

**The Economics of Tobacco Control in Nigeria:**  
*Modelling the Fiscal and Health Effects of a Tobacco Excise Tax Change in Nigeria*



**Authors:**

Precious Chukwuemeli Akanonu

Joseph Ishaku

Chukwuka Onyekwena

*Centre for the Study of the Economies of Africa (CSEA)*

*Abuja, Nigeria*

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## Table of Contents

1. Executive Summary .....	4
2. Background .....	6
3. Current State of Tobacco Taxes in Nigeria (Baseline Scenario) .....	7
4. Methods and Data Sources.....	8
5. Results and Analysis .....	15
6. Conclusion and Recommendations for Future Tobacco Tax Policy in Nigeria.....	23
References.....	25
Annex.....	26

## 1. Executive Summary

In Nigeria, a majority of the adult smoking population (15 years and above) consume tobacco primarily in the form of cigarettes. Nigeria has about 6 million adult smokers, or 5.6 percent smoking prevalence (GATS, 2017). Smoking prevalence is significantly higher for men (at 10 percent) relative to women (1.1 percent), and 18 percent of Nigerian youths between the ages of 13 to 15 years smoke (GATS, 2017). A total of 920 million cigarette packs were consumed in Nigeria in 2015 (GlobalData Plc., 2016), of which 74 percent is domestically produced (NCS, 2015). Tobacco related diseases are responsible for about 17,500 deaths per year (about 207 men and 130 women per week) and about 250,000 cancer diagnoses (Tobacco Atlas, 2015). Economic losses in the form of medical treatments and loss of productivity from tobacco-related diseases is estimated at US\$ 591 million in 2015 (Tobacco Atlas, 2015).

Currently in Nigeria, 2017, the average pack of cigarettes costs approximately ₦183.50 (Table 1). Excise tax is charged at only 20 percent ad valorem on Unit cost of production (UCA). Given the low value of UCA (reported to be around ₦60), this amounts to an excise tax rate of 12 percent of retail price. This is very small compared to the WHO-recommended excise tax burden of 75 percent (WHO, 2015). Furthermore, imported cigarettes are excluded from excise tax, and taxing reliant on an import levy of 40 percent of CIF (along with other smaller levies, such as the ECOWAS Trade Liberalization Scheme (ETLS), Comprehensive Import Supervision Scheme (CISS), import duty and surcharge. A general value added tax (VAT) of 5 percent is applicable to both imported and domestically produced cigarettes.

Thus, there is an urgent need to implement an effective tobacco control program to curb the epidemic of rising smoking prevalence rates and their impacts. Among several tobacco control measures, tobacco taxation is widely considered as the most effective means of not only reducing tobacco consumption but also raising substantial government revenues (WHO, 2005; 2015). In order to reverse the current trajectory of smoking prevalence or at least slow down the pace of growth, a tobacco tax policy that increases the excise tax (and consequently the retail prices) of cigarettes is essential.

In this regard, this report examines the potential for tobacco tax to contribute to raising government revenues, reducing tobacco use, and improving public health in Nigeria. Specifically, it estimates the impact of a change in the excise tax structure and level on cigarette consumption, government revenue, smoking prevalence, net-of-tax (NOT) revenue<sup>1</sup>, and excise tax burden. To this end, we run the Tobacco Excise Tax Simulation Model (TETSIM), adapted by the researchers to calibrate for the Nigerian context<sup>2</sup>.

We model four different changes to the tobacco tax structure and level under 12 different scenarios of economic/income growth (slow, medium and high growth) and industry price response to an increase in excise taxes (either a full pass-through, or under-shift or over-shift of the tax onto the retail price). The policy interventions are as follows:

- i. Policy Intervention 1 (PI.1): Keep 20 percent ad valorem tax, include ₦20 specific tax, and increase import levy to 50 percent of CIF per pack. This is similar to the change in the tax structure proposed by the Ministry of Finance during a technical meeting in Keffi.
- ii. Policy Intervention 2 (PI.2): Change to specific tax system, set the excise tax burden to ₦30 per pack, and increase import levy to 50 percent of CIF per pack.

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<sup>1</sup> Net-of-tax revenue refers the total amount of net-of-tax revenue generated from cigarette sales. This is the gross revenue earned by cigarette manufacturers and sellers

<sup>2</sup> We omitted the WHO Tobacco Tax Simulation Model (TaxSiM) due to the lack of data on the cost of production and quantity produced for each cigarette brand sold in Nigeria.

- iii. Policy Intervention 3 (PI.3): Change to specific tax system, set the excise tax burden to ₦60 per pack, and increase import levy to 50 percent of CIF per pack.
- iv. Policy Intervention 4 (PI.4): Change to specific tax system, set the excise tax burden to the equivalent of 75 percent of current retail price, and increase import levy to 50 percent of CIF per pack, as recommended by the WHO.

The effects of the proposed policy changes are as follows:

1. On Cigarette Consumption and Smoking Prevalence: Cigarette consumption and smoking prevalence decrease in all twelve scenarios of possible economic/income growth and industry price changes under PI.3 and PI.4 – which impose higher tax levels and specific tax systems relative to PI.1 and PI.2. Thus, changes in tax policy need to be significant to have the desired effect on smoking prevalence under all scenarios considered.
2. On Government Revenue: Under all policy interventions and in all scenarios considered, government excise tax revenues from cigarette sales increase significantly. Excise tax revenues are most significant under specific tax system (as in PI.3 and PI.4) relative to ad valorem tax system (as in PI.1 and PI.2).
3. On Net-of-Tax Revenue: Under all policy interventions, the best response to maximize NOT revenue for the tobacco industry is to increase industry price.
4. On Excise Tax Burden: Under all policy interventions and in all scenarios considered, the excise tax burden to the consumer will at least double. In terms of setting policy target and monitoring impact, tracking excise tax burden is the most useful indicator relative to the excise tax rate. The excise tax burden shows the impact of policy interventions after the industry response, whereas simply focusing on the excise tax rate will mask the pass-through effect on retail prices.

We also performed a three-year projection of the proposed policy change, which shows a consistent trend of increasing government revenues, decreasing consumption, and decreasing smoking prevalence rates if policy interventions are sustained each year over the three-year period.

In conclusion, an effective tobacco control tax policy will require that: the tax system is changed from ad valorem to specific tax system; excise tax burden on tobacco products is continuously increased at least until it reaches 75 percent; and tax administration and revenue-collecting agencies are strengthened. Importantly, improvements in boarder control, monitoring and tracking systems, enforcement measures and international cooperation must accompany a tobacco tax policy in order to yield the optimal results. In this regard, the Ministry of Finance; Ministry of Industry, Trade and Investment; Ministry of Health; Federal Inland Revenue Service, and the Nigerian Customs Service all have key roles to play in creating a successful and effective tobacco tax policy in Nigeria. Lastly, it is important to note that the effectiveness of tobacco tax increase is enhanced when implemented as part of a comprehensive tobacco control strategy.

## 2. Background

The World Health Organization (WHO) emphasizes that tobacco use is a significant hurdle to public health and development gains worldwide, as it imposes significant economic costs on countries both in terms of direct medical care for adults and lost productivity. Cigarette smoking and other forms of tobacco use impose a large and growing public health burden globally and in Nigeria. Globally, tobacco use is the most preventable cause of death worldwide. Statistics show that tobacco use caused 100 million deaths in the 20th century, and if current trends continue unchecked, one billion people (about 10 million, 1 in 6 adults, per year) will die from tobacco-related causes in the 21st century (Blecher & Ross, 2013). Nearly, 80 percent of these deaths occur in low- and middle- income countries, especially in Asia (Blecher & Ross, 2013). Presently in Nigeria, more than 17,500 deaths are recorded each year on the account of tobacco-related diseases; that is about 207 men and 130 women per week (Tobacco Atlas, 2015).

Tobacco use and tobacco control in Africa has received little attention relative to other regions. This is due to the perceived low smoking prevalence in Africa in addition to the more immediate need for interventions against infectious diseases. However, the trends are quickly changing. With improving economic growth and health in Africa, the number of smokers and cigarettes smoked in the region is rising. In Nigeria, smoking prevalence is growing at an average of 4 percent each year; from 11.3 percent in 2000 to 17.4 percent in 2015 (World Bank, 2017). According to data from Nigeria Customs Service (NCS) and the GlobalData Plc, a total of 920 million of cigarettes packs were sold in Nigeria in 2015; of which 74 percent is produced domestically.

