

A REVIEW OF EXCISE TAXES ON CIGARETTES IN MAURITIUS

October 12, 2018

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EXECUTIVE SUMMARY

This report presents the results of a simulation model that predicts how an increase in the specific excise tax on cigarettes in Mauritius would influence, amongst other things, the retail price, the total consumption of cigarettes and government revenues. The focus of the model is on improving health outcomes and raising additional government revenue in Mauritius.

Mauritius's past experience has shown that increasing the excise tax on tobacco has been particularly effective at raising government revenues and reducing tobacco consumption. Nevertheless, tobacco consumption is still high in the country, with a smoking prevalence of 38.5% among males and 4.1% among females in 2016. Affordability incorporates the impact of both price and income as determinants of demand. The successive excise tax increases since 2012 have made cigarettes in Mauritius progressively less affordable. Nevertheless, cigarettes in Mauritius are more affordable than in many other African countries.

The tobacco industry has responded to the excise tax increases by substantially increasing the net-of-tax price of cigarettes on premium and popular brands, while decreasing the net-of-tax price on economy brands. Currently, all cigarettes consumed in Mauritius are imported. The excise tax is levied as a specific excise tax of Rs 5 111 per 1000 cigarettes. In addition, a 15% VAT is levied on the VAT-exclusive cigarette retail price.

Given the industry's pricing strategy that it has followed in recent years, the relatively high levels of cigarette consumption in Mauritius, and our modelling exercise, we recommend the following:

1. That, given that the excise tax structure already follows international best practice (i.e. a uniform specific tax), the tax structure remains unchanged;
2. That, to increase government revenue and decrease cigarette consumption, the government of Mauritius substantially increases the excise tax on cigarettes,
3. That the government substantially increases the excise tax in the first year, followed by regular annual increases that will account for inflation and economic growth. Such strategy will achieve both public health and revenue objectives.

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1 Introduction

The use of tobacco is the single most preventable cause of premature death in our society, with seven million deaths globally attributable to smoking annually.¹ Other than its well-publicised relation to lung cancer and other types of cancers, several other diseases, such as respiratory diseases, chronic obstructive pulmonary disease (COPD), pneumonia, and heart diseases are causally associated with tobacco consumption.² An increasing proportion of these premature deaths are occurring in low- and middle-income countries (LMICs) as smoking prevalence is increasing in these countries, while it is decreasing in many high-income countries. About 80% of the world's one billion smokers live in LMICs.

In 2008, 40.3% of adult men and 3.7% of adult women in Mauritius smoked about 1 081 million cigarettes.³ This was one of the highest smoking prevalence rates in Africa. In response to the high smoking prevalence, Mauritius adopted a four-year National Action Plan on Tobacco Control (NAPTC) in 2008 to discourage the use of tobacco products, to encourage people to quit smoking, and to reduce second-hand smoke exposure.⁴ The objective was to revise existing tobacco control policies and enforce new regulations so as to reduce tobacco-related mortality and morbidity in the country. As part of this plan, the Mauritian government passed the Public Health (Restrictions on Tobacco Products) Regulations in 2008. These new regulations included restrictions on smoking in public places, curbs on illicit trade (with the introduction of an official excise stamp and notification of country of sale and country of origin on cigarette packages), and the banning of tobacco advertising, promotion and sponsorship. These regulations became effective in March 2009. Moreover, additional regulations that mandated pictorial warning labels and that banned the sale of single cigarettes came into effect in June 2009 by. In 2011, an intensive anti-tobacco mass media campaign (the Sponge campaign) was initiated by the Ministry of Health and Quality of Life on television, radio and billboards, and awareness discussions focused on the negative effects of tobacco use.

Increasing tobacco taxes and prices is well documented as the single most cost-effective tobacco control intervention and a critical component of a comprehensive tobacco control strategy.⁵ In

¹ World Health Organization. Tobacco fact sheet. 2017. <http://www.who.int/mediacentre/factsheets/fs339/en/>.

² U.S. Department of Health & Human Services. Office of the Surgeon General. The Health Consequences of Smoking: A Report of the Surgeon General. Available at: <http://www.surgeongeneral.gov/library/smokingconsequences/index.html>. Accessed August 2010.

³ Republic of Mauritius, Ministry of Health and Quality of Life. The Trends in Diabetes and Cardiovascular Disease Risk in Mauritius: The Mauritius Non Communicable Diseases Survey 2009. 2009. <http://www.gov.mu/portal/goc/moh/file/ncd/ncd-2009.pdf>.

⁴ Ministry of Health and Quality of Life. National Action Plan for Tobacco Control: 20082012. Mauritius: Ministry of Health and Quality of Life, 2007.

⁵ IARC. IARC Handbooks of Cancer Prevention: Tobacco Control. Volume 14. Effectiveness of price and tax policies for control of tobacco. Lyon, France: International Agency for Research on Cancer, 2011.

contrast to other interventions (such as an advertising ban, restrictions on indoor smoking and plain packaging), increasing the excise tax on tobacco is not a one-off event. Even if taxes have been increased in the past, there is nothing to prevent further increases. Excise tax increases promote smoking cessation, prevent initiation and reduce tobacco consumption while at the same time increasing the amount of revenue collected by the government.

The more stringent tobacco control measures were implemented within the context of the World Health Organisation's Framework Convention on Tobacco Control (WHO FCTC). The World Health Organisation adopted the FCTC on 21 May 2003 and it came into force on 27 February 2005. Mauritius signed the WHO FCTC in June 2003 and ratified it on 17 May 2004,⁶ being the 15th country in the world and the second in Africa to do so.⁷ The treaty came into force on 27 February 2005.⁸ Article 6 of the WHO FCTC requires Parties to use tax and price policies to reduce tobacco consumption. In practical terms, tobacco tax policy typically takes the form of an excise tax. An excise tax, in contrast to other indirect taxes like a general sales tax or value-added tax, targets a specific product. Excise taxes are often levied on tobacco products, alcohol, petroleum products and luxury goods, and increasingly on sugar-sweetened beverages as well.

With regards to the tobacco tax structure and its level, the government of Mauritius has made several changes over time. Before 2008, the excise tax structure consisted of a combination of ad valorem and specific excise taxes levied on all domestically produced cigarettes. Imported cigarettes were subject to customs duties and excise taxes. Imported cigarettes were subject to higher excise taxes than domestically produced cigarettes. Both domestically produced and imported cigarettes were subject to VAT. In 2008, domestic tobacco manufacturing was discontinued and only imported cigarettes were sold in Mauritius. Consequently, in July 2008 the tax structure was simplified to a specific excise tax, plus VAT of 15% on the sum of excise tax and the base cost of cigarettes. Even though all cigarettes were imported, no customs duties were levied because the taxes on cigarettes were rationalised into a single excise tax. This tobacco tax structure has remained in force since 2008, but the level of the tax has been increased regularly over time.

A number of studies have shown that this combination of policy measures significantly reduced the prevalence of smoking in Mauritius. Azagba et al. (2015) found that between 2009 and 2011 the

⁶ Azagba et al., Effect of cigarette tax increase in combination with mass media campaign on smoking behaviour in Mauritius: findings from the ITC survey, Tobacco Control, 2015, 1-5.

⁷ <http://www.fctc.org/about-fca/tobacco-control-treaty/latest-ratifications/parties-ratifications-accessions/ratifications-accessions-chronological-order>.

⁸ Azagba et al., Effect of cigarette tax increase in combination with mass media campaign on smoking behaviour in Mauritius: findings from the ITC survey, Tobacco Control, 2015, 1-5.

cigarette tax increase, in combination with a national anti-tobacco mass media campaign (the so-called Sponge campaign) reduced the odds of being a smoker by about 12% between 2009 and 2011. Similarly, using data from the Household Budget Surveys (HBS), Ross et al. (2017) found that excise taxes and retail cigarette price increases between 2006 and 2012, along with numerous non-price tobacco control measures, were associated with a substantial decrease (from 35.7% to 29.3%) in the percentage of households that indicated that they consumed tobacco. Over that period, government revenues from tobacco taxation increased despite the reduced consumption.

As will be shown in this report, Mauritius's past experience of increasing the excise tax on tobacco has proven to be particularly effective at raising government revenues, while at the same time reducing tobacco consumption. Nevertheless, tobacco consumption is still high in the country. According to the 2016 Mauritius Non-Communicable Diseases Survey, adult smoking prevalence is still at 38.5% for men and 4.1% for women, nearly unchanged from 2008 (which was 40.3% for men and 3.7% for women).⁹ These results suggest that tax increases in the past few years might have been insufficient to reduce the affordability of cigarettes enough to reduce consumption substantially.

