SIMULATING THE ECONOMIC AND WELFARE IMPACTS OF THE NEW MINIMUM WAGE USING A CGE MODEL

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ABSTRACT
This study investigates the economic and welfare impacts of increasing the minimum wage using a static computable general equilibrium (CGE) model calibrated with Nigeria's updated 2013 social accounting matrix (SAM). The results show that increasing the minimum wage leads to decrease in the demand for labour in most sectors, supporting conventional theory on the impact of minimum wage increase. The results further show that increasing the minimum wage leads to rise in household income, driven by increase in labour income, but the increase in household income is overridden by increase in consumer prices (inflationary pressure), such that the consumption budget of households decline, implying a welfare loss. The welfare loss is higher for urban households than rural households. Lastly, the minimum wage increase results in lower real GDP, suggesting negative impact on the aggregate economy. The study notes that the negative impact of minimum wage increase on labour demand, household welfare and real GDP, is to some extent, mitigated if the government adjusts its expenditure to accommodate the increase.
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JEL Classification: C68, J23, J31

1. INTRODUCTION
President Muhammadu Buhari, on April 18th, 2019, signed the minimum wage bill into law. The Act increased the minimum wage from ₦18,000 to ₦30,000. This action, which was necessitated by the increasing cost of living and high poverty rates in the country, has been lauded by various stakeholders, especially labour unions. There have been commentaries and debates on how the new minimum wage will enhance the welfare of workers and impact government financial standing and the economy (Adegboyega, 2019; John, 2019). Some commentaries have stated that the new minimum wage will lead to inflation. Others have stated it will increase fiscal deficit and impede economic development. There is, however, no empirical evidence yet on the macroeconomic effects of the new minimum wage. This is the focus of this study.

There are several empirical analysis of the impacts of minimum wage in Nigeria. The key studies addressing the economy-wide effects of minimum wage using CGE model, like Folawewo, (2009), and Aderemi and Ogwumike (2017), use 2006 data/social accounting matrix (SAM), which is outdated and no longer reflect the size and structure of the Nigerian economy. The findings of the study using such outdated data may not be suitable for the current policy dispensation. Abachi and Iorember (2017) use an updated data/SAM to evaluate the macroeconomic and household welfare impact of minimum wage increase, but the simulated increases in minimum wage were based on arbitrary minimum wage increase.

This study advances the existing literature on the economic impacts of minimum wage in Nigeria in a number of ways. First, the 2006 SAM used by the previous studies was updated with 2013 economic

data using the cross-entropy method (Lemelin, Fofana and Cockburn, 2013). Second, this study simulates the increase in minimum wage as enacted by the President, rather than an arbitrary minimum wage increase. Third, the impacts of the minimum wage on the economy is examined for scenarios where the minimum wage increase is financed by adjustments in government expenditure or increase in public deficit. This distinction is important because government expenditure has significant effects on economic output and employment (Anjande, Ahemen and Ijirshar, 2020). Lastly, this study analyses the impacts of the minimum wage legislation financed by the recent increase in the value added tax (VAT).

Therefore, the broad objective of this study is to investigate the economy-wide and welfare effects of the new minimum wage policy. Specifically, the study examines how the new minimum wage policy affects employment, household welfare, sectoral output, government finances, GDP and other macroeconomic indicators. The government also increased the VAT rate from 5% to 7.5% via the recently passed Finance Bill. The study, therefore simulates a combination of the minimum wage policy and the VAT reform.

2. LITERATURE REVIEW

The impacts of minimum wage legislations on economic indicators, s employment, has enjoyed substantial attention in the literature. Most of the early studies test the basic hypothesis of minimum wage increase having a negative effect on employment. For example, Majchrowska and Zolkiewski (2012) investigate the impacts of minimum wage on employment across workers group and regions in Poland using econometric model. The study finds that minimum wage has a negative effect on employment during 1999-2000 period, and the negative effect is larger for young workers. The study concludes that adopting a uniform minimum wage level will negatively affect the poorest regions than other regions. This finding is consistent with neoclassical theory and is the earliest consensus on the subject.

However, recent studies and reviews have showed mixed findings, and in some context, a positive effect. Imobighe (2007) analyse the impact of minimum wage increase on employment and productivity in Nigeria. The study finds that minimum wage increase does not have a serious negative effect on employment, and the positive effect on productivity is not as high as expected. In a recent review of about 70 studies in high income countries, Belman and Wolfson (2014) shows that the effect of minimum wage on employment ranges from large negative effect to small positive effect. The study shows that the employment effects of minimum wage are close to zero and largely unnoticeable in aggregate employment and unemployment statistics. This evidence is also emerging for developing countries. Kuddo, Robalino and Weber (2015) find that recent evidence on the impacts of minimum wage on employment in developing countries shows a small or insignificant effect. In some cases, there are reported positive effects. This tends to support earlier findings by Dickens, Machin and Manning (1999). They formulated an empirical model to analyse the impact of the minimum wage set by the United Kingdom Wages Council between 1975 and 1990. The empirical evidence suggests that minimum wage increases reduce earnings distribution, and have a positive effect on employment.