The increasing use of tobacco products and the recognition of its health and economic consequences have led to calls for the adoption and implementation of strong tobacco control measures. Economic theory suggests that, when consumers know all the risks and bear all the costs of their choices in an efficient market, then there is no justification for governments to intervene in a market. However, there are two key inefficiencies (or market failures) in the tobacco market: inadequate information about the health risks of tobacco and risks of addiction; and physical or financial costs imposed on non-smokers. Therefore, there are clear economic grounds for intervening, particularly to protect young people and non-smokers.

The use of price and tax measures to increase the retail price of tobacco products is widely recognized as the most effective way to curb demand for tobacco products and reduce diseases and deaths caused by tobacco use. The WHO Framework Convention on Tobacco Control (FCTC) Article 6 states that: “price and tax measures are an effective and important means of reducing tobacco consumption by various segments of the population, in particular young persons” (WHO, 2005, p. 7). It is also widely documented that, other than the public health benefits of tobacco taxation, raising taxes on tobacco products can also boost government revenue in an appropriately structured tax policy regime (World Health Organization, 2015). In the Addis Ababa Action Agenda and the 2030 Agenda for Sustainable Development, tobacco taxation features as a means of mobilizing domestic resources to finance health and other development programmes.

Empirical studies have shown that tobacco consumption decreases in the face of higher price, and can increase government revenue (Chaloupka & Warner, 1999; Sunley, et al., 2000; Van Walbeek, 2010; Goodchild, et al., 2016). Despite addictiveness, tobacco consumption decreases as a result of decreases in smoking prevalence (i.e., the number of people quitting or not starting to smoke) and smoking intensity (i.e. change in the average consumption of remaining smokers). More so, due to addictiveness, tobacco use is relatively price inelastic; as such, tobacco excise tax can also increase government revenue. For every given percentage increase in the excise tax per cigarette, the percentage decrease in cigarette consumption is smaller; thus resulting in an overall increase in government revenue. For instance, Sunley et al. (2000)

provide estimates of the revenue-generating potential of tax increases based on existing empirical evidence on price, tax and demand elasticity for 70 countries. The authors conclude that an increase of 10 percent in the tax on cigarettes in each of these countries would raise government revenues by nearly 7 percent on average for low-income and middle-income countries. Therefore, tobacco taxation could be a win-win policy for governments: simultaneously reducing tobacco use and creating a fiscal space to finance development and/or health programmes.

### **3 Current State of Tobacco Taxes in Nigeria (Baseline Scenario)**

Tax rates on tobacco products in Nigeria are considered comparatively low (WHO, 2015). While the WHO recommends an excise tax burden of 75 percent of retail price and a specific excise tax system for effective tobacco taxation, excise tax rate on tobacco products in Nigeria stands at ad valorem rate of 20 percent of UCA (not retail price). It is important to note that the excise tax rate has fallen since 2009; from 40 percent excise rate recorded pre-2009. More so, VAT rate levied on domestically consumed products in Nigeria, including tobacco products, stands at 5 percent –among the lowest VAT rates globally. In addition to the VAT rate, other taxes are applicable to imported tobacco products. They include: Import Duty (20 percent of CIF); Levy (40 percent of CIF); CISS (1 percent of cost of goods or FOB); Surcharge (7 percent of total value of duty payable); and ETLs (0.5 percent of CIF) (NCS, 2015).

Given that Nigeria operates an ad valorem tax structure, all of these taxes are charged as a percentage of the value of tobacco products. According to literature, the ad valorem tax structure is typically susceptible to undervaluation; encourages price reductions; disincentivizes costly ‘quality’ improvements; and encourages ‘trading down’ in favour of cheaper tobacco products –thereby reducing health benefits (WHO, 2010). While some of these issues can be addressed by establishing a minimum retail sales price as well as running a strong tax administration with technical capacity, Nigeria’s tobacco tax system does not incorporate a minimum retail sales price and tax administrative system remains weak.

In Nigeria, about 80 percent of consumed tobacco products are produced by three registered tobacco companies: British American Tobacco Nigeria (BATN), Leave Tobacco and Commodities Nigeria Ltd, and International Tobacco. According to available data from Global Data Plc, 18.4 billion cigarettes sticks were sold in 2015, of which 12.2 billion were domestically produced by the three main tobacco companies. BATN holds considerable market power, accounting for 75 percent of overall domestic production –based on data from the Nigerian Customs Service.

## 4. Methods and Data Sources

### 4.1 Methodology

We applied the Tobacco Excise Tax Simulation Model (TETSIM) as developed by the Economics of Tobacco Control Project, adapted and empirically applied by researchers to fit the local setting. The TETSIM is a simulation tool used by tobacco control advocates and government officials to consider the impacts of changes in tobacco excise taxes on a number of outcomes. The mathematical model that underpins the TETSIM is generic and can be calibrated to a variety of countries (TETSIM, 2017). Using the TETSIM, we calculate the effects of four possible changes (policy interventions) in Nigeria's tobacco tax structure and level on key outcomes. The measured outcomes include:

- *Government revenue*: This includes revenue generated excise taxes as well as the import duty, VAT, CISS, ETLs, and levy on cigarettes.
- *Cigarette consumption*: This is the quantity of cigarettes smoked annually in Nigeria
- *Smoking prevalence*: This is the percentage of the adult population that smoke cigarettes.
- *Net-of-tax revenue*: This is the gross revenue earned by cigarette manufacturers and sellers
- *Excise Tax burden*: This is the percentage of retail price that accounts for excise taxes on cigarettes.

The model consists of an initial equilibrium or baseline period, which is the current tax structure and level of 20% ad valorem on UCA. Through simulations, new equilibria emerge that capture the effects of policy changes of the baseline tax structure and level on the key outcomes. Two sets of simulations are carried out: (1) once-off policy changes in the tobacco tax structure and level over a one-year period, and (2) the projected impact of policy changes on the key outcomes over a three-year period. In order to calibrate the TETSIM, we make a set of key assumptions, supported by literature. These include assumptions around price and income elasticities for licit and illicit cigarettes, the cross-price elasticity between illicit and licit cigarettes, as well as the proportion of a decrease in prevalence driven by a reduction in smoking intensity.

Our model consists of three market segments, each of which is affected differently by government policies. The first 3 market segments consist of domestically produced cigarettes (premium, mid-priced, and economy), which are affected by changes in the excise tax policy. The fourth market segment consists of imported cigarettes, which are affected by changes in import levy. Given that no excise tax can be charged on imported cigarettes, policymakers make use of various import levies to affect the price of imported cigarettes. Finally, we also allow for an illicit trade segment of the market, which is not affected by a change in the tobacco tax structure and level, but rather by the legal tobacco industry's response to changes in the tobacco tax policy.

#### 4.1.1 The TETSIM model

In order to determine the sensitivities of various taxation policies and pricing strategies on the future tobacco landscape, a spreadsheet-based model is developed. The following outputs are estimated: (1) predicted future cigarette consumption, (2) the predicted excise tax, net-of-tax, and retail price of a pack of cigarettes, (3) predicted future government cigarette excise tax revenue and total government cigarette tax revenues (from VAT and import tariffs), (4) predicted future net-of-tax revenue, and (5) smoking prevalence (TETSIM, 2017).

The retail price ( $P$ ) is broken into two components: (1) the net-of-tax price ( $NOT$ ), and (2) taxes (excise tax, VAT, and tariffs). The net-of-tax is a catch-all category that represents the revenue distributed among



all players along the tobacco value chain, i.e. primary producers, manufacturers, importers, logistical companies, wholesalers and retailers. The contribution of each segment to the average retail price is weighted by its share of the market: domestic premium brands (36%) domestic mid-priced brands (10%), domestic economy brands (20%), imported (24%), and illicit (10%)<sup>3</sup>.

In order to obtain desired outputs, we input the values of the following variables: (1) the average growth in the real net-of-tax-price, (2) the price elasticity of demand, (3) the income elasticity of demand, (4) the Excise tax, VAT rate, Levy rate, Import duty rate, CISS, ETLs and (5) the tax burden (i.e. the total tax as a percentage of the retail price). The base year is chosen as 2016.