This report aims to evaluate to what extent a substantial increase in the specific excise tax in Mauritius would impact cigarette consumption. After providing an overview of the tobacco control landscape in Mauritius, we present the results of a simulation exercise, where we consider the likely impact of different tobacco tax increase scenarios on government revenues and cigarette consumption.

⁹ Republic of Mauritius, Ministry of Health and Quality of Life. The Trends in Diabetes and Cardiovascular Disease Risk in Mauritius: The Mauritius Non Communicable Diseases Survey 2016.

2 Cigarette excise tax in Mauritius

2.1 The economic context in Mauritius

Mauritius, with a population of about 1.3 million people, has performed quite well in terms of economic growth in the past decades. Since 1970, real Gross Domestic Product (GDP) averaged a 5% growth per year. Similarly, per capita GDP increased sevenfold between 1976 and 2008. This economic success, together with strong institutions, led to a substantial improvement in human development indicators.¹⁰ Mauritius benefited from a stable monetary policy for years, limiting inflation and was not subject to large exchange rate fluctuations. Table 1 below provides an overview of the adult population growth and economic indicators since 2009.

Table 1: Growth rate, Inflation rate and Exchange rate in Mauritius since 2009

Year	Adult population (thousands)	GDP growth rate (%)	Inflation rate	Rs / US\$ Exchange rate
2009	985	3.3	2.5	31.7
2010	988	4.4	2.9	30.8
2011	993	4.1	6.5	29.8
2012	990	3.5	3.9	30.7
2013	998	3.4	3.6	30.7
2014	1 007	3.7	3.2	30.1
2015	1 015	3.5	1.3	31.7
2016	1 011	3.5	0.9	35.8
2017	1 022	3.4	4.2	35.8
2018		3.5*	4.9*	33.5

* forecast rates

2.2 Historic overview of cigarette excise taxes in Mauritius

Traditionally, as in many countries, especially in Africa, the excise tax on cigarettes in Mauritius was levied as an ad valorem tax. Furthermore, different tax rates were imposed on imported and locally produced cigarettes.

¹⁰ Zafar, A., Mauritius: An Economic Success Story

In the early 2000s, the government of Mauritius implemented its first move towards greater reliance on specific taxes, when it shifted the basis of taxation from full ad valorem to a mixed structure (ad valorem and specific). The objective was to, over time, equalise the tax rates for imported and locally-produced cigarettes, in conformity with the National Treatment principle of the World Trade Organisation¹¹. In 2001 a specific tax of Rs 210 per thousand cigarettes was introduced on locally produced cigarettes, and the rate of the ad valorem excise tax was reduced from 225% to 210% of the ex-works value. On imported cigarettes a specific tax of Rs 360 per thousand cigarettes was introduced, while the ad valorem excise tax was reduced from 400% to 360% of the CIF value. To further reduce the tax differential between locally-produced and imported cigarettes, in June 2003 the specific tax on locally-produced cigarettes was increased from Rs 210 to Rs 780 per thousand cigarettes and the ad valorem component was decreased from 210% to 125%. On imported cigarettes the specific component was increased from Rs 360 to Rs 780 (the same as locally-produced cigarettes) per thousand, while the ad valorem component was decreased from 360% to 215%. The tax changes resulted in a substantial narrowing in the excise tax difference between imported and locally-produced cigarettes.

In June 2004, the tax differential between imported and locally-produced cigarettes was reduced further when the Ministry announced a small increase in the ad valorem tax component on locally-produced cigarettes (from 125% to 130%) and a modest decrease in the ad valorem tax component of imported cigarettes (from 215% to 205%), while increasing the specific component for both categories of cigarettes from Rs 780 to Rs 835 per thousand cigarettes.¹²

In the budget speech of 2005-2006, the Deputy Prime Minister proposed a change to a fully specific tax on cigarettes. Cigarettes would be classified by the Tobacco Board in four categories, and each category would carry a different duty rate¹³.

After 2008, when local production of cigarettes ceased in Mauritius, the different taxation categories of locally-produced and imported cigarettes became moot. Since 1 July 2008, Mauritius has had a uniform specific tax system. All cigarettes, irrespective of price or any other characteristic, are subject to the same excise tax. A simple excise tax system is generally regarded as “best practice” (WHO Technical Manual, 2011 and FCTC Article 6 Guidelines, 2016), and a uniform specific tax system falls

¹¹ Budget Speech 2003-2004 by Hon. Paul R. Bérenger, G.C.S.K., Deputy Prime Minister and Minister of Finance, 9 June 2003.

¹² Budget Speech 2004-2005 by Hon. Pravind Jugnauth, Deputy Prime Minister, Minister of Finance and Economic Development, 11 June 2004.

¹³ Budget Speech 2005-2006 by Hon. Pravind Jugnauth Deputy Prime Minister, Minister of Finance and Economic Development 4 April 2005.

into this category. The crucial aspect, highlighted in tax manuals (WHO Technical Manual, 2011 and FCTC Article 6 Guidelines, 2016), is that the excise tax should be adjusted regularly, to account for inflation and economic growth (i.e. the fact that people's incomes are increasing over time) so that cigarettes should not become more affordable.

In subsequent sections we will focus on the period after 2008, as the tax system that applied before July 2008 is not really relevant in the current circumstances, and detailed data before 2008 are patchy and unreliable.

2.3 Cigarette excise tax changes since 2008

Following the ratification of the WHO FCTC in 2004, Mauritius's tax policy on tobacco products experienced major changes. Table 2 below summarizes the changes in the cigarette excise tax structure in Mauritius since 2008.

Table 2: Cigarette excise tax structure in Mauritius since 2008

Period	Specific excise duty (RS per 1000 sticks) (Nominal)	Percentage increase in nominal terms	Specific excise duty (RS per 1000 sticks) (Real price base 2017)
1 July 2008 - 19 Nov. 2010	2 200		2 773
23 Nov. 2010 - 4 Nov. 2011	2 750	25%	3 254
5 Nov. 2011 - 9 Nov. 2012	3 160	15%	3 601
10 Nov. 2012 – 12 Nov. 2013	3 540	12%	3 895
13 Nov. 2013 – 2014	3 717	5%	3 963
2015 – June 2016	3 717	0%	3 912
1 July 2016 – June 2017	4 646	25%	4 843
1 July 2017 - present	5 111	10%	5 111

Since July 2008 Mauritius has imposed a *uniform specific* tax on tobacco. A *specific* tax is based on the quantity of cigarettes, not the value. A specific excise tax is much easier to administer, because it is easier to count cigarettes than to determine their value. The tax is *uniform*, meaning that, irrespective of the characteristics of the cigarette (e.g. the length, the type of packaging, the perceived quality, and the price), the amount of tax levied per cigarette is the same. However, one of the drawbacks of a uniform specific excise tax is that, if it is not adjusted regularly, its real value is eroded by inflation over time.

Following the implementation of the uniform specific excise tax in July 2008, the tax amount was adjusted several times. As shown in Table 2, a duty rate of Rs 2 200 per thousand cigarettes sticks was initially imposed, as of July 2008. This uniform specific tax replaced a four-tiered specific tax system, where imported cigarettes were taxed at either Rs 2 370 or Rs 1 770 per thousand cigarettes, and domestically-produced cigarettes were tax at either Rs 2 130 or Rs 2 010 per thousand cigarettes, depending on brand and price. This simplification in 2008 resulted in less total tax since before 2008 cigarettes were also subject to customs duties, which now fell away. Subsequently, in November 2010, November 2011 and November 2012, the excise duty increased by 25%, 15% and 12% respectively. In November 2013, the rate of excise duty on cigarettes was raised again by 5%. After almost 2 years without being adjusted, the excise tax was increased by 25% in July 2016. A further 10% increase on cigarette excise duty became effective from 1 July 2017. At the time of writing this report (September 2018), the excise tax is still the same and levied at Rs 5 111 per 1000 cigarettes.

