

# A SIMULATION OF TOBACCO EXCISE TAXES IN ZAMBIA

**A focus on**  
**Cigarette Excise  
Tax Revenue  
Loss**



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# ABBREVIATIONS

|               |                                                      |
|---------------|------------------------------------------------------|
| <b>BAT</b>    | British American Tobacco                             |
| <b>CIF</b>    | Cost, Insurance and Freight                          |
| <b>COMESA</b> | Common Market for Eastern and Southern Africa        |
| <b>CPI</b>    | Consumer Price Index                                 |
| <b>FCTC</b>   | Framework Convention on Tobacco Control              |
| <b>FTA</b>    | Free Trade Agreement                                 |
| <b>GDP</b>    | Gross domestic product                               |
| <b>IMF</b>    | International Monetary Fund                          |
| <b>MFEZ</b>   | Multi-Facility Economic Zones                        |
| <b>NOT</b>    | Net-of-tax                                           |
| <b>REEP</b>   | Research Unit on the Economics of Excisable Products |
| <b>RITCO</b>  | Roland Imperial Tobacco Company                      |
| <b>SADC</b>   | Southern African Development Community               |
| <b>SSA</b>    | Sub-Saharan Africa                                   |
| <b>TETSIM</b> | Tobacco Excise Tax Simulation Model                  |
| <b>USD</b>    | United States Dollar                                 |
| <b>WHO</b>    | World Health Organization                            |
| <b>ZDA</b>    | Zambian Development Agency                           |
| <b>ZMW</b>    | Zambian Kwacha                                       |
| <b>ZRA</b>    | Zambia Revenue Authority                             |

# Executive summary

This report presents the results of the Tobacco Excise Tax Simulation Model (TETSIM) applied to Zambia. The TETSIM simulates how changes in cigarette excise taxes impact cigarette consumption, smoking prevalence, excise tax revenue, and cigarette prices, among other variables. 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 additionally 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, the following recommendations are made:

01

Zambia should abolish the investment incentive for all tobacco products.

02

Zambia should implement a simple tax structure that is easy to administer and revise, collapsing the tax tiers of the specific tax.

03

The specific excise should be revised annually in line with inflation and income growth.

## 1. Introduction

Rapid population growth and increasing consumer purchasing power across Africa are creating larger, more accessible markets, including those targeted by the tobacco industry. In many African markets, particularly in sub-Saharan Africa (SSA), regulation is limited, cigarette prices are low, and tobacco laws are weak or inconsistently enforced.<sup>1</sup>

Although tobacco use prevalence in Africa is the lowest among all World Health Organization (WHO) regions, the absolute number of smokers is rising, driven by rapid population growth.<sup>1</sup> The increase in tobacco use is most pronounced among the youth, especially among girls.<sup>2</sup>

Zambia is among the top five tobacco leaf-growing countries in Africa.<sup>3</sup> The agricultural land devoted to tobacco cultivation in Zambia increased between 1996 and 2016 by nearly 2000%, and the export quantity increased by nearly 800% in the same period.<sup>4</sup> In 2022, Zambia produced 38,738 tons of tobacco leaf on 21,491 hectares of arable land.<sup>3</sup> 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 cultivating 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).<sup>5</sup> Cigarette butts and packets account for 620 tonnes of the country's toxic waste.<sup>6</sup>

An ad valorem tax is levied as a proportion of the value of a product. A uniform specific tax applies the same specified amount per unit regardless of product characteristics. A tiered specific tax applies different amounts per unit based on defined product characteristics.

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



**Cost of tobacco**  
**ZMW 2.8 billion**  
(USD 299.3 million) annually

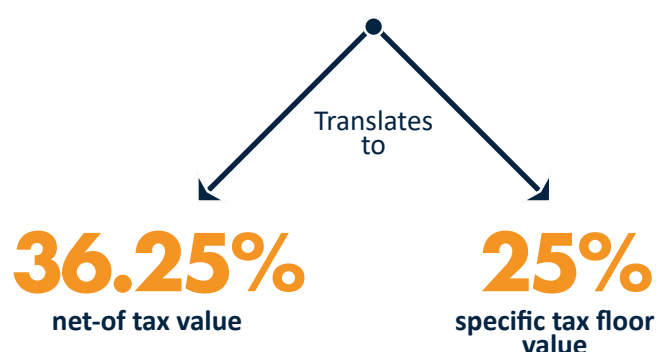
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# 75%

