral situation. In doing this, a scalar is introduced to scale all non-adjusting variables proportionally at each experiment.

5.1 Parameter Calibration

The static equilibrium model is calibrated to replicate the baseline data by adding a vector of constants to each equation in order to enforce base-line solution. Some of the elements of the vector are put at zero where such constants are not required to ensure solution. The parameters are able to replicate the base year values of the variables with acceptable precision. World prices of both imports and exports are fixed at unity. The exchange rate is also fixed at unity. The calibration is carried out using General Algebraic Modelling Systems (GAMSTM) Software. Table 3 shows the calibrated base year values of the model's major parameters. The effects of changes in MW are then evaluated in terms of the nature and extent of the difference from the baseline solution.

Table 3: Calibrated Base Year Parameter Values

Parameter	Sector			
	Agriculture	Manufacturing	oil	Services
Elasticities:				
Sigma (σ)	0.951	0.355	0.966	0.737
Omega (Ω)	0.866	0.644	0.672	0.913
Share parameters:				
Alpha (α)	0.647	0.432	0.996	0.726
Beta (β)	0.001	0.001	0.001	0.001
Subsistence min.				
Gamma (γ)	0.248	0.063	0.004	0.403
Marginal prod. Differential:				
λ^K	0.005	0.161	0.679	0.132
λ^L	0.004	0.370	0.907	0.044
Fixed tech. AX	74.741	100.0	3.218	100.0
Fixed min. wage tax: θ	0.150	0.150	0.150	0.150

Source: Calibration results

5.2 Estimation and Discussion of Results

In the estimation of the static CGE model some assumptions are made for ease of analysis. First, full employment equilibrium exists in the economy such that the fixed labour supply and the capital supply in the economy are fully utilized. The simulation analyses are carried out using three alternative scenarios: 10, 15 and 25 percentage increments in minimum wages. The choice of these

scenarios is predicated on the fact that over the years the Federal government has never raised wages below or beyond these levels. This is attested to by the currently approved and implemented increase in minimum take home pay of workers in the country, in which wages and salaries are adjusted upward by 15 percent.

The effect of different levels of increment in MW on output (productivity), labour demand (employment) and prices are presented in Table 4. The results show that a 10 percent rise in MW would bring about a corresponding increase in output in all economic activity sectors, with agricultural and services output experiencing large rise while manufacturing and mining and oil sectors' output only increase marginally. A 15 percentage point increment in MW leads to significant rise in output in all sectors, with the exception of mining and oil that experiences just about six percent increase in its output. Similar scenarios are observable when MW rises by 25 percent. The positive effect of MW increment on output could be ascribed to the fact that improved compensation serves as incentive that raises workers' productivity.

Table 4: Output, Employment and Price Effect of Minimum Wage Increment

Variable	base value	percentage change from base value		
	(₦'billion)	10% increase	15% increase	25% increase
Output:				
Agric.	5944.5	15.2	15.9	31.6
Mfg.	1909.2	1.5	10.5	12.0
Min.& Oil	4502.4	0.6	0.6	0.7
Serv.	4561.7	21.3	35.4	40.9
Labour:				
Agric.	254.2	0.2	1.1	2.1
Mfg.	49.6	0.1	-0.3	0.4
Ming.& Oil	17.7	0.0	0.0	0.0
Serv.	1007.4	-0.7	-10.3	-18.8
Prices:				
PQ.	143.5	32.7	41.1	58.6
PX	148.7	17.7	28.3	44.9

The labour demand (employment) effect of MW increment is mixed. A 10 percentage point increase in MW leads to slight rise in employment in both of agricultural and manufacturing sectors, has no effect on employment in the mining and oil sector, whilst it results in a marginal fall in employment in the services sector. On the other hand, an increase in MW by 15 percent results in a marginal drop in manufacturing sector's employment and about 10 percent decrease in services sector's employment. A further increment of MW by 25 percent yields a positive effect on employment in agricultural and manufacturing sectors, no employment effect in the mining and oil sector, and about 19 percent employment reduction in the services sector. The lack of employment effect of MW increment in the mining and oil sector could be based on the fact that salaries and wages in the sector are usually far above what is obtainable in other sectors (public and private inclusive). Thus, a rise in wages would have little or no impact on the sector. The negative employment effect of increase in MW in services sector indicates the overwhelming effect of retrenchment and staff laid-off in the public sector that often accompanies such increment. The marginal rise in agricultural sector's employment shows that increase in MW would lead to labour shift into the sector.