2.4 Cigarette taxes per pack and government revenues

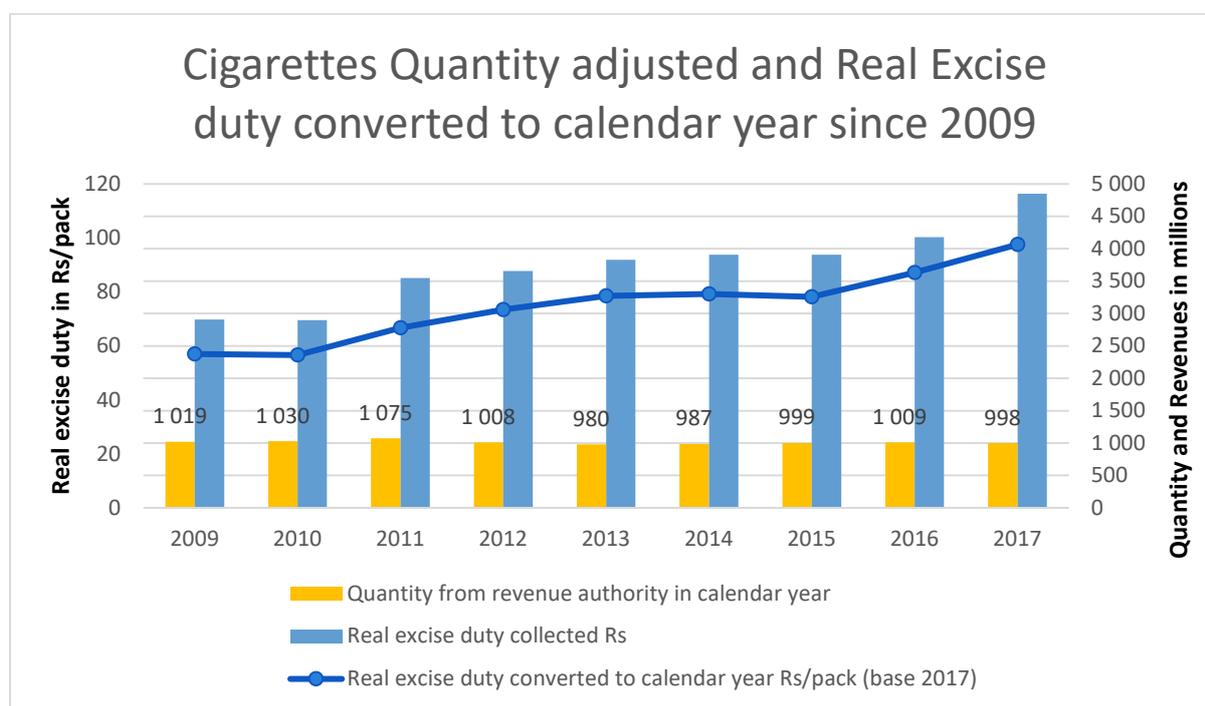
With a uniform specific tax, we can easily convert the excise duty per unit. For convenience, the table below provides the cigarette taxes per pack (i.e. 20 cigarettes) since 2008. The amount per pack is the same for any brand or type of cigarettes as a specific tax is based on the quantity, irrespective of the characteristics of the cigarettes.

Table 3: cigarette excise tax per pack since 2008

Period	Specific excise duty (Rs per 1000 sticks) (Nominal)	Excise duty Rs/pack (20 cigarettes) (Nominal)	Excise duty Rs/pack (20 cigarettes) (real price base 2017)
1 July 2008 - 19 Nov. 2010	2 200	44	55.5
23 Nov. 2010 - 4 Nov. 2011	2 750	55	65.1
5 Nov. 2011 - 9 Nov. 2012	3 160	63.2	72.0
10 Nov. 2012 – 12 Nov. 2013	3 540	70.8	77.9
13 Nov. 2013 – 2014	3 717	74.3	79.3
2015 – June 2016	3 717	74.3	78.2
1 July 2016 – June 2017	4 646	92.9	96.9
1 July 2017 - present	5 111	102.2	102.2

Despite the successive increments to the cigarette excise tax over the past 10 years, the impact on the quantity of cigarettes sold was limited. Over the period 2009 – 2017, the quantity sold decreased by only 2%, while the tax increased by almost 80% (in real terms). This signals that the tax increases were not large enough to counter the raising income. The combination of rapid increases in the excise tax per pack and the modest decrease in cigarette consumption means that government revenues from cigarette taxes have witnessed a steady increase since 2009. Revenues increased by 67% (in real terms) between 2009 and 2017.

Figure 1: Cigarettes Excise duty per pack (in Rs) and quantity sold (in millions) over the last 10 years



Note: Real excise duty per pack should be read off from the primary axis. Cigarettes quantity and Excise duty revenues should be read off from the secondary axis.

The government generated nearly Rs 10 billion (in real terms, 2017 prices) in extra revenues over the total period from cigarettes tax increases over the past 9 years. However, the effect of the increase in the excise tax (and thus the price) on cigarette consumption has not been as great as one would have expected. In the next section, we investigate trends in cigarette retail prices and cigarette affordability over the period.

3 Cigarette prices, consumption and illicit trade in Mauritius

Increasing the excise tax on tobacco products is considered to be one of the most effective components of a comprehensive tobacco control strategy. Article 6 of the FCTC obliges Parties to adopt pricing and taxation measures that reduce tobacco consumption, and to restrict “duty-free” sales of cigarettes to international travellers.

Extensive empirical research confirms that higher excise taxes reduce tobacco use and discourage non-smokers from initiating smoking (IARC, 2011, NCI Monograph 2017). However, the effectiveness of the tobacco tax increase depends on how it reduces cigarettes’ affordability and on the tobacco industry’s pricing strategies. For instance, the tobacco industry may choose to absorb a part (or even the full amount) of the tax increase. In doing so, they limit the tax increase to be passed onto consumers in the form of higher prices. Conversely, they might opt to increase the retail price by more than the amount of the tax increase, thus amplifying the effect of the tax increase. In Mauritius, British American Tobacco (BAT) has a virtual monopoly with almost 99% of total sales. This gives them very significant market power, which allows them to charge monopolistic prices. Moreover, the tobacco industry may take into account the addictive nature of cigarettes when defining its pricing strategy. The industry may raise prices by more than the tax to obtain higher profits in the short term, knowing that many smokers will not be able to quit or to decrease their consumption. Alternatively, they may opt for reduced profits in the short term (by absorbing the tax burden) to encourage smokers to keep smoking, which ensures them additional profits in the long term.

3.1 Nominal cigarette prices

In Mauritius, every increase in cigarette excise tax has been followed by an increase in the price of cigarettes. All the excise tax increases described in the previous section resulted in an increase in the retail price of cigarettes. About fifteen different cigarette brands are sold in Mauritius. These brands are categorized as (1) premium brands (e.g. Camel, Dunhill, Marlboro), (2) the popular brand (Matinee) and (3) economy brands (e.g. Matelot, Rothmans). Table 4 provides further details on the evolution of the cigarette prices in local currency since 2012. Where prices were increased during a particular year, we calculated a weighted average price for the calendar year.

Table 4: Average nominal cigarette prices in local currency from 2012 to 2017

	Retail prices converted to calendar year		
	Premium	Popular	Economy
2012	131.7	119.2	106.7
2013	142.5	140.8	116.7
2014	155	145	125
2015	165	145	130
2016	182.5	157	132.5
2017	212.5	177.5	140

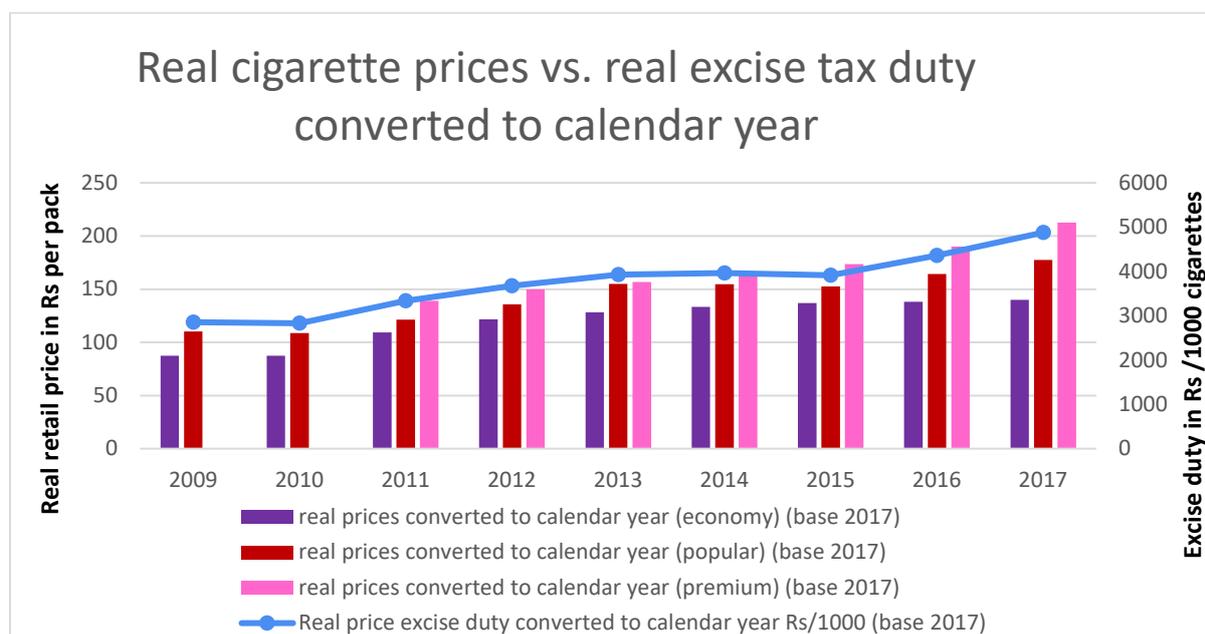
Between 2012 and 2017, the average price per pack increased by an average annual increase of 10.9% from Rs 131.7 to Rs 212.5 for the premium brands. For the most popular brand, the average price increased by 8.3% per year from Rs 119.2 to Rs 177.5, and for economy brands by 5.6% per year from Rs 106.7 to Rs 140. These data have been compiled from different data sources, including media releases, WHO-FCTC reports and price data that have been collected for the Economics of Tobacco Control Project at the University of Cape Town.