At the outset, the retail price is given as  $P_1$ . The following formula is used to calculate the retail price in the next period ( $P_2$ ):

$$P_2 = \{Market\ share_{Domestic\ premium} \times (NOT_{Domestic\ premium} + Excise_{Domestic\ premium} + VAT_{Domestic\ premium})\} + \{Market\ share_{Domestic\ mid-priced} \times (NOT_{Domestic\ mid-priced} + Excise_{Domestic\ mid-priced} + VAT_{Domestic\ mid-priced})\} + \{Market\ share_{Domestic\ economy} \times (NOT_{Domestic\ economy} + Excise_{Domestic\ economy} + VAT_{Domestic\ economy})\} + \{Market\ share_{Imported} \times (NOT_{Imported} + VAT_{Imported} + Levy_{Imported} + Duty_{Imported} + CISS_{Imported} + ETLs_{Imported})\} + \{Market\ share_{Illicit} \times (NOT_{Illicit})\} \quad (1)$$

At the outset, the excise tax (which in practice is expressed in naira per pack) is set as a percentage of the UCA of cigarettes ( $Excise_1 = 0.2 * UCA_1$ ). The excise tax in the next period ( $Excise_2$ ) is given as:

$$Excise_2 = Excise_1 \times \left(1 + \frac{\Delta Excise}{100}\right) \quad (2)$$

Similarly, a change to import levy is given as:

$$Import\ levy_2 = Import\ levy_1 \times \left(1 + \frac{\Delta Import\ levy}{100}\right) \quad (3)$$

The net-of-tax price (NOT) is obtained as:

$$NOT = Market\ share_{Domestic} \times (P_{Domestic} - Excise_{Domestic} - VAT_{Domestic}) + Market\ share_{Imported} \times (P_{Imported} - VAT_{Imported} - Levy_{Imported} - Duty_{Imported} - CISS_{Imported} - ETLs_{Imported}) + Market\ share_{Illicit} \times (P_{Illicit}) \quad (4)$$

We use the price elasticity ( $\varepsilon_p$ ) and income elasticity ( $\varepsilon_i$ ) formulae to solve for cigarette consumption of licit cigarettes in the next period ( $Q\ Licit_2$ ).  $Q\ Licit_2$  subtracts change in consumption of illicit cigarettes ( $\Delta Q\ Illicit_1$ ) from licit cigarette consumption. This is given as:

$$Q\ Licit_2 = \left( Q\ Licit_1 \times \left\{ \frac{1 + \varepsilon_p \left( \frac{P_2 - P_1}{P_2 + P_1} \right)}{1 - \varepsilon_p \left( \frac{P_2 - P_1}{P_2 + P_1} \right)} \right\} + \left\{ \frac{1 + \varepsilon_i \left( \frac{GDP_2 - GDP_1}{GDP_2 + GDP_1} \right)}{1 - \varepsilon_i \left( \frac{GDP_2 - GDP_1}{GDP_2 + GDP_1} \right)} \right\} \right) - \Delta Q\ Illicit \quad (5)$$

Where GDP is gross domestic product and is used to represent national income levels.

<sup>3</sup> Computations are based on 2015 Euromonitor report.

The consumption of illicit cigarettes is also affected by possible cross-price elasticity between illicit cigarettes and the cheapest licit cigarettes. That is, a decrease in the price of licit cigarettes due to an increase in tobacco tax may result in users switching to illicit cigarette consumption. Consumption of illicit cigarettes in the next period ( $Q_{Illicit_2}$ ) is calculated as follows:

$$Q_{Illicit_2} = Q_{Illicit_1} \times \left\{ \frac{[1 + \varepsilon_p \frac{(P_2 - P_1)}{(P_2 + P_1)}]}{[1 - \varepsilon_p \frac{(P_2 - P_1)}{(P_2 + P_1)}]} \right\} + \left\{ \frac{[1 + \varepsilon_i \frac{(GDP_2 - GDP_1)}{(GDP_2 + GDP_1)}]}{[1 - \varepsilon_i \frac{(GDP_2 - GDP_1)}{(GDP_2 + GDP_1)}]} \right\} + \left\{ \frac{[1 + \varepsilon_{cross-price} \frac{(Price_{Cheap licit 2} - Price_{Cheap licit 1})}{(Price_{Cheap licit 2} + Price_{Cheap licit 1})}]}{[1 - \varepsilon_{cross-price} \frac{(Price_{Cheap licit 2} - Price_{Cheap licit 1})}{(Price_{Cheap licit 2} + Price_{Cheap licit 1})}]} \right\} \quad (6)$$

Smoking prevalence (SP) is given as:

$$SP_2 = SP_1 [1 + \frac{Q_2 - Q_1}{(Q_1 + Q_2)/2}] \times \rho \quad (7)$$

Where  $\rho$  is the percentage of decrease in cigarette consumption that is due to decrease in smoking prevalence.

Smoking intensity (SI) is given as:

$$SI_1 = Q_1 / SP_1 \quad (8)$$

We can easily calculate the following aggregates:

- Total government revenue:  $Q_2 \times [\{Market share_{Domestic premium} \times (Tax_{Domestic premium})\} + \{Market share_{Domestic mid-priced} \times (Tax_{Domestic mid-priced})\} + \{Market share_{Domestic economy} \times (Tax_{Domestic economy})\} + \{Market share_{Imported} \times (Tax_{Imported})\}]$ , where  $Tax_{Domestic premium}$ ,  $Tax_{Domestic mid-priced}$ ,  $Tax_{domestic economy}$ , and  $Tax_{Imported}$  represent taxes on domestically produced (premium brands, mid-priced brands, and economy brands) and imported cigarettes, respectively.
- Total Net-of-tax revenue:  $(NOT_2 \times Q_{licit_2}) + (NOT_2 \times Q_{illicit_2})$

*Limitation:* The TETSIM does not consider population growth and inflation in the three-year simulation.

## 4.2 Data

### 4.2.1 Model inputs

For this study, data were mostly derived from national sources; both primary and secondary data collection (See Annex, Appendix 1). Other data were sourced from international databases due its unavailability in home-country.

The prices of cigarettes were collected from randomly selected kiosk, through a nationally representative survey across the six geopolitical zones in Nigeria: North Central, North-East, North-West, South-East, South-South, South-West. A total of six states were surveyed: Abuja (North-Central); Adamawa (North-East); Kaduna (North-West); Anambra (South-East); Delta (South-South); and Lagos (South-West). The prices bands for premium, mid-priced, and economy domestic market segments derived from Euromonitor International.

Key secondary data were collected from national sources. Data on cigarette brands and the quantity of cigarette packs produced in Nigeria were provided on request by the Nigerian Customs Service (NCS). Data on taxes collected on cigarette products sold in Nigeria were sourced from NCS. Data on GDP (income), inflation, and population growth were also collected from the National Bureau of Statistics (NBS). Other secondary data include: total quantity of cigarette consumed in the country –obtained from GlobalData Plc; smoking prevalence –World Bank; price elasticity of demand, income elasticity of demand, illicit market share, and percentage increase in net-of-tax –obtained from the literature.

A summary of key baseline data and their sources are presented in *Table 1*.

*Table 1: A Summary of Key Baseline Data*

<i>Item</i>	<i>Baseline Data</i>	<i>Year</i>	<i>Data Sources</i>
Average cigarette retail price (Domestic premium) <sup>4</sup>	₦250	2017	Primary – collected from 6 geopolitical zones in Nigeria
Average cigarette retail price (Domestic mid-priced)	₦200		
Average cigarette retail price (Domestic economy)	₦150		
Average cigarette retail price (Imported segment)	₦180		
Average cigarette retail price (Illicit segment) <sup>5</sup>	₦100		
Domestic market share	66%	2015	NCS, GlobalData Plc., World Customs Journal, authors' computation
Imported market share	24%		
Illicit market share	10%		
Excise tax ( <i>based on unit cost of production - UCA</i> )	20%	2017	Nigerian Customs Service (NCS)
VAT	5%,	2017	NCS
Import duty + Surcharge on duty payable	20% + 7% = 21.4%	2017	NCS
Levy	40%	2017	NCS
ETLS	1%	2017	NCS
CISS	0.5%	2017	NCS
Adult population	106,257,431	2015	National Bureau of Statistics (NBS)
Smoking prevalence	5.6%	2015	World Health Organization
GDP (USD)	405082.68	2016	World Bank
Slow GDP growth projection	-1.5%	Authors' computation using historical data from World Bank	
Medium GDP growth projection	2.7%		
High GDP growth projection	4.9%		
Projected GDP growth rate – Year 1(2017)	1.2	World Bank	
Projected GDP growth rate – Year 2(2018)	2.4		

<sup>4</sup> The average retail price of cigarettes from our survey corroborates with the WHO estimates of retail prices in Nigeria, as well as estimates from the Ministry of Finance

<sup>5</sup> We assume the average retail price of the cheapest cigarettes across regions represents the average retail price of the illicit market segment

Projected GDP growth rate – Year 3(2019)	2.5	
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#### 4.2.2 Assumptions about key parameters

*Price elasticities ( $\epsilon_p < 0$ ):* Three price elasticities of cigarette demand for each market segments (domestic, imported, and illicit). For the licit market segments, the price elasticity of cigarette demand of  $-0.5$  (domestic) and  $-0.6$  (imported) were selected based on literature (Kostova et al., 2013). We assume that demand for imported cigarettes is relatively more responsive to changes in price than demand for domestic cigarettes. For the illicit market segments, the price elasticity of cigarette demand of  $-0.9$  was selected, based on the assumption that the demand for illicit cigarettes is more responsive to price changes than the demand for licit cigarettes. The price elasticity is higher for the cheapest brand (illicit cigarettes) as these consumers cannot switch to an even cheaper brand.

