

A SIMULATION OF TOBACCO EXCISE TAXES IN ZAMBIA: A FOCUS ON CIGARETTE EXCISE TAX REVENUE LOSS

Author

Vanessa Darsamo

Contributions

Nicole Vellios
Corné van Walbeek
and
Moses R. Tembo

WHO FCTC Knowledge Hub on Tobacco Taxation, Research Unit on the Economics of
Excisable Products (REEP), University of Cape Town, South Africa

Zambia Revenue Authority



ABBREVIATIONS

BAT British American Tobacco

CIF Cost, Insurance and Freight

COMESA Common Market for Eastern and Southern Africa

CPI Consumer Price Index

FCTC Framework Convention on Tobacco Control

FTA Free Trade Agreement

GDP Gross domestic product

IMF International Monetary Fund

MFEZ Multi-Facility Economic Zones

NOT Net-of-tax

REEP Research Unit on the Economics of Excisable Products

RITCO Roland Imperial Tobacco Company

SADC Southern African Development Community

SSA Sub-Saharan Africa

TETSIM Tobacco Excise Tax Simulation Model

USD United States Dollar

WHO World Health Organization

ZDA Zambian Development Agency

ZMW Zambian Kwacha

ZRA Zambia Revenue Authority

EXECUTIVE SUMMARY

This report presents the results of the Tobacco Excise Tax Simulation Model (TETSIM) for Zambia. The TETSIM simulates how changes in cigarette excise taxes impact cigarette consumption, smoking prevalence, excise tax revenue, cigarette prices, among others. The model focuses on improving health outcomes and increasing government tax revenue. For Zambia, the model was calibrated for a retrospective analysis that simulates the loss in cigarette excise tax revenue between 2016 and 2022 due to an investment incentive.

Tobacco taxes have rarely increased in Zambia, despite high inflation. The inflation-adjusted price of manufactured cigarettes has been falling since 2002. In 2016, Zambia implemented an investment incentive to attract foreign investment and foster local manufacturing, which led to the opening of two new tobacco manufacturing plants. Zambia has a mixed tax structure with an ad valorem tax at 145% of the cost, insurance and freight value or ZMW 7.10 per pack of imported cigarettes (in 2022), whichever value was higher. Locally-manufactured cigarettes are taxed 25% of these values due to the tobacco incentive. The excise taxes have not kept pace with inflation and income growth, and cigarettes are becoming more affordable over time. The incentive violates Article 5.3 of the World Health Organization's Framework Convention on Tobacco Control (WHO FCTC), which Zambia ratified in 2008.

Tobacco use costs Zambia ZMW 2.8 billion (USD 299.3 million) annually, equivalent to 1.2% of Zambia's gross domestic product (GDP). Tobacco production only contributes 0.4% to the Zambian GDP. The Zambian government is losing further from the investment incentive that has had no impact on curbing tobacco use, and only a marginal effect on job creation, with 170 jobs created since its implementation.

To ensure that cigarette taxes are effective at curbing cigarette consumption, increasing government revenue, and that Zambia complies with the WHO FCTC, we recommend the following:

1. Zambia abolishes the investment incentive for all tobacco products.
2. Zambia implements a simple tax structure that is easy to administer and revise, collapsing the tax tiers of the specific tax.
3. The specific excise tax is revised annually in line with inflation and income growth.

INTRODUCTION

Rapid population growth and increasing consumer purchasing power in Africa are fostering larger and more accessible markets and investments, including investments from the tobacco industry. Markets in Africa, particularly in sub-Saharan Africa (SSA), are often unregulated, cigarette prices are low, and tobacco laws are weak or not fully implemented and enforced.¹

While the prevalence of tobacco use in Africa is the lowest among all World Health Organization (WHO) regions, in absolute terms, the number of smokers is rising due to the rapidly growing population.¹ The increase in tobacco use is rising among the youth, especially among girls.²

Zambia is among the top five tobacco leaf-growing countries in Africa.³ The agricultural land devoted to tobacco harvesting in Zambia increased between 1996 and 2016 by nearly 2000%, and the export quantity increased by nearly 800% in the same period.⁴ In 2022, Zambia produced 38,738 tons of tobacco leaf on 21,491 hectares of arable land.³ The value of exported tobacco leaves increased from USD 1.4 million in 1995 to USD 139.9 million in 2016. However, despite the economic returns of growing tobacco, the costs outweigh the benefits. Tobacco costs Zambia ZMW 2.8 billion (USD 299.3 million) annually, equivalent to 1.2% of its gross domestic product (GDP).⁵ Cigarette butts and packets account for 620 tonnes of the country's toxicwaste.⁶

Ad valorem taxes are levied as a proportion of the value of the product. A uniform specific tax is when the same specified value is taxed for that product regardless of differing characteristics. A tiered specific tax is a tax levied at different values based on different characteristics.

Prior to 2016 Zambia had an ad valorem tax structure with a minimum uniform specific tax floor. This means that cigarettes were taxed 145% of the cost, insurance and freight (CIF) values or the same amount per unit i.e. ZMW 90 per 1 000 sticks, whichever value was higher.

Since 2016, cigarettes in Zambia have been taxed at a different rate, depending on whether they are locally-manufactured or imported, i.e. tiered taxes. Locally-manufactured cigarettes currently enjoy a 75% tax exemption on the excise tax rate as part of the investment incentive enacted by the government on 24 December 2015. This translates to 36.25% of the net-of tax value, or 25% of the specific tax floor value levied on imported cigarettes. The incentive, outlined in the Customs and excise Amendment Act of 2015,⁷ came into effect on 1 January 2016. No end date was specified. The investment incentive enjoyed by the two tobacco

manufacturers, Roland Imperial Tobacco Company (RITCO) and British American Tobacco (BAT) extends to excise tax payments.

Prior to 2018, there was only one small domestic cigarette manufacturer, RITCO, a wholly owned Zambian company.⁸ Tax and other incentives offered by the government (zero per cent tax for the first five years of operation) led to the opening of two new facilities in the Lusaka Multi-Facility Economic Zone (MFEZ): a BAT plant (fully operational in 2018), and a new RITCO plant (fully operational in early 2019).⁸ RITCO invested more than USD 8 million in their cigarette plant in Lusaka.⁹ The BAT plant cost USD 25 million.⁸

The WHO recommends that tobacco taxes should be adjusted in line with inflation and income growth, to ensure that these products remain less affordable over time.¹⁰ Despite high, often double-digit, inflation and rapid income growth, tobacco taxes have rarely increased in Zambia.¹¹ The inflation-adjusted price of manufactured cigarettes has been falling since 2002.¹¹

The WHO also recommends that tobacco taxes should be simple, easy to monitor and revise. Uniform specific taxes are recommended over tiered specific taxes and ad valorem taxes. Pure ad valorem taxes present more implementation and administration challenges. Pure ad valorem systems may suffer from product undervaluation in an effort to reduce the excise tax.¹⁰ This can be circumvented by introducing a minimum specific tax floor, i.e. a mixed tax structure. Zambia's cigarette excise tax is a mixed tax structure, an ad valorem tax, with a specific tax floor.¹²

In 2022, the ad valorem excise tax rate was 145% of the CIF value for imported cigarettes or ZMW355 per 1000 cigarettes (whichever is greater). This amounts to ZMW 7.10 (USD 0.39) for a pack of 20 imported cigarettes (using the specific tax floor rate), and ZMW 1.78 (USD 0.10) for a pack of locally-manufactured cigarettes.

The investment incentive extended to the tobacco industry is in violation of Article 5.3 of the World Health Organization Framework Convention on Tobacco Control (WHO FCTC) that Zambia ratified in 2008.¹³ Article 5.3 states that "Parties should not grant incentives, privileges or benefits to the tobacco industry to establish or run their businesses".¹⁴

This incentive has caused more detriment than good. While several countries are experiencing a decrease in smoking prevalence, Zambia remains an outlier, as smoking prevalence continues to increase. By 2025, the WHO estimates that there will be 300,000 new smokers in Zambia.¹⁵

Despite the belief that the investment incentive would create jobs and increase revenue, the incentive, among others, has promoted tobacco use, led to decreasing excise tax revenue, and exacerbated tobacco-related harms.¹⁵ The 170 new jobs⁹ that were created in the two plants by RITCO and BAT pale in comparison to the long-term direct and indirect costs of tobacco use in the country, which amount to ZMW 154.3 million and ZMW 2.7 billion respectively. This study aims to illustrate how much the Zambian government has lost in excise tax revenue because of the investment incentive implemented in 2016.

2 CIGARETTE TAXATION IN ZAMBIA

Imported cigarettes incur excise taxes, import duties, a surtax, and value-added tax (VAT). Locally-manufactured cigarettes incur excise taxes and VAT. This report focuses on excise taxes and excise tax revenue lost due to the investment incentive.

2.1 THE ECONOMIC CONTEXT IN ZAMBIA

Zambia is a large, landlocked country, in the centre of Southern Africa. It shares borders with eight countries: Angola, Botswana, the Democratic Republic of Congo, Malawi, Mozambique, Namibia, Tanzania, and Zimbabwe.