Nominal prices (also called current prices) are the prices of cigarettes at the time they were sold, without accounting for inflation. To get a more accurate picture of cigarette price increase over time, we use *real* prices. Real prices are adjusted for the general price level and therefore reflect price changes after the effect of inflation has been removed.

3.2 Real cigarette prices and cigarette consumption

In Figure 2 the annual average real retail price per cigarette pack, subdivided by price category (the bar chart), is shown on the primary vertical axis. The real excise duty per 1000 cigarettes (the blue line) is shown on the secondary vertical axis.

We can see that the real price of cigarettes broadly follows the real excise tax increase. Between 2009 and 2017, the real excise duty increased by about 79% (average of 7.6% per year). Meanwhile, the real price of popular cigarettes increased at a compounded growth rate of about 6.1% per year (61% in total). Compared to countries that have used aggressive tax increases to increase the retail price and thus reduce tobacco consumption (such as Australia, the UK and France), the 6.1% increase in the real retail price of cigarettes in Mauritius in this period was modest. However, compared to many LMICs (and especially countries in Africa), the price increases in Mauritius are well above average.

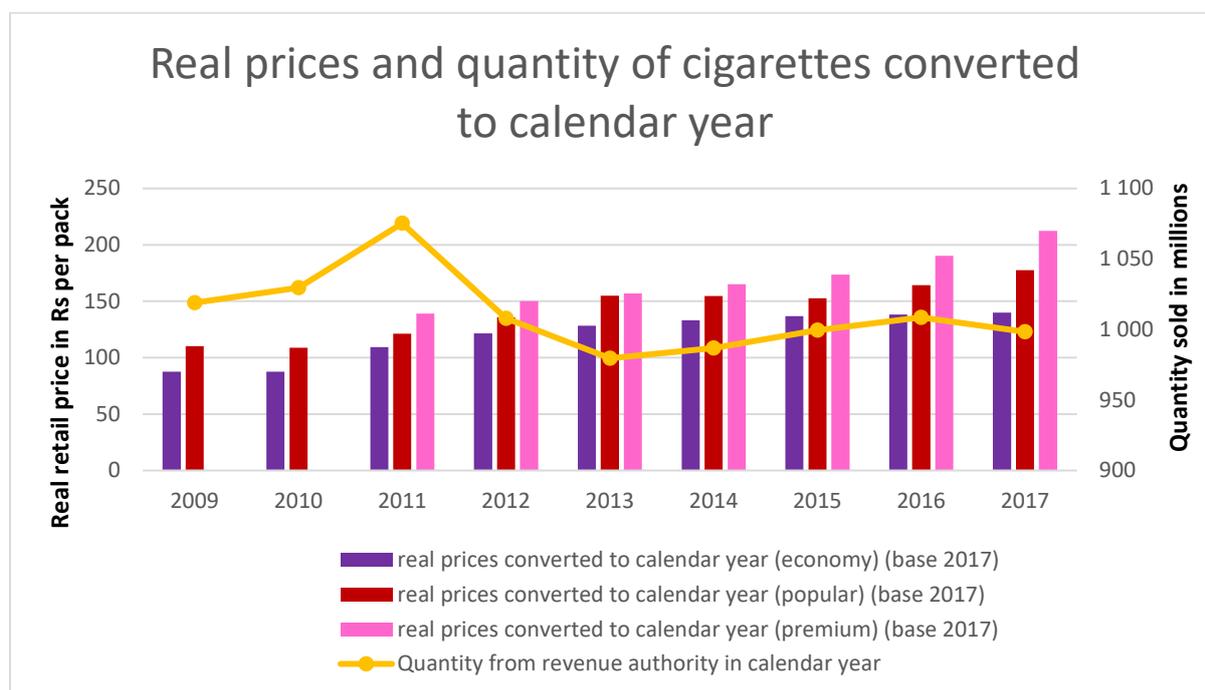
Figure 2: Retail price of a pack of cigarettes – per brand and Excise duty since 2009 (Real 2017 base)

Note: Real prices per pack should be read off from the primary axis. Excise duty should be read off from the secondary axis.

Furthermore, in the recent years the increase in retail prices has been much more limited. Indeed, between 2012 and 2017 the price of popular cigarettes increased by 30.7% (average 5.5% per year) in real terms i.e. after correcting for inflation. This is much less than the increase as it appears in current prices. In the previous sub-section, we found an average of 8.3% increase per year in nominal prices over that period. This limited increase in the real price reduces the potential impact on consumption.

In Figure 3, real prices are superposed on the aggregate annual cigarette consumption (the yellow line read off from the secondary vertical axis). Between 2011 and 2013 aggregate cigarette consumption decreased by an average of 4.5% per year, most likely responding to a substantial increase in the real price of cigarettes. Please note that the consumption axis (the secondary Y-axis) does not start in the origin. This trend changed after 2013 when consumption of cigarettes began to increase while real cigarette prices stabilized. In 2017 consumption again dropped slightly (by 1%), following two successive increases in real price of cigarettes in 2016 and 2017.

Figure 3: Real (2017 base) retail price of a pack of cigarettes (per price category) and cigarettes quantity sold since 2009

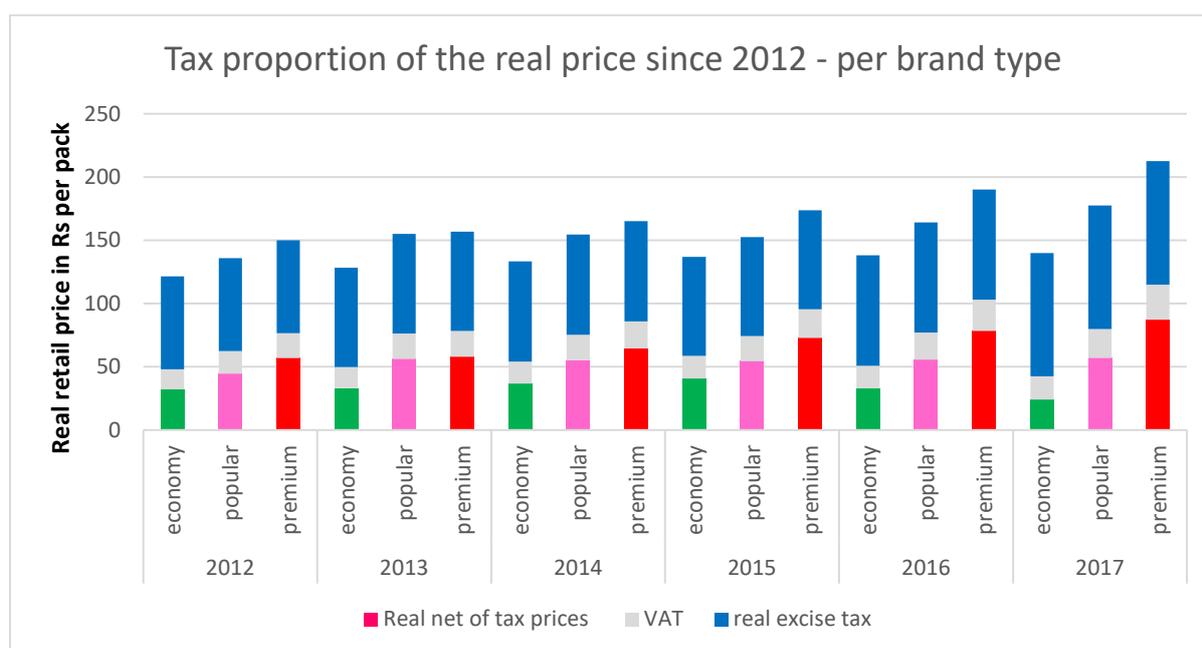


**Note: (1) Premium brands were not on the market in 2009 and 2010, (2) Real prices per pack should be read off from the primary axis, and (3) Cigarettes quantity should be read off from the secondary axis.*

Between 2010 and 2012 the real retail price of economy brand cigarettes increased by 39%, which coincided with a 2.1% decrease in the total number of cigarettes consumed. It seems plausible, and Figure 3 suggests this, that the quantity of cigarettes consumed in Mauritius is determined more by the price of economy brand cigarettes than by any of the other price categories. After 2012, the price of economy brand cigarettes did not increase much. In fact, between 2012 and 2017 economy brand cigarettes increased by only 15.2% in real terms, compared to an increase of 30.7% in the real price of popular brands and an increase of 41.6% in the real price of premium brand cigarettes.