*Cross-price elasticity ( $\epsilon_{cross-price} > 0$ ):* We assume a cross-price elasticity of demand from licit to illicit cigarettes to be 0.5. This is based on Tauras et al. (2006) study on cross-price elasticities between premium (licit in this study) and discount (inferior illicit) cigarettes. As the price of licit cigarettes increase, consumers of the cheapest licit brands are likely to switch to buying illicit cigarettes.

*Income elasticity (Licit cigarettes:  $\epsilon_i > 0$ ; Illicit cigarettes:  $\epsilon_i < 0$ ):* We make the assumption that illicit cigarettes are inferior goods and therefore, any increase in income will lead to a decline in illicit cigarette consumption. Income elasticity for licit cigarettes are set at 0.5 (Gallus, et al., 2006), while we make an assumption that the income elasticity for illicit cigarettes are  $-0.5$ .

*Change in Prevalence:* Cigarette consumption can decrease in one of two ways: either fewer people smoke (a decrease in smoking prevalence), or remaining smokers consume less (a decrease in smoking intensity). Some studies in developed countries on youth smoking suggest that about 50 percent of the decrease in cigarette consumption can be ascribed to a decrease in smoking prevalence, while the other 50 percent of the decrease in cigarette consumption can be ascribed to a decrease in smoking intensity. Since there is no consensus for developing countries, we assume 50 percent applicable to developed countries (TETSIM, 2017).

### 4.3 Proposed Policy Interventions

Four possible policy interventions were used for the tax simulations in our TETSIM.

Table 2: Possible Policy Interventions

	<b>Policy Intervention</b>	<b>Description</b>
Policy intervention 1 (PI.1)	Keep 20 percent ad valorem tax, include ₦20 specific tax, and increase import levy to 50 percent of CIF per pack.	This policy intervention represents the government's plans to retain the present ad valorem tax on tobacco while introducing a specific tax and increasing import levy from (40 to 50 percent) for 2018.
Policy intervention 2 (PI.2)	Change to specific tax system, set the excise tax burden to ₦30 per pack, and increase import levy to 50 percent of CIF per pack.	This policy intervention simulates a complete change from ad valorem to specific tax system set at ₦30 per pack. Also, accommodates an increase in import levy to 50 percent.

Policy intervention 3 (PI.3)	Change to specific tax system, set the excise tax burden to ₦60 per pack, and increase import levy to 50 percent of CIF per pack.	This policy intervention simulates a complete change from ad valorem to specific tax system set at ₦60 per pack. Also, accommodates an increase in import levy to 50 percent.
Policy intervention 4 (PI.4)	Change to specific tax system, set the excise tax burden to the equivalent of 75 percent of current retail price, and increase import levy to 50 percent of CIF per pack.	This policy intervention simulates a complete change from ad valorem to specific tax system in line with the WHO recommended 75 percent benchmark; which is equivalent to ₦139 specific tax per pack for Nigeria. Also, accommodates an increase in import levy to 50 percent.

## 4.4 Sensitivity Analysis

### 4.4.1 Sensitivity Analysis 1: Assumptions on economic growth and industry response

We model twelve possible scenario outcomes for different possible growth rates against possible industry responses. Table 3 provides the description of scenarios for income growth and industry price changes used in the model

4.4.1.1 *Economic/Income Growth Rates*: We use four growth rate options (no growth, slow, medium and high growth). The slow, medium and high growth rates used were sourced from World Bank (*see Table 1*).

4.4.1.2 *Industry Response*: For the licit cigarette market, we use three potential industry responses to a change in the excise tax rate (no change in NOT price, a 10 percent decrease in NOT price, and a 10 percent increase in NOT price). Generally, the tobacco industry tends to decrease NOT price if trying to break into the market, otherwise they increase NOT price if they have substantial market share. For the illicit market segment, we make the assumption that it is linked to licit industry response. That is, if licit industry increases price by 10 percent, so will illicit industry.

*Table 3: Sensitivity Analysis - Income Growth and Industry Response Scenarios*

Scenarios	Assumption on Income Growth	Assumption on Industry Price
<b>SCENARIO 1 (S.1)</b>	No income growth effect	No change in industry price
<b>SCENARIO 2 (S.2)</b>	No income growth effect	Industry increases price by 10%
<b>SCENARIO 3 (S.3)</b>	No income growth effect	Industry decreases price by 10%
<b>SCENARIO 4 (S.4)</b>	Slow economic growth	No change in industry price
<b>SCENARIO 5 (S.5)</b>	Slow economic growth	Industry increases price by 10%
<b>SCENARIO 6 (S.6)</b>	Slow economic growth	Industry decreases price by 10%
<b>SCENARIO 7 (S.7)</b>	Medium economic growth	No change in industry price
<b>SCENARIO 8 (S.8)</b>	Medium economic growth	Industry increases price by 10%
<b>SCENARIO 9 (S.9)</b>	Medium economic growth	Industry decreases price by 10%

<b>SCENARIO 10 (S.10)</b>	High economic growth	No change in industry price
<b>SCENARIO 11 (S.11)</b>	High economic growth	Industry increases price by 10%
<b>SCENARIO 12 (S.12)</b>	High economic growth	Industry decreases price by 10%

4.4.2 Sensitivity Analysis 2: A Three-year projection of results (in 2016 prices)

We simulate a 3-year projection of results accounting for no economic growth and World Bank projected economic growth (for 2017, 2018, and 2019) as well as potential industry response (retain, increase, or decrease NOT price). We implement the four policy interventions outlined above in the base year, and subsequently assume an increase in specific excise tax of ₦20 (in 2016 prices) per year under PI.1, and an increase in the excise tax burden in retail price by two percentage points annually for PI.2, 3, and 4.

## 5. Results and Analysis

Using the TETSIm, we calculate the effects of four possible changes (policy interventions) in Nigeria's tobacco tax structure and level on key measured outcomes.

### 5.1 Baseline (2016) Results

Our results provide estimates of the impact of policy changes in cigarette excise tax on average cigarette consumption, government revenue, smoking prevalence, net-of-tax revenue and tax burden in baseline period.

#### A. Cigarette Consumption

We find consumption decreases in all scenarios under policy interventions 3 and 4 –which impose higher tax levels and specific tax systems. Changes in tax policy need to be significant to have the desired effect on cigarette consumption under all scenarios considered.

Specifically, under the government-proposed policy intervention which entails retaining the current 20% ad valorem plus a 20 Naira specific tax (PI.1), cigarette consumption will fall by the largest percentage (-7.58%) if there is slow economic/income growth in the country and the tobacco industry increases price by 10% (S.5). However, this policy intervention will have counteractive effect on cigarette consumption, if there is high economic/income growth and the industry decreases price by 10% (S.9) – this will in fact lead to a 2.19% increase in the quantity of cigarette consumed in the country. This finding follows from the law of demand, where an increase in income leads to higher demands.

Under the WHO-proposed policy intervention which entails changing the tax system/structure from an ad valorem to a specific that is equal to 75% of current retail price of cigarettes (PI.4), we can expect an average of -18.52% decrease in the quantity of cigarette consumed in all 12 scenarios. The largest decrease (-25.47%) occurs where there is slow economic growth and industry increases price (S.5). This finding are intuitive given the negative impact of slow economic growth and price increase on demand. The results of other alternative policy interventions (PI.2 and PI.3) can be found in *Table 4*.