Between 1931 and 1965 Zambia's real GDP per capita tripled, driven by copper exports. At this time, Zambia was classified as a middle-income country by the World Bank. Zambia's economic growth declined post-1965, resulting in the per capita GDP falling by 50%, and Zambia was reclassified as a lower-income country.¹⁶ The decline in economic growth resulted from mismanagement by the Zambian government, and a drop in global copper demand.¹⁶ The economy recovered in the 2000s, returning to low middle-income classification in 2010.¹⁶ Zambia's economy is still rebounding from the COVID-19 recession. Furthermore, Zambia faced a severe drought exacerbated by El Niño, impacting 9.8 million people across 84 districts.¹⁷ This climatic disaster slowed real GDP growth in the first half of 2024. To date, Zambia has a population of 21.7 million and a per capita GDP of USD 1,470.¹⁸ Inflation rates have been high, often reaching double digits, averaging 13.4% per annum between 2000 and 2025, see Table 2.1.¹⁸

Table 2.1 Inflation rates, real GDP growth rate, and population growth in Zambia, 2000–2025

| Year | Real GDP growth (%) | Population (millions) | Inflation rate (%) | CPI* (base: 2022) |
|------|---------------------|-----------------------|--------------------|-------------------|
| 2000 | 4.00 | 9.89 | 24.10 | 0.06 |
| 2001 | 5.30 | 10.19 | 21.40 | 0.08 |
| 2002 | 4.50 | 10.51 | 22.20 | 0.09 |
| 2003 | 6.90 | 10.84 | 21.40 | 0.11 |
| 2004 | 7.00 | 11.19 | 18.00 | 0.14 |

| | | | | |
|------|-------|-------|-------|------|
| 2005 | 7.20 | 11.57 | 18.30 | 0.16 |
| 2006 | 7.90 | 11.97 | 9.00 | 0.19 |
| 2007 | 7.20 | 11.57 | 18.30 | 0.16 |
| 2008 | 7.20 | 11.57 | 18.30 | 0.16 |
| 2009 | 7.20 | 11.57 | 18.30 | 0.16 |
| 2010 | 7.20 | 11.57 | 18.30 | 0.16 |
| 2011 | 7.20 | 11.57 | 18.30 | 0.16 |
| 2012 | 7.20 | 11.57 | 18.30 | 0.16 |
| 2013 | 7.20 | 11.57 | 18.30 | 0.16 |
| 2014 | 7.20 | 11.57 | 18.30 | 0.16 |
| 2015 | 7.20 | 11.57 | 18.30 | 0.16 |
| 2016 | 3.80 | 16.77 | 17.90 | 0.47 |
| 2017 | 3.50 | 17.30 | 6.60 | 0.57 |
| 2018 | 4.00 | 17.84 | 7.50 | 0.60 |
| 2019 | 1.40 | 18.38 | 9.20 | 0.65 |
| 2020 | -2.80 | 18.93 | 15.70 | 0.71 |
| 2021 | 6.20 | 19.47 | 22.00 | 0.82 |
| 2022 | 5.20 | 20.20 | 11.00 | 1.00 |
| 2023 | 5.40 | 20.57 | 10.90 | 1.11 |

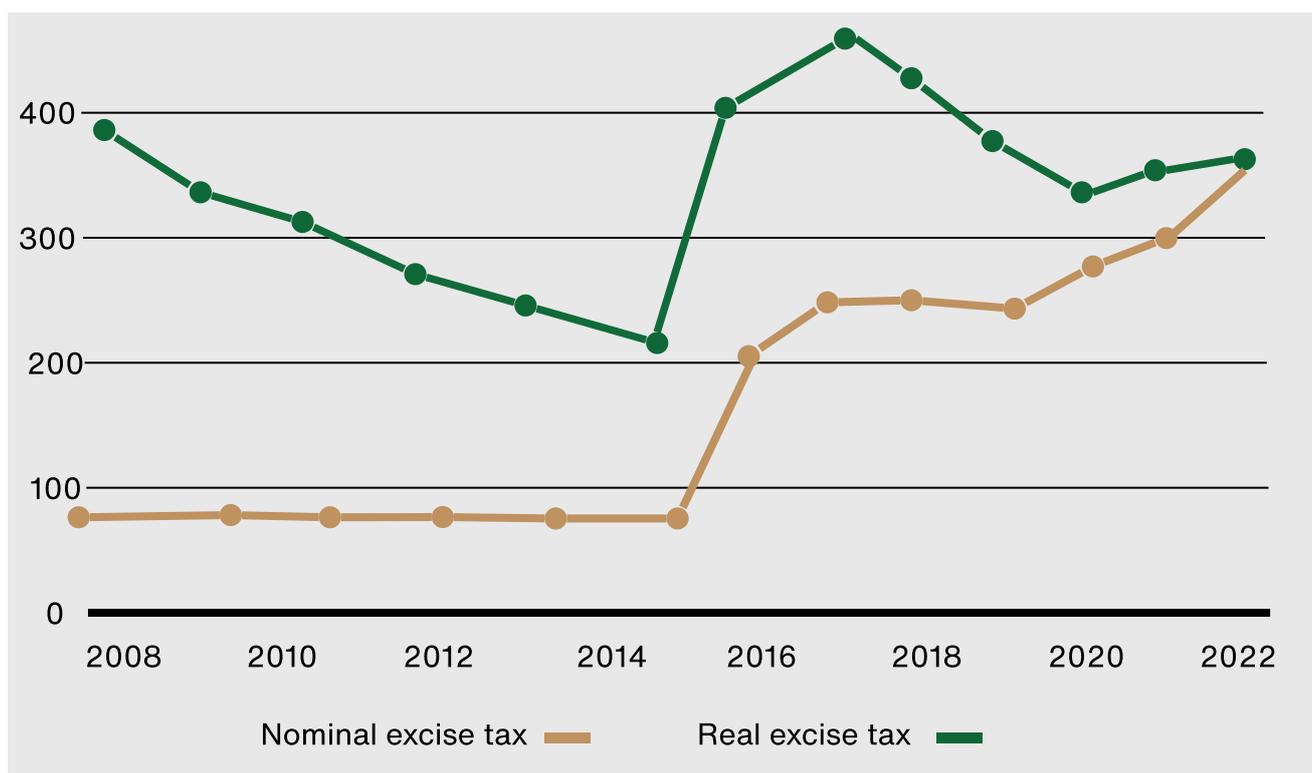
| | | | | |
|------|------|-------|-------|------|
| 2022 | 5.20 | 20.20 | 11.00 | 1.00 |
| 2023 | 5.40 | 20.57 | 10.90 | 1.11 |

2.2 OVERVIEW OF CIGARETTE EXCISE TAXES

Real, inflation-adjusted, cigarette excise taxes in Zambia have been falling over time. Between 2008 and 2022, real cigarette excise taxes fell in all years except three (2016, 2017, and 2022) (Figure 2.1). From 2008 to 2015, the nominal specific excise tax rate remained at ZMW 90 per 1,000 sticks.

Following the implementation of the investment incentive in 2016, the nominal specific excise tax for imported cigarettes increased from ZMW 90 to ZMW 200 per 1,000 sticks. In 2016, the nominal specific excise tax on locally-manufactured cigarettes decreased from ZMW 90 to ZMW 50 per 1,000 sticks. In 2017, the nominal specific excise tax increased to ZMW 240 per 1,000 sticks for imported cigarettes and to ZMW 60 per 1,000 sticks for locally-manufactured cigarettes. In 2018 and 2019, the nominal specific excise tax did not change. The high inflation rates eroded the effect of the tax, resulting in a decline in the inflation-adjusted specific excise tax. In 2020, the nominal specific excise tax increased by 10.4 % to ZMW 265 per 1,000 sticks for imported cigarettes, and ZMW 66.25 per 1,000 sticks for locally-manufactured cigarettes. In 2021, the nominal specific excise tax increased by 14% per 1,000 sticks for both imported (ZMW 302) and locally-manufactured cigarettes (ZMW 75.50), despite inflation being 22%.^{18 19} The nominal specific excise tax increased to ZMW 355 per 1,000 sticks for imported cigarettes and to ZMW 88.75 for locally-manufactured cigarettes in 2022. The ad valorem tax remained 145% of the CIF value throughout this period and even prior to 2015.

Figure 2.1: Cigarette excise tax per 1000 sticks



2.3 CIGARETTE EXCISE TAX REVENUE

The real excise tax revenue in Zambia increased from ZMW 272.2 million in 2015 to ZMW 393.9 million in 2016, after the implementation of the investment incentive.¹⁹ However, between 2017 and 2022, the excise tax revenue collected by the Zambia Revenue Authority (ZRA) remained below the amount collected in 2015, prior to the investment incentive. According to the ZRA, the large increase in the real excise tax revenue in 2019 was attributed to an increase in excise tax paid by a domestic cigarette producer.²⁰

