

Welfare implications of minimum wage increase in Nigeria

Minimum wage increase in Nigeria

Taiwo Aderemi and Fidelis Ogwumike

Department of Economics, University of Ibadan, Ibadan, Nigeria

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Abstract

Purpose – The primary motive of a minimum wage policy is to provide a wage floor for poorly paid workers and improve their welfare. In Nigeria, real minimum wage declined by 60 per cent between 1974 and 2011, thus reducing the welfare of workers. The wage gap between low skilled and high skilled workers have also widened over the years in favour of the latter. There are concerns that the series of minimum wage increase in Nigeria may not be welfare-enhancing. The paper aims to discuss these issues.

Design/methodology/approach – This study examined the welfare effects of minimum wage increase in Nigeria using a computable general equilibrium model. The model was calibrated using a 2006 Social Accounting Matrix and four sets of scenarios (20, 35, 50 and 140 per cent wage increases), were simulated.

Findings – The findings show that employers substituted other labour categories for minimum wage workers. This increases the wage rates of other labour. The consumer price index also increased as firms partly pass-on increased labour cost to consumers. Generally, the simulations show that minimum wage policies worsen the welfare of its intended beneficiaries, due to negative impact on prices and employment.

Originality/value – This study deviates from existing studies on minimum wage in Nigeria, by providing a proper disaggregation of the labour market that represents the Nigerian economy. In this regard, the informal sector was accommodated and the potential impact of the minimum wage on this sector determined. It also adopted the equivalent variation welfare measure which incorporates price and consumption effects in measuring welfare.

Keywords Nigeria, Welfare, Minimum wage, Informal sector

Paper type Research paper

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1. Introduction

The central motive of a minimum wage policy is to provide a living wage to poorly paid workers thereby enhancing their welfare and closing the wage gap. This was the rationale for the creation of the minimum wage in the late nineteenth century (Cunningham, 2007). However, early studies on the impact of minimum wage on welfare and employment found that it resulted in job losses and as such it may not be welfare-enhancing[1]. These results are in consonance with the classical model of minimum wage in a perfect competitive labour market.

The work of Card and Krueger (1994) marked a turning point about the widely held view that a rise in minimum wage reduces employment. They found no evidence that the rise in New Jersey's minimum wage reduced employment at fast food restaurants in the State. Other studies have also presented evidence that minimum wages do not have a negative impact on employment and welfare[2]. This timely topic still generates debates in developing countries where minimum wage is believed to be an important instrument in improving workers' welfare.

In Nigeria, evidence point to deteriorating workers' welfare despite series of minimum wage increases. Between 1974 and 2011, real minimum wage declined by 60 per cent, thus eroding the purchasing power of workers. As evidenced in the annual abstract of statistics (2009), the welfare of minimum wage workers (grade level 01 workers) in the public sector deteriorated between 1980 and 1998, as their real monthly wages declined from ₦248 to ₦90. It also declined from ₦7,339.08 in 2003 to ₦4,724.28 in 2007. The Nigerian wage system is characterised by

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unplanned and infrequent wage fixing and no ascertainable principle underlies wage reviews (Yesufu, 1982).

Job losses have also been associated with minimum wage increases in Nigeria. Between January and December 2000, 31,116 workers lost their jobs. About 70 per cent of them were compulsorily retrenched (Anyanwu, 2004). The job loss affected all categories of employers and coincided with the increase in the minimum wage from ₦3,500 to ₦7,500 per month in 2000. The exclusion of informal sector and part-time workers from the minimum wage coverage is also worrisome. The exclusion of the rapidly growing informal sector (size estimated at 53 per cent of GNP in 2006 (Schneider, 2012) may be partly responsible for the poor condition of low income households in the country.

There are concerns that the minimum wage may not be a pro-welfare tool in Nigeria. This topic has not been given adequate attention empirically in Nigeria and there is no consensus on the direction of the impact of minimum wage policies. The few studies that have examined the effects of minimum wages in Nigeria have mixed results. Folawewo (2009) finds that minimum wage improved the welfare of workers. He, however, did not take into account the large informal sector in Nigeria. Taiwo *et al.* (2005) examined the job losses arising from minimum wage increases in the country. Though the study incorporated the informal sector in its modelling, it did not account for the heterogeneous nature of labour in Nigeria. It did not disaggregate labour by skill type and thus implicitly assumed that all urban labour benefits directly from a minimum wage increase. In reality, only low-skilled workers benefit from minimum wage rise in Nigeria. Therefore, the study may have overestimated the unemployment effects among the urban workers.

This study corrects for some of these shortcomings, by disaggregating labour by skill (skilled or unskilled) and sector (formal or informal) type, thereby conforming to the reality in the Nigerian labour market and accommodating the potential effects of minimum wage in the informal sector. It uses a recent Social Accounting Matrix (SAM) and adopts equivalent variation (EV), which incorporates price and consumption effects in measuring welfare. Findings from this study may help in redirecting wage policies and also reveal the eventual gainers and losers from a minimum wage policy.

The remainder of the paper is organised as follows. Following this introductory part is Section 2, which presents some stylised facts on minimum wage and welfare in Nigeria. Section 3 gives a brief literature review. Section 4 presents the methodology and data description. Section 5 contains the simulation result and analysis. Section 6 concludes and makes recommendations based on findings from the study.