Overall, the impact of minimum wage depends on a number of factors including whether the minimum wage is binding, the workers group, the geographical location, time, nature and size of the industry, methodology adopted, etc. Boockmann (2010) in a literature survey of the impact of minimum wage on employment in 15 industrialized countries found that the real effect of wage on employment are heterogeneous across countries.

There are also studies on the economic, employment and welfare impacts of minimum wage increase in Nigeria. Akpansung (2014) conducts an empirical assessment of the effects of minimum wage increases on unemployment in Nigeria using Ordinary least square and Granger causality. The empirical results show that increasing the minimum wage is associated with increase in unemployment. The estimation results show that a 1% increase in the minimum wage decrease employment by 6.4%

in the current year, and 9.9% in the following year. Aderemi and Ogwumike (2017) examine the welfare impacts of minimum wage increase in Nigeria using a CGE model calibrated using the 2006 SAM. The study formulates four different scenarios of minimum wage increase (20%, 35%, 50%, and 140%), and finds that increasing the minimum wage leads to reduction in labour demand and increment in the consumer price index. The paper concludes that minimum wage increase leads to welfare loss, through its impacts on employment and prices. Another recent study that uses a CGE model to analyse the impact of minimum wage in Nigeria is Abachi and Iorember (2017). They analyse a 150% and 211% increase in the ₦18,000 minimum wage. The simulation results show that increase in minimum wage makes agriculture and industrial outputs and exports to increase while imports fall. Household indicators – income, consumption and savings – also shows increase in welfare. Idiaye, Kuhn and Okoruwa (2018) studies the impacts of minimum wage increase by 12%, 30% and 68% on rural economy and household welfare in Nigeria. The analysis shows that increasing the minimum wage leads to reduction in output in all sectors except crude oil and mining. A decline in labour demand was also observed due to the increase in the price of labour – wages. GDP, real GDP, investment and household utility fell, indicating that minimum wage increase leads to welfare loss in the long run.

This study builds on the existing literature and analyses the impacts of the enacted minimum wage increase on the Nigerian economy. It uses an updated SAM using the cross entropy method (Lemelin, Fofana and Cockburn, 2013). Given the current high unemployment rate in Nigeria at 23.1%, this study relaxes the neoclassical assumption of full employment and incorporates unemployment in the model. In addition, this study simulates the impact of the new minimum wage increase given consideration to the means of financing the new minimum wage.

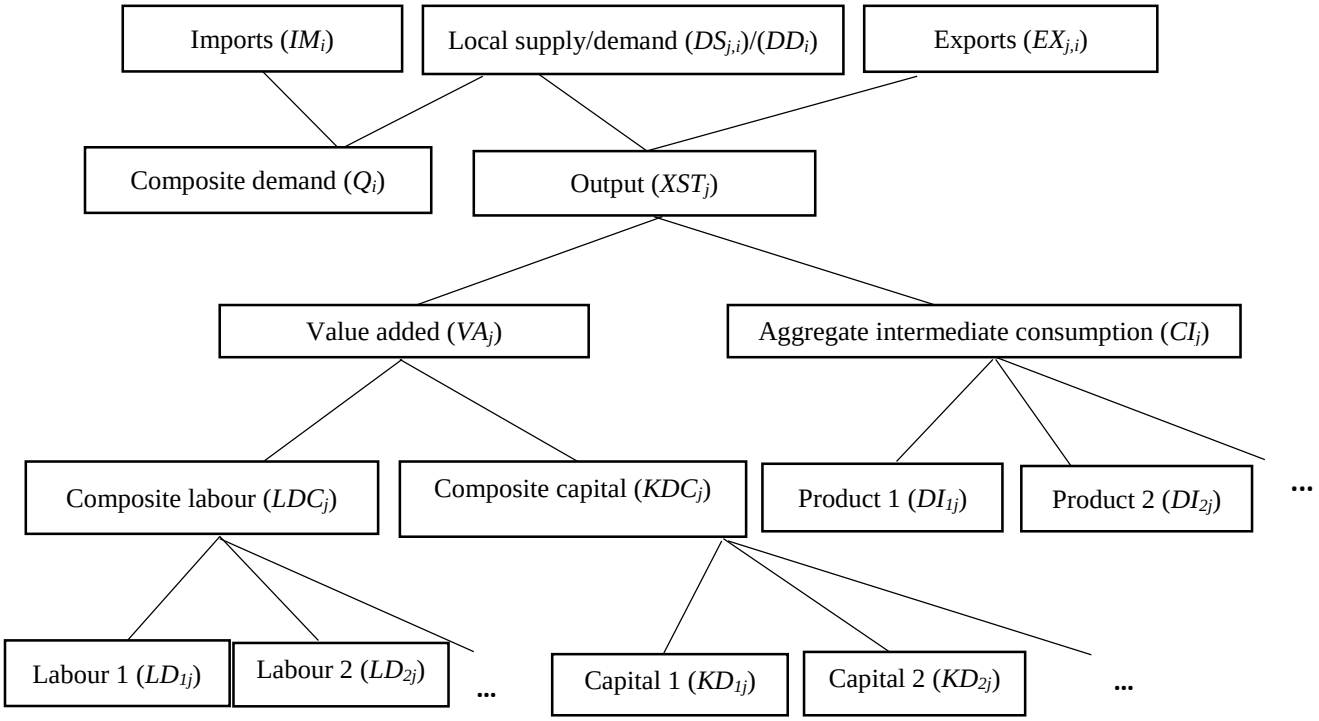
The theoretical framework for this study is based on the minimum wage theory. The theory depicts that the higher the wage rate, the lower the demand for labour or lower labour hours. This shows an inverse relationship between wage rate and labour demand. Similarly, as the wage increases, workers are willing to supply more labour to the market, depicting a positive relationship between wage rate and labour supply. Without a minimum wage in place, wages will adjust to ensure that the demand and supply of labour are equal. At this point, the equilibrium wage will clear the market, such that there will be no unemployment. However, a minimum wage serves as a wage floor. If the minimum wage is set above the equilibrium wage level, there will be increase in labour supply than employers are willing to employ, leading to labour surplus or unemployment (Ehrenberg and Smith, 1994).