tax exemption on the excise tax rate



Since 2016, cigarettes in Zambia have been taxed at a different rate, depending on whether they are locally-manufactured or imported, i.e. constituting 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 a rate of 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,<sup>7</sup> 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, only one small domestic cigarette manufacturer operated in Zambia: RITCO, a wholly owned Zambian company.<sup>8</sup> 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).<sup>8</sup> RITCO invested more than USD 8 million in their cigarette plant in Lusaka.<sup>9</sup> The BAT plant cost USD 25 million.<sup>8</sup>

The WHO recommends that tobacco taxes should be adjusted in line with inflation and income growth, to ensure that these products remain increasingly less affordable over time.<sup>10</sup> Despite high, often double-digit, inflation and rapid income growth, tobacco taxes have rarely increased in Zambia.<sup>11</sup> The inflation-adjusted price of manufactured cigarettes has been falling since 2002.<sup>11</sup>

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 are susceptible to product undervaluation, which reduces the effective excise tax burden.<sup>10</sup> 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.<sup>12</sup>

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.<sup>13</sup> Article 5.3 states that

**“Parties should not grant incentives, privileges or benefits to the tobacco industry to establish or run their businesses”.<sup>14</sup>**

This incentive has caused more harm 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.<sup>15</sup>

Despite expectations that the investment incentive would create jobs and increase revenue, it has instead promoted tobacco use, contributed to declining excise tax revenue, and exacerbated tobacco-related harms.<sup>15</sup> The 170 new jobs<sup>9</sup> 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 quantifies the excise tax revenue foregone by the Zambian government as a result of the investment incentive implemented in 2016

In 2022, the ad valorem excise tax rate was

**145%**

of the CIF value for imported cigarettes



## 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.<sup>16</sup> The decline in economic growth resulted from government mismanagement and a decline in

government, and a drop in global copper demand.<sup>16</sup> The economy recovered in the 2000s, returning to low middle-income classification in 2010.<sup>16</sup>

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.<sup>17</sup> This climatic shock 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.<sup>18</sup> Inflation rates have been high, often reaching double digits, averaging 13.4% per annum between 2000 and 2025, see Table 2.1.<sup>18</sup>

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   | 8.40                | 12.40                 | 10.70              | 0.21              |
| 2008   | 7.80                | 12.85                 | 12.40              | 0.23              |
| 2009   | 9.20                | 13.32                 | 13.40              | 0.26              |
| 2010   | 10.30               | 13.79                 | 8.50               | 0.30              |
| 2011   | 5.60                | 14.27                 | 8.70               | 0.32              |
| 2012   | 7.60                | 14.75                 | 6.60               | 0.35              |
| 2013   | 5.10                | 15.24                 | 7.00               | 0.37              |
| 2014   | 4.70                | 15.74                 | 7.80               | 0.40              |
| 2015   | 2.90                | 16.25                 | 10.10              | 0.43              |
| 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              |
| 2024   | 2.30                | 21.14                 | 14.60              | 1.27              |
| 2025** | 6.60                | 21.71                 | 12.10              | 1.42              |

\*\* Calculated, \*Projected rates

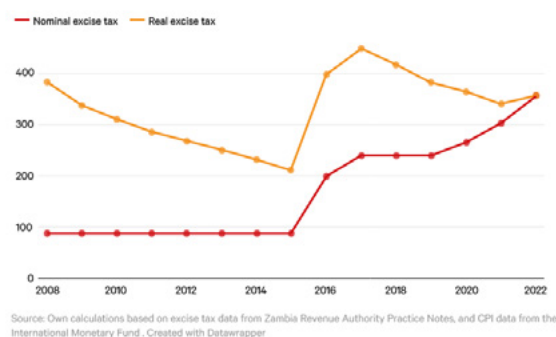
Source: International Monetary Fund, 2024<sup>18</sup>

## 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 declined 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 real value 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% in that year.<sup>18</sup> <sup>19</sup> 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 at 145% of the CIF value throughout this period and even prior to 2015.