In order to isolate the impact of MW policy on prices focus is made on two types of price, prices of composite goods and aggregate output. The average net effect of changes in MW on each of the two prices across the four sectors is calculated. The results from the different increment experiments suggest that prices of composite goods and output tend to rise with adjustments in MW. This indicates that increase in MW would result in inflationary pressure which consequently erodes the purchasing power of income. Thus, while MW policy leads to rise in nominal income, such a rise could be accompanied with decline in real income.

The impact of MW increment on household income, consumption and government balances is shown in Table 5. The results show that 10, 15 and 25 percent increases in MW would raise household income by about 21, 36.4 and 53.3 respectively. Similarly, increase in MW leads to a

rising effect on both household consumption and government balances. Worthy of discussion is the positive impact of increases in MW on government balances. The results suggest that although increase in public sector wages and salaries would raise government expenditure, it would not result into decline in government revenue. This could be explained by the fact that bulk of government revenue depends on earnings from oil exports, which have been rising continually in the past half decade, due to the persistent rise in world prices of crude petroleum.

Table 5: Income, Consumption and Public Sector Effects of Minimum Wage Increment

Variable	Base value (₦'billion)	percentage change from base value		
		10% increase	15% increase	25% increase
Nominal household Income:	10257.1	21.0	36.4	53.3
Household Consumption:	7371.3	38.2	51.6	68.8
Government Balance:	1295.8	12.1	18.4	29.1

6. Concluding Remarks

The use of minimum wage policy as a welfare boosting tool has become popular especially in developing countries. Although frequent increment in wages has had both positive and negative impacts on Nigerian economy, government has found such increment as an effective income policy, both for socio-economic and political reasons. This study has examined the impact of MW policy on major macroeconomic variables in Nigeria within the framework of a CGE model. Simulation results from the study show that a rise in MW would lead to increased productivity in all economic sectors. From policy stand point this is suggestive of improved workers' productivity impact of MW policy.

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 employment, and no significant effect in manufacturing and mining and oil sectors. The implication of this is that while increase in MW could raise employment in agricultural sector, such increase could also lead to loss of jobs in services sector. Further, the results of the study reveal that an increase in MW would lead to a significant rise in general price level, thereby, indicating that such policy could induce inflation in the economy. Finally, a rise in MW has positive effects on household income and consumption, as well as on government balances, suggesting the positive welfare effect of MW policy.

Reference

Brown, Charles, Curtis Gilroy, and Andrew Kohen (1982), 'The Effect of the Minimum Wage on Employment and Unemployment', *Journal of Economic Literature*, 20 (2): 487-528.

Adams, Gerard (1987), *Increasing the Minimum Wage: The Macroeconomic Impacts*, Briefing Paper, Economic Policy Institute, Washington, DC.

L'Horty, Yannick and Christopher Rault (2004), 'Inflation, Minimum Wage and other Wages: An Econometric Study of French Macroeconomic Data', *Applied Economics*, 36: 277-90.

Grossman, Jean Baldwin (1983), 'The Impact of the Minimum Wage on other Wages', *The Journal of Human Resources*, 18 (3):359-378.

Stigler, J. George (1946), *The Economics of Minimum Wage legislation*, *American Economic Review*, 36: 358-65.

Neumark, David, Mark Schweitzer, and William Wascher. 2005. "The Effects of Minimum Wages on the Distribution of Family Incomes: A Nonparametric Analysis." *Journal of Human Resources* 40(4): 867-894.

Neumark, David, Mark Schweitzer, and William Wascher. 2004. "Minimum Wage Effects throughout the Wage Distribution." *Journal of Human Resources* 39(2): 425-450.