2. Minimum wage and welfare in Nigeria

Table I shows the nominal and real minimum wage between 1974 and 2011 on a five-year average[3]. Despite the upward trend recorded in the nominal wage, the real wage

Years	Consumer price index, weights 1,000	Money wage (per month) ₦	Real wage (per month) ₦
1974-1978	0.52	60	115.38
1979-1983	1.05	99	94.28
1984-1988	2.41	125	51.86
1989-1993	9.01	222.6	24.70
1994-1998	49.28	990.4	20.09
1999-2003	86.88	6,700	77.11
2004-2008	158.30	7,500	47.37
2009-2011	236.20	11,000	46.57

Table I.
Monthly minimum wage (Nominal and Real) 1974-2011 (2003 = 100)

Source: Authors' computation from CBN Statistical Bulletin and various Minimum Wage Acts

declined continuously except for a temporary increase from ₦20.09 in 1994-1998 to ₦77.11 in 1999-2003.

The observed general decline in the real wages clearly indicates that workers' wages have not kept pace with rising prices. This is one of the fallouts of poor indexation of wages to price level. Another observation is that the real wage between 2009 and 2011 was less than half of its value between 1974 and 1978.

Figure 1 shows the relative distribution of poverty incidence in Nigeria. It shows declining non-poor, rising moderate poor and very poor classes. In 1980, about 73 per cent of the population were non-poor, 21 per cent moderately poor class and only 6.2 per cent were very poor. At this time, the national poverty rate was 27.2 per cent. About 30 years after (2010), the distribution of poverty among these three groups had changed radically and poverty incidence had risen sharply to 62.6 per cent. The proportion of the non-poor in the population dropped to 31 per cent, the moderately poor increased to 30.3 per cent, while the very poor rose to 38.7 per cent.

The transition of a significant proportion of the non-poor to either the moderate or very poor groups occurred in the 1980s and 1990s, as shown in Figure 1. As at 1996, half of the non-poor population in 1980 had transited into the moderate or very poor groups. Stringent conditions of the Structural Adjustment Programme in the 1980s resulted in a sharp rise in the price level. The consumer price index increased unprecedentedly from 2.4 in 1987 to 63.5 in 1998. Real wages as a share of nominal wages also declined from 42 per cent in 1987 to just 1.5 per cent in 1998. This severe fall in the worth of wages earned by workers may have pushed a large number of people into poverty. In addition to the poor getting poorer, many who were not previously poor transited into poverty. Figure 2 shows widening wage gap overtime. Low skilled workers' wages as a ratio of high skilled workers' wages declined from 29 per cent in 1991 to 11 per cent in 2007.

3. Literature review

Discussions of the effects of a minimum wage policy on the economy have been a long-standing debate in the literature. Despite the volume of empirical evidence on this topic in the developed economies, there are still divergent views on its economic impact. Stigler's (1946) seminal article dubbed a minimum wage policy as being a weak tool in reducing poverty since its setting does not take into account employment level, family size

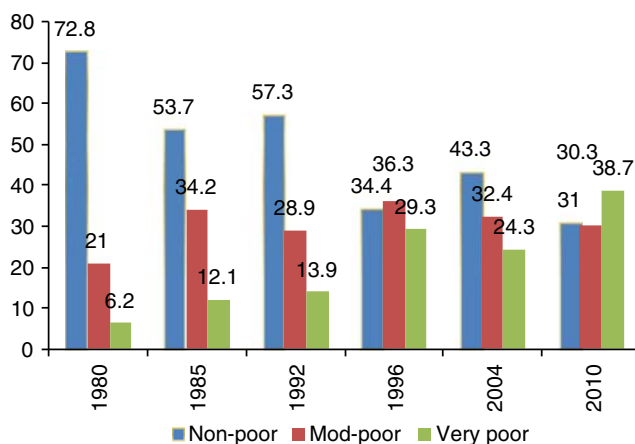


Figure 1. Relative poverty in Nigeria (in %) (1980-2010)

Source: Data from the NBS, 2010 Nigeria Poverty Profile



Figure 2. Wage Gap: low skilled wages as a share of high skilled workers' wages
Source: Data from the Annual Abstract of Statistics (1999, 2001, 2009) and Federal Office of Statistics Review of the Nigerian Economy, 1992, 1998

and number of earners in a family. Others studies have corroborated this evidence either from a negative employment or poverty effects, induced by a minimum wage policy (see Browning and Johnson, 1983; Conradie, 2004; Meer and West, 2016).

Burkhauser and Finegan (1989) in their study of the likely impact of the 1988 Kennedy-Hawkin Bill sponsored to increase the minimum wage in the USA from \$3.35 to \$5.05 per hour found that out of the estimated wage bill of \$7 billion from the minimum wage increase, only \$800 million (11 per cent) would go to poor families. They attributed this to the small share of low wage earners (minimum wage beneficiaries) in poor households, estimated at only 11 per cent. About \$2.8 billion (40 per cent) of the minimum wage increase would go to families with income three times above the poverty line. Sabia and Nielsen (2012) also did not find evidence that the minimum wage in the USA reduced poverty incidence and participation in hardship-related programmes between 1996 and 2007.