Figure 2.1: Cigarette excise tax per 1000 sticks

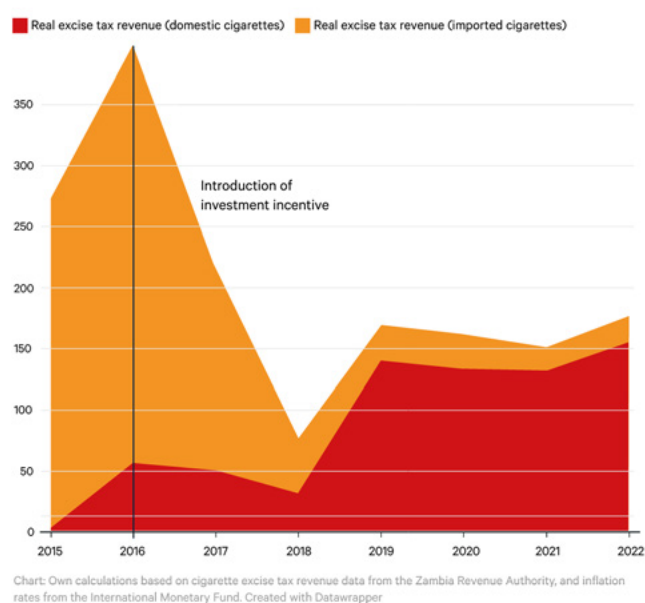


## 2.3 Cigarette excise tax revenue

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.<sup>19</sup> 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.<sup>20</sup> Figure 2.2 illustrates the locally-manufactured and imported cigarette real excise tax revenue collected between 2015 and 2022.

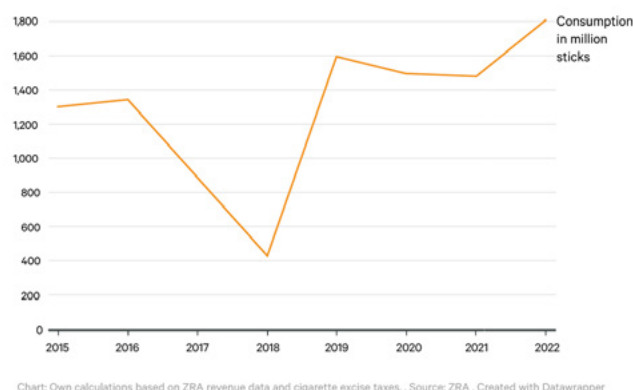
Figure 2.2: Real cigarette excise tax revenue in million ZMW, 2015–2022 (2022 prices)



## 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



### 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 customised to cater to unique country-specific scenarios. The TETSIM can be used for prospective and retrospective simulations. The model 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'. The 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

Input data on population growth, GDP per capita growth (a proxy for income), and inflation rates are drawn from the International Monetary Fund (IMF) (Table 2.1)

ZRA excise revenue data are used 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. The model uses 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, estimates provided by the ZRA employees and the ZRA revenue data, while for the illicit cigarette market size, 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.<sup>8</sup>

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).<sup>10</sup> 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.<sup>22</sup> Differentiated demand elasticities are applied across price segments because consumers' price and income responsiveness varies. Premium brand consumers tend to be more affluent and, therefore, less price-sensitive than economy brand consumers.<sup>23-25</sup>

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.<sup>10 26-29</sup> It is 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.<sup>30</sup> An income elasticity of –0.10 for illicit cigarettes as these are typically low-priced, and inferior.<sup>31</sup> 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.<sup>11 32 33</sup> 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    | .       |
| 2016                                             | 4.00     | 1.00    | 1.00      | 1.00    | .       |
| 2017 <sup>1</sup>                                | 4.80     | 1.20    | 1.20      | 1.20    | .       |
| 2018                                             | 4.80     | 1.20    | 1.20      | 1.20    | .       |
| 2019                                             | 4.80     | 1.20    | 1.20      | 1.20    | .       |
| 2020                                             | 5.30     | 1.33    | 1.33      | 1.33    | .       |
| 2021                                             | 6.04     | 1.51    | 1.51      | 1.51    | .       |
| 2022                                             | 7.10     | 1.78    | 1.78      | 1.78    | .       |

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

Source: Zambia Revenue Authority<sup>19</sup>

<sup>1</sup> A selected goods surtax, at 5% of CIF was introduced in 2017.