Given that the excise tax is uniform across brands, it might be useful to further investigate the retail price decomposition over that period to explain these differences across price categories.

The retail price of cigarettes can easily be decomposed into three parts, namely VAT, the excise tax and the net-of-tax price. The decomposition of the cigarette retail price over time is shown in Figure 4. In 2017 the excise tax burden (excise tax as a percentage of the retail price) was 46% for premium brands, 55% for the popular brand and 70% for the discount brands. In the same year, the *total* tax burden (i.e. excise plus VAT) was 59% for premium brands, almost 68% for the popular brand, and 83% for economy brands. Figure 4, below, shows how the composition of the retail price has developed over time.

Figure 4: Decomposition of the real retail price (base 2017) of cigarettes in Mauritius, 2012-2017

Note: the green (economy brands), pink (popular brands) and red (premium brands) refer to the net-of-tax price.

Figure 4 allows one to understand the tobacco industry's reaction to cigarette excise duty increases over the past years. Indeed, the effectiveness of the tobacco tax increase depends on the tobacco industry's pricing strategies and on the market structure. From the graphic above we can conclude that the industry had a differentiated price strategy for each segment (i.e. premium vs. popular, vs. economy). The net-of-tax price of economy cigarettes is much lower than that of popular (and especially premium) cigarettes and has not increased over the 2012-2017 period. In fact, it has decreased. For popular and premium cigarettes, the net-of-tax price is much larger and has increased substantially over the 2012-2017 period.

Table 5, below, summarises the changes in the retail price, excise tax and net-of-tax price between 2012 and 2017. Over this period, the excise tax increased by 32.8% (5.8% average per year) in real terms across all brand categories, as the tax is levied as a uniform tax. Over the same period, the real retail price increased by 41.6% (7.2% per year) for the premium brands, by 30.7% (5.5% per year) for the popular brand and by 15.2% (2.9% per year) for the economy brands. Had the tobacco industry simply passed through the excise tax, while increasing the nominal net-of-tax price in line with the inflation rate, the change in the *real* net-of-tax price increase would have been zero. As it turns out, the real net-of-tax price increased by 53% (8.9% per year) for the premium brands, by 27.3% (4.9% per year) for the popular brand and *decreased* by 25% (4.6% per year) for the economy brands. Given that BAT has a monopoly in Mauritius, they are in a position to set the prices.

Therefore, we can conclude that the industry over-shifted the tax on premium and popular brands. The industry margin (i.e. the net-of-tax price, expressed as a percentage of the retail price) increased from 38% to 41% for premium cigarettes between 2012 and 2017. Stated differently, even though the real excise tax amount increased by 32.8% between 2012 and 2017, the excise tax burden (i.e. the excise tax as a percentage of the retail price) decreased (from 48.96% to 45.92%). This can only happen if the tobacco industry has significant pricing power.

The tobacco industry also over-shifted the tax on the popular brand of cigarette, but not to the same extent as on premium brands. However, because the tobacco industry increased the real net-of-tax price (27.3%) by slightly less than the real excise tax (32.8%), the excise tax burden did not change much over this period (from 54.1% to 55.0%).

On the other hand, the excise tax was under-shifted on the economy brands. The excise tax increased by 32.8% (the same percentage as for premium and popular brands), but the real net-of-tax price decreased by 25% over the period. This means that the real retail price increased, but by much less than it would have increased if the tobacco industry had simply passed through the tax increase to the consumers. This implies that the industry absorbed the increase in the excise tax on economy cigarettes by reducing its margin. The excise tax burden on economy brands increased (from 60.4% to 69.7%) between 2012 and 2017.

Table 5: Summary statistics of the increases in tax and prices between 2012 and 2017

	Increase between 2012 and 2017		
	Premium	Popular	Economy
Real retail prices	41.6%	30.7%	15.2%
VAT (15%) per pack	41.6%	30.7%	15.2%
Real excise tax	32.8%	32.8%	32.8%
Real net of tax prices	53.0%	27.3%	-25.0%

Economy brands are usually consumed by low-income households, which also tend to be more price sensitive (Vijayaraghavan et al., 2013). This is true for Mauritius and was confirmed by previous studies. Ross et al. (2017) find that, following several tax increases between 2006 and 2012, the largest relative decline in the proportion of tobacco-consuming households was observed among low-income households. These findings suggest that low-income households are more price sensitive. Therefore, it is not surprising that the tobacco industry reduces the burden of the tax increase on the cheapest brands.

There are two conclusions to be drawn here. First, after correcting for inflation, i.e. using real prices, the successive tax increases are much more limited than they appear in current prices. Secondly, the tobacco industry adapted its pricing strategy to account for the spending patterns and ability to pay of different groups of smokers. They have over-shifted the tax on premium brands, usually consumed by less price-sensitive smokers. On the other hand, they have under-shifted the tax increase on economy brands to reduce the burden on smokers who are in the lowest income categories and who are usually the most price-sensitive (Ross and Tesche, 2016).

In this section, we used real prices to account for the inflation. However, real prices do not account for the general increase of incomes due to economic growth. Economic growth can also contribute to make cigarettes more affordable, which is another important aspect and is covered in the next section.

3.3 Affordability of cigarettes in Mauritius

Economic theory and many empirical studies have shown that the two most important determinants of the demand for tobacco products are the price of the product and average income levels (IARC, 2011). In the tobacco control literature, the focus is primarily on the relationship between the price and tobacco demand (i.e. the price elasticity of demand), because the policy lever to affect demand is the excise tax, which has a direct impact on the retail price. Comparatively little emphasis is placed on the relationship between income levels and the demand for tobacco, because, even though an increase in average income increases the demand for tobacco, very few, if any, economists would argue that a good tobacco control strategy would be to reduce average levels of income.

Nevertheless, changes in income should be considered in an effective tobacco control strategy. For example, if the real price of cigarettes is increasing at a rate of 6% per year, that would generally be regarded as good tobacco taxation policy. However, if the overall economy is growing at 8% per year and per capita real incomes are growing at 7% per year, then a 6% annual increase in the real price of cigarettes is not as striking. Despite becoming relatively more expensive, cigarettes are becoming more *affordable* because average incomes are increasing more than the increase in cigarette prices. For this reason, the WHO Technical Manual (2011) indicates that the excise tax should be adjusted regularly to account for inflation *and* growth in average incomes. To be effective, excise tax increases should make cigarettes less affordable in order to reduce consumption.

To estimate cigarette affordability, we calculate the relative income price (RIP), which is measured as the percentage of annual per capita gross domestic product (GDP) required to purchase 100 packs of 20 cigarettes. This measure was introduced in 2004 (Blecher and Van Walbeek, 2004) and has gained popularity subsequently (e.g. Eriksen et al. 2012). The greater the RIP, the less affordable cigarettes are. The smaller the RIP, the more affordable cigarettes are. A decrease in the RIP implies that cigarettes are becoming more affordable. Table 6 provides the RIP calculated for Mauritius from 2009 to 2017. The RIP is calculated for both popular-brand and economy-brand average cigarette prices.