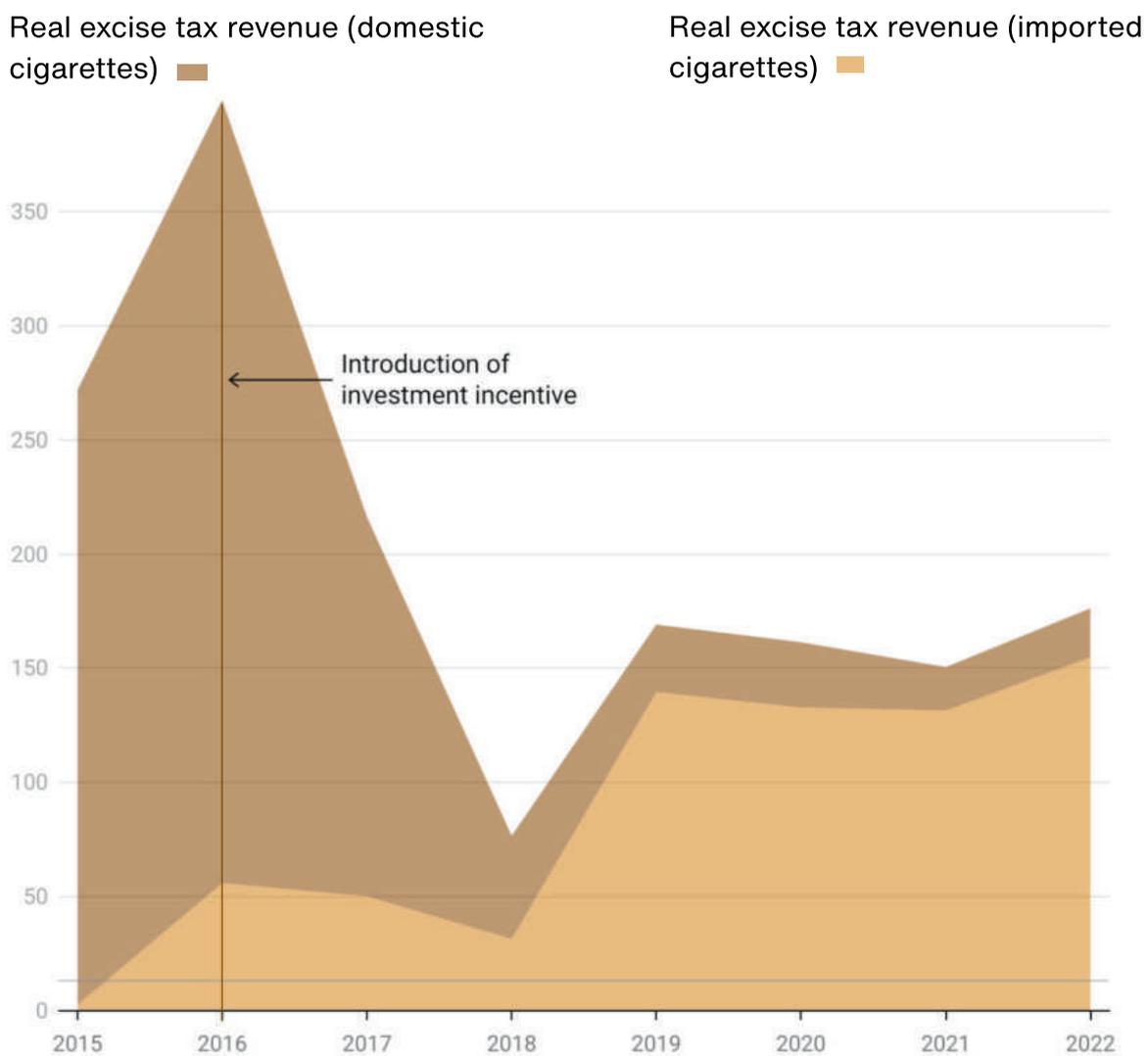
Figure 2.2 illustrates the

January 2025

10

locally-manufactured cigarettes and imported cigarette real excise tax revenue collected between 2015 and 2022.

Figure 2.2: Real cigarette excise tax revenue in million ZMW, 2015–2022 (2022 prices)



2.4 CIGARETTE CONSUMPTION

According to cigarette excise tax revenue data from the ZRA, cigarette consumption fell significantly in 2017, and dropped further in 2018, despite the cigarette excise taxes remaining constant between 2017 and 2019. Figure 2.3 illustrates the estimated cigarette consumption based on the cigarette excise tax revenue data from the ZRA.

Figure 2.3: Cigarette consumption in millions of sticks

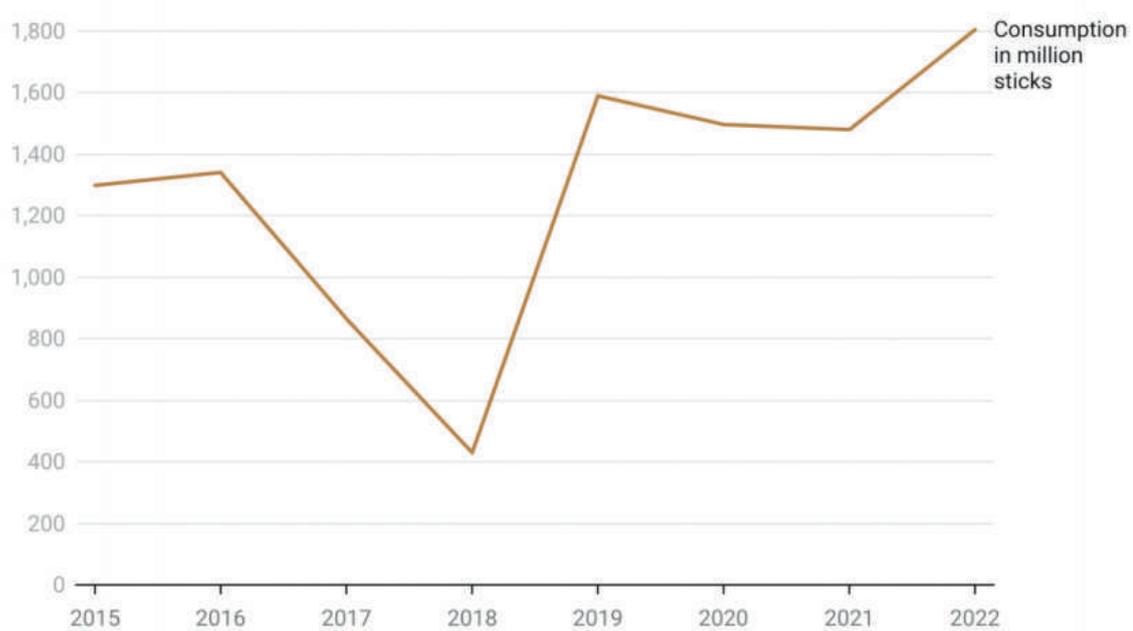


Chart: Own calculations based on ZRA revenue data and cigarette excise taxes. • Source: ZRA • Created with Datawrapper

3 TOBACCO EXCISE TAX SIMULATION MODEL

The Tobacco Excise Tax Simulation Model (TETSIM) is a simulation tool that quantifies the likely impact of a change in the excise tax level, and/ or structure on several economic variables, such as: excise tax revenue, cigarette affordability, cigarette consumption, cigarette prices, and cigarette tax shares.

The model is flexible, adaptable, and does not require excessive input data. The input data required to calibrate the model include: cigarette prices, price elasticities, income growth, population growth, inflation rates, and cigarette price segments.

The simulations are programmed in Microsoft Excel and custom-built to cater to unique scenarios. The TETSIM can be used for future and retrospective simulations.

We compared the cigarette excise tax revenue from the ZRA data to that of the TETSIM outputs, to gauge how closely the TETSIM results match the ZRA revenue data. The TETSIM that estimates revenue under the conditions of the incentive scheme is referred to as the 'tiered TETSIM'. We did a retrospective simulation from 2015 to 2022. Given the inconsistencies in 2017 and 2018 in the excise revenue data, and estimated cigarette consumption that is based on the excise revenue data, we omitted 2017 and 2018 from our analysis. However, we included these years in the appendix for interested readers. We refer to the retrospective TETSIM under a uniform-specific tax as the 'uniform TETSIM'. The uniform TETSIM depicts the excise tax revenue, cigarette consumption, and prevalence rates that would have prevailed without the investment incentive, holding all other factors constant.

3.1 TETSIM INPUT DATA

We use input data from the International Monetary Fund (IMF) for population growth, GDP per capita growth (a proxy for income), and inflation rates (Table 2.1). We calculated the consumer price index (CPI) from the inflation rates and report all prices in real 2022 values.

We use ZRA excise revenue data to estimate the annual changes in the market size of the different cigarette price segments, driven, among others, by the tiered tax rates that resulted from the investment incentive. We use five price segments: imported cigarettes, premium (locally-manufactured), popular or most-sold brands (locally-manufactured), economy brands (locally-manufactured), and illicit cigarettes. For the market size of each price segment, we use estimates provided by the ZRA employees and the ZRA revenue data, while for the illicit cigarette market size, we used estimates by Zyambo, et al. 21 Primary research data by Labonte et al. (2019) indicate that because cigarette prices are amongst the lowest in the region, the illicit cigarette market is small.⁸

Price elasticities measure the change in demand in response to a 1% change in price. We use different price elasticities for the various price segments (-0.4 for imported cigarettes and premium locally-manufactured cigarettes, -0.5 for most-sold cigarettes, -0.6 for economy cigarettes, and -0.7 for illicit cigarettes).¹⁰ This implies that, on average, a 10% increase in the real price of cigarettes will decrease cigarette consumption by between 4% and 7%, holding all other factors constant. These estimates are in line with findings for low- and middle-income countries.²² We use different demand elasticities for the different price segments as consumers' responses to price and income varies. Premium brand consumers tend to be more affluent and, therefore, less price-sensitive than economy brand consumers.²³⁻²⁵

Income elasticities measure the change in demand in response to a change in income. The income elasticity of demand for legal tobacco products lies between zero and one and is typically smaller than 0.5.¹⁰ 26-29 We assumed that the income elasticities are 0.25 for imported cigarettes and premium (locally-manufactured) cigarettes, 0.15 for most-sold cigarettes and 0.10 for economy cigarettes.³⁰ We used an income elasticity of -0.10 for illicit cigarettes as these are typically low-priced, and inferior.³¹ This implies that, on average, a 10% increase in real per-capita GDP (proxy for income) would result in an increase in the demand for legal cigarettes by between 1% and 2.5%, and reduce the demand for illegal cigarettes by 1%, holding all other factors constant.