Meer and West (2016) provided insight into the employment effect debate of the minimum wage in the USA, incorporating the dynamic effects between 1975 and 2012. The authors' position is that the minimum wage has a small unemployment effect in the short term, but the magnitude increases overtime. They concluded that the negative employment effect of a minimum wage increase does not involve a quick adjustment as argued in the minimum wage literature. Dickens and Manning (2004) examined the effects of the re-introduction of the minimum wage in the UK in 1999 on income inequality. They showed that the new minimum wage was effective in raising the earnings of the lowest paid workers. The effect of the minimum wage on overall wage inequality was marginal, with no detectable effect on earnings at the 10th percentile, even when the effect of the new minimum wage was largest. They opined that this could have resulted from the fact that the minimum wage was set at low levels, hence affecting less than 10 per cent of workers.

Giuliano (2013), however, noted that the employment effects of a minimum wage policy could differ among sub-groups. The author established that the increase in the federal minimum wage in the USA in 1996 resulted in a decline in the employment of adult workers. Teenagers, however, recorded a rise in employment. The findings show that the latter could be attributed to increase labour market participation of teenagers and improvement in their skill-sets. Both groups (adult and teenagers) recorded positive wage increases.

Dolton *et al.* (2015) showed that the introduction of a national minimum wage in the UK had no effect on employment between 1999 and 2010. They accounted for spatial dependence of local labour markets and argued that most minimum wage studies reporting

a negative or positive employment effects failed to properly account for spatial dependence, recessionary demand shocks, steady state trend in the employment series and endogeneity of the minimum wage.

Some findings have also favoured positive employment and welfare effects of a minimum wage policy and these results have been interpreted in the context of a monopsony or monopsonistic-competitive labour market setting (Jones, 1997). For instance, Mincy (1990) showed that a higher minimum wage would have a poverty-reducing effect in the USA using survey data for 1987. The author reported that with full coverage and compliance, and a \$4.25 minimum wage, the poverty gap among families with at least one wage earner would fall by 11.1 per cent. Other studies which supported a positive impact of minimum wage policies include Addison and Blackburn (1999), Flinn (2006), Dinkelman and Ranchhod (2012) and Bhorat *et al.* (2013).

Some studies have also presented mixed findings. Bell (1997) found mixed evidence while probing the divergent trends observed in the real minimum wage in Columbia and Mexico in the 1980s. The study found that the minimum wage had no effect on employment or wages in Mexico. In Columbia, however, the minimum wage had a negative dis-employment effect on low-paid unskilled workers. Flinn (2002) also presented mixed evidence on the impact of minimum wage rise on wage distributions in the USA. He found that the 1996 change in minimum wage from \$4.25 to \$4.75 per hour did not improve welfare, but that the 1997 minimum wage changes from \$4.75 to \$5.15 per hour increased welfare in the population of youths aged 16-24.

The minimum wage literature in developing countries has also grown over the last decade. This may be due to the widely-held belief that minimum wage is a key welfare instrument in these economies and largely because findings on minimum wage from the developed countries cannot be appropriately applied to developing economies due to huge differences in the labour market structure and conditions (emphasis mine) (Alatas and Cameron, 2008). The labour market in developing countries is dichotomous, consisting of the formal and informal sectors. Workers operating in the informal sector are not often covered by a minimum wage legislation.

Even among developing countries, the structure of the minimum wage is different. South Africa's minimum wage legislation covers activities such as domestic work, commercial driving (taxi operators) and the retail sector (see Bhorat *et al.*, 2013). In contrast, in Nigeria, these activities are regarded as informal and are not covered by a minimum wage policy. Also, part-time workers do not earn a minimum wage in Nigeria and the wage is set at the central government level. Indonesia has a minimum wage that is fixed at the provincial level and also the informal sector is not covered by the wage policy (Hohberg and Lay, 2015). Although, the informal sector may not benefit directly from a minimum wage increase, the spill over effects of the policy may, however, impact them as predicted in the neoclassical competitive model (see Kaufman and Hotchkiss, 2003). It is therefore important to incorporate this sector in any comprehensive study on minimum wage in a developing country (Jones, 1997).

Some studies have examined the minimum wage effects in developing economies in this context, although the direction of the effect is still being contested. Chun and Khor (2010) showed that the minimum wage in Indonesia reduced wage inequality by raising wage levels of formal sector workers, but found no evidence of spill over effects into the informal or self-employed sector. They reported negative employment effects in the formal sector and no significant effect on overall employment. In contrast, Hohberg and Lay (2015), for Indonesia, found evidence supporting a positive, although small employment effect for formal sector workers between 1997 and 2007. The authors attributed the positive employment in the formal sector to low real wages, which is low enough not to generate a negative employment effect. They suggested that employers may also consider other adjustment mechanisms other

than employment to offset increased labour cost. The informal sector, however, recorded negative, significant job losses and no wage increase.

Bhorat *et al.* (2013) found a positive and statistically significant employment effects in the retail, domestic workers and taxi workers sectors between 2000 and 2007 after the enactment of minimum wage policies in these sectors. The probability of employment in the forestry sector was not significant and a negative employment change was recorded in the taxi sector. Real hourly wages also increased. In china, Fang and Lin (2015) showed that although minimum wage increases raised the wages of workers, it had negative effects on general employment between 2004 and 2009. The dis-employment effects were more severe among young adults and low-skilled workers.