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          |

Source: Zambia Revenue Authority 19, \*\*Zyambo, et al. 21

<sup>1</sup> A selected goods surtax, at 5% of CIF was introduced in 2017.



## 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, the data indicate 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 staff.<sup>34</sup> As such 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, the specific tiered<sup>2</sup> excise tax floor value in these 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.<sup>34</sup> As such, our estimates are modest and should be interpreted as conservative lower-bound 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. This shift is incorporated into the tiered TETSIM where tiered excise taxes applied, given that such taxes, among other factors, 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, the 2015 market shares. This approach is adopted because there would have been no incentive to promote local cigarette manufacturing without the investment incentive that

led to the tiered specific cigarette taxes.

Demand elasticities are assumed to remain constant throughout the analysis period. It is further assumed 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, it is assumed that locally-manufactured cigarettes are levied the same excise taxes as imported cigarettes.



### 4.2 Cigarette prices

Inflation-adjusted 2015 cigarette prices by using are derived using 2022 prices as a the base year, and the cigarette real excise taxes per pack in 2015.<sup>19</sup> The retail price of imported cigarettes is decomposed 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 introduced in 2017, the value-added tax (VAT), and importer's profit. 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.

<sup>2</sup> According to a presentation by Mweemba D et al. at Virtual Workshop on Tobacco Taxation Modelling in August 2021, the current excise duty on cigarettes' is a specific tax.

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 vs. Real 2022 values | Nominal  | Real | Nominal | Real | Nominal | Real | Nominal  | Real | Nominal | Real |
| 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, reported cigarette sales, accounting for the illicit market size, and the market shares shown in Table 3.2 are used to estimate cigarette consumption by price segment. The growth in aggregate cigarette consumption in the 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. Price elasticities are used to measure the change in consumption attributable to changes in the price. Cross-price elasticities measure changes in consumption of one price segment resulting from changes in the price of another price segment. Income elasticities 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.  $\epsilon_{pb}$  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  $t$ .  $\epsilon_{ib}$  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.

$$\delta SimCons_{sbt} = \frac{p_{at} - p_{at-1}}{0.5(p_{at} + p_{at-1})} * \epsilon_{xb} * SimCons_{bt} \quad (2)$$

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  $b$ .  $p_{bt}$  and  $p_{bt-1}$  are the prices for the higher-price segment  $a$  in year  $t$  and year  $t-1$ , respectively.  $\epsilon_{xb}$  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.

$$TotalSimCons_{bt} = SimCons_{bt} + \delta SimCons_{sbt} \quad (3)$$

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.

$$TotalSimCons_t = \sum_b^5 SimCons_{bt} \quad (4)$$

### 5.1 Simulated excise tax revenue

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

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

Where *Simtaxrev<sub>t</sub>* is the simulated tax revenue for all price segments in year t. *tax<sub>t</sub>* is the excise tax amount per cigarette pack in year t. *TotalSimCons<sub>bt</sub>* is the total simulated cigarette consumption in year t, derived from equation 3.

### 5.2 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).<sup>10 22</sup> We use this evidence to estimate the smoking prevalence rates using the ZRA data and the TETSIM. Equation 6 summarises the computational procedure:

$$Cigcons_t = Cigcons_{t-1}(1 + \% \delta TotalSimCons_t * 50\%) \quad (6)$$

*Cigconst* is the number of cigarette consumers in year t. *Cigconst<sub>t-1</sub>* is the number of cigarette consumers in the previous period. *%δTotalSimConst* is the percentage change in the total simulated cigarette consumption between year t and year t-1.