3. METHODOLOGY

The methodological approach for this study is the computable general equilibrium (CGE) modelling. It uses a system of equations to model the economic behaviour of economic agents, and has been widely employed to assess the macroeconomic, distributional and welfare impacts of public policy. It is most appropriate for understanding the comprehensive economy-wide and distributional impacts of public policy (Nwafor et al., 2010), and has been applied to policy issues in the Nigerian context (Iorember, 2020). Thus, the CGE model in this study simulates the potential effects of the new minimum wage on various macroeconomic indicators - macro, structural, price, trade, fiscal and labour market.

The standard PEP 1-1 developed by Decaluwe et al. (2013) is the reference CGE model used in this study. The model is a single-country static model. It separates capital and labour into several categories, and takes into account a broader set of tax instruments). The nested production and consumption structure in the model is shown in Figure 1.

Figure 1: Production and consumption structure of the PEP-1-1 model



Source: Decaluwe, et al. (2013)

In the standard PEP-1-1 model, total output (XST_j) is made up of value added (VA_j) and intermediate consumption (CI_j) in fixed proportion (see equations 1 and 2). The output of each sector (XS_j) is either consumed in the local market (DS_j) or exported (EX_j). The relationship between consumption of domestic commodities and export is presented by a constant elasticity of transformation (CET) function (equation 3). Similarly, consumers can consume locally made commodities (DD_j) or imported commodities (IM_j) (equation 4), which are imperfect substitute (Sisso, Sawadogo and Natama, 2016). The relationship between consumption of imported and locally made commodities is introduced with a constant elasticity of substitution (CES) function based on the Armington assumption (Armington, 1969).

$$VA_j = v_j XST_j \ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$
$$CI_j = io_j XST_j \ldots\ldots\ldots\ldots\ldots\ldots\ldots 2$$

where

CI_j: Total intermediate consumption of industry j

VA_j: Value added of industry j

XST_j: Total aggregate output of industry j

io_j: Coefficient (Leontief – intermediate consumption)

v_j: Coefficient (Leontief – value added)

$$XS_{j,i} = B_{j,i}^X [\beta_{j,i}^X EX_{j,i}^{\rho_{j,i}^X} + (1-\beta_{j,i}^X) DS_{j,i}^{\rho_{j,i}^X}]^{\frac{1}{\rho_{j,i}^X}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

$$Q_i = B_i^M [\beta_i^M IM_i^{-\rho_i^M} + (1-\beta_i^M) DD_i^{-\rho_i^M}]^{\frac{-1}{\rho_i^M}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots 4$$

where

$XS_{j,i}$: Total supply of commodity i by sector j

$DS_{j,i}$: Supply of commodity i by sector j to the domestic market

$EX_{j,i}$: Supply of commodity i by sector j to the international market (exports)
$B_{j,i}^{X}$: Scale parameter (CET between local sales and exports)
$\beta_{j,i}^{X}$: Share parameter (CET between local sales and exports)
$\rho_{j,i}^{X}$: Elasticity parameter (CET between local sales and exports); $1 < \rho_{j,i}^{X} > \infty$
Q_i: Quantity demanded of composite commodity i
IM_i: Quantity demanded of imported commodity i
DD_i: Quantity demanded of locally produced commodity i
B_i^M: Scale parameter (CES between imports and locally produced commodity)
β_i^M: Share parameter (CES between imports and locally produced commodity)
ρ_i^M: Elasticity parameter (CES between imports and locally produced commodity); $-1<\rho_i^M<\infty$