The literature on this topic is handful and mixed in Nigeria. Taiwo *et al.* (2005) using a computable general equilibrium (CGE) method, simulated the impact of a likely minimum wage increase from ₦7,500 in 2000 to ₦9,375 per month on labour market outcomes and macro-economic variables. The study simulated a 25 per cent rise in the minimum wage in Nigeria using a 1999 SAM. Labour input was categorised into urban formal, urban informal and rural labour. The results show that unemployment rate increased by 35.6 per cent. Wage rates of all other labour categories also rose, implying spillover effects of the minimum wage on other wages. Also, while a sharp fall was recorded in the employment of urban formal labour in all sectors both urban informal and rural labour experienced re-allocation of labour across sectors.

Folawewo (2009) examined the macro-economic impact of minimum wage legislations in the Nigerian economy using a CGE model and a 2005 Nigerian SAM. In the study, labour was disaggregated into skilled and unskilled, and the analysis was restricted to the formal sector only. The employment effects are mixed. Both labour categories registered reduction in employment in the service sector, with greater impact on unskilled workers. The consumption of low and high income households rose, with the former benefitting more.

It is evident from this review that empirical findings in the literature differ on the effectiveness of the minimum wage in improving welfare. One major drawback of existing minimum wage studies on Nigeria is the failure to either incorporate the informal sector and the potential wage effects on this sector or inappropriate generalisation that minimum wage applies to all urban workers. These inadequacies could result to misleading findings. This study corrects for these anomalies by incorporating the informal economy into the labour market and also making a realistic assumption that only formal unskilled workers benefit directly from minimum wage increase in Nigeria. The latter assumption formed the basis for disaggregation of the labour-type.

4. Methodology

Minimum wage policies have indirect and economy-wide effects. Feedback effects resulting from changes in disposable income when minimum wage rises are not accounted for in partial equilibrium methods (DPRU, 2008). These effects are relevant in investigating the welfare effects of minimum wage policies. The choice of the CGE method in this paper is therefore premised on its ability to fully account for the transmission mechanism through which minimum wage affects welfare. It also has the advantage of accounting for the indirect effects of policies, thus making it relevant in this kind of study in which both formal and informal sector workers are considered.

The CGE model adopted in this paper is a slightly modified version of PEP-1-1 model developed by Decaluwe *et al.* (2010). It is a single-country and a static CGE model. Changes were made to the labour market block in order to capture the features of the Nigerian labour market and possible spillover effects of the policy on the informal sector. Thus, the labour market is one, with global unemployment[4]. In addition, the EV welfare measure was incorporated into the model.

The SAM

The data for the study are the 2006 Nigerian SAM developed by (Nwafor *et al.*, 2010). For the purpose of this study, the SAM is re-aggregated into ten sectors and commodities, five production factors and six household categories. Given the interest of the study, the labour account is disaggregated into formal skilled, formal unskilled, informal skilled and informal unskilled to reflect the Nigerian labour market. Capital is aggregated.

Model description

The model has ten sectors (agriculture; manufacturing; extractive; utilities and construction; trade; hotel and restaurant; finance, telecoms and estate; health and education; administration; and other private sector services), four labour categories (formal skilled and unskilled, informal skilled and unskilled), six households that are categorised by income and location (low, middle, high income rural households, and low, middle, high income urban households). The classification of households into income categories is based on the National Bureau of Statistic's definition which groups income classes based on per capita expenditure. Households are classified as low income, if their per capita income is less than one-third of mean per capita expenditure. Middle income households have their per capita income between one-third and two-thirds of mean per capita income, while high income households have per capita income of above two-thirds.

The disaggregation of the SAM is carried out using the Nigeria Living Standards Household Survey of 2004. In disaggregating labour into skill type, it is assumed that all workers in the formal sector with educational qualifications below tertiary education or equivalent are unskilled labour and are therefore potential beneficiaries of minimum wage increase. The 2004 NLSS data contains information on tax payment, work contracts, size of firm, etc., which was used in categorising workers into formal and informal sectors. Aderemi (2015) provides explicit information on the categorisation of workers into informality in the Nigerian labour market. Parameters are calibrated on computations from the SAM and estimates from related literature (see Annabi *et al.*, 2006; Adenikinju *et al.*, 2009). The latter is presented in Table II.

Production and factor demand. The production function is described by a nested structure of two levels. At the first level, the output of each productive activity combines value added (VA) and total intermediate consumption (IC) in fixed shares[5]. This is represented by a Leontief production function as shown in Equations (1) and (2). At the second level (Equation (3)), each industry's VA consists of composite capital and composite labour following a constant elasticity of substitution (CES) specification. Equation (3) allows for factor substitution among composite labour and capital. Capital is aggregated in the model.

Sector	δ_i^{KD} (CES-composite capital)	δ_i^{LD} (CES-composite labour)	δ_i^{VA} (CES-value added)
Agriculture	0.5	2.0	1.5
Manufacturing	0.5	1.5	1.5
Extractive	0.5	0.9	0.1
Util. and Con	0.5	1.5	0.7
Trade	0.5	2.0	0.7
Hotel and Rest.	0.5	2.0	0.7
Fin, Tel. and Est.	0.5	0.8	1.2
Health and Education	0.5	0.8	0.2
Admin.	0.5	1.5	0.2
Other private services	0.5	1.5	0.7

Source: Authors' estimates from Annabi *et al.* (2006) and Adenikinju *et al.* (2009)