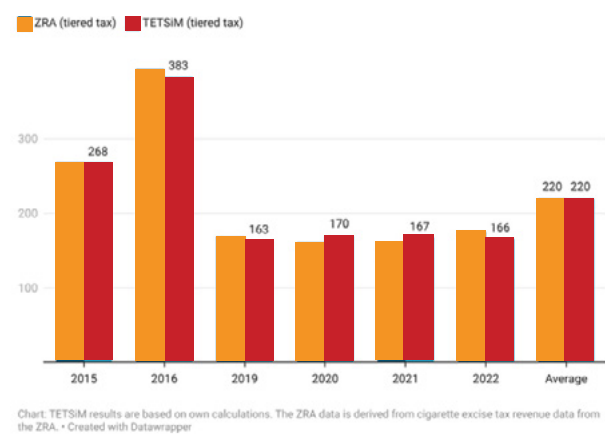
## 6. Results

Tiered TETSIM results for the current tiered specific excise taxes are first compared with ZRA data; no substantial differences are found. Uniform TETSIM results are then presented under a uniform specific excise tax scenario, wherein locally-manufactured cigarettes are levied the same specific excise tax as imported cigarettes. The results are presented below.

### 6.1 Excise tax revenue

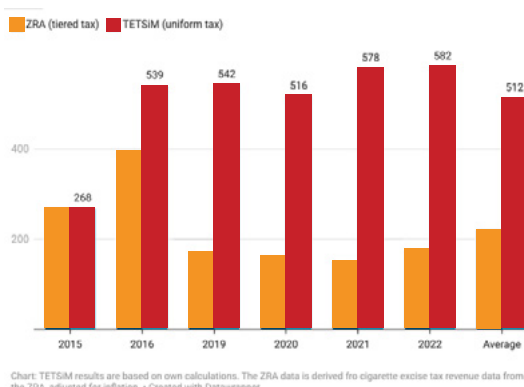
Tiered TETSIM results are compared with actual excise tax revenue collected by the ZRA. During the analysis period, the average real cigarette excise tax revenue was ZMW 220 million for both the ZRA data (actual collections), and the tiered TETSIM retrospective simulations (Figure 5.1).

Figure 5.1. Cigarette excise tax revenue: ZRA vs. TETSIM



On average, the tiered cigarette excise tax structure 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 in cigarette excise tax revenue but foregone ZMW 1.75 billion, in real 2022 values, over the analysis period.

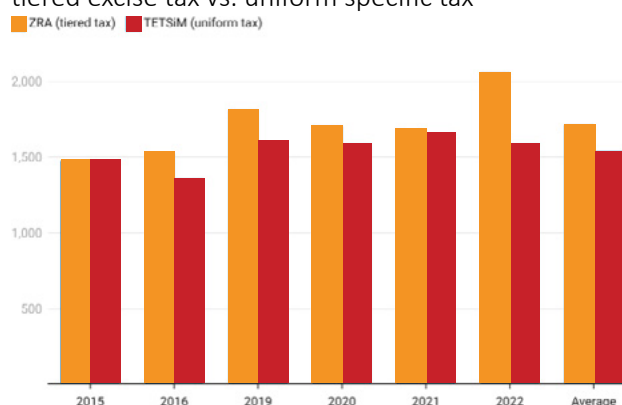
Figure 5.2. Real cigarette excise tax revenue: tiered vs. uniform specific



### 6.2 Cigarette consumption

Had Zambia retained a uniform specific excise tax for both domestically manufactured and imported cigarettes, cigarette consumption would have remained relatively stable. The results indicate that, under a uniform specific tax, average annual cigarette consumption would have been approximately 1,535 million<sup>3</sup>, even in the absence of the recommended annual revision of excise taxes in line with income growth and inflation. Using the ZRA data, average annual cigarette consumption under the tiered tax is estimated at 1,711 million stick<sup>4</sup>, under the tiered tax. Figure 5.3 illustrates the difference in total cigarette consumption (legal and illicit) under the current tiered tax versus a uniform specific tax over the analysis period..