#### B. Government Revenue (Excise Tax Revenue)

We find that under all policy interventions and in all scenarios considered, government excise tax revenue from cigarette sales will increase significantly. This implies that there is a very wide scope for increasing tax revenue without adversely affecting fiscal revenue. Excise tax revenues are most significant under specific tax system (as in PI.3 and PI.4) relative to ad valorem tax system (as in PI.1 and PI.2).

Under the government proposed PI.1, excise tax revenue is expected to increase by an average of 157% across all 12 scenarios. Excise tax revenue is highest under S.12 (from a baseline revenue of ₦7.3 billion to ₦19.7 billion) where there is high economic growth and industry decrease price by 10%. Under the WHO-proposed PI.4, excise tax revenue is expected to increase by an average of 803% across all 12 scenarios. However, excise tax revenue is highest under S.1 (from ₦ 7.3 billion to ₦ 76.1 billion) where there is no change in neither income growth nor industry price. The results are presented in *Table 5*.

#### C. Smoking Prevalence

As with the cigarette consumption findings, changes in tax policy need to be significant to have the desired effect on smoking prevalence under all scenarios considered. Smoking prevalence decreases in all scenarios under PI.3 and PI.4 – which impose higher tax levels and specific tax systems relative to PI.1 and PI.2.

Under the government-proposed PI.1, smoking prevalence will fall by the largest percentage under S.5 (from a baseline of 5.6% to 5.39%). However, smoking prevalence will rise under the scenario where there is high economic/income growth and the industry decreases price by 10% (S.12) to 5.66%. Under the WHO-proposed PI.4, we can expect smoking prevalence to fall to at least 5.29% (S.1). The largest decrease (4.89%) occurs where there is slow economic growth and industry increases price (S.5).

The results of other alternative policy interventions (PI.2 and PI.3) can be found in *Table 6*.

#### D. Net-of-Tax (NOT) Revenue

We find that under all policy interventions, the optimal response for the tobacco industry is to increase industry price in order to maximize NOT revenue. The industry stands to lose revenue when they do nothing or decrease industry price in efforts to possibly frustrate policy interventions.

Under PI.1 and PI.2, the NOT revenue of the tobacco industry from cigarette sales will only rise when they pass on some of the tax burden to consumers by increasing industry price. The industry stands to lose revenue when they do nothing or take up the tax burden (by decreasing industry price) in efforts to possibly frustrate policy interventions. Specifically, under the government-proposed PI.1, the NOT revenue of the tobacco industry will rise most significantly under S.11 (from a baseline revenue of ₦154 billion to ₦162.3 billion) where there is high economic growth and industry increases price by 10%. However, the industry will record the largest decrease under S.6 (from ₦154 billion to ₦137.3 billion) where there is slow economic growth and industry decreases price by 10%.

Under the WHO-recommended PI.4, the tobacco industry will record a decline in their NOT revenue in all scenarios. The worst outcome for the industry occurs in S6; they stand to shed about one-third of their revenue (-32.6%) where there is slow economic growth and the industry decreases price by 10%. *Table 7* provides the results.

#### E. Excise Tax Burden

We find that under all policy interventions and in all scenarios considered, the excise tax burden to the consumer will at least double. However, since current excise tax burden is very low (at 4%), the policy impact witnessed in the model remains minimal relative to the WHO-recommended excise tax burden. This implies that the political will for tobacco control policies has to be strong and consistent to raise excise tax burden to meet up with the WHO-recommended level of 75% of retail price.

Intuitively, excise tax burden increases more when the tobacco industry decreases industry price. Under PI.1, excise tax burden will increase from a baseline of 4.0% to about 10.2% in all scenarios where industry decreases price (S.3, S.6, S.9, S12). Under P1.4, excise tax burden increases most significantly (to 27.0%) in S.3. The results are presented in *Table 8*.

In terms of setting policy target and monitoring impact, tracking excise tax burden is the most useful indicator relative to the excise tax rate. The excise tax burden shows the impact of policy interventions after the industry response, whereas simply focusing on the excise tax rate will mask the pass-through effect on retail prices. Hence, in what follows, we shift the focus of policy interventions to tax policies benchmarked on excise tax burden.



**Table 4: Cigarette Consumption**  
Quantity consumed (in millions of sticks)

	SCENARIO 1	SCENARIO 2	SCENARIO 3	SCENARIO 4	SCENARIO 5	SCENARIO 6	SCENARIO 7	SCENARIO 8	SCENARIO 9	SCENARIO 10	SCENARIO 11	SCENARIO 12	Average	
<b>Assumption on industry price</b>	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%		
<b>Assumption on income growth</b>	No income growth effect	No income growth effect	No income growth effect	Slow economic growth	Slow economic growth	Slow economic growth	Medium economic growth	Medium economic growth	Medium economic growth	High economic growth	High economic growth	High economic growth		
<b>Baseline</b>	920	920	920	920	920	920	920	920	920	920	920	920	920	
<b>Policy intervention 1</b>	891	864	920	882	850	914	899	868	931	909	877	940	895	
<b>Percentage change relative to the baseline</b>	-3.19	-6.04	0.03	-4.14	-7.58	-0.70	-2.25	-5.69	1.19	-1.25	-4.69	2.19	-2.68	
<b>Policy intervention 2</b>	882	856	910	871	839	902	888	856	920	897	866	929	885	
<b>Percentage change relative to the baseline</b>	-4.18	-6.92	-1.09	-5.35	-8.79	-1.91	-3.47	-6.91	-0.03	-2.46	-5.90	0.98	-3.84	
<b>Policy intervention 3</b>	861	838	887	843	811	875	860	829	892	869	838	901	859	
<b>Percentage change relative to the baseline</b>	-6.41	-8.91	-3.61	-8.38	-11.83	-4.94	-6.50	-9.94	-3.06	-5.49	-8.93	-2.05	-6.67	
<b>Policy intervention 4</b>	819	780	809	717	686	749	735	703	766	744	712	776	750	
<b>Percentage change relative to the baseline</b>	-11.00	-15.25	-12.08	-22.03	-25.47	-18.59	-20.14	-23.58	-16.70	-19.13	-22.58	-15.69	-18.52	

**Table 5: Government Revenue**  
Excise tax revenue (in Ns millions)

	SCENARIO 1	SCENARIO 2	SCENARIO 3	SCENARIO 4	SCENARIO 5	SCENARIO 6	SCENARIO 7	SCENARIO 8	SCENARIO 9	SCENARIO 10	SCENARIO 11	SCENARIO 12	Average	
<b>Assumption on industry price</b>	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%		
<b>Assumption on income growth</b>	No income growth effect	No income growth effect	No income growth effect	Slow economic growth	Slow economic growth	Slow economic growth	Medium economic growth	Medium economic growth	Medium economic growth	High economic growth	High economic growth	High economic growth		
<b>Baseline</b>	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	
<b>Policy intervention 1</b>	18.6	18.2	19.2	18.4	17.8	19.0	18.9	18.2	19.5	19.1	18.5	19.7	18.8	
<b>Percentage change relative to the baseline</b>	+155	+148	+163	+152	+143	+160	+158	+149	+166	+161	+153	+170	+156.5	
<b>Policy intervention 2</b>	22.9	22.4	23.6	22.6	21.8	23.3	23.1	22.3	23.9	23.4	22.7	24.2	23.0	
<b>Percentage change relative to the baseline</b>	+214	+206	+223	+208	+198	+219	+216	+206	+227	+220	+210	+231	+214.8	
<b>Policy intervention 3</b>	33.2	32.5	34.0	32.2	31.0	33.3	33.0	31.8	34.2	33.5	32.3	34.7	33.0	
<b>Percentage change relative to the baseline</b>	+354	+344	+365	+340	+324	+356	+351	+335	+368	+358	+342	+374	+350.8	
<b>Policy intervention 4</b>	76.1	72.3	73.6	61.6	58.7	64.5	63.7	60.8	66.7	64.9	61.9	67.8	66.1	
<b>Percentage change relative to the baseline</b>	+940	+889	+906	+742	+702	+782	+771	+731	+812	+787	+747	+827	+803.0	