Table II.
Key exogenous
parameters in
the model

The various categories of labour are combined following a CES technology as depicted in Equation (5)[6]. This feature allows for substitution among the labour types, when there is a minimum wage review which automatically alters relative factor prices[7]:

$$VA_j = v_j XST_j \tag{1}$$

$$CI_j = i o_j XST_j \tag{2}$$

$$VA_j = B_j^{VA} \left[\beta_j^{VA} LDC_j^{-\rho_j^{VA}} + (1 - \beta_j^{VA}) KDC_j^{-\rho_j^{VA}} \right]^{-\frac{1}{\rho_j^{VA}}} \tag{3}$$

$$LDC_j = \left[\frac{\beta_j^{VA} RC_j}{1 - \beta_j^{VA} WC_j} \right]^{\delta_j^{VA}} KDC_j \tag{4}$$

$$LDC_j = B_j^{LD} \left[\sum_l \beta_{lj}^{LD} LD_{lj}^{-\rho_j^{LD}} \right]^{-\frac{1}{\rho_j^{LD}}} \tag{5}$$

where l is defined over; fsk, fusk, infsk, infusk.

Income and savings. In this study, the household structure is a representative type of six categories. The households differ with respect to location (rural or urban), and expenditure or income levels. Households receive income from factors of production (labour and capital), and transfers from other agents as specified in the following equation. The income of households is related to their sources of employment:

$$YH_h = YHL_h + YHK_h + YHTR_h \tag{6}$$

Demand. The aggregate demand for both domestic and imported goods consists of household consumption demand, demand for investment purposes and government consumption demand. Activities also demand for commodities as intermediate input in the production process.

Trade. This block represents trade relations among countries. The available supply of goods and services in a given economy is made up of locally produced goods and imported commodities, represented by a CES function (Equation (8)). In addition, goods produced locally are either consumed in the domestic market or exported. It is assumed that goods produced for the domestic market are fairly different from those produced for the export market, and are thus not perfectly transformable. This is represented by a constant elasticity of transformation function (Equation (7)):

$$XS_{j,x} = B_{j,x}^X \left[\beta_{j,x}^X EX_{j,x}^{\rho_{j,x}^X} + (1 - \beta_{j,x}^X) DS_{j,x}^{\rho_{j,x}^X} \right]^{\frac{1}{\rho_{j,x}^X}} \tag{7}$$

$$Q_m = B_m^M \left[\beta_m^M IM_m^{-\rho_m^M} + (1 - \beta_m^M) DD_m^{-\rho_m^M} \right]^{\frac{-1}{\rho_m^M}} \tag{8}$$

Prices. The price of an aggregate is a weighted sum of the prices of its components. The price of an industry's commodity therefore is a weighted sum of the prices of VA and

aggregate IC. Price paid by consumers for imported goods is the world price (converted to local currency), taxes on imports and domestic indirect taxes.

Labour market. The Nigerian labour market is dominated by a large informal sector. This sector is rapidly growing due to high unemployment rate and bureaucratic constraints to entry and operation in the formal sector. In Nigeria, the coverage of the minimum wage does not extend to the informal sector. Yet, minimum wage setting in the formal sector may have ripple effects on informal sector workers. Therefore, in modelling the labour market, an attempt is made to capture this feature in a stylised way. The factor labour consists of the formal skilled, formal unskilled, informal skilled and informal unskilled labour.

The macro-constraints imposed on the labour market affect both the demand and supply side of the market. As shown in Equation (9), the labour market for formal skilled workers clears, since wage rate adjusts to market forces. Similarly, as depicted in Equation (10), the informal sector operates such that the wage rate is flexible and also leads to equilibrium of demand and supply. However, the wage rate in the labour market for formal unskilled workers (minimum wage workers) is fixed. Since wage rate is fixed, the labour market for this category of workers does not clear and this creates excess labour supply of minimum wage workers in the market as jobs are rationed[8].

This excess labour moves into the informal labour market as shown in Equation (11), where the wage rate adjusts and the market clears. On the labour demand side, firms substitute away from the relatively expensive minimum wage workers. This therefore increases demand for other classes of workers. The overall effect on wages in the informal sector depends on which effect dominates i.e. the labour demand or supply side. In the labour market for formal skilled (fsk), informal skilled (infsk) and informal unskilled (infusk), labour supply and demand equilibrate and wage rate adjusts to clear the market. As pointed out earlier, the labour market is one without global unemployment, where potential unemployment of unskilled workers in the formal market spills over into the informal market. Equation (12) states that the total labour supply of formal unskilled is the aggregate of those who retain their jobs as minimum wage workers and the excess labour that moves into the informal sector:

$$\sum_j LD_{fsk,j} = LS_{fsk} \quad (9)$$

$$\sum_j LD_{inf,j} = LS_{inf} \quad (10)$$

$$LS_{inf} = LS_{inf}^e + LS_{fusk,j}^e \quad (11)$$

where $LS_{inf} = LS_{infsk} + LS_{infusk}$

$$\sum_j LD_{fusk,j} + LS_{fusk,j}^e = LS_{fusk,j} \quad (12)$$

Equilibrium. The model specifies supply and demand equilibrium in the goods, services and factor market. Similarly, total investment expenditure must equal the sum of agents' savings. The sum of supplies of commodities by local producers must be equal to domestic demand for those commodities produced locally. Also, supply of goods to the export market must be matched by demand.