If the price of a brand increases, demand for that brand will fall, but the demand for a substitute, lower-priced brand, may increase. To account for this switch from higher-priced brands to lower-priced brands, when prices of the higher-priced brands change and all other factors are held constant, we used cross-price elasticities. There is limited empirical literature on cross-price elasticities for cigarettes. However, findings suggest that the cross-price elasticities are positive. This implies that cigarettes across different price segments are substitutes.¹¹ 32 33 We used cross-price elasticities that range from 0.05 to 0.10. Tables 3.1 and 3.2 summarise the input data.

Table 3.1: Demand elasticities and tiered specific excise taxes

| | Imported | Premium | Most-sold | Economy | Illicit |
|---|----------|---------|-----------|---------|---------|
| Price elasticity | -0.40 | -0.40 | -0.50 | -0.60 | -0.70 |
| Income elasticity | 0.25 | 0.25 | 0.15 | 0.10 | -0.10 |
| Cross-price elasticity | . | 0.05 | 0.05 | 0.05 | 0.10 |
| Excise taxes* per pack in nominal values (ZMW)** | | | | | |
| 2015 | 1.80 | 1.80 | 1.80 | 1.80 | 1.80 |
| 2016 | 4.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 2017 | 4.80 | 1.20 | 1.20 | 1.20 | 1.20 |
| 2018 | 4.80 | 1.20 | 1.20 | 1.20 | 1.20 |
| 2019 | 4.80 | 1.20 | 1.20 | 1.20 | 1.20 |
| 2020 | 5.30 | 1.33 | 1.33 | 1.33 | 1.33 |
| 2021 | 6.04 | 1.51 | 1.51 | 1.51 | 1.51 |
| 2022 | 7.10 | 1.78 | 1.78 | 1.78 | 1.78 |

*Excise tax was 145% of CIF or the specific values listed above, whichever was greater.

**Zambia Revenue Authority

Table 3.2 Change in price segment shares

| Year | Imported* (%) | Premium*(%) | Most-sold* (%) | Economy* (%) | Illicit** (%) |
|------|---------------|-------------|----------------|--------------|---------------|
| 2015 | 86.9 | 0.1 | 0.4 | 0.4 | 12.2 |
| 2016 | 53.1 | 4.3 | 15.2 | 15.2 | 12.2 |
| 2017 | 39.8 | 5.9 | 21.1 | 21.1 | 12.2 |
| 2018 | 23.2 | 8.0 | 28.3 | 28.3 | 12.2 |
| 2019 | 4.4 | 10.3 | 36.5 | 36.5 | 12.2 |
| 2020 | 4.5 | 10.3 | 36.5 | 36.5 | 12.2 |
| 2021 | 3.1 | 10.5 | 37.1 | 37.1 | 12.2 |
| 2022 | 2.9 | 10.5 | 37.2 | 37.2 | 12.2 |

*Zambia Revenue Authority 19, **Zyambo, et al.

4. METHODS

Recall that Zambia has a mixed excise tax structure i.e., an ad valorem tax with a minimum specific tiered tax floor. The ad valorem tax for imported cigarettes is 145% of the CIF value or the specific tiered excise tax floor value, whichever is higher. For locally-manufactured cigarettes, the ad valorem tax, at 25% of that of imported cigarettes, translates to 36.25% of the net-of-tax price or 25% of the specific tiered excise tax floor levied on imported cigarettes, whichever is higher.

The TETSIM uses average values per cigarette price segment. For example, the average price of imported cigarettes, or the average CIF value for all imported cigarettes per year. For imported cigarettes, our estimates suggest that the specific tiered excise tax floor value was higher than 145% of the CIF value. The average CIF value was obtained from the ZRA team.³⁴ For locally-manufactured cigarettes, 25% of the specific tax value levied on imported cigarettes was also found to be higher than 36.25% of the net-of-tax price, for the specified year. Thus, we use the specific tiered² excise tax floor value in our estimations. Given data availability limitations, it is not possible to estimate, on average, which tax was applied, the ad valorem tax value or the specific tiered excise tax. However, our estimates indicate that on average, the specific excise tax was applied.³⁴ As such, our estimates are modest and should be interpreted as lower estimates.

4.1 ASSUMPTIONS

The investment incentive promoted local cigarette manufacturing, resulting in a decline in the number of imported cigarettes. This led to a shift in the market shares of the different price segments. We take this into account in the tiered TETSIM where we use tiered excise taxes because the tiered taxes, among others, incentivised local cigarette manufacturing. However, for the uniform TETSIM which applies the uniform specific tax, i.e., the scenario where the investment incentive and the tiered taxes had not been applied to cigarettes, we retain the 2015 market shares. We do this because there would have been no incentive to promote local cigarette manufacturing without the investment incentive that led to the tiered specific cigarette taxes.

We assume that our demand elasticities remain constant over the period of analysis. We also assume that the CIF and net-of-tax prices change over time in line with inflation (i.e., in real terms, these values remain constant).

For the uniform TETSIM, we assumed that locally-manufactured cigarettes are levied the same excise taxes as imported cigarettes.

4.2 CIGARETTE PRICES

We derived inflation-adjusted 2015 cigarette prices by using 2022 prices as a the base year, and the cigarette real excise taxes per pack in 2015.¹⁹ We decomposed the retail price for imported cigarettes into the CIF value, the import duty, which is levied at a rate of 25% of the CIF value for cigarettes from outside the Southern African Development Community (SADC), the Free Trade Agreement (FTA), and the Common Market for Eastern and Southern Africa (COMESA), the excise tax, the surtax at 5% of the CIF implemented in 2017, the value-added tax (VAT), and importer profit. We decomposed the retail price of locally-manufactured cigarettes into the net-of-tax (NOT) price, the excise tax, the VAT amount, and retailer/ wholesaler profits. The VAT is 16% of the sum of the net-of-tax or CIF value, profits, the excise tax, and any other taxes.

Table 4. 1 summarises the price breakdown for all five price segments in 2015, the baseline, in nominal and real 2022 values.

Table 4.1 Cigarette price categories for 2015 in nominal and real 2022 values

| Price disaggregation | Imported | | Premium | | Popular | | Discount | | Illicit | |
|------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|-------------|
| | Nominal | Real | Nominal | Real | Nominal | Real | Nominal | Real | Nominal | Real |
| Nominal vs. Real 2022 values | | | | | | | | | | |
| CIF/ NOT | 1.7 | 4.0 | 1.9 | 4.3 | 1.6 | 3.7 | 1.4 | 3.2 | 4.4 | 10.0 |
| Profits | 11.6 | 26.5 | 12.4 | 28.4 | 10.8 | 24.7 | 9.1 | 20.9 | | |
| Excise tax | 1.8 | 4.1 | 1.8 | 4.1 | 1.8 | 4.1 | 1.8 | 4.1 | | |
| Import duty | 0.4 | 1.0 | | | | | | | | |
| VAT | 2.5 | 5.7 | 2.6 | 5.9 | 2.3 | 5.2 | 2.0 | 4.5 | | |
| Retail price | 18.0 | 41.3 | 18.6 | 42.7 | 16.5 | 37.7 | 14.3 | 32.7 | 4.4 | 10.0 |

4.3 CIGARETTE CONSUMPTION

For the baseline, 2015, we used the reported cigarette sales, accounting for the illicit market size, and we used the market shares shown in Table 3.2 to estimate cigarette consumption by price segments. The growth in aggregate cigarette consumption in our analysis is derived from the changes in the real price of the product, changes in per-capita income (per capita GDP), and changes in the population. We use the price elasticities to measure the change in consumption attributable to changes in the price. We use cross-price elasticities to measure changes in consumption of one price segment resulting from changes in the price of another price segment. The income elasticities are used to estimate the changes in consumption attributable to changes in income. The change in the population impacts aggregate consumption, but has no impact on per capita consumption. Aggregate cigarette consumption in period t is equal to aggregate cigarette consumption in the previous period i.e. t-1, adjusted for the changes in price, per capita income and population. Equation 1 summarises the computational procedure.

$$SimCons_{bt} = Cons_{bt-1} * \left[\frac{(1 + \epsilon_{pb}(p_{bt} - p_{bt-1}))}{(p_{bt} + p_{bt-1})} * \frac{(p_{bt} + p_{bt-1})}{1 - \epsilon_{pb}(p_{bt} - p_{bt-1})} \right] * (1 + pop_t)(1 + inc_t * \epsilon_{ib}) \quad [1]$$

$SimCons_{bt}$ is simulated cigarette consumption for market segment b in year t. $Cons_{bt-1}$ is the cigarette consumption in market segment b in the previous year. ϵ_{pb} is the own-price elasticity for market segment b. p_{bt} and p_{bt-1} are the prices per pack for market segment b at year t and year t-1, respectively. pop_t is the population growth rate in year t and inc_t is the real per capita GDP growth rate in year t. ϵ_{ib} is the income elasticity for market segment b. We used the arc elasticity formula for the price elasticity of demand.; see Van Walbeek 35 for further details. Some smokers may switch from smoking cigarettes in one price segment to smoking cigarettes in a lower price segment. We accounted for this switch between price segments by using cross-price elasticities, summarised in equation 2.