Labour and capital are key production factors in the economy (Ashakah and Ogbebor, 2020). In the model, and they combine to form the value added following a CES function (equation 5). Firms will employ a combination of labour and capital to the point where the marginal product of labour and capital are equal to the wages and rental rate of capital. Hence, the demand for labour will be depicted by the relative price of both factors as shown in equation 6. The labour market in the standard model is perfectly competitive, and wages are determined by the interplay of labour demand and supply. However, given the implausibility of this assumption in the Nigerian context (Aigheyisi and Edore, 2021), we adjust the model to account for unemployment in Nigeria.

$$VA_j = B_j^{VA}[\beta_j^{VA} LDC_j^{-\rho_j^{VA}} + (1-\beta_j^{VA}) KDC_j^{-\rho_j^{VA}}]^{\frac{-1}{\rho_j^{VA}}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots 5$$

$$LDC_j = \left[\frac{\beta_j^{VA}}{1-\beta_j^{VA}} \frac{RC_j}{WC_j}\right]^{\sigma_j^{VA}} KDC_j \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 6$$

where
KDC_j: Industry j demand or composite capital
LDC_j: Industry j demand or composite labour
B_j^{VA}: Scale parameter (CES – value added)
β_j^{VA}: Share parameter (CES – value added)
ρ_j^{VA}: Elasticity parameter (CES – value added); $-1 < \rho_j^{VA} < \infty$
where
RC_j: Rental rate of industry j composite capital
WC_j: Rental rate of industry j composite labour
σ_j^{VA}: Elasticity of transformation (CES – value added); $0 < \sigma_j^{VA} < \infty$

The standard PEP-1-1 model assumes full employment, depicted by equation 7. The equation express that total labour supply in the economy is the sum of all labour demanded by all the sectors. But we adjust this equation by incorporating unemployment because the Nigerian economy is far from full employment (see equation 8).

$$\sum_j LD_{l,j} = LS_l \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 7$$

$$\frac{\sum_j LD_{l,j}}{1 - UR_l} = LS_l \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 8$$

where
$LD_{l,j}$: Demand for type l labour in industry j
$LS_{l,j}$: Supply of type l labour
UR_l: Unemployment rate of type l labour

The data used for this study is the 2006 social accounting matrix (SAM). SAMs show the circular flow of income and expenses of economic agents and describes how agents allocate factors of production to sectors and how sectoral outputs are distributed among the economic agents. The latest SAM for Nigeria was published in 2010 based on 2006 national accounts data. According to Nwafor et al. (2010), the data for constructing the SAM were obtained from various publications of key government agencies such as the Central Bank of Nigeria, National Bureau of Statistics and Ministry of Agriculture and Water Resources. There are 61 sectors and 62 commodities, three production factors (land, labour and capital), four economic agents (households, firms, government, and rest of the world). Households supply their labour and capital resources to firms, which in turn pays the households in terms of wages and returns on capital. They also gain income from remittances from abroad, and transfer from firms and government. Household incomes are used to pay taxes, purchase goods and services produced by firms, and the rest are saved. Government obtain incomes from taxes (income, sales tax, imports and export taxes, factors taxes, etc.), income from capital, and transfer from the rest of the world. The government income are used to pay for public goods, transfer to other agents, especially household, and savings. All goods and services from the sectors to the rest of the world are exports, and commodities and services from the rest of the world are imports. The difference between both is the current account balance.

There are 12 households in the original SAM (South-South rural, South South urban, South East rural, South East urban, South West rural, South West urban, North Central rural, North Central urban, North East rural, North East urban, North West rural, and North West urban), but it has been aggregated into rural and urban households in this study. Also, the 61 sectors and 62 commodities in the original households have been aggregated into 25 sectors and 26 commodities (see Table 2 in the Appendix). Also see Nwafor, et al. (2010) for details of the Nigerian SAM.

Between 2006 when the SAM was developed and now, the Nigerian economy has changed significantly in size and structure. Therefore, the 2006 SAM was updated to 2013 economic data (Omoju, Ikhide, Dimnwobi and Ehimare, 2019) using the cross entropy method implemented by SAMBAL (Lemelin, Fofana and Cockburn, 2013). The PEP-1-1 CGE model is used to calibrate the updated SAM to examine the impact of the new minimum wage policy.

There are no specific elasticities and parameters for Nigeria, hence, we adopt the elasticities from Decaluwe, Martens and Savard (2001). The model is implemented using GAMS software.