Table 6: Calculating the relative income price of cigarettes in Mauritius from 2006 to 2017

Year	GDP per capita in current prices Rs (thousands)	Nominal retail prices converted to calendar year (Rs per pack - popular)	Relative income prices (RIP) – popular	Nominal retail prices converted to calendar year (Rs per pack economy)	Relative income prices (RIP) – economy
	(1)	(2)	(3)	(4)	(5)
2006*	-	75	4.3%		
2007*	-	75	3.8%		
2008*	-	80	3.6%		
2009	226	85	3.7%	68	3.0%
2010	239	86	3.6%	69	2.9%
2011	258	103	4.0%	93	3.6%
2012	274	119	4.3%	107	3.9%
2013	291	141	4.8%	117	4.0%
2014	307	145	4.7%	125	4.1%
2015	320	145	4.5%	130	4.1%
2016	339	158	4.6%	133	3.9%
2017	361	178	4.9%	140	3.9%

*Note: RIP data from 2006 to 2008 extracted from Ross and al. 2017

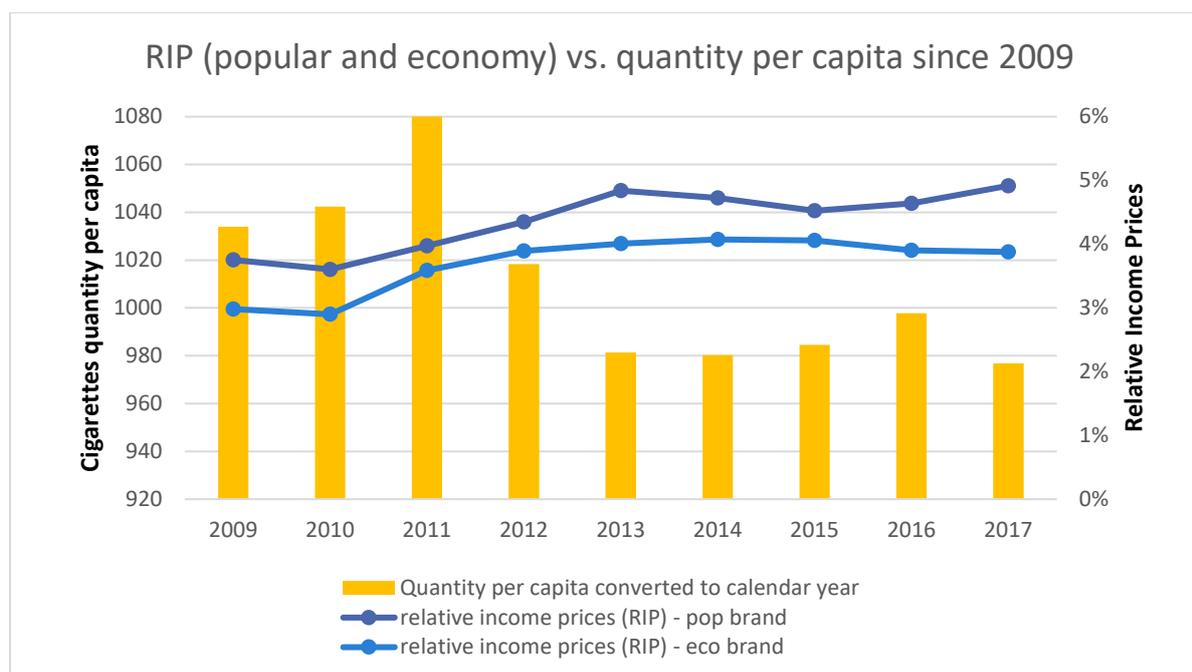
The per capita GDP in nominal terms is given in column 1 and the retail price of cigarettes (in current prices) is shown in column 2 and 4 for popular and economy brands respectively. The RIP is provided in column 3 and 5 and is calculated as the retail price of 100 packs of cigarettes, multiplied by 100, and divided by the per capita GDP for that year. The RIP is particularly useful to see whether cigarettes are becoming more or less affordable over time. In 2009, for example, it required 3.7% of per capita GDP to buy 100 packs of cigarettes Matinée.

Considering the trend over the past 10 years, we can see that the RIP for popular brand increased from 3.7% in 2009 to 4.9% in 2017. In 2006 the RIP for Matinée (popular brand) was 4.3% (Ross and al. 2017). This means that popular brand cigarettes in Mauritius became more affordable between 2006 and 2011, but less affordable since 2011. From a tobacco control and public health perspective that is

an encouraging result. However, these results should be moderated, given that, within the African context, cigarettes in Mauritius are still more affordable than in many other countries.¹⁴ Moreover, as shown in Table 6, the pattern for economy brand is slightly different. Between 2009 and 2014 economy brand cigarettes became less affordable. However, since 2015 they became considerably more affordable. This change seems to match closely with the limited increase in cigarettes taxation over the past 3 years (see Table 2).

In Figure 5 below, we observe a negative relationship between the RIP value and the quantity per capita. The correlation coefficients between the RIP and quantity are -0.84 (P =0.005) and -0.66 (P=0.05) for popular and economy brand respectively. In other words, when cigarettes become less affordable (indicated by an increase in the RIP), this is associated with a modest decrease in cigarette consumption. This relationship is consistent with previous findings, based on a cross-section of a large number of diverse countries (Blecher and Van Walbeek, 2004).

Figure 5: Per capita cigarette quantity and relative income prices (RIP) in Mauritius since 2009



Note: Quantity per capita should be read off from the primary axis. Relative income prices should be read off from the secondary axis.

These results suggest that an increase in the RIP value would reduce cigarette consumption.

¹⁴ Blecher E, van Walbeek C. An Analysis of Cigarette Affordability. Paris: International Union Against Tuberculosis and Lung Disease; 2008. available at https://www.global.tobaccofreekids.org/assets/global/pdfs/en/TAX_Cigarette_affordability_report_en.pdf.

3.4 Illicit trade

To the best of our knowledge, few market surveys have been done on the illicit market share in Mauritius. The ITC Mauritius National Report (2011) reveals that each 1% increase in the illicit market share in Mauritius would represent a revenue loss of Rs 26 million. Therefore, to curb the illicit trade of tobacco products in Mauritius, the 2008 Regulations included a provision that requires the country of origin to be noted on cigarette packs. Packs must also carry the statement 'sale allowed in Mauritius only' and the Excise (Amendment) Regulations 2008 of the Excise Act prescribes that an excise stamp be affixed.

ITC Mauritius Survey (Waves 1 to 3, 2009 – 2011) findings suggest that Mauritius's measures to limit illicit trade by requiring an official excise stamp and health warning label on packs are effective. While some evidence of illicit packs was reported, the prevalence of these packs was very low overall.

4 Increasing the specific excise tax on cigarettes

In this section, we present the results of a modelling exercise to demonstrate the likely impact of a change in the excise tax on cigarette consumption and government revenue. The goal is to increase the excise tax level in such a way that it will be effective in reducing tobacco consumption and smoking prevalence while, at the same time, generating additional government revenues.

4.1 The forecasting model

The current Mauritian excise tax structure is in line with the WHO's recommendation, and that of the FCTC Article 6 Guidelines, namely to impose a specific excise tax on cigarettes, rather than an ad valorem tax (WHO, 2010). The uniform specific excise tax implemented by Mauritius since 2008 is administratively easy to implement and offers a simplified and transparent structure. Therefore, the simulation exercise will not suggest changing or revising the structure. Instead, it will investigate alternative tax increase scenario.

The TetSim model is a tax simulation model designed by researchers at the Economics of Tobacco Control Project. The model is used to illustrate what could happen to the average retail price of cigarettes, cigarette consumption, and government excise revenue if the government were to increase the excise tax on cigarette products. The model consists of a base scenario (including excise and sales tax, retail price, and consumption). It models the proposed subsequent excise tax change and calculates the resultant change in the retail price, the tax burden, the level of consumption, excise revenue, and industry revenue. This forecasting model is programmed in Excel and is available upon request. An automated, but less flexible, version of the model is available at <http://untobaccocontrol.org/kh/taxation/access-online-tetsim-application-now-available-website/>. Please refer to Appendix A for more details on the model.

Modelling assumptions and parameters.

All the model assumptions are detailed in Appendix A. The model is flexible and can handle a variety of different scenarios. The user of the model can set the parameters. Some of the crucial parameters and assumptions made by the users are provided below:

- Given that Mauritius has a very simple tax system on cigarettes, we change only the excise tax. There are no import duties. VAT stays at 15%.
- We assume that an increase in the excise tax does not have an effect on illicit trade or substitute products.
- We assume that the tobacco industry increases the net-of-tax price by 10% on premium brands, and by 8% on popular brands in response and coincident with an increase in the excise tax. On economy brands we assume that they will *decrease* their margin by 2%. These assumed percentage changes in the net-of-tax price are based on historical precedent, where the tobacco industry over-shifts the excise tax increase on premium and popular cigarettes, but under-shifts the excise tax increase on economy brands. However, these parameters can be changed in the model.
- We assume a price elasticity of demand of -0.5 for economy and popular brands and -0.4 for premium cigarettes. This elasticity estimate closely follows elasticity estimates for LMICs (IARC, 2011, and NCI, 2017)
- We assume that an annual economic growth rate of 3.6% (average over the past 10 years, Mauritius Central Bank, 2018) stays constant over the simulation period and that the income elasticity of demand is 0.5.
- Most of the baseline data are from 2018. In cases where no information for 2018 was available, the most recent data were used. When no information is available at all, assumptions are made based on international standards and findings in similar contexts.
- Market shares are based the reported brand consumption from ITC data (wave 3). The model assumes that 8% of the domestic market consists of premium brands, 85% of popular brands and 7% of economy brands. We assume that the market share will change over time due to the increase of the excise tax. For a 15% to 20% increase in excise tax, we assume that 5% of smokers who smoke a premium brand will switch to the popular brand and 1% of smokers who smoke the popular brand will switch to economy brands. If the excise tax increases by 30% to 40%, we assume that 15% of smokers who previously smoked premium brands will switch to popular brands and 5% of smokers who smoke popular brands will switch to economy brands.
- All prices and revenue are presented in current (nominal) prices since we do not want to assume future rates of inflation.