$$\delta SimCons_{sbt} = \frac{p_{at} - p_{at-1}}{0.5(p_{at} + p_{at-1})} * \epsilon_{xb} * SimCons_{bt}$$

where $\delta SimCons_{sbt}$ is the simulated change in consumption attributed to consumers switching from higher-priced cigarettes in price segment a to lower-priced cigarettes in price segment b. p_{at} and p_{at-1} are the prices for the higher-price segment a in year t and year t-1, respectively. ϵ_{xb} is the cross-price elasticity, defined as the percentage change in consumption for the lower-price segment b attributed to a 1% price change in the higher-price segment a. $SimCons_{bt}$ is the simulated cigarette consumption for price segment b in year t, derived from equation 1. We subtracted the consumption in the lower-price segment b from that in the higher-price segment a. The net effect of the substitution effects on aggregate consumption is zero. To estimate the total cigarette consumption (by price segment) while accounting for income and population growth, we summed the simulated cigarette demand (equation 1), and the simulated change in cigarette demand attributed to the substitution effect (equation 2), as shown in equation 3.

$$TotalSimCons_{bt} = SimCons_{bt} + \delta SimCons_{sbt}$$

Total simulated cigarette consumption is the sum of the consumption in each of the five price segments: imported, premium, popular, discount, and illicit, see equation 4

$$TotalSimCons_t = \sum_b^5 SimCons_{bt}$$

4.4 SIMULATED EXCISE TAX REVENUE

To calculate the simulated excise tax revenue, we multiplied the simulated cigarette consumption by the cigarette excise taxes, for each price segment, see equation 5. For the current tiered excise taxes, we used the excise taxes provided by the ZRA for 2015 to 2022. For the uniform excise tax, we assumed that locally-manufactured cigarettes are levied the same excise taxes as imported cigarettes.

$$Simtaxrev_t = \sum_{b=1}^5 tax_t * TotalSimCons_{bt}$$

Where $Simtaxrev_t$ is the simulated tax revenue for all price segments in year t . tax_t is the excise tax amount per cigarette pack in year t . $TotalSimConsbt$ is the total simulated cigarette consumption in year t , derived from equation 3.

4.5 SIMULATED CIGARETTE PREVALENCE RATE

We define the cigarette prevalence rate as the number of smokers divided by the adult population (aged 15+). The empirical literature indicates that approximately half of the impact of a reduction in cigarette consumption is reflected in a decrease in the number of smokers, and the other half is reflected in a decrease in smoking intensity (i.e., in the average number of cigarettes smoked by consumers).^{10 22} We use this evidence to estimate the smoking prevalence rates using the ZRA data and the TETSIM. Equation 6 summarizes the computational procedure:

$$Cigcons_t = Cigcons_{t-1}(1 + \% \delta TotalSimCons_t * 50\%)$$

$Cigconst$ is the number of cigarette consumers in year t . $Cigconst-1$ is the number of cigarette consumers in the previous period. $\% \delta TotalSimConst$ is the percentage change in the total simulated cigarette consumption between year t and year $t-1$.

5 RESULTS

We first compare our tiered TETSIM results for the current tiered specific excise taxes to those of the ZRA data, and found no substantial differences. We then compared our uniform TETSIM results under a uniform specific excise tax, where locally-manufactured cigarettes are levied the same specific excise tax value as imported cigarettes. The results are presented below.

5.1 Excise tax revenue

We compare our tiered TETSIM results to the actual excise tax revenue collected by the ZRA. During the analysis period, the average real cigarette excise tax revenue was ZMW 220 million for both the ZRA data (actual collections), and the tiered TETSIM retrospective simulations (Figure 5.1).

Figure 5.1: Real cigarette excise tax revenue: ZRA vs. TETSIM

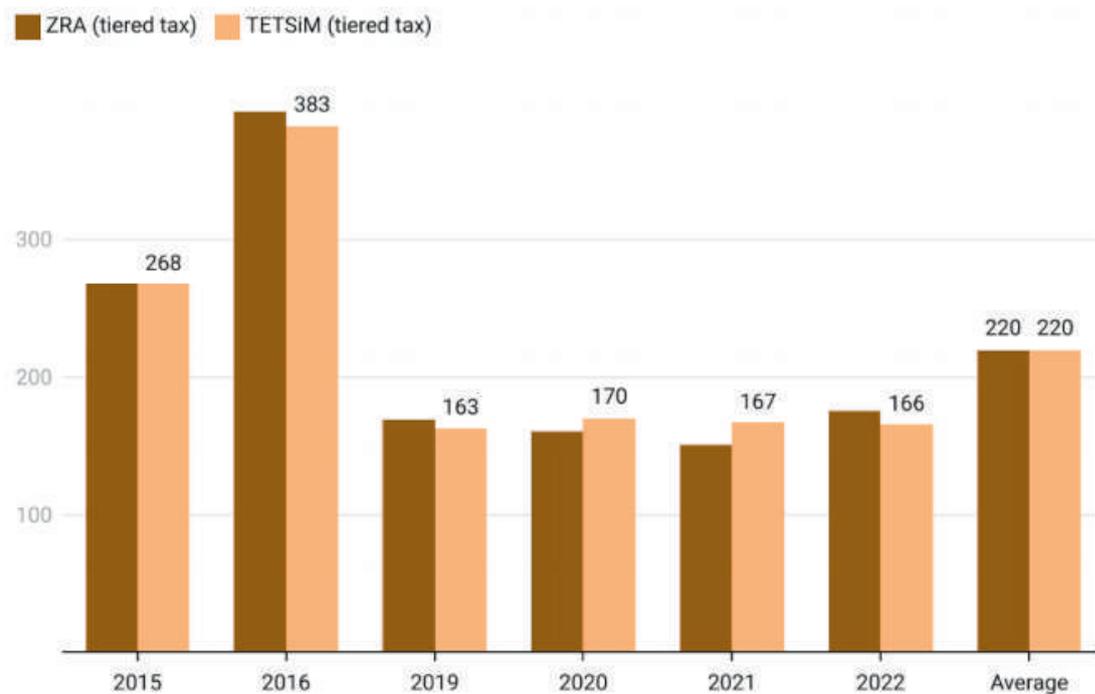


Chart: TETSIM results are based on own calculations. The ZRA data is derived from cigarette excise tax revenue data from the ZRA. • Created with Datawrapper

On average, the tiered cigarette excise tax cost the Zambian government ZMW 292 million per year, in real 2022 values, between 2015 and 2022, excluding 2017 and 2018 (Figure 5.2). In total, the government collected ZMW 1.32 billion but lost ZMW 1.75 billion, in real 2022 values, during the analysis period.

Figure 5.2: Real cigarette excise tax revenue: tiered vs uniform specific

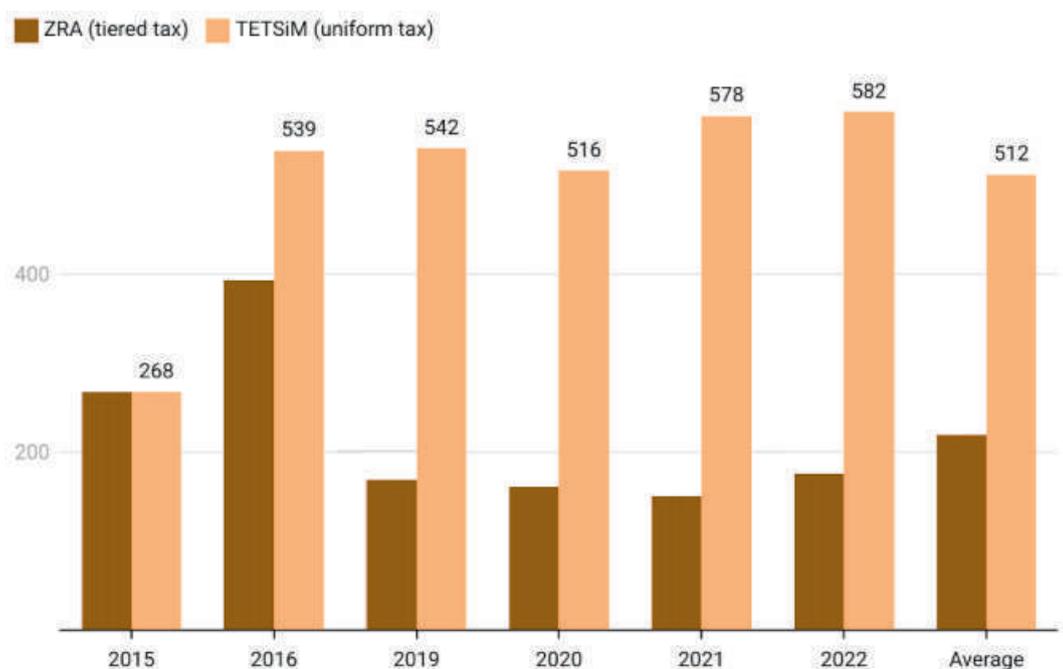


Chart: TETSIM results are based on own calculations. The ZRA data is derived from cigarette excise tax revenue data from the ZRA, adjusted for inflation. • Created with Datawrapper

5.2 CIGARETTE CONSUMPTION

Had Zambia retained the uniform specific excise tax for both domestic and imported cigarettes, cigarette consumption would have remained relatively consistent. Our results suggest that cigarette consumption under a uniform specific tax would have averaged 1,535 million sticks³ per year, despite the excise taxes not being revised in line with income growth and inflation, as is recommended. Using the ZRA data, our estimates indicate that the average annual cigarette consumption was 1,711 sticks⁴, under the tiered tax. Figure 5.3 illustrates the difference in total cigarette consumption (legal and illegal) under the current tiered tax versus a uniform specific cigarette tax, for the analysis period.