4. RESULTS AND DISCUSSION OF FINDINGS

The impacts of increasing the minimum wage from ₦18,000 to ₦30,000 (67% increase) on key economic and welfare variables are presented in this section. Three scenarios are simulated in this study based on how the minimum wage increase is financed, including:

Scenario 1: Increase in minimum wage (the government does not reduce expenditure) such that this leads to increase in public deficit;

Scenario 2: Increase in minimum wage (government adjusts its expenditure to accommodate the increase in minimum wage) such that this does not lead to increase in public deficit;

Scenario 3: Increase in minimum wage to be financed by the recent increase in VAT rate from 5% to 7.5%.

In the first instance, increasing the minimum wage from N18,000 to N30,000 implies an increase in the cost of hiring labour. As a result of the increase in the cost of hiring labour, the demand for labour will fall, particularly in labour intensive sectors, supporting the neoclassical theory of a negative correlation between wages and employment. From the results in table 1, all economic sectors, except real estate, education and other services, experience a negative effect of minimum wage increase as the demand for labour reduces significantly. The negative effects on labour demand in most of the sectors persist regardless of how the minimum wage increase is financed. However, the reduction in the average demand for labour across all sectors is lower (15.2%) when government adjusts its

expenditure to accommodate the minimum wage compared to when the minimum wage leads to increase in government deficit (16.8%) or is being financed by the increase in VAT (16.7%). A major observation is that labour demand in the public administration sector (civil service) does not decrease if the government reduces or adjusts its expenditure in order to accommodate the increase in minimum wage. In other words, the government can reduce expenditure on other activities in order to ensure that employment in the civil service is not undermined by the minimum wage increase. Otherwise, public sector employment will reduce by as much as 18.7%.

As a result of the increase in the cost of hiring labour occasioned by the minimum wage increase, the demand for capital increases as some sectors substitute labour for capital (see Table 1). The increase in the demand for capital leads to increase in the rental rate of capital by 5.5% (scenario 1), 5.3% (scenario 2) and 5.6% (scenario 3). This change in the rental rate of capital influence the extent to which sectors can substitute labour for capital. Thus, the demand for capital even decrease in some capital-intensive sectors such as other manufacturing, crude oil and gas, refined oil, other solid minerals, road and other transports, and banking and financial services.

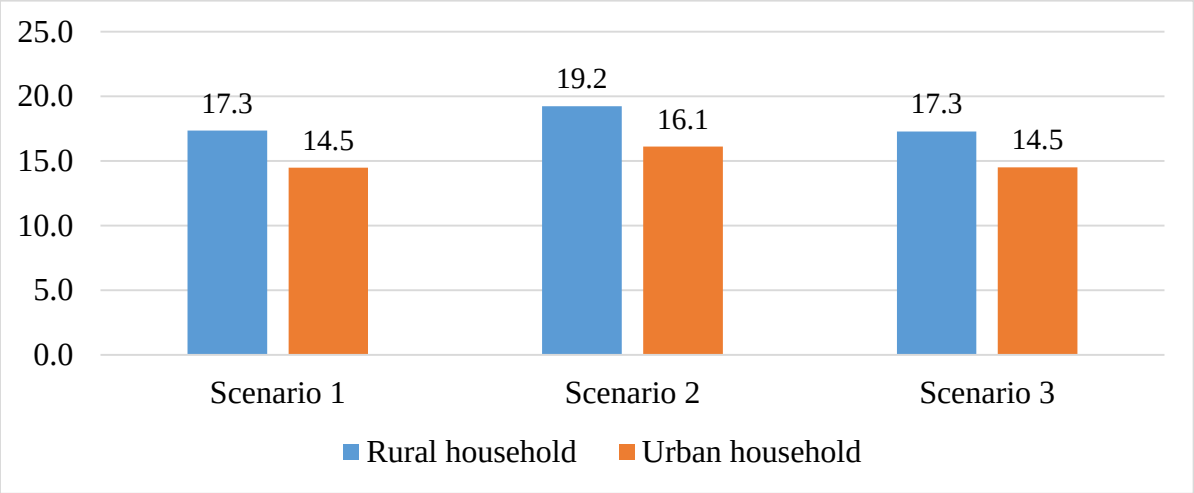
Table 1: Impacts on labour and capital demand