**Table 6: Smoking Prevalence  
(in percentage)**

	SCENARIO 1	SCENARIO 2	SCENARIO 3	SCENARIO 4	SCENARIO 5	SCENARIO 6	SCENARIO 7	SCENARIO 8	SCENARIO 9	SCENARIO 10	SCENARIO 11	SCENARIO 12
<b>Assumption on industry price</b>	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%
<b>Assumption on income growth</b>	No income growth effect	No income growth effect	No income growth effect	Slow economic growth	Slow economic growth	Slow economic growth	Medium economic growth	Medium economic growth	Medium economic growth	High economic growth	High economic growth	High economic growth
<b>Baseline</b>	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60
<b>Policy intervention 1</b>	5.51	5.43	5.60	5.48	5.39	5.58	5.54	5.44	5.63	5.57	5.47	5.66
<b>Policy intervention 2</b>	5.48	5.41	5.57	5.45	5.35	5.55	5.50	5.41	5.60	5.53	5.43	5.63
<b>Policy intervention 3</b>	5.42	5.35	5.50	5.37	5.27	5.46	5.42	5.32	5.51	5.45	5.35	5.54
<b>Policy intervention 4</b>	5.29	5.17	5.26	4.98	4.89	5.08	5.04	4.94	5.13	5.06	4.97	5.16

**Table 7: Net-of-Tax Revenue  
NOT revenue (in Ns billions)**

	SCENARIO 1	SCENARIO 2	SCENARIO 3	SCENARIO 4	SCENARIO 5	SCENARIO 6	SCENARIO 7	SCENARIO 8	SCENARIO 9	SCENARIO 10	SCENARIO 11	SCENARIO 12	Average	
<b>Assumption on industry price</b>	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%		
<b>Assumption on income growth</b>	No income growth effect	No income growth effect	No income growth effect	Slow economic growth	Slow economic growth	Slow economic growth	Medium economic growth	Medium economic growth	Medium economic growth	High economic growth	High economic growth	High economic growth		
<b>Baseline</b>	154.0	154.0	154.0	154.0	154.0	154.0	154.0	154.0	154.0	154.0	154.0	154.0		154
<b>Policy intervention 1</b>	149.1	159.6	138.3	147.6	157.0	137.3	150.8	160.4	140.1	152.4	162.3	141.6	150	
<b>Percentage change relative to the baseline</b>	-3.2	3.6	-10.2	-4.2	1.9	-10.9	-2.1	4.2	-9.0	-1.0	5.4	-8.0	-2.79	
<b>Policy intervention 2</b>	147.6	158.1	136.8	145.7	154.9	135.6	148.9	158.4	138.4	150.6	160.3	140.0	148	
<b>Percentage change relative to the baseline</b>	-4.2	2.7	-11.2	-5.4	0.6	-12.0	-3.3	2.9	-10.1	-2.2	4.1	-9.1	-3.94	
<b>Policy intervention 3</b>	144.1	154.7	133.3	141.1	149.8	131.4	144.3	153.3	134.3	146.0	155.2	135.8	144	
<b>Percentage change relative to the baseline</b>	-6.4	0.4	-13.5	-8.4	-2.7	-14.7	-6.3	-0.5	-12.8	-5.2	0.8	-11.8	-6.76	
<b>Policy intervention 4</b>	127.3	133.8	112.3	110.9	117.1	103.8	114.2	120.8	106.8	116.0	122.7	108.4	116	
<b>Percentage change relative to the baseline</b>	-17.4	-13.1	-27.1	-28.0	-24.0	-32.6	-25.8	-21.6	-30.7	-24.7	-20.3	-29.6	-24.57	

**Table 8: Tax Burden**  
**Excise tax burden (in percentage)**

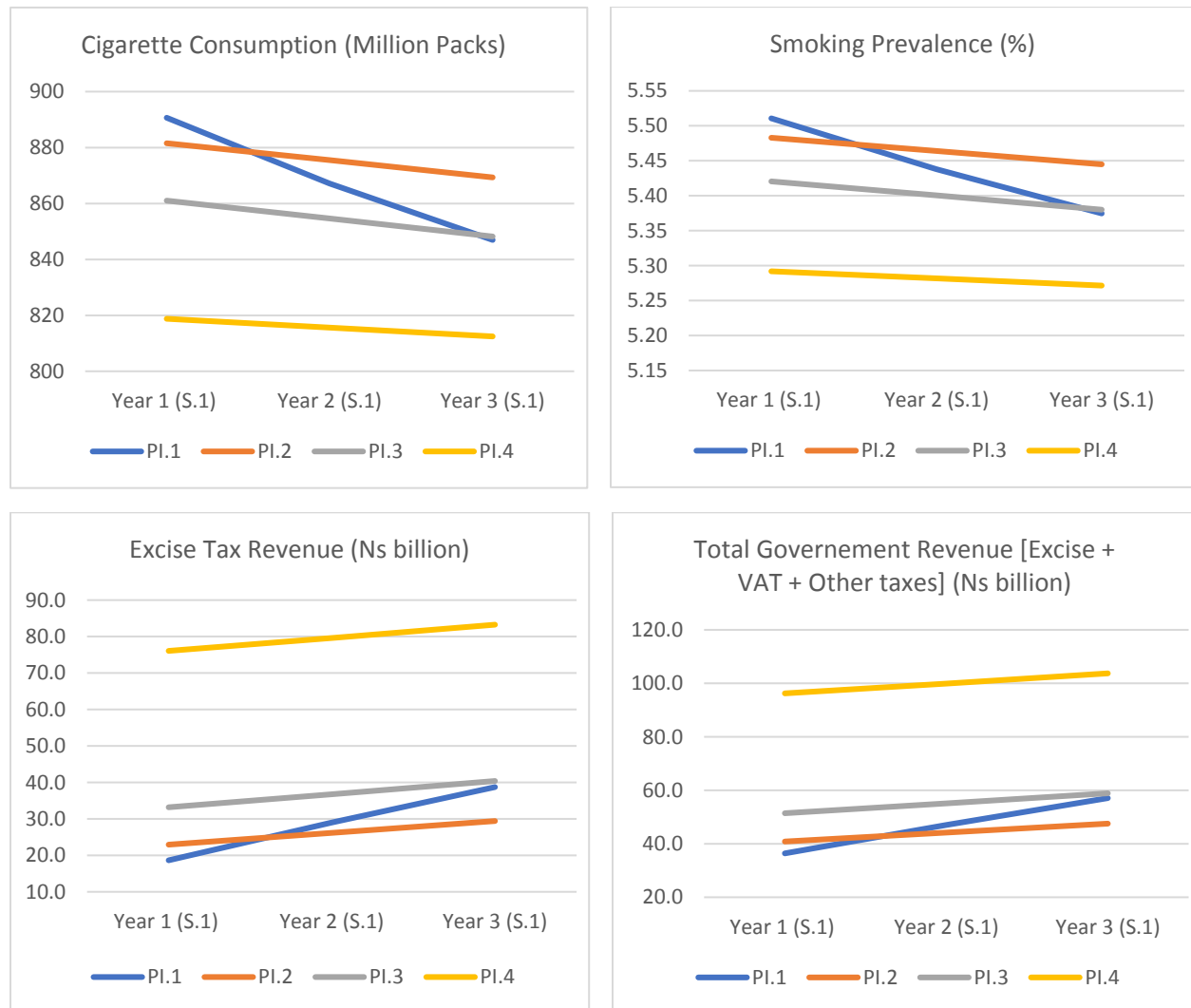
	SCENARIO 1	SCENARIO 2	SCENARIO 3	SCENARIO 4	SCENARIO 5	SCENARIO 6	SCENARIO 7	SCENARIO 8	SCENARIO 9	SCENARIO 10	SCENARIO 11	SCENARIO 12	Average	
<b>Assumption on industry price</b>	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%	No change in industry price	Industry increases price by 10%	Industry decreases price by 10%		
<b>Assumption on income growth</b>	No income growth effect	No income growth effect	No income growth effect	Slow economic growth	Slow economic growth	Slow economic growth	Medium economic growth	Medium economic growth	Medium economic growth	High economic growth	High economic growth	High economic growth		
<b>Baseline</b>	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4	
<b>Policy intervention 1</b>	9.3	8.6	10.2	9.3	8.6	10.2	9.3	8.6	10.2	9.4	8.6	10.2	9	
<b>Percentage change relative to the baseline</b>	+136	+118	+158	+135	+117	+157	+136	+118	+158	+137	+118	+159	+137	
<b>Policy intervention 2</b>	11.1	10.3	12.1	11.1	10.2	12.1	11.1	10.3	12.1	11.2	10.3	12.2	11	
<b>Percentage change relative to the baseline</b>	+182	+162	+206	+180	+159	+205	+182	+160	+207	+183	+161	+208	+183	
<b>Policy intervention 3</b>	15.0	14.1	16.2	14.8	13.8	16.1	14.9	13.9	16.2	15.0	13.9	16.2	15	
<b>Percentage change relative to the baseline</b>	+281	+256	+310	+275	+249	+306	+278	+251	+309	+279	+252	+310	+280	
<b>Policy intervention 4</b>	26.2	24.7	27.0	23.6	22.2	25.2	23.9	22.5	25.5	24.0	22.6	25.6	24	
<b>Percentage change relative to the baseline</b>	+562	+525	+584	+498	+462	+538	+505	+469	+545	+508	+472	+548	+518	