Closure Rule. The macro-closure adopted ensures a fixed current account balance and foreign savings. Equilibrium in the investment-savings market is achieved by adopting an

investment-driven savings closure, in which the investment level is fixed, and savings adjust endogenously to the desired investment level. Government savings is flexible and real expenditure is fixed. Price of imported products is adopted as the numeraire.

5. Policy simulations and analysis

Four sets of simulations are carried out. They examined the impact of a 20 per cent (Sim1), 35 per cent (Sim2), 50 per cent (Sim3) and 140 per cent (Sim4) increases in the minimum wage, respectively, from ₦7,500 per month which was initiated in 2000. Simulation 4 represents the current minimum wage of ₦18,000 in Nigeria.

The study adopts EV welfare method to measure the impact of minimum wage increase on households' welfare. This approach measures the amount of money a consumer would give up or be offered to provide him/her with the same utility level as he/she would have obtained after the policy. The household's utility level at given prices and income in the base run is compared to the level of utility after the introduction of the policy (Varian, 1990). A positive and negative EV values indicate welfare improvement and decline, respectively. Functionally, it is denoted as:

$$EV_h = \left(CTH_h - \sum_{ij} PC_{ij} C_{ij,h}^{MIN} \right) \prod_i \left(\frac{PCO_i}{PC_i} \right)^{LES_{i,h}} - \left(CTHO_h - \sum_{ij} PCO_{ij} C_{ij,h}^{MIN} \right)$$

In this study, it is assumed that when the minimum wage is increased all employers of formal unskilled workers (minimum wage workers) fully comply. The rise in the minimum wage therefore increases the relative cost of formal unskilled labour, and results in re-allocation of labour. Firms substitute away from formal unskilled workers, leading to increase in the demand for other labour categories and higher wage rates as shown in Figure 3. In the 20 per cent simulation, wage rates of formal skilled, informal skilled and informal unskilled workers increased by 15.2, 31.7 and 33.7 per cent, respectively, after the increase in the minimum wage. This trend is repeated in the 35, 50 and 140 per cent simulations, but with different magnitudes. This result corroborates Taiwo *et al.*'s (2005) findings of an induced higher wage rates for rural and urban informal labour, following a 25 per cent increase in the minimum wage of urban formal workers in Nigeria.

The decline in the employment of formal unskilled workers (fusk) due to increase in the minimum wage is shown in Table III. This is expected, as increase in the factor price of minimum wage workers (shown in Figure 3) leads to a reduction in employment.

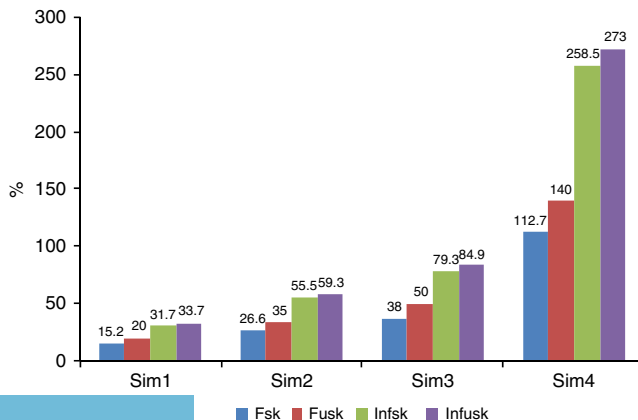


Figure 3.
Wage effects of minimum wage increases (change percentage)

Table III.

Labour demand for formal sector workers

Sector	Base ₦ million	Formal skilled (fsk) % change from base				Base ₦ million	Formal unskilled (fusk) % change from base			
		Sim1	Sim2	Sim3	Sim4		Sim1	Sim2	Sim3	Sim4
Agriculture	412,646	31.1	51.0	68.3	291.6	465,325	24.8	39.8	52.3	84.3
Manufacturing	113,615	-2.6	-5.3	-8.2	-5.6	123,082	-7.2	-12.3	-16.9	-19.7
Extractive	2,147	-13.1	-21.4	-28.6	-111.64	439	-17.2	-27.2	-35.4	-56.8
Util. and Con.	132,778	-5.5	-9.6	-13.6	-40.4	226,082	-10.1	-16.4	-21.8	-31.8
Trade	175,288	13.0	20.2	25.9	145.1	168,414	7.64	11.3	13.9	33.0
Hotel and Rest.	39,203	3.7	5.5	6.9	50.4	83,307	-1.21	-2.2	-3.2	-0.1
Fin, Tel. and Est.	654,920	-12.1	-19.2	-24.8	-111.6	242,231	-16.4	-25.1	-31.9	-56.7
Health and Education	278,603	-6.2	-10.4	-14.2	-55.9	65,351	-10.7	-17.0	-22.3	-37.3
Admin.	530,632	-8.7	-14.3	-19.3	-102.5	384,251	-13.1	-20.7	-27.0	-50.4
Other private services	17,990	7.8	12.7	16.7	86.2	34,922	2.8	4.3	5.6	12.4

Source: Authors' compilation

In the 20 per cent wage scenario (Sim1), employment of minimum wage workers in the manufacturing sector dropped by 7.2 per cent, while it declined by 17.2 per cent in the extractive industry. Health and education, and finance sectors, telecoms, and estate shed 10.7 and 16.4 per cent of formal unskilled workers, respectively. Unsurprisingly, the demand for formal unskilled workers in government agencies (administration) declined by 13.1 per cent due to rise in government wage bill.