Sectors	Demand for labour (LD)			Demand for capital (KD)		
	Scenario 1	Scenario 2	Scenario 3	Scenario 1	Scenario 2	Scenario 3
crop	-9.91	-7.72	-10.29	10.89	12.42	10.58
live	-10.38	-9.79	-9.83	20.44	21.52	20.99
fish	-13.01	-12.23	-11.73	17.18	18.49	18.64
fore	-8.11	-7.42	-8.21	23.26	24.47	23.00
bevg	-16.32	-14.14	-16.50	13.08	16.12	12.73
text	-18.42	-16.55	-18.58	10.48	13.12	10.16
wood	-13.34	-14.91	-13.23	16.77	15.17	16.78
omfc	-34.31	-35.84	-34.21	-9.23	-10.84	-9.20
coil	-36.16	-35.99	-36.18	-11.51	-11.03	-11.64
roil	-42.02	-40.87	-42.02	-18.77	-17.09	-18.87
omin	-38.96	-39.33	-38.92	-14.98	-15.18	-15.04
cons	-10.68	-18.14	-10.14	20.08	11.15	20.61
water	-19.15	-16.97	-19.25	9.57	12.60	9.33
elect	-19.15	-16.97	-19.25	9.57	12.60	9.33
rtra	-36.05	-35.18	-36.05	-11.38	-10.02	-11.49
otra	-32.16	-31.42	-32.21	-6.55	-5.35	-6.73
trad	-3.19	-4.27	-2.99	29.36	28.38	29.46
hotl	-2.88	-0.46	-3.01	29.74	33.11	29.44
comm	-15.66	-11.90	-15.71	13.90	18.91	13.71
bser	-27.21	-26.41	-27.24	-0.41	0.87	-0.57
rest	3.19	5.64	3.02	37.26	40.70	36.90
educ	0.47	2.62	0.30	33.89	36.95	33.54
heal	-2.58	-0.23	-2.75	30.11	33.40	29.76
pser	-18.68	2.41	-18.69	10.15	36.68	10.01
oser	5.44	6.77	5.26	40.06	42.10	39.68
Average	-16.77	-15.17	-16.74	12.12	14.37	12.04

Source: Authors' compilation

The increase in wages leads to increase in household labour income as households earn more income from higher wages. This, alongside increase in household capital income (propelled by increase in the rental rate of capital) and inter-agent transfer income, leads to increase in overall household income. According to the results (see Figure 2), the increase in total household income varies for rural and urban households in the three scenarios. For scenario 1, the income of rural households by 17.3% while that of urban households increase by 14.5%. This is similar to the result of scenario 3 which shows an increase in rural household income by 17.3% vis-à-vis urban household income by 14.5%. However, the increase in the income of rural (19.2%) and urban (16.1%) household is much higher under scenario 2 – when government adjusts its expenditure to accommodate the minimum wage increase.

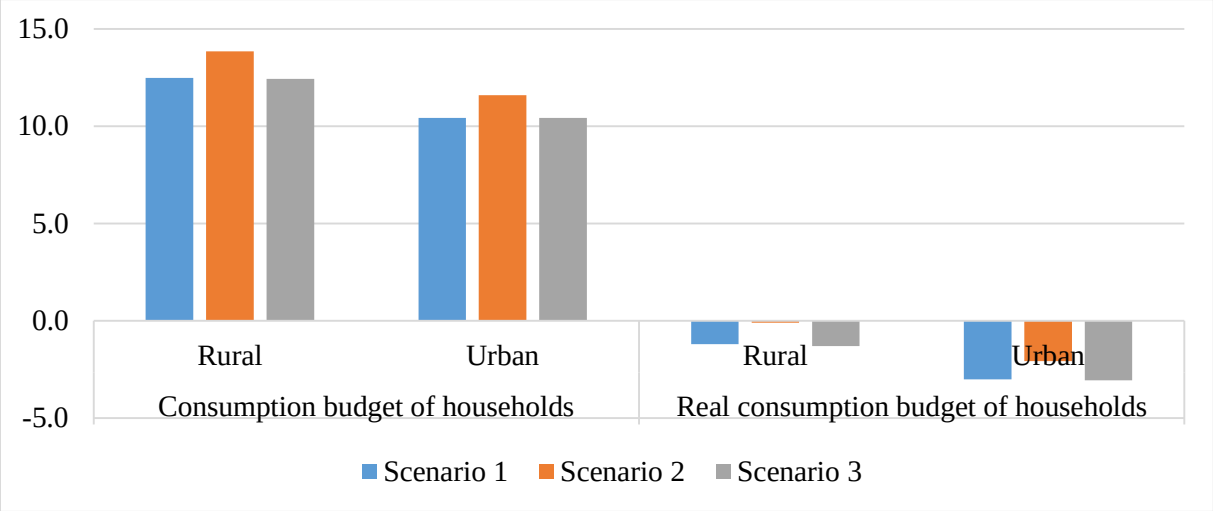
Figure 2: Impacts on income of rural and urban households