Tax increase scenario.

Three possible tax increases are modelled in this report:

- Policy option 1: The first policy change proposes a systematic increase of the excise tax by 15% annually, from its level of Rs 5 111 per thousand (Rs 102.2 per pack) in January 2019 to Rs 8 937.5 per thousand (Rs 178.75 per pack) by 2022.
- Policy option 2: The second policy change proposes an increase of the excise tax by 40% the first year (2019/2020 financial year) followed by regular annual increases of 15% up to Rs 217.61 per pack by 2022 (Rs 10 880.5 per thousand).
- Policy option 3: The third policy change proposes an increase of the excise tax by 30% the first year (2019/2020 financial year) followed by regular annual increases of 20% up to Rs 229.58 per pack by 2022 (Rs 11 479 per thousand).

The table below summarizes the different options:

Table 7: Summarize of the policy options tested in the simulation model

		Policy option 1	Policy option 2	Policy option 3
	Year	Specific component (Rs per pack)	Specific component (Rs per pack)	Specific component (Rs per pack)
Base scenario	January 2019	Rs 102.2	Rs 102.2	Rs 102.2
Short term	June 2019	Rs 117.53 (15% increase)	Rs 143.08 (40% increase)	Rs 132.86 (30% increase)
Medium term	June 2020	Rs 135.16 (15% increase)	Rs 164.54 (15% increase)	Rs 159.43 (20% increase)
	June 2021	Rs 155.43 (15% increase)	Rs 189.22 (15% increase)	Rs 191.31 (20% increase)
	June 2022	Rs 178.75 (15% increase)	Rs 217.61 (15% increase)	Rs 229.58 (20% increase)

4.2 Simulation results

In this section, we simulate the effect of an increase in the tobacco specific excise tax level on cigarette consumption, government revenue, the tax burden, net-of-tax revenue, and retail price in the short and medium term (from 2019 to 2023).

Immediate results after 1 year

The tax model was calibrated with the different scenarios and the model was subsequently used to calculate the change for the variables of interest and the percentage change in selected variables between the simulated scenario and the base scenario. Table 7 below provides the results for the estimated impact after one year for each different scenario. Outputs are weighted by price categories (premium, popular and economy) market shares. An example of the input section of the model can be found in the appendix A along with an example of the outputs per brand category.

Table 7: Simulation results of increasing the specific excise tax on cigarettes in Mauritius

Outputs	Base Scenario	Scenario 1 increase by 15%	Scenario 2 increase by 40%	Scenario 3 increase by 30%
	(1)	(2)	(3)	(4)
Composition of the retail price				
Net-of tax price	51.7	55.3	55.3	55.3
Specific Excise tax	102.2	117.5	143.1	132.9
VAT	23.1	25.9	29.8	28.2
Retail price	177.0	198.8	228.2	216.4
Quantity (million packs)	50.0	48.0	45.0	46.2
Aggregate numbers (million Rs)				
Industry revenue	2 950.9	3 062.5	2 875.0	2 945.5
Excise tax revenue	5 110.0	5 646.2	6 441.0	6 131.7
VAT revenue	1 209.1	1 306.3	1 397.4	1 361.6
Excise tax + VAT	6 319.1	6 952.5	7 838.4	7 493.2
Total expenditure by buyers	9 270.0	10 015.0	10 713.4	10 438.7
Percentage changes				
Retail price		12.3	29.2	22.4
Consumption		-3.9	-10.0	-7.7
Industry revenue		3.8	-2.6	-0.2
Excise tax revenue		10.5	26.0	20.0
VAT revenue		8.0	15.6	12.6
Excise tax + VAT		10.0	24.0	18.6
Total expenditure by buyers		8.0	15.6	12.6

Column (1), the Base scenario, gives the current situation, without any tax increase. The remaining columns (2 to 4) gives the estimates for our three scenarios. The excise tax structure across all three policies is the same (i.e. uniform excise tax), but the assumed increases are different, resulting in different levels of effectiveness. All three scenarios result in a decrease in consumption and in an

increase in government revenue. However, scenario 2 - in which the excise tax increases by 40% - would result in the largest decrease in consumption and the largest increase in government revenue.

Based on Scenario 2, should the government increase the excise tax by 40%, together with an average increase in the net-of-tax price of almost 7% across the three price categories, the retail price will increase by an average of about 29%. This would result in a decrease in consumption of 10%. Given that the consumption would decrease by less than the increase in taxation, the excise tax revenue would be expected to increase by 26%.

Scenarios 1 and 3 offer different alternatives. If the government were to increase the specific excise tax by 15%, as in Scenario 1, the changes in the variables of interest would be as follows: the retail price would be expected to increase by an average of 12.3%, aggregate consumption would decrease by 3.9%, and total excise revenue would increase by 10.5%. In Scenario 3, the impact of increasing the excise tax by 30% will be expected to increase the average retail price by 22.4%, decrease consumption by 7.7%, and increase tax revenue by approximately 20%.

Following an excise tax increase in June 2019, we propose annual increases of the specific excise tax in subsequent years. As discussed previously, the real value of a specific tax can be easily eroded by inflation and cigarettes can become more affordable if the nominal increase in the excise tax is not adjusted on a regular basis. In the following section, we summarize the results on of the successive tax increases in the medium term.

A number of countries pre-announce the excise tax increases for a number of years into the future. For example, the Sin Tax Reform in the Philippines was a multi-year project where all role-players, including the tobacco industry, knew years ahead of time how the excise tax would develop. Similarly, in 2013, the Australian government announced that it would annually increase the excise tax on cigarettes by 12.5% above the inflation rate.¹⁵ Internationally, it seems that pre-announcing tax increases for multiple years is becoming more common.

Change in quantity and tax revenue in the medium term (by 2023)

All three policy options will result in a decline in consumption from current levels by 2023. However, scenario 3 will deliver the largest decrease in consumption in the medium term, with a 22% decline in

¹⁵ <http://www.who.int/fctc/cop/WHO-FCTC-ITC-Global-Evidence-Review.pdf>, on page 25

consumption from the baseline to 2023. Scenarios 1 and 2 will result in a 15% and 21% drop in cigarette consumption between the baseline and 2023, respectively.

Given the price inelasticity in the demand for cigarettes, an increase in the excise tax on cigarettes will lead to a less than proportional decrease in the consumption of cigarettes. As a result, government revenue will continue to increase in the medium term.

Table 8: Change in quantity (in million packs) in the medium term as per the different scenarios

year	Total - Scenario 1		Total - Scenario 2		Total - Scenario 3	
	amount	% change	amount	% change	amount	% change
Baseline: January 2019	50		50		50	
2019-2020	48	-4	45	-10	46	-8
2020-2021	46	-4	43	-4	44	-5
2021-2022	44	-4	41	-4	41	-6
2022-2023	42	-4	40	-4	39	-6
Total compared to baseline		-15%		-20%		-22%

Again, Scenario 3 is the most promising scenario, with a substantial increase in government revenue of 69% between 2019 and 2023. In Scenario 2, government revenue increases by about 64% between 2019 and 2023. Although a lower growth rate is achieved in Scenario 1, it still results in an increase in government revenue of 46% between 2019 and 2023.

Table 9: Change in total tax revenue from cigarettes (specific excise tax + VAT in million Rs) in the medium term as per the different scenarios

year	Total - Scenario 1		Total - Scenario 2		Total - Scenario 3	
	amount	% change	amount	% change	amount	% change
Baseline: January 2019	6 319		6 319		6 319	
2019-2020	6 949	10,02	7 823	24,04	7 477	18,58
2020-2021	7 639	9,99	8 595	9,91	8 430	12,78
2021-2022	8 396	9,96	9 440	9,88	9 496	12,70
2022-2023	9 229	9,93	10 369	9,84	10 694	12,62
Total compared to baseline		46%		64%		69%

5 Conclusion and recommendations

This research report presents the results of a number of simulation models, aimed at quantifying the impact of increasing the excise tax on cigarettes in Mauritius.