Yuen, Terence. 2003. "The Effect of Minimum Wages on Youth Employment in Canada: A Panel Study." *Journal of Human Resources* 38(3):647-672.

Neumark, David, and William Wascher. 2002. "State-Level Estimates of Minimum Wage Effects: New Evidence and Interpretations from Disequilibrium Methods." *Journal of Human Resources* 37(1):35-62.

Golan, Amos, Jeffrey M. Perloff, and Ximing Wu (2001), *Welfare Effect of Minimum Wage and other Government Policies*, Working Paper 957, Department of Agricultural and Resources Economics, University of California, Berkeley.

Abowd, John M., Francis Kramarz, and David N. Margolis (1999), 'Minimum Wage and Employment in France and the United States', NBER Working Paper no. 6996.

Currie, Janet and Bruce C. Fallick (1996), *The Minimum Wage and Employment of Youth: Evidence from the NLSY*, *Journal of Human Resource*, 31 (20): 404-428.

DiNardo, John, Nicole Fortin, and Thomas Lemieux (1996), 'Labour Market Institutions and the Distribution of Wages', 1973-1992: A Semi-Parametric Approach', *Econometrica*, 64 (5):1001-1044.

Card, David and Alan B. Krueger (1994), *Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania*, *American Economic Review*, 84 (4):772-793.

Falk, Armin, Ernest Fehr, and Christian Zehnder (2006), *Fairness Perceptions and Reservation Wages – The Behavioral Effects of Minimum Wage Laws*, *Quarterly Journal of Economics*, forthcoming.

Efe, Ovuakporie (2006), Nigeria: "On the Public Sector Reforms", Daily Champion Newspaper, August.

Salisu, Mohammed (2001), 'Incentive Structure, Civil Service Efficiency and the Hidden Economy in Nigeria', UNU/WIDER Discussion Paper No. 2001/86, September.

Olaleye, Ona (1974), 'Labour and Politics in Nigeria: 1945-71', Heinemann Publishers, Ibadan.

Owoye, Oluwole (1994), "Wage Determination and Strike Activity in Nigeria", Journal of African Economics, 3 (3): 447-80.

Obasanjo, Olusegun (1999), Inaugural Presidential Speech, May.

de Melo, J. and Sherman Robinson (1990), "Productivity and Externalities: Models of Export Led Growth", Policy, Research, and External Affairs, Working Papers, Country Economic Department, WPs 387. The World Bank (March).

Devarajan, S., Delfin S. Go, J.D. Lewis, S. Robinson, and Pekka Sinko, 1997. "Simple General Equilibrium Modelling". J. Francois and K. Reinert ed. Applied Method for Trade Policy Analysis. A Handbook, Cambridge University Press.

Endogenous Variables

C	=	consumption of good and services
D	=	domestic goods
E	=	export goods
\tilde{G}	=	nominal government balance
GD	=	government demand
K^D	=	demand for capital
K^E	=	effective capital stock
L^D	=	demand for labour
M	=	import goods
PD	=	producer price of domestic good
PE	=	domestic price of export
PK	=	price of capital (returns to savings)
PL	=	Price of labour
PM	=	domestic price of import
PQ	=	price of composite good
PT	=	sales price of import
PV	=	price of real value added
PX	=	price of aggregate output
Q	=	composite good
Q^D	=	demand for composite good
R	=	nominal exchange rate
\tilde{S}	=	nominal aggregate saving
T	=	total government revenue
V	=	real value added
W_L	=	marginal product of labour
W_K	=	marginal product of capital
X	=	production output
\tilde{Y}	=	nominal aggregate income
YD	=	disposable household income
Z	=	real investment

Exogenous Variables and Parameters

\overline{AX}	=	exogenously determined technical progress
\overline{MW}	=	fixed minimum wage