Figure 5.3: Total cigarette consumption under the tiered excise tax vs. uniform specific tax

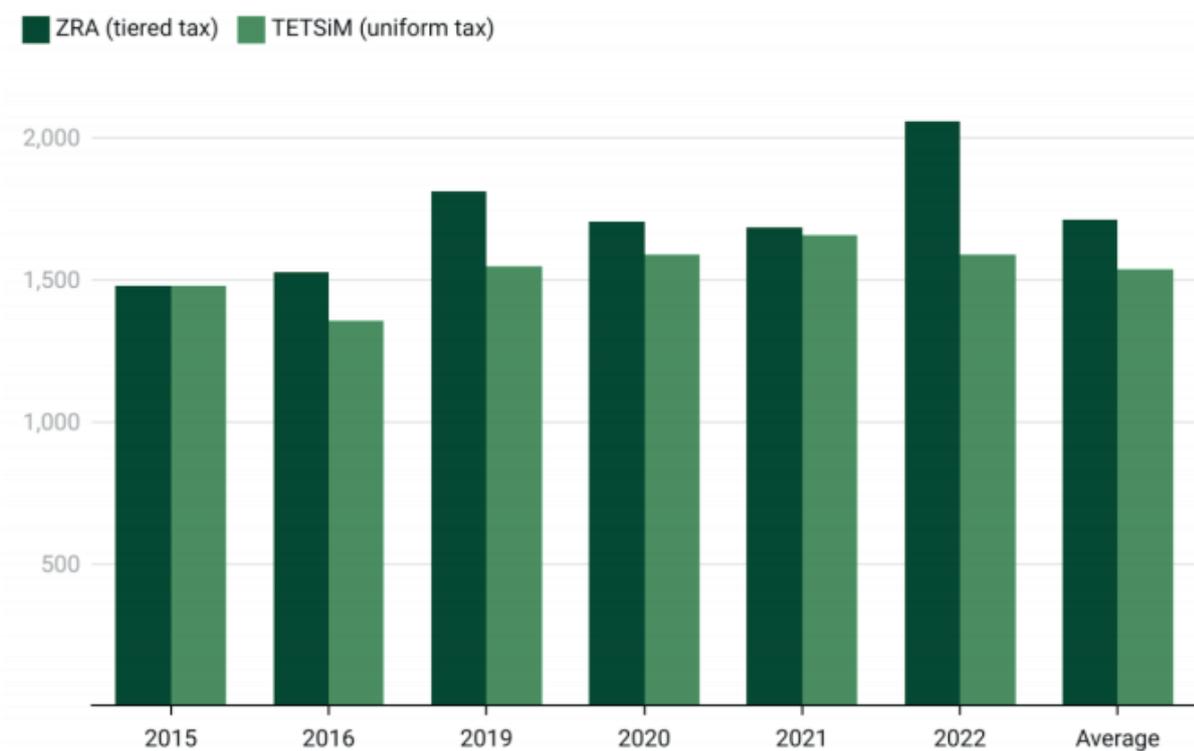


Chart: TETSIM results are based on own calculation. ZRA estimates are based on cigarette excise tax revenue data by the ZRA • Created with Datawrapper

5.4 CIGARETTE SMOKING PREVALENCE RATE

The cigarette smoking prevalence rate increased by 0.8 percentage points during the analysis period, under the current tiered excise tax. Our simulations suggest that had Zambia retained the uniform specific excise tax, the cigarette smoking prevalence rate would have dropped by 0.8 percentage points from 9.0% in 2015 to 8.2% by 2022 (Figure 5.4)

Figure 5.4 Cigarette smoking prevalence rate under the tiered excise tax vs. uniform specific tax

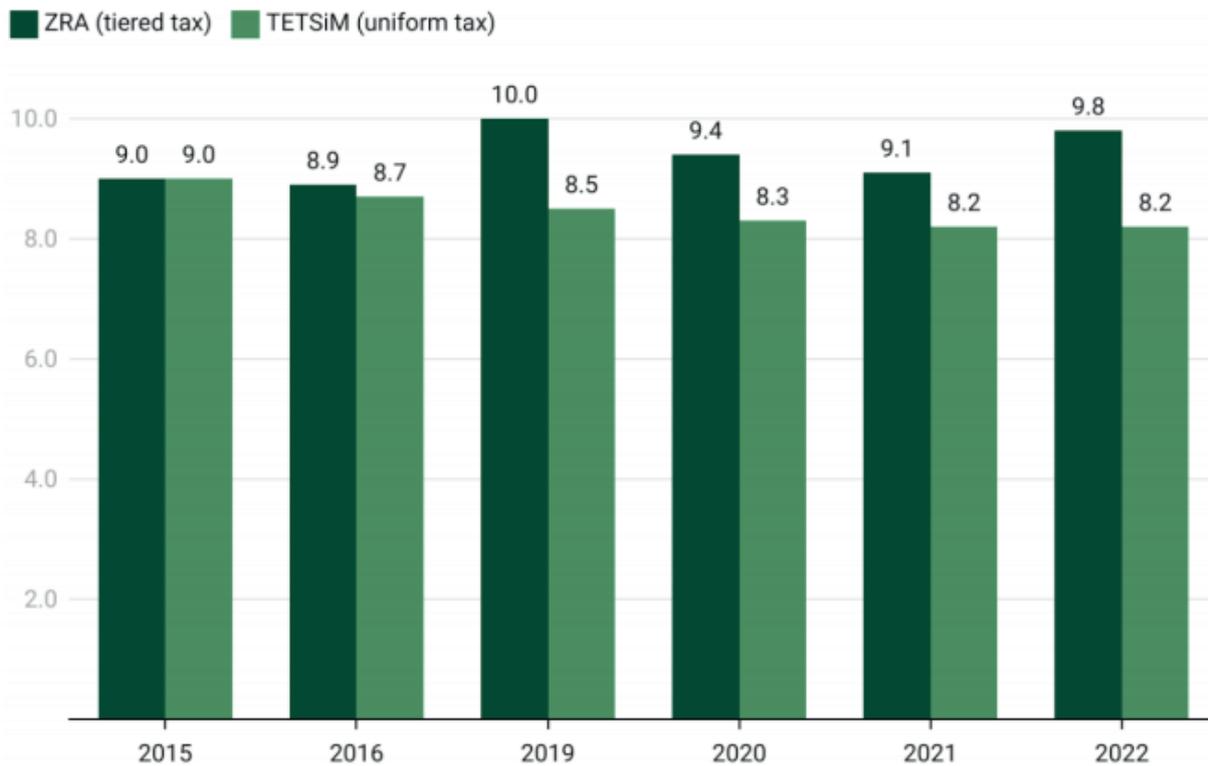


Chart: TETSIM results are based on own calculations. The ZRA estimates are based on ZRA revenue data, IMF population data, and STEPS Zambia 2017 prevalence rates. • Created with Datawrapper

6. DISCUSSION AND RECOMMENDATIONS

The investment incentive that led to the tiered specific taxes for imported versus locally manufactured cigarettes has caused more detriment than good. The 170 new jobs created due to the incentive pale compared to the costs attributed to tobacco use, which amount to ZMW 2.8 billion, 1.2% of the GDP.⁵⁸ 36 The costs of tobacco use outweigh the benefits, given that tobacco production contributes only 0.4% of the GDP.³⁶ On average, the government loses ZMW 292 million annually in cigarette excise tax revenue due to the current tiered taxes. The simulated annual loss in cigarette excise tax revenue is almost double the annual health costs attributed to tobacco use (ZMW 154 million). During the analysis period, the loss in cigarette excise tax revenue amounted to ZMW 1.75 billion, which equates to 0.75% of the GDP. Our results show that even in the absence of the recommended tax revisions, in line with inflation and income growth, a uniform specific tax would have decreased smoking prevalence.

Zambia should follow best practice and collapse their specific tax tiers, opting for a uniform specific tax that is revised routinely for income growth and inflation. This will ensure that cigarettes remain less affordable over time. A uniform specific tax will also discourage consumers from switching from higher-taxed cigarette brands to lower-taxed brands. The investment incentive should be abolished for all tobacco products as this violates Article 5.3 of the WHO FCTC, ratified in 2008.

REFERENCES

1. Egbe CO, Magati P, Wanyonyi E, et al. Landscape of tobacco control in sub-Saharan Africa. *Tobacco Control* 2022;31(2):153. doi: 10.1136/tobaccocontrol-2021-056540
2. World Health Organization. Tobacco control Regional office for Africa: WHO; [Available from: /web/20250106114406/https://www.afro.who.int/health-topics/tobacco-control accessed 5 January 2025.
3. Tobacco Atlas, Vital Strategies. Country Factsheet: Zambia 2024 [cited 2025 6 January]. Available from: /web/20250106122025/https://tobaccoatlas.org/factsheets/zambia/ accessed 6 January 2025.
4. Food and Agriculture Organization in Tobacco Tactics, University of Bath. Zambia Country profile University fo Bath: Tobacco Tactics; 2021 [updated 13 Sepetmebr 2021; cited 2025 6 January]. Available from: /web/20250106123516/https://www.tobaccotactics.org/article/zambia-country-profile/ accessed 6 January 2025.
5. Ministry of Health Zambia, RTI International, United Nations Development Programme, et al. Investment Case for Tobacco Control in Zambia: The Case for Investing in WHO FCTC Implementation. New York: UNDP, 2019.
6. McDougall A, Mustafa M. Tobacco Control As An Accelerator For The Sustainable Development Goals: Zambia: MOH Zambia, WHO FCTC, WHO, UNDP, Undated.
7. Government of Zambia. Customs and Excise (Amendment) [No. 18, ACT No. 18 of 2015, Date of Assent: 17th December 2015, Enacted by the Parliament of Zambia on 24th December, 2015. 2015
8. Labonté R, Lencucha R, Goma F, et al. Consequences of policy incoherence: how Zambia's post-FCTC investment policy stimulated tobacco production. *J Public Health Policy* 2019;40(3):286-91. doi: 10.1057/s41271-019-00171-8
9. Lencucha R, Drope J, Labonte R, et al. Investment incentives and the implementation of the Framework Convention on Tobacco Control: evidence from Zambia. *Tob Control* 2016;25(4):483-7. doi: 10.1136/tobaccocontrol-2015-052250 [published Online First: 20150701]
10. WHO Framework Convention on Tobacco Control. Guidelines for implementation of Article 6 of the WHO FCTC (Price and tax measures to reduce the demand for tobacco) Moscow, Russian Federation: WHO FCTC; 2017 [Available from: https://fctc.who.int/publications/m/item/price-and-tax-measures-to-reduce-the-demand-for-tobacco.