Source: Authors' compilation

The increase in minimum wage exerts inflationary pressure in the economy, as it leads to increase in the prices of goods and services. The price of all commodities increases, though in different proportion. This results in an overall increase in the consumer price index by 13.85% (scenario 1), 13.96% (scenario 2) and 13.91% (scenario 3). The increase in household income suggests an increase in household purchasing power as the consumption budget (CTH) of rural and urban household increases by 12.4%-13.8% and 10.4%-11.6% respectively. However, due to the increase in prices, which pushed the consumer price index to increase by an average of 13.9%, the real consumption budget (CTH_REAL) decrease. In other words, the inflationary impacts of the minimum wage increase dampens the positive effect on income, such that if price changes are taken into consideration, the available budget for household consumption declines in real terms, suggesting a welfare loss. From Figure 3, the reduction in the real consumption budget of households is more pronounced in urban households than in rural households, suggesting higher welfare losses in urban areas than rural areas. The implication of this result is that minimum wage increase ultimately harm those it was meant to help as the inflationary impacts leads to aggregate welfare loss. It is important to note, however, that the welfare loss is lower if government adjusts its expenditure to accommodate the minimum wage increase compared to when it results in public deficit or is financed by increase in the VAT rate.

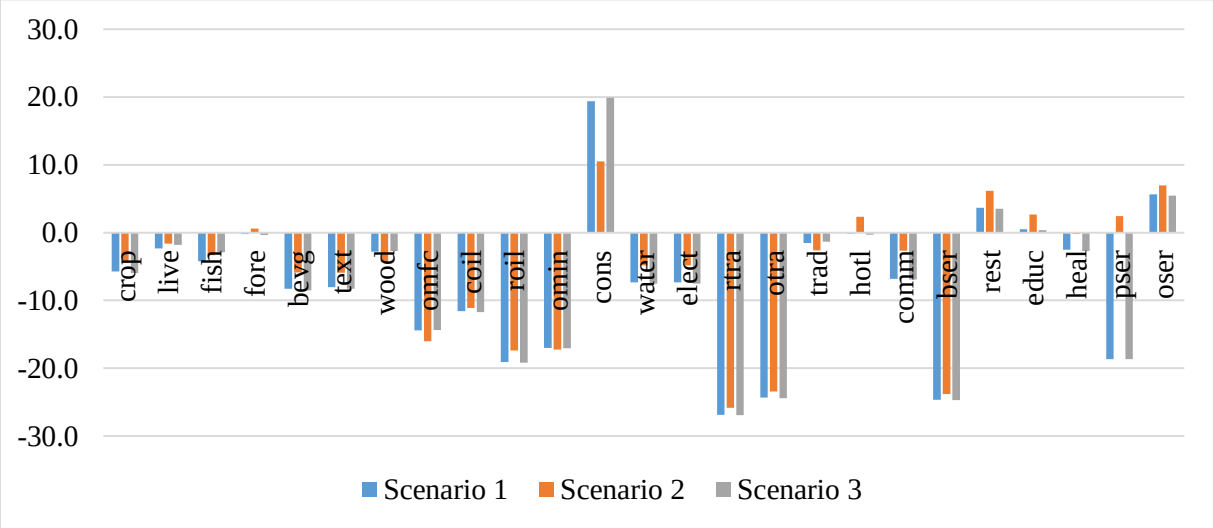
Figure 3: Impacts on household welfare (measured by consumption budget)



Source: Authors' computation

The increase in minimum wage leads to reduction in output in most sectors. The pass through of this effect is through value added (labour and capital) and cost of production. Under scenarios 1 and 3 (Figure 4), there is decline in the output of all sectors whose labour demand reduce. The reduction in the demand for production factors results in the decline in sectoral value added and then sectoral output. The output of all sectors decline, except construction, real estate, education and other services. This is driven by the high cost of production occasioned by the high cost of labour. Higher cost of labour, and by extension higher production cost, results in reduction in output.