$\overline{P_{WM}}$	=	fixed world price of import
$\overline{P_{WE}}$	=	fixed world price of export
t_e	=	export tariff/subsidies
t_m	=	import tariff
t_s	=	sales/exercise/indirect taxes
t_y	=	direct income tax
a	=	input-output coefficient
b	=	contribution of capital to value of Q
L, K	=	fixed economy's labour and capital resources
σ, Ω	=	substitution and transformation elasticities
α, β, δ	=	share parameters
θ	=	fixed minimum wage tax
γ	=	subsistence minima of consumption
λ	=	differential marginal productivity distortion parameter

TABLE A1																								
SOCIAL ACCOUNTING MATRIX (SAM) FOR THE CGE MODEL																								
(Description of the Basic Structure)																								
FACTORS			INSTITUTIONS				ACTIVITIES				GOODS FOR DOMESTIC MARKETS				GOODS FOR EXPORT MARKETS				CAPITAL ACCOUNTS				TOTAL	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
Labour	Capital	Household	Firms	Govt.	ROW	Agric.	Manufact.	Ming.&Oil	Services	Agric.	Manufact.	Ming.&Oil	Services	Agric.	Manufact.	Ming.&Oil	Services	Household	Firms	Govt.	ROW	TOTAL		
1	Labour									Factor income (compensation of employees and operating surplus)												1		
2	Capital																						2	
3	Household																						3	
4	Firms	Factor income into institutions		Distribution and Redistribution (taxes), transfers, subsidies, and dividends						indirect taxes on goods													4	
5	Govt.																						5	
6	ROW																						6	
7	Agric.																						7	
8	Manufact.																						8	
9	Ming.&Oil																						9	
10	Services																						10	
11	Agric.																						11	
12	Manufact.																						12	
13	Ming.&Oil																						13	
14	Services																						14	
15	Agric.																						15	
16	Manufact.																						16	
17	Ming.&Oil																						17	
18	Services																						18	
19	Household																						19	
20	Firms																						20	
21	Govt.																						21	
22	ROW																						22	
23	Total																						23	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	16		17	18	19	20	21	22	23

TABLE A2

SOCIAL ACCOUNTING MATRIX FOR NIGERIA (2005)																											
(THE EMPIRICAL SAM FOR THE CGE MODEL N' billion)																											
Factor		institutions				Activities						Goods for domestic market						Goods for export market						Capital account			Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23					
Labour	Capital	Househol	Firms	Govt.	ROW	Agric.	Manufact.	Ming.&Oil	Services	Agric.	Manufact.	Ming.&Oil	Services	Agric.	Manufact.	Ming.&Oil	Services	Househol	Firms	Govt.	ROW						
1	Labour						254.2	49.6	17.5	1007.4												1328.6	1				
2	Capital						5124.2	44.5	4215.3	2663.9													12047.9	2			
3	Household	1328.6	7748.2		1156.7	-4.3	27.9																10257.1	3			
4	Firms		4298.8																				4298.8	4			
5	Govt.			2.1	472.8																		1295.0	5			
6	ROW				675.0	470.5																	4693.1	6			
7	Agric.				1994.3	13.9																	5944.5	7			
8	Manufact.					162.5																	1909.2	8			
9	Ming.&Oil					1.3																	4502.3	9			
10	Services					651.9																	4561.7	10			
11	Agric.			2541.1				401.7	186.8	0.0	277.1												3592.4	11			
12	Manufact.			648.3				64.1	1045.8	5.2	37.8											1543.0	3344.1	12			
13	Ming.&Oil			45.7				37.0	45.9	57.6	228.5											1113.7	1528.3	13			
14	Services			4136.2				54.0	175.2	200.2	276.2											43.5	4885.4	14			
15	Agric.									549.2														549.2	15		
16	Manufact.									647.7														647.7	16		
17	Ming.&Oil									3113.7														3113.7	17		
18	Services									354.5														354.5	18		
19	Household			2885.8																				2885.8	19		
20	Firms																							0.0	20		
21	Govt.																							0.0	21		
22	ROW																							0.0	22		
23	Total	1328.6	12047.0	10259.2	4298.8	1295.8	4693.1	5944.5	1909.2	4502.4	4561.7	3592.4	3343.0	1527.5	4885.4	549.2	647.7	3113.7	354.5	2885.8	0.0	0.0	0.0	71739.4	23		