## 5.2 A 3-year projection of results (in 2016 prices)

We also performed a three-year projection of the proposed policy changes, which shows a consistent trend of increasing government revenues, decreasing consumption and prevalence rates if policy interventions are sustained each year over the three-year period. Given that excise tax burden are considered as more important benchmark for setting tobacco control policy target, we simulate the impact of policy interventions that are benchmarked on excise tax burden. Such policy targeting ensures that cigarette consumption and smoking prevalence remain low and maintain a steady decline overtime, while government revenue steadily increases.

Therefore, for PI.1, we maintain the base year (2016) policy change then add ₦20 increase in specific excise tax annually. For PI.2, PI.3, and PI.4, we set the base year (2016) policy change then add 2 percentage point increase in excise tax burden annually. The results are presented in *Figure 1* and *Appendix 3*.

*Figure 1: Cigarette Consumption, Smoking Prevalence, and Government Revenues for Scenario 1*



## **6. Conclusion and Recommendations for Future Tobacco Tax Policy in Nigeria**

Tobacco taxation can prevent millions of smoking-attributable deaths throughout the country, reduce the number of young people initiating smoking, and contribute to the achievement of national public health objectives. It can also create the fiscal space needed to finance the country's economic development and public health programmes. At present, the level of excise is well-below the WHO benchmark (set at 75 percent of retail price) and this has adverse present and future impact on smoking prevalence and smoking intensity, with attendant health and economic costs at households and national levels. From the perspective of public health and public finance, there is an urgent need to raise excise tax on tobacco products in the country.

Our simulations show that a substantial upward review of excise tax level on cigarettes alongside a change to the specific tax system yields the most significant gains in public health (measured by reductions in cigarette consumption and smoking prevalence) as well fiscal revenue (measured by increase in excise tax and other government revenues). Specifically, policy interventions (PI.3 and PI.4) that substantially raise excise tax levels and apply the specific tax system record the most favorable outcomes, both in magnitude and direction.

The implications of our findings are that, first, there is significant scope for upward review of tobacco excise tax revenues without having negative impacts on public health or government revenues. This holds under various scenarios and is robust to substantial sensitivity test/analysis. Second, changes in tax policy need to be significant to have the desired effect on public health and fiscal revenue. Third, under all policy interventions, the optimal response for the tobacco industry is to increase industry price in order to maximize NOT revenue. The industry stands to lose revenue when they do nothing or decrease industry price in efforts to possibly frustrate policy interventions. Fourth, in terms of setting policy target and monitoring impact, tracking excise tax burden is the most useful indicator relative to the excise tax rate, as focusing on the excise tax rate will mask the pass-through effect on retail prices. Fifth, given that the current excise tax burden is very low (at about 6 percent), even the most stringent policy intervention (P.4) in our model yields a maximum excise tax burden of 27 percent, hence still under-performing relative to the WHO-recommended benchmark of 75 percent of retail price which are based on a series of country studies and best-practices. Thus, there will be a need for strong and consistent political will for tobacco control policies in order to continuously raise excise tax burden annually and meet up with the WHO benchmark. Lastly, it is important to note that the measured outcomes from our model incorporates the potential impact of illicit trade in cigarettes following price adjustments of licit cigarettes.

Therefore, an effective tobacco control tax policy will require that: the tax system is changed from ad valorem to specific tax system; excise tax burden on tobacco products is continuously increased at least until it reaches 75 percent; and tax administration and revenue-collecting agencies are strengthened. Importantly, improvements in border control, monitoring and tracking systems, enforcement measures and international cooperation must accompany a tobacco tax policy in order to yield the optimal results. In this regard, the Ministry of Finance; Ministry of Industry, Trade and Investment; Ministry of Health; Federal Inland Revenue Service, and the Nigerian Customs Service all have key roles to play in creating a successful and effective tobacco tax policy in Nigeria. Lastly, it is important to note that the effectiveness of tobacco tax increase is enhanced when implemented as part of a comprehensive tobacco control strategy.

A critical limitation of this study is that data gaps imposed constraints to the depth and rigor of the analysis. For instance, the lack of data on the quantity of cigarettes produced for each cigarette brand and the cost of production of each cigarette brand did not allow the researchers perform cross-price analysis in order to estimate changes in the measured outcomes for each brand –in line with the WHO Tobacco Tax Simulation

Model (TaXSim). Nevertheless, the available data provided useful insight on the impact of changes in cigarette excise tax structure and level on public health and fiscal revenue, which can provide useful guidance for intervention to policymakers. Going forward, there is need to conduct country-specific baseline surveys that capture the critical data on tobacco products in order to close the data and research gaps.



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## Annex

*Appendix 1: Cigarette brand prices collected for the study (in Naira ₦, per pack of 20 cigarettes)*

Brands / Regions	Company	North-Central	North-East	North-West	South-East	South-South	South-West	Brand Average
		<i>Abuja</i>	<i>Adamawa</i>	<i>Kaduna</i>	<i>Anambra</i>	<i>Delta</i>	<i>Lagos</i>	
<b>Pall Mall M</b>	BAT	150	150	100	90	100	250	140
<b>Pall Mall FF</b>	BAT	100	130	100	100	130	100	110
<b>Excel</b>	BAT	100	130	90	90		200	122
<b>Benson &amp; Hedges</b>	BAT	300	250	190	180	250	200	228.3333
<b>Benson &amp; Hedge Switch</b>	BAT	300	250	220	220	300	250	256.6667
<b>Benson &amp; Hedges Demi Slim</b>	BAT	150	200	200	130		200	176
<b>St Morits</b>	BAT	200	200	100	170	200	200	178.3333
<b>St Moris by Dunhill</b>	BAT	300	300	250	220	350	350	295
<b>Rothmans</b>	BAT	200	200		170	200	200	194
<b>Dunhill Switch</b>	BAT	350	400	190	200	350	300	298.3333
<b>Dunhill FF</b>	BAT	250		250	200			233.3333
<b>Dunhill Light</b>	BAT	250		250	200		230	232.5
<b>London M</b>	BAT	300	220		140		200	215
<b>London FF</b>	BAT	180	250	140	140		200	182
<b>Royal Standard</b>	BAT	120	100	90	90	100	200	116.6667
<b>Three Rings</b>	BAT		100	140	90	90	150	114
<b>Consulate</b>	BAT	400	400	300	450	450	250	375
<b>Rothmans Demi Slim</b>	BAT	200			200		200	200
<b>Aspen</b>	ITC	180	180	140	150		200	170
<b>Business Club</b>	ITC	300	200					250
<b>Dorchester Menthol</b>	ITC	180	200	180	130	180	200	178.3333
<b>Forum Menthol</b>	ITC						100	100
<b>Forum Regular</b>	ITC						150	150
<b>Yes</b>	LTCN	200	230	250	130	220		206
<b>Peterfield</b>	LTCN			190				190
<b>All Star Brand</b>	LTCN			150				150
<b>Malboro</b>	PM	200	200	170	170	200	200	190
<b>Chesterfield</b>	PM	180	200	200	120	200	150	175
<b>Chesterfield Switch</b>	PM	140	200	200	120	250	200	185
<b>Bond Menthol</b>	PM	100		100	80		150	107.5
<b>Edge</b>	Others	100					200	150
<b>Bohem</b>	Others	200		150				175
<b>Esse Change</b>	Others	200		200				200
<b>Oris Slims</b>	Others	300	200	200	160	250	200	218.3333
<b>Overall Average Retail Price of Cigarettes</b>								<b>190.0686</b>