Figure 4: Impacts of sectoral output

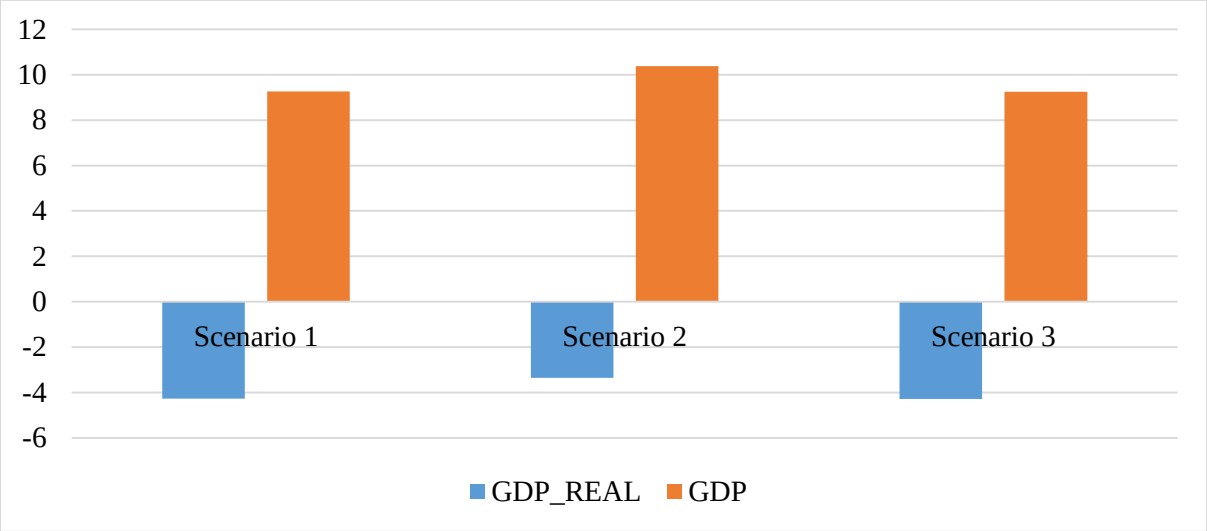


Source: Authors' computation

As a result of the decrease in sectoral output, it is expected that GDP will decline. However, nominal GDP increases as shown in Figure 5. Under the scenario where the increase in minimum wage is financed by public deficit (scenario 1) and VAT increase (scenario 3), nominal GDP increase by 9.3% respectively. Contrarily, when the minimum wage increase is financed by adjustment in government expenditure, nominal GDP increases by 10.4%. However, this observed GDP increase is not as a result of increase in output, but mainly as a result of increase in prices which drives up the value of economic output. However, when the effect of price changes is considered, the increase in GDP disappears as

real GDP shows a negative effect. The reduction in real GDP is smaller for the scenario where government adjusts its expenditure to accommodate the new minimum wage.

Figure 5: Impacts on GDP and real GDP



Source: Authors' computation

5. CONCLUSION AND POLICY RECOMMENDATIONS

The recent increase in the minimum wage from ₦18,000 to ₦30,000 is aimed at enhancing the welfare of workers, and reducing the incidence of poverty in Nigeria. This study uses a static computable general equilibrium (CGE) model calibrated on updated 2013 social accounting matrix (SAM) to analyse the macroeconomic and welfare impacts of the new minimum wage. The results show that increasing the minimum wage leads to reduction in the demand for labour in most sectors, and creates opportunities for sectors to substitute labour for capital. The increase in wages results in increase in household income, suggesting an improvement in household welfare. However, the inflationary pressure (increase in price level) engendered by the minimum wage increase overshadow the increase in income such that the consumption budget of households decline. This implies a net welfare loss, with the impact higher for urban households than rural households. The output of most sectors, especially labour-intensive sectors, decline but nominal GDP increase. The increase in nominal GDP is as a result of increase in price, rather than real economic output. When the price effect is incorporated, real GDP decline. This implies that the aggregate economic effect of the minimum wage increase is negative. Finally, the study finds that the negative effects of the minimum wage increase on labour demand, household welfare and GDP is smaller when the government adjusts its expenditure to accommodate the minimum wage increase, rather than allowing it to increase budget deficit or through increase in the VAT rate.

The policy implication of this results is that government needs to adopt measures to mitigate the negative employment effects of minimum wage increase. Rather than government paying for the minimum wage via fiscal deficit and borrowing, the government can adjust the expenditure profile such that the increase in minimum wage is counterbalanced by reduction in other expenditure, such that fiscal deficit remains unchanged.

This study is not without limitation. First, it uses a static CGE model to analyse the impacts of the minimum wage, thus limiting the assessment of impacts to the current period. Extension of this study should adopt the dynamic CGE model so that the impacts of the minimum wage increase will be ascertained over longer time period. Second, the simulated increase in minimum wage in this study is a uniform 67% increase in wages. However, the new minimum wage increase is proportional across the grade level of workers. This can be simulated in future studies if data on the different categories of

workers in different grade levels/cadre is available. It is also important to note that this analysis assumes that all employers pay the new minimum wage.
Employers' compliance with minimum wage payment is not accounted for in this analysis.

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APPENDIX

The 25 sectors included in the SAM and model are listed in Table 2 below. All the 25 sectors produce 25 corresponding commodities. The additional commodity that makes it 26 is fertiliser, which is imported.

Table 2: Sectors and Abbreviations

crop	Crop production
live	Livestock
fish	Fisheries
fore	Forestry
bevg	Beverages, tobacco and processed food
text	Textile, footwear and leather products
wood	Wood, furniture and paper products
omfc	Other manufacturing
coil	Crude oil and gas
roil	Refined oil and gas
omin	Other minerals
cons	Construction
water	Water
elect	Electricity
rtra	Road transport
otra	Other transport
trad	Wholesale and retail trade
hotl	Hotel and restaurants
comm	Communication
bser	Banking, insurance and other financial services
rest	Real estate
educ	Education
heal	Health
pser	Public administration
oser	Other services