Only agriculture, trade and other private services sectors recorded increases in employment. The employment of unskilled workers in agriculture, and wholesale and retail industry increased by 24.8 and 7.64 per cent, respectively. These sectors have insignificant wage bill on formal unskilled workers. Similarly, the goods produced in these sectors are fairly inelastic, and firms could easily pass-on some of the increased labour cost to consumers in form of higher prices. As shown in Table V, price increase in the agriculture, trade and other private services sectors were the highest. In this respect, our findings differ from Taiwo *et al.* (2005) for Nigeria which presented a general decline in sectoral labour demand for minimum wage workers after an increase in their wages. Labour re-allocation in the informal sector, resulting from minimum wage increase is presented in Table IV. The mixed trend observed in the employment of other labour by sectors is in harmony with

Sector	Base ₦ million	Informal skilled (infsk) % change from base				Base ₦ million	Informal unskilled (infusk) % change from base			
		Sim1	Sim2	Sim3	Sim4		Sim1	Sim2	Sim3	Sim4
Agriculture	237,052	11.6	17.9	22.8	111.6	2,396,863	9.6	14.6	18.4	99.3
Manufacturing	15,089	-17.1	-26.0	-32.9	-180.7	487,893	-18.5	-28.1	-35.3	-198.0
Extractive	56	-26.0	-38.6	-47.8	-286.6	199	-27.4	-40.4	-49.7	-303.9
Util. and Con.	26,425	-19.5	-29.4	-36.9	-215.4	267,188	-21.0	-31.4	-39.2	-232.7
Trade	255,902	-3.7	-6.1	-8.0	-29.9	962,682	-5.5	-8.7	-11.3	-47.3
Hotel and Rest.	8,871	-11.6	-17.5	-21.9	-124.6	79,843	-13.3	-19.8	-24.7	-141.9
Fin, Tel and Est.	8,971	-25.2	-36.8	-45.1	-286.5	28,409	-26.5	-38.6	-47.1	-303.9
Health and Education	17,646	-20.2	-30.4	-37.3	-230.8	12,262	-21.6	-32.0	-39.6	-248.2
Admin.										
Other private services	42,918	-8.1	-11.9	-14.7	-88.8	100,142	-9.8	-14.5	-17.7	-106.2

Table IV.
Labour demand for informal sector workers

Source: Authors' compilation

Folawewo (2009) and Taiwo *et al.* (2005) which also found mixed employment effects after the increase in minimum wages in Nigeria.

As shown in Table V, firms still passed-on some of the increase in wages to consumers in the form of higher prices, despite the reduction in employment of minimum wage workers due to increase in labour cost.

Table VI shows welfare changes of households. The values of the EV welfare measure in the table show how much the utility of households changes considering variations in the price and consumption budget arising from minimum wage increase. A positive value indicates welfare improvement, while a negative value denotes welfare loss. In simulations 1, 2 and 3, only high-urban households benefitted from minimum wage increases in terms of welfare improvement. All other households recorded welfare losses in different degrees. In simulation 1, the largest welfare loss was recorded by low-rural households (-0.094), followed by middle-rural, low-urban, high-rural and middle-urban households in that order.

Worth pointing out is that low-rural households receive more than half of their income from informal activities. Although this category of workers benefitted indirectly from a minimum wage increase through rising wages, the rise in prices eroded most of the gains in income. Formal skilled workers only contributed a small amount to the labour income of this household. Similarly, middle-rural households receive a large share of its labour income from informal activities. The welfare of low-urban households declined less (compared to low-rural and middle-rural households) because a relatively large number of workers in this household are skilled. A substantial number of these skilled workers in this household work in the informal sector. Worth noting is that minimum wage workers largely dominated middle-urban and low-urban households, particularly the latter.

The welfare of middle-urban households declined relatively less, as shown by the negative EV value of -0.011. About one-third of its labour income is from formal skilled workers' wage bill and another one-third from minimum wage workers. Although loss of

Table V.
Price effects of
minimum wage

Domestic price of commodity	Base value	Sim1 (%)	Sim2 (%)	Sim3 (%)	Sim4 (%)
Agric.	1	41.8	74.2	107.3	332.5
Man.	1	1.3	2.8	4.7	6.2
Extractive	1	-3.1	-4.9	-6.2	-25.9
Util. and con.	1	6.2	10.7	15.2	46.8
Trade	1	25.2	44	62.6	208.7
Hotel and restaurant	1	17.5	30.4	43.3	140.5
Fin, telecoms, estate	1	12.1	21.2	30.4	77.2
Health and education	1	11.0	19.2	27.5	79.8
Admin.	1	11.8	20.5	29.2	80.5
Other private services	1	25.9	45.3	64.7	212.9

Source: Authors' compilation

Table VI.
Equivalent
variation welfare

	Simulation 1 (20%)	Simulation 2 (35%)	Simulation 3 (50%)	Simulation 4 (140%)
Low-rurh	-0.094	-0.121	-0.130	-0.220
Mid-rurh	-0.069	-0.091	-0.098	-0.140
High-rurh	-0.013	-0.010	-0.001	0.240
Low-urbh	-0.035	-0.043	-0.044	-0.111
Mid-urbh	-0.011	-0.012	-0.009	0.193
High-urbh	0.007	0.014	0.021	0.231

Source: Authors' compilation

jobs among minimum wage workers negatively impacted the labour income received by this household, increased employment and wage rates for skilled workers who are also members of the household cushioned the negative effect. In addition, this household also received capital income, unlike the low-urban household which depended on labour income. Similarly, the rise in prices eroded the gains among workers who retained their jobs. High-urban households recorded improvement in welfare, largely as a result of the positive indirect wage effect on skilled workers who dominated this household.