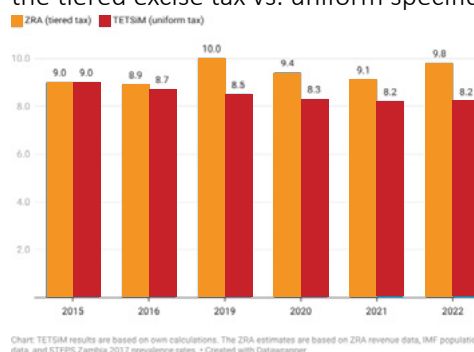
Figure 5.3. Total cigarette consumption under the tiered excise tax vs. uniform specific tax



### 6.3 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 5.3)

Figure 5.3. Cigarette smoking prevalence rate under the tiered excise tax vs. uniform specific tax



<sup>3</sup> Equivalent to 76.75 million cigarette packs.

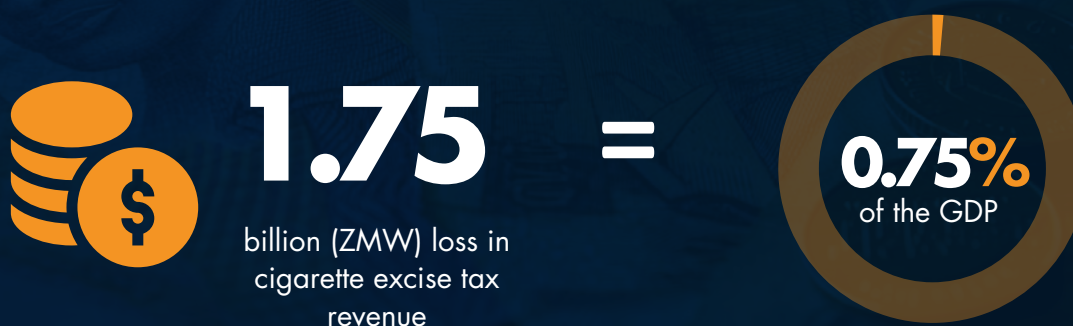
<sup>4</sup> Equivalent to 85.53 million packs.

## 7. Discussion and recommendations

The investment incentive that gave rise to tiered specific taxes for imported versus locally-manufactured cigarettes has caused more harm 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.<sup>5 8 36</sup> The costs of tobacco use outweigh the economic benefits, given that tobacco production contributes only 0.4% of GDP<sup>36</sup> On average, the government foregoes ZMW 292 million annually in cigarette excise tax revenue under the current tiered tax structure..The simulated annual foregone cigarette excise tax revenue is nearly double the annual direct health costs attributable 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.

The results demonstrate that even in the absence of the recommended annual tax revisions aligned with inflation and income growth, a uniform specific tax would have reduced smoking prevalence.

Zambia should follow best practice and collapse its specific tax tiers, adopting a uniform specific tax that is revised routinely in line with income growth and inflation.. This will ensure that cigarettes become progressively less affordable over time. A uniform specific tax would also discourage consumers from switching from higher-taxed cigarette brands to lower-taxed alternatives..



The investment incentive should be abolished for all tobacco products, as it violates Article 5.3 of the WHO FCTC, which Zambia ratified in 2008.



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# Appendix

## A1 Cigarette excise tax revenue

Years 2017 and 2018 are excluded from the primary analysis for two reasons. First, the trend in excise tax revenue in 2017 and 2018 deviates substantially from that observed in other years of the analysis period (Figure A1)..