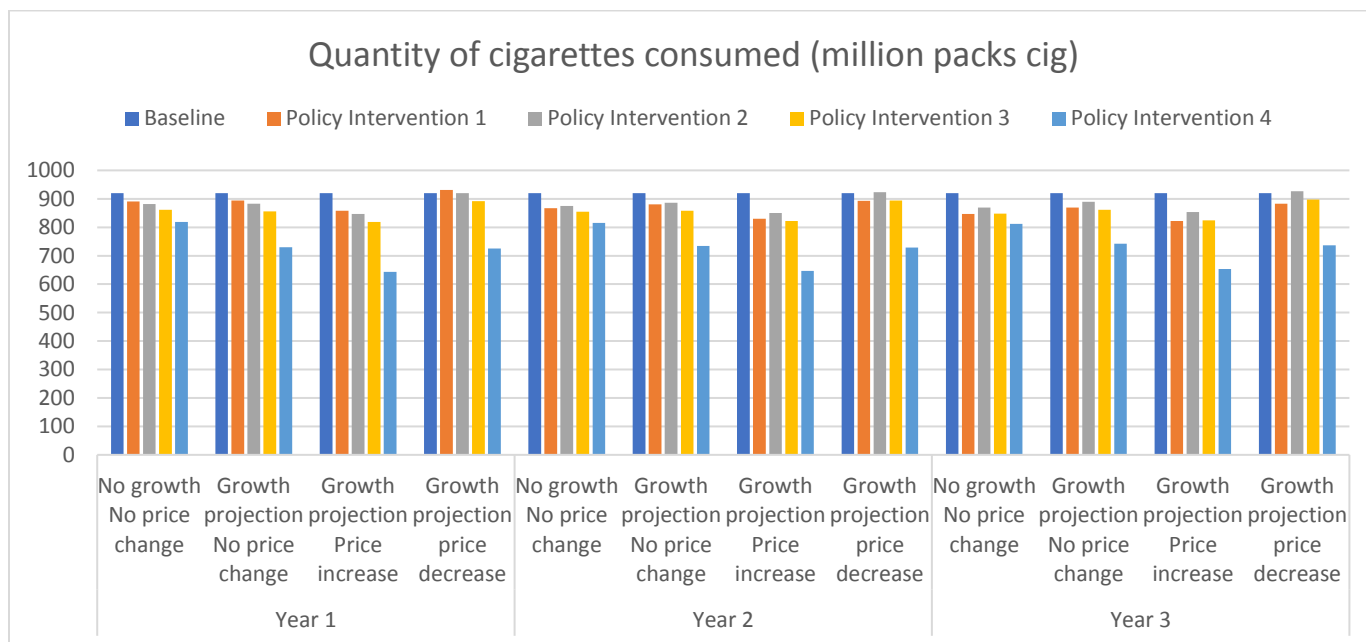
\*BAT – British American Tobacco (Domestic producer); ITC – International Tobacco Company Ltd (Domestic Producer); LTCN – Leaf Tobacco & Commodities Nigeria Ltd (Domestic Producer)

\*PM – Phillip Morris (International producer / Importer); Others – other imported cigarette brands

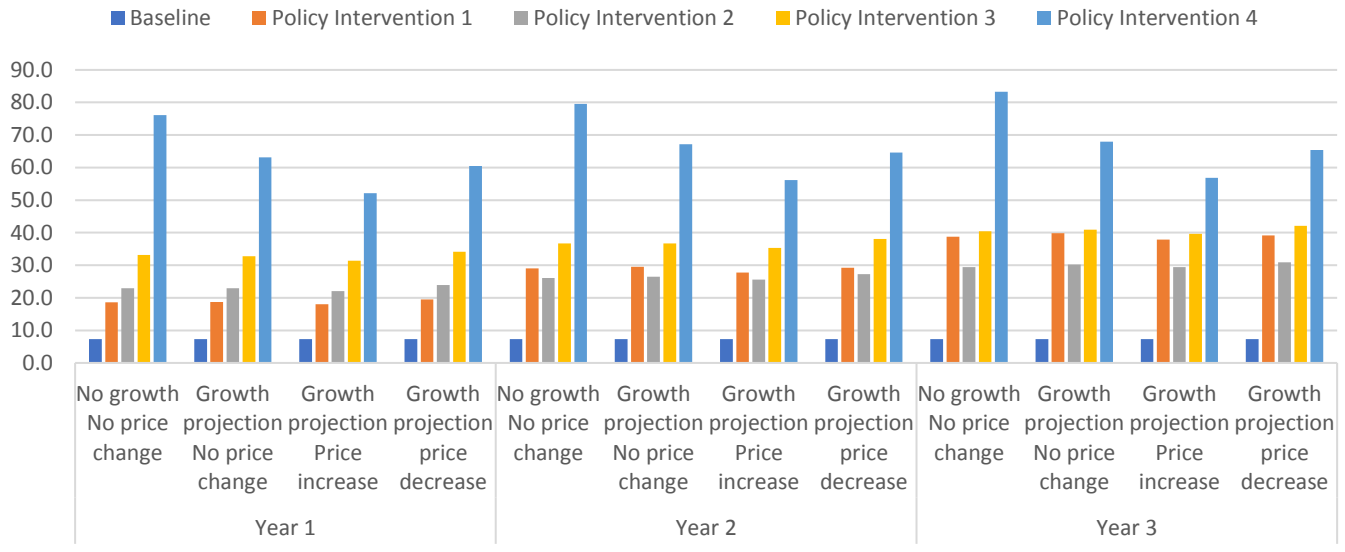
**Appendix 2: Cigarette Brands Segments and Market Share**

Brand Segments	Market share when looking at entire market	Market share when looking at domestic market
Premium	51.1	54.01691332
Economy	14.6	15.43340381
Mid-priced	28.9	30.54968288
Imported and other	5.4	
Total	100	100

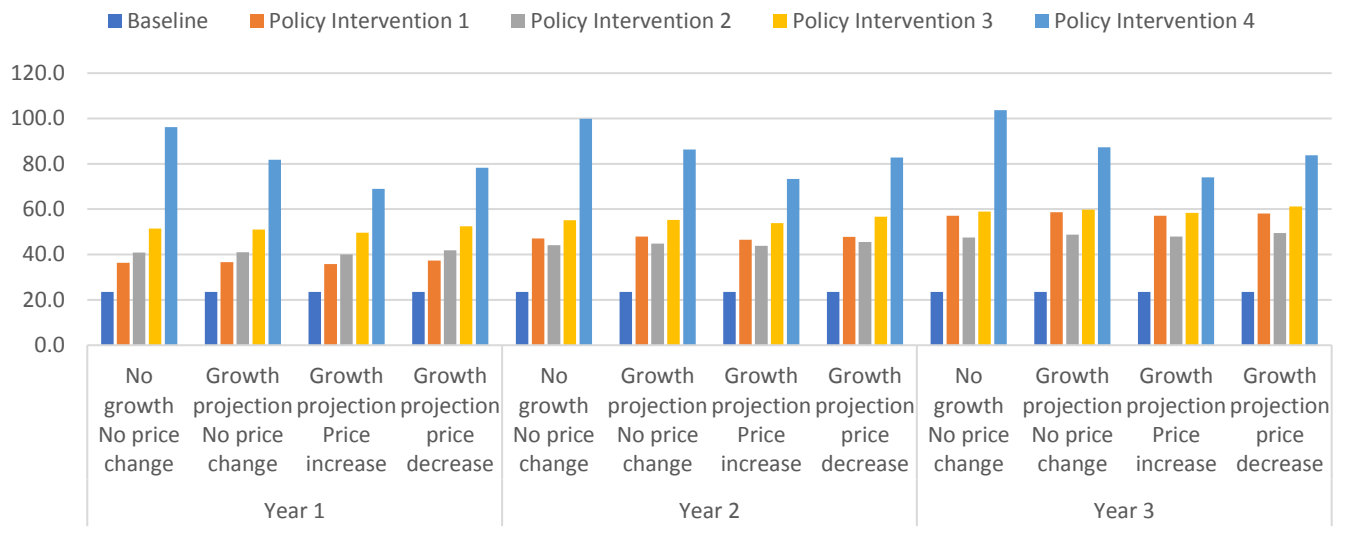
**Appendix 3: Three-year Simulation Outputs**



### Excise Tax Revenue (billion naira)



### Total Government Revenue (billion naira)



### Smoking Prevalence (%)