11. Stoklosa M, Goma F, Nargis N, et al. Price, tax and tobacco product substitution in Zambia: findings from the ITC Zambia Surveys. *Tobacco Control* 2019;28(Suppl 1):s45. doi: 10.1136/tobaccocontrol-2017-054037
12. Zambia Revenue Authority. Practice note no.1/2020. <http://web.archive.org/web/20230112140445/https://www.zra.org.zm/wp-content/uploads/2020/09/Practise-Notes-2020-002.pdf>. 2020
13. Secretariat of the WHO Framework Convention of Tobacco Control. Needs assessment for implementation of the WHO Framework Convention on Tobacco Control in Zambia, 2018. January 2025
14. WHO Framework Convention on Tobacco Control. Guidelines for implementation Article 5.3; Article 8; Articles 9 and 10; Article 11; Article 12; Article 13; Article 14 2013 edition: WHO, 2013.
15. Economics for Health, Johns Hopkins Bloomberg school of public health. Challenges in Tobacco Control in Zambia: Economics for Health, 2022.
16. Seekings J, Tembo A. Economic history of Zambia. Institute for Democracy, Citizenship and Public Policy in Africa 2022(28) [published Online First: April 2022]
17. World Bank Group. The World Bank in Zambia: World Bank; 2024 [updated 09 October 2024; cited 2025 13 January]. Available from: <https://www.worldbank.org/en/country/zambia/overview> accessed 13 January 2025.
18. International Monetary Fund. Zambia: Inflation rates. In: IMF, ed., 2024.
19. Zambia Revenue Authority. Tobacco excise tax revenue: ZRA, 2022.
20. Tembo M. Cigarette tax collection in Zambia. In: Vellios N, Darsamo V, eds. Cape Town, 2022.
21. Zyambo C, Phiri MM, Mwamulela W, et al. Illicit Cigarette Trade and Tax evasion in Zambia: Findings from the Tobacco Control Data Initiative 2023. *MedRxiv* 2023 doi: <https://doi.org/10.1101/2024.10.14.24315433>
22. International Agency for the Research on Cancer (IARC). Effectiveness of tax and price policies for tobacco control. IARC Handbooks of Cancer prevention in Tobacco Control. Lyon, France.: International Agency for the Research on Cancer; 2011 [Available from: https://web.archive.org/web/20220125151614/https://publications.iarc.fr/_publications/media/download/4018/05229a5e57f58b0bf51364dd0f3329d45c898839.pdf].

23. A.N N, H.N T. Cigarette Brand-Switching Behavior and Tobacco Taxation in Vietnam. Ha Noi, Vietnam: Development and Policies Research Center, 2021.
24. DeCicca P, Kenkel D, Liu F, et al. Quantifying brand loyalty: Evidence from the cigarette market. *J Health Econ* 2021;79:102512. doi: 10.1016/j.jhealeco.2021.102512 [published Online First: 20210802]
25. Lewis M, Wang Y, Cahn Z, et al. An exploratory analysis of cigarette price premium, market share and consumer loyalty in relation to continued consumption versus cessation in a national US panel. *BMJ Open* 2015;5(11):e008796. doi: 10.1136/bmjopen-2015-008796
26. Adeniji F. Consumption function and price elasticity of tobacco demand in Nigeria. *Tob Prev Cessation* 2019;5(December) doi: 10.18332/tpc/114084
27. Chelwa G, Van Walbeek C. Does cigarette demand respond to price increases in Uganda? Price elasticity estimates using the Uganda National Panel Survey and Deaton's method. *BMJ* 2019;9(3):e026150. doi: <https://doi.org/10.1136/bmjopen-2018-026150>
28. Goodchild M, Perucic AM, Nargis N. Modelling the impact of raising tobacco taxes on public health and finance. *Bull World Health Organ* 2016;94(4):250-7. doi: 10.2471/blt.15.164707 [published Online First: 20160212]
29. Mukong AK, Tingum EN. The demand for cigarettes: New evidence from South Africa. *Development Southern Africa* 2020;37(1):40-54. doi: 10.1080/0376835X.2019.1640108
January 2025
26
30. Tingum EN, Mukong AK, Mdege N. The effects of price and non-price policies on cigarette consumption in South Africa. *Tobacco Induced Diseases* 2020;18(July) doi: 10.18332/tid/123424
31. Shimul SN, Hussain AKMG, Nargis N. Estimating own-price and cross-price elasticity of cigarette consumption by price tiers in Bangladesh. *Tobacco Control* 2024;33(Suppl 2):s44. doi: 10.1136/tc-2022-057679
32. Shimul S, Hussain AKM. Estimating own- and cross-price elasticity of cigarette consumption by price tiers in Bangladesh. *Bangladesh IHE*, 2022
33. Chalak A, Nakkash R, Abu-Rmeileh NME, et al. Own-price and cross-price elasticities of demand for cigarettes and waterpipe tobacco in three Eastern Mediterranean countries: a volumetric choice experiment. *Tobacco Control* 2021;tobaccocontrol-2021-056616. doi: 10.1136/tobaccocontrol-2021-056616
34. D. Mweemba, M. Nseluke, E.D. Mwale, et al. Tobacco Taxation in Zambia. In: *Research Unit on the Economics of Excisable Products (REEP)*, ed., 2021.

35. Van Walbeek C. A simulation model to predict the fiscal and public health impact of a change in cigarette excise taxes. *Tobacco Control* 2010;19(1):31. doi: 10.1136/tc.2008.028779

36. Goma F, Drope J, Zulu R, et al. *The Economics of Tobacco Farming in Zambia*: American Cancer Society
University of Zambia, School of Medicine, 2017.



APPENDIX

A1 Cigarette excise tax revenue

We excluded 2017 and 2018 from our analysis for two reasons. The first is that we noticed a substantial difference in the trend in excise tax revenue in 2017 and 2018 compared to other years (Figure A1).

Figure A1 Nominal and real cigarette excise tax revenue, 2015 to 2022

Figure A1 Nominal and real cigarette excise tax revenue, 2015 to 2022

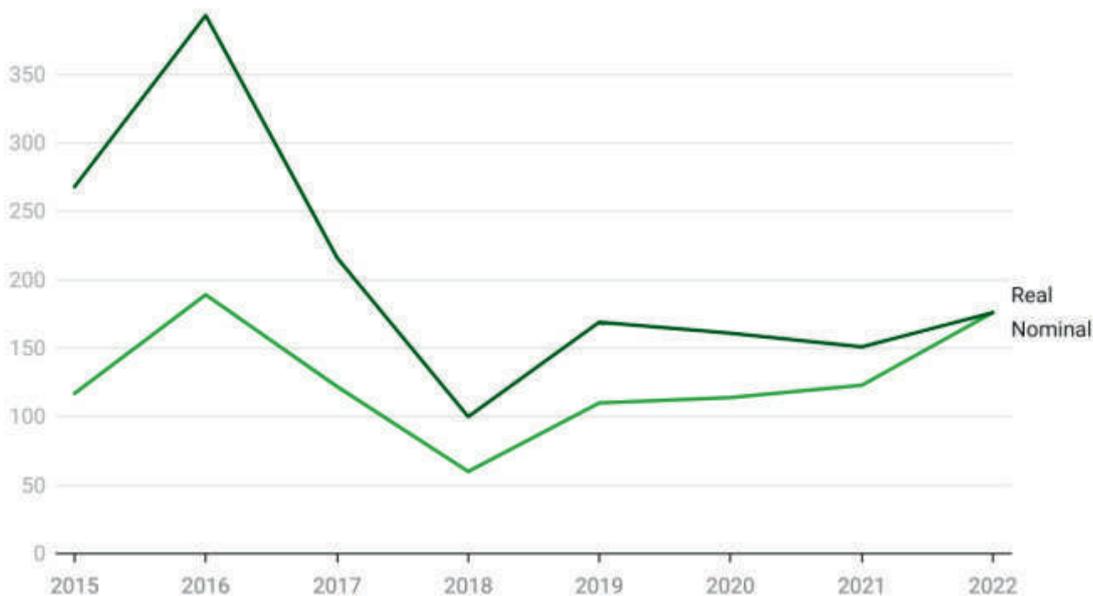


Chart: Cigarette excise tax revenue data from the ZRA, inflation data from the IMF, and own calculations of CPI. • Created with Datawrapper

We compared the cigarette excise tax revenue collected by the ZRA to that simulated by the TETSIM, and noticed considerable differences for 2017 and 2018 (Figure A2). According to personal communication with the ZRA, the large increase [in excise tax revenue] in 2019 is mostly attributed to an increase in local excise duty payments from one taxpayer whose payments increased from ZMW 9.5 million in 2018 to 77.8 million in 2019.