In simulation 2, the welfare of high-urban households increased, while low-rural, middle-urban, low-urban and middle-rural households recorded high welfare losses. Although, high-rural households also registered a decline in welfare, it was an improvement over simulation 1 as shown by EV value of -0.010 compared to -0.013 in simulation 1. In simulation 3, high-rural and middle-urban households recorded some improvement in welfare compared to simulation 2, although their welfare still declined. Low-rural, middle-rural, low-urban households further recorded losses in welfare, and only high-urban had higher welfare improvement. Meanwhile, with a 140 per cent increase in the minimum wage from ₦7,500 to ₦18,000 per month, the welfare of high urban, middle-urban and high-rural households improved. The welfare of low-urban, low-rural and middle-rural households however worsened.

The trend observed in the welfare pattern of high-rural and middle-urban households is worth noting. It may take a much larger increase in the minimum wage for these households to achieve welfare improvement. For these households, welfare improvement is an indirect effect of minimum wage increases, since more than half of labour income received is from skilled workers. Nevertheless, low-urban households, who received bulk of their labour income from minimum wage workers, may continue to be adversely affected by the wage policy. Middle-rural and low-rural households although benefitted indirectly from wage increases, the accompany price increases made them worse-off.

A major intuition behind this outcome is that, although all households benefitted from minimum wage increases either directly or indirectly (through spillover effects on wage rates); the associated increases in prices subdued the wage gains of households who recorded welfare losses. This resulted in a significant decline in the consumption demand of these households. Analysis of changes in aggregate consumption demand of households after the 20 per cent wage increase shows that, low-rural, middle-rural and low-urban households' consumption demand declined by -105.7 , -81.5 and -46.3 per cent, respectively. Consumption expenditures of middle-urban, high-rural and high-urban households, however, declined by a smaller percentage; -30.1 , -29.6 and -14.6 per cent, respectively. The marginal decline in the consumption demand of high-urban household's further points out that the indirect benefit of wage increases and small job losses among the formal skilled workers muted the accompanying price increases. High urban households received the largest share of total formal skilled wage bill, estimated at over 30 per cent.

6. Conclusion

Minimum wage policies are intended to protect poorly paid workers. This was the rationale behind the setting up of this welfare programme. It should be noted, however, that when minimum wages are increased, it has indirect effects on employment and wages of other workers. This has significant welfare implications for both minimum wage beneficiaries and those who are not covered by the policy.

The results of the four simulations (20, 35, 50 and 140 per cent) of the study show that the wage rates of other labour categories increased, following an increase in the minimum wage. Similarly, minimum wage workers recorded mixed employment effects. The findings also revealed that the prices of commodities and services increased, as production units passed-on some of the higher labour cost to consumers. Consumption demand for

commodities by households differs markedly. The changes in prices and employment impacted more negatively on low income households' welfare as their demand for goods declined more than those of high income households. Another major finding is that, with larger increases in the minimum wage, high-rural, high-urban and middle-urban households' welfare declined less, while low-urban, middle-rural, and low-rural recorded greater welfare losses. This is because large rise in prices of goods affects the consumption pattern of lower income households more than the upper income households. More importantly, low income households depend mainly on labour income, while high income households derive income from capital as well as labour, therefore the losses accruing to the former increases as employment declines and price increases.

A major policy lesson drawn from this study is that gradual increase in the minimum wage is desirable since it will have less volatile impact on prices. Evidence from developed countries shows that minimum wage increases are moderate. Timeliness in the adjustment of wages will prevent sharp increases in the minimum wage that could induce uncontrollable price increases or job losses. Wage increases should also be adjusted to reflect price changes. This is essential in order to prevent erosion of minimum wage gains.

Also worth noting is that despite low-urban households having the highest proportion of unskilled workers who are beneficiaries of the minimum wage, they eventually became worse-off in welfare. This is attributed to the dis-employment and price effects of the minimum wage increases. Policies that directly target unskilled workers such as health, transportation subsidies and affordable housing scheme should complement the minimum wage policy. Studies have shown that poor workers spend a large proportion of their wages on these amenities.

Notes

1. See Browning and Johnson (1983), Conradie (2004), and Meer and West (2016).
2. See Mincy (1990) and Borat *et al.* (2013).
3. The last time the minimum wage was increased was in 2011.
4. It is modelled such that formal unskilled workers (beneficiaries of minimum wage) who lose their jobs as a result of minimum wage increase can easily be accommodated into informal activities.
5. The two aggregate inputs are assumed to be strictly complementary, without any possibility of substitution.
6. The CES combination of the different labour categories allows for the analysis of the effects of a minimum wage increase on other labour categories.
7. Only the key equations and the ones that were modified are included, due to space limitation. The remaining mathematical expressions of the blocks are available from the Partnership for Economic Policy (PEP) website: www.pep-net.org/pep-standard-cge-models
8. It is assumed that labour supply is exogenously fixed, such that increase in the minimum wage does not induce potential workers into the labour market.

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Corresponding author

Taiwo Aderemi can be contacted at: adekunte22@yahoo.com

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