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

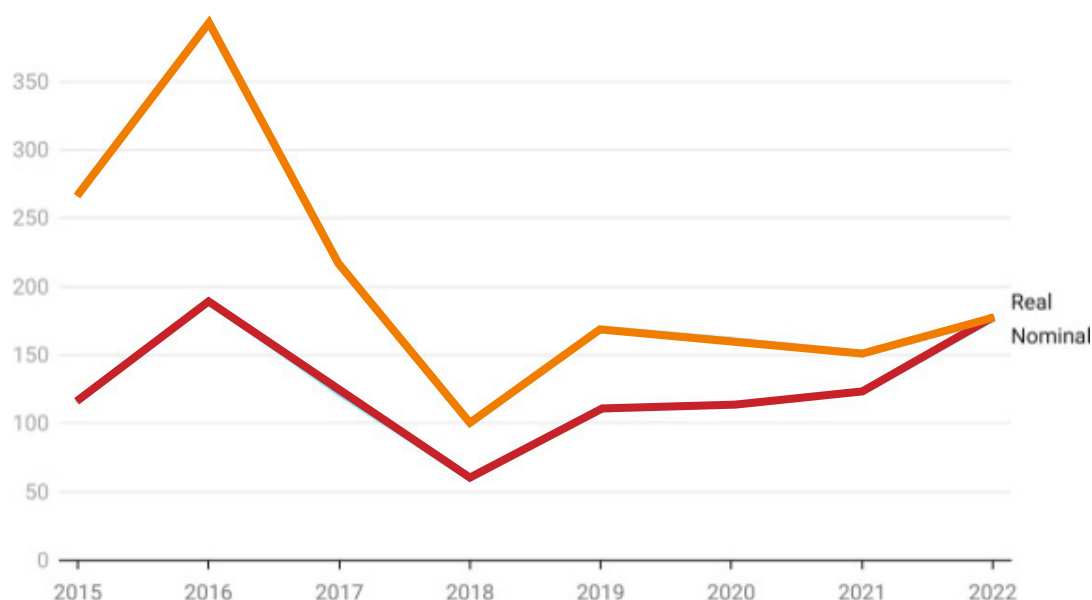


Chart: Cigarette excise tax revenue data from the ZRA, inflation data from the IMF, and own calculations of CPI. • Created with Datawrapper

A comparison of the cigarette excise tax revenue collected by the ZRA with that simulated by the TETSIM reveals considerable differences for 2017 and 2018 (Figure A2). According to ZRA [20], the substantial increase in excise tax revenue in 2019 is primarily attributable to a rise in local excise duty payments from a single taxpayer, whose payments increased from ZMW 9.5 million in 2018 to ZMW 77.8 million in 2019.20

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

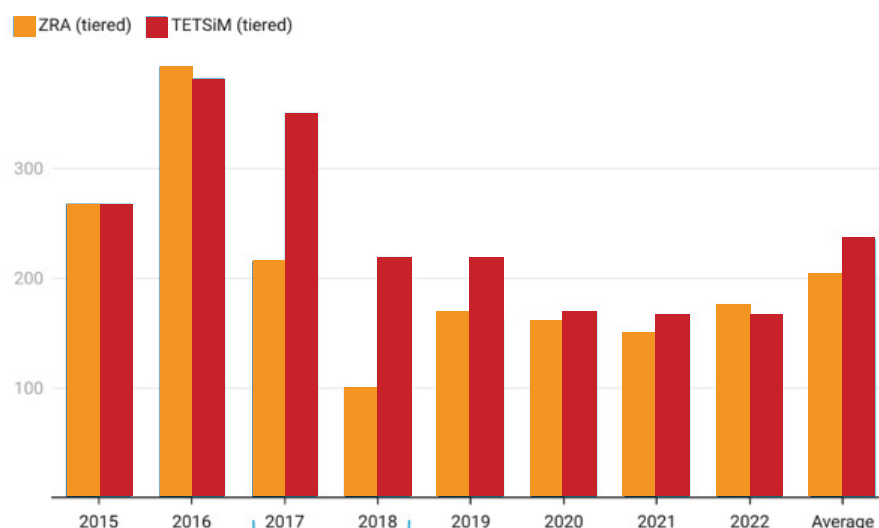


Chart: TETSIM results are based on own calculations. The ZRA data is derived from cigarette excise tax revenue data from the ZRA. • Created with Datawrapper

Total legal cigarette consumption is estimated as the quotient of ZRA cigarette excise tax revenue and the cigarette excise tax per stick, derived from the excise tax per mille.. For 2017 and 2018, consumption is found to be markedly lower than in all other years of the analysis period. This is the second reason for omitting 2017 and 2018 in the analysis (Figure A3).