Figure A2 Cigarette excise tax revenue ZRA data vs. TETSIM results

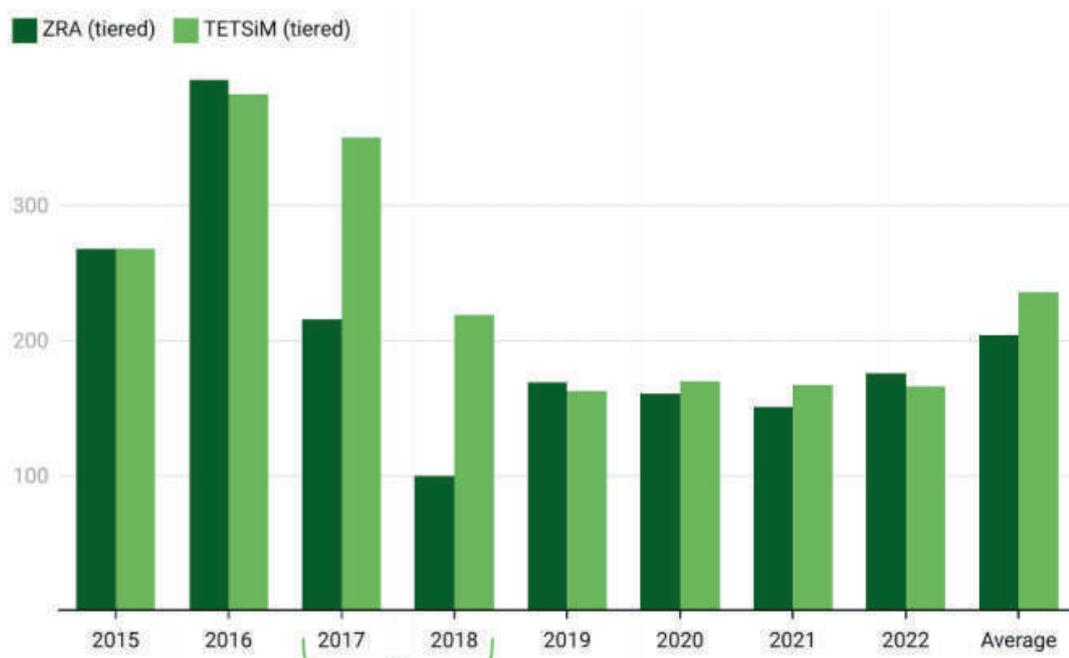


Chart: TETSIM results are based on own calculations. The ZRA data is derived from cigarette excise tax revenue data from the ZRA. • Created with Datawrapper

To estimate total legal cigarette consumption, we used the quotient of the cigarette excise tax revenue from the ZRA, and the cigarette excise tax per stick, derived from the excise tax per mille. We found that for 2017 and 2018, consumption was inexplicably lower than in other years. This is the second reason for omitting 2017 and 2018 in our analysis (Figure A3).

Figure A3 Estimated legal cigarette consumption, 2015 to 2022

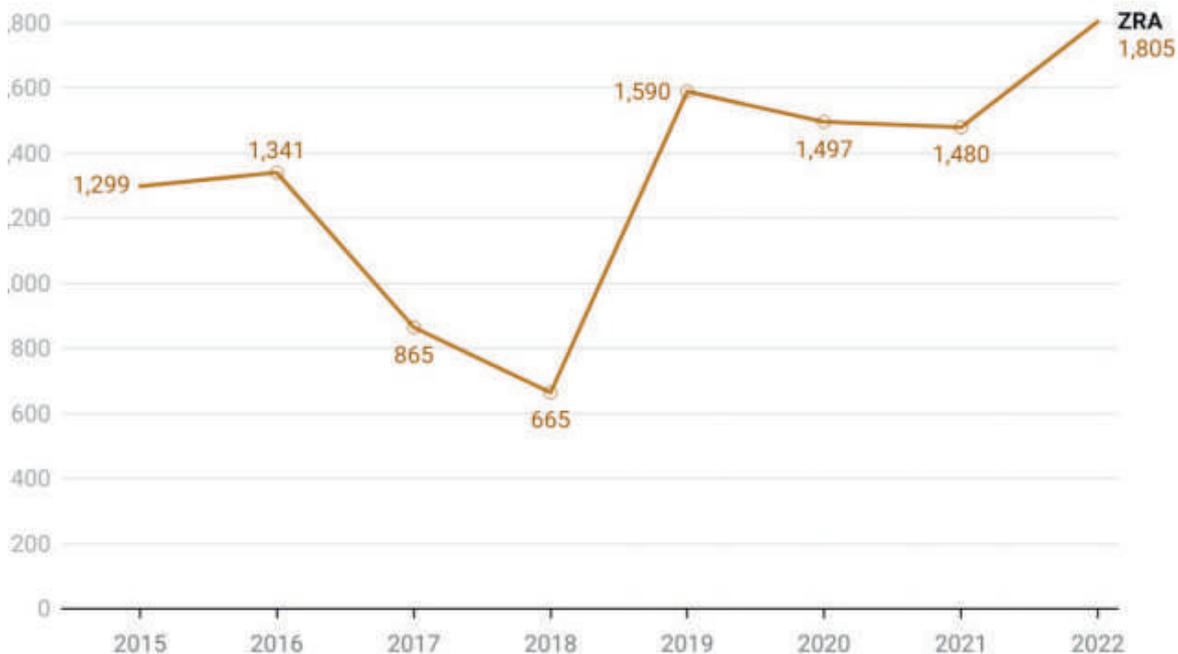


Chart: TETSIM results are based on own calculations. The ZRA data is derived from cigarette excise tax revenue data from the ZRA. • Created with Datawrapper

We compared the estimated cigarette consumption derived from the ZRA revenue data to that of the TETSIM results and Euromonitor data. We find that both the TETSIM and Euromonitor data have a consistent trend for cigarette consumption, see Figure A4. We therefore opted to omit 2017 and 2018 from our analysis.

Figure A4 Legal cigarette consumption in million sticks ZRA, tiered TETSIM, and Euromonitor

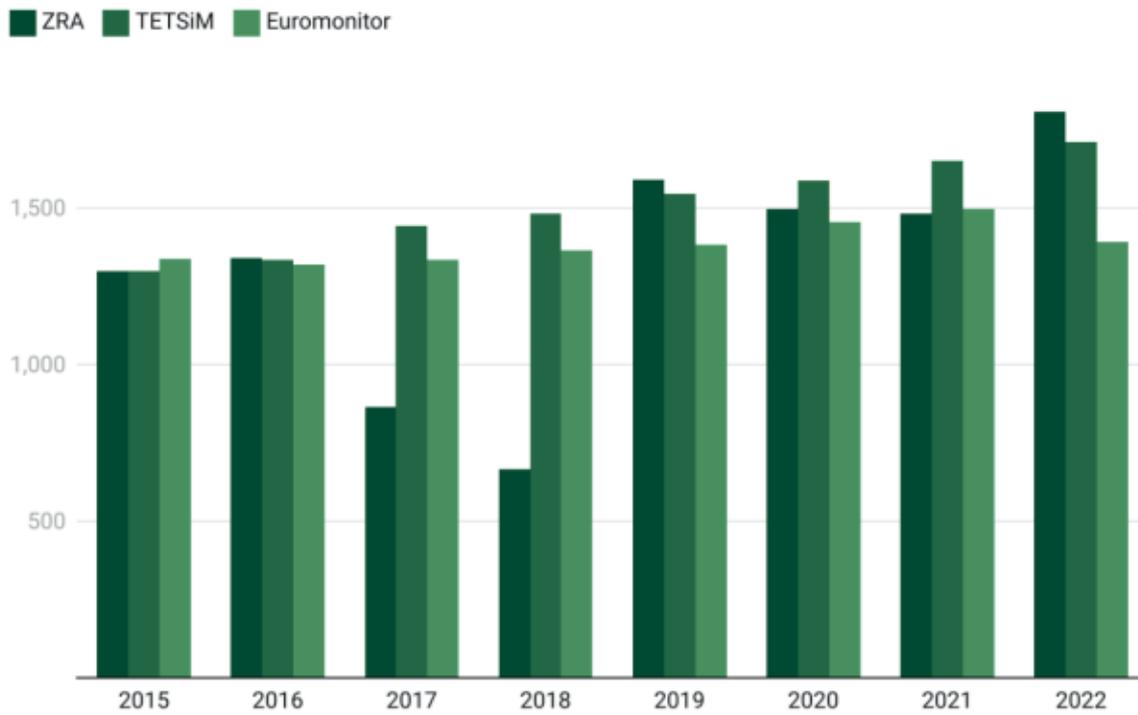


Chart: Estimates are derived from the cigarette excise tax per stick and the cigarette excise tax revenue from the ZRA, tiered tax TETSIM, and Euromonitor data. • Created with Datawrapper

*Derived from ZRA tax revenue data and cigarette excise taxes per pack

**Derived from tiered tax TETSIM



FCTC

WHO FRAMEWORK CONVENTION
ON TOBACCO CONTROL
SECRETARIAT-KNOWLEDGE HUB

X REEP

Research Unit on the Economics
of Excisable Products



**TAX JUSTICE
NETWORK
AFRICA**