Figure A3 Estimated legal cigarette consumption, 2015 to 2022

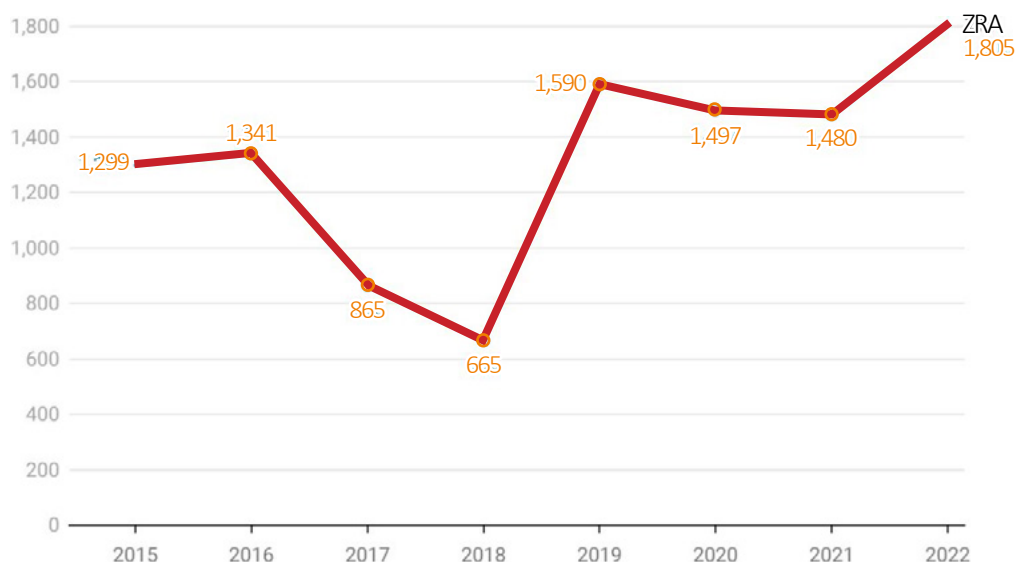


Chart: TETSIM results are based on own calculations. The ZRA data is derived from cigarette excise tax revenue data from the ZRA. • Created with Datawrapper

The estimated cigarette consumption derived from ZRA revenue data is compared with TETSIM results and Euromonitor data. Both the TETSIM and Euromonitor data display a consistent trend in cigarette consumption (Figure A4). Accordingly, 2017 and 2018 are omitted from the primary analysis.

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

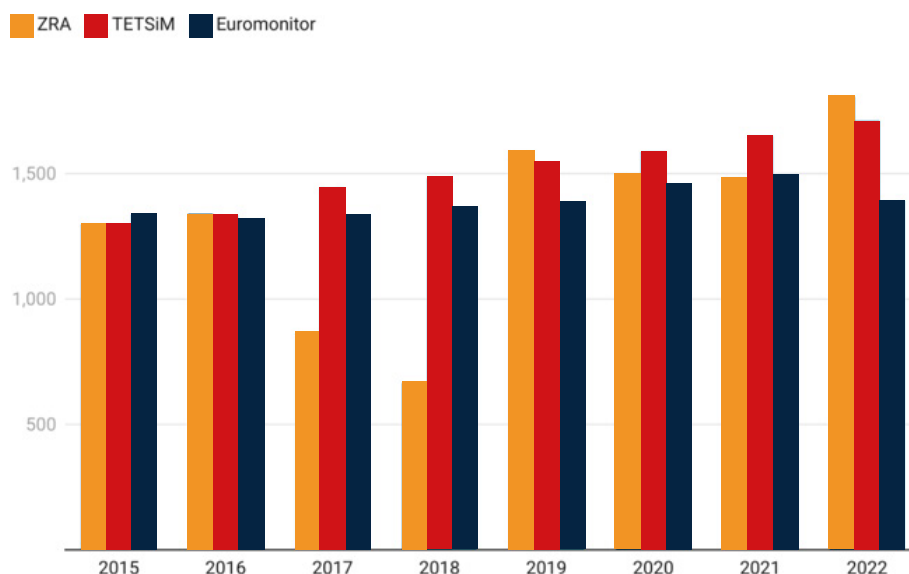


Chart: Estimates are derived from the cigarette excise tax per stick and the cigarette excise tax revenue from the ZRA, tiered tax TETSIM, and Euromonitor data. • Created with Datawrapper

Source: ZRA tax revenue data and cigarette excise taxes per pack

Source: tiered tax TETSIM







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