Although the WHO Technical Manual (2011) recommends an excise tax burden of 70%, it also reiterates the importance of cigarette affordability. A higher excise tax burden will be inefficient in decreasing cigarette consumption if the retail price remains relatively low compared to average incomes. The current specific excise tax structure in Mauritius is efficient and administratively simple, therefore our modelling focused on different increases in the rate. **We do not recommend a change in the excise tax structure.** We have modelled various scenarios for a regular increase of the excise tax by 2023. In the current model, Scenario 3 delivers the optimal results, leading to the highest increase in government revenue (+69%) and the largest decrease in cigarette consumption (-22%). This scenario requires that the excise tax be increased by 30% in the first year (June 2019) and should then be followed by a 20% increase in the following years. Scenarios 1 and 2 provide possible alternatives to scenario 3, also leading to a decrease in consumption and an increase in government revenue. Scenario 1, which increases the excise rates by 15% each year is the least efficient. Should scenario 2 be considered, the government revenues would increase by almost 64% and the quantity consumed would decrease by 20%.

If the Mauritian government wants to reinforce its tobacco control policy, they should opt for large tobacco tax increases. Pre-announcing large increases in the excise tax for a number of years is becoming increasingly common, with some of the leading countries doing it. Rather than having to negotiate and defend a tax increase every year (and having the tobacco industry make often unwarranted claims in the media), one deals with the issue once, and simply implements what has been decided in each of the following fiscal years. Also, it might serve as an encouragement to smokers to quit smoking, because they can see that it will become increasingly more expensive in the near future.

The tobacco industry will probably argue that increases in the excise tax will lead to illicit trade. That is a standard tactic internationally. These claims should not be taken too seriously, unless there is real evidence that there is a problem. Large-scale illicit trade is firstly a matter of crime, not of high taxes. Nevertheless, illicit trade needs to be addressed. The Illicit Trade Protocol of the FCTC gives member countries tools and commitments to tackle illicit trade. Moreover, the industry's argument that

increases in the illicit trade result from the increase in the excise tax sound hollow in light of the fact that they have very substantially over-shifted the excise tax on premium and popular cigarettes in the past five years. If there was such an incentive to smuggle cigarettes, the tobacco industry would not increase the incentive by increasing the real net-of-tax price so substantially.

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Appendix A: The tobacco taxation model

The models are mathematical constructions, based on business intuition (specifically the decomposition of the retail price into its cost and tax components) and economic logic (the relationship between price and consumption), and have to be populated by the user. We have endeavoured to populate these models with input parameters and variables that reflect the reality in Mauritius as much as possible. Officials from the Ministry of Finance and the Ministry of Health have been particularly helpful in providing us with the data needed for the input section. However, to the extent that the inputs do not reflect reality, the model will be inaccurate in its predictions.

For the Mauritius modelling, each scenario has been performed in a separate Excel file. Each Excel file consists of several spreadsheets, each year requiring an additional spreadsheet. A typical spreadsheet consists of an input and an output section. The *Input* section allows users to change any of the input variables. An example of the input section for Scenario 1 is provided below.

Example of the input section (Scenario 1)

Inputs	Premium	Popular	Economy
Base Scenario			
Retail price (nominal price 2018, per pack)	225	185	145
Market share	8	85	7
Specific Excise tax (nominal price 2018, per pack)	102,2	102,2	102,2
Price elasticity	-0,4	-0,5	-0,5
Scenario 1 : Y1 - 2018			
Percentage change in the net-of-tax price	10	8	-2
Percentage change in the excise tax	15	15	15
New VAT rate	15	15	15
Per capita income growth	3,6	3,6	3,6
Income elasticity	0,5	0,5	0,5
VAT	15		
Total quantity (million packs, 2017)	50		

The *Output* section provides the simulated impact of a particular tax intervention (e.g. increasing the excise tax by 15%) on the variables of interest. The *Output* section is derived from the user-determined inputs. The retail selling price for each market segment is used as the starting point. The model then breaks up the retail price into its various cost components (i.e. VAT, excise tax and the net-of-tax price). A weighted average price (subdivided into a weighted average VAT amount, excise tax amount and net-of-tax price) is calculated, based on the relative market shares of the three price/market segments. Subsequent detailed modelling assumptions and parameters are provided below:

- Other than the excise tax rate, the model assumes that the other tax rates remain constant over the simulation period. For instance, the model is programmed with a fixed **VAT** rate at 15%.
- The model also allows for a change in the **net-of-tax price**. The model does not incorporate any effect of taxes on illicit trade or substitute products. Although government sets the excise tax amount, the tobacco industry sets the retail price. An increase in the excise tax rate may be met by the industry undershifting or overshifting the excise tax, or by passing it through fully. International experience has shown that to protect its overall profitability, the tobacco industry will often increase the net-of-tax price in response to the excise tax increase. To incorporate this feature into the model, the user can set the percentage by which he or she believes the tobacco industry will change the net-of-tax price. In our model, we assume that the tobacco industry increases its net-of-tax price by 10% on premium brands, and by 8% on popular brands. On economy brands we assume that they will decrease their margin by 2%.
- The model allows for different **price elasticity** estimates for different market segments. The greater the price elasticity, the greater the decrease in the consumption of cigarettes in response to a given percentage change in the price. A very extensive literature has investigated the price elasticity of demand for cigarettes (see IARC, 2011). An increase in the price will reduce the quantity demanded, but, given the addictive nature of nicotine, by proportionally less than the increase in price. This responsiveness of a change in consumption to a change in price is referred to as the price elasticity of demand for cigarettes. The price elasticity of demand for cigarettes is estimated at about -0.4 for developed countries and between -0.4 and -0.8 for developing countries. This implies that a 10 per cent increase in the real (inflation-adjusted) price of cigarettes decreases tobacco consumption by 4 per cent in developed countries and by between 4 and 8 per cent in developing countries. Given the limited information on price and income elasticity for Mauritius, we use the range derived from developing country data and common sense. Poor-quality and medium-quality cigarettes are typically consumed by poorer consumers who are typically more price sensitive than somewhat richer consumers. Thus, we assume a price elasticity of demand of -0.5 for economy and popular brands and -0.4 for premium cigarettes. If the price of the mid-range or expensively-priced cigarettes increases, individuals may switch to lower-priced cigarettes. For this reason, we assume that the price elasticity varies across price segments. The price elasticity is higher for the cheapest brand, as these consumers cannot switch to an even cheaper brand. They could, however, decrease their consumption and still continue to smoke.

- We assume that an annual **economic growth rate** of 3.6% (average over the past 10 years, Mauritius Central Bank, 2018) stays constant over the simulation period and that the income elasticity is 0.5.
- Most of the **Baseline data** are from May 2018. In cases where no information for May 2018 was available, the most recent data were used. When no information is available at all, assumptions are made based on international standards and findings in similar contexts.
- **Market shares** are based on brand data collected by the ITC project. The model assumes that 8% of the domestic market sales are from premium brands, 85% are from popular brands and 7% are from economy brands. We assume that the market share will change over time due to the increase in the excise tax. For a 15% to 20% increase in excise tax, 5% of premium-brand smokers are assumed to switch to the popular brand and 1% of popular brand smokers are assumed to switch to economy brands. For a 30% or 40% increase in excise tax in the first year, 15% of premium-brand smokers are assumed to switch to the popular brand and 5% of popular brand smokers are assumed to switch to economy brands. The others stay where they are.
- **Retail price** consists of the total tax payable to the government (i.e. VAT and excise tax) and the net-of-tax price. As the name indicates, the net-of-tax price is the amount collected by the tobacco industry after paying the various taxes levied on cigarettes. The calculated amount will include their input costs as well as their profit margin.
- All prices and revenue are presented in current (nominal) prices since we do not want to assume the magnitude of future inflation.

The next step is to calculate what would be the change in the aggregate values after the tax increases. All numbers in this sheet are driven by formulae. The user should only read the results and should not enter any data in the output section. We are especially interested in the quantity of cigarettes and in government revenue and the new values in comparison to the base scenario. An example of the output section for Scenario 1 is provided below. The upper part provides the base scenario (before the tax increase), the section in blue gives the outputs after the tax increase. At the bottom of the output section, the percentage changes in the appropriate variables between the simulated results (in blue) and the base scenario are calculated. These variables are the following:

- Average retail price
- Cigarette consumption
- Total excise tax revenue from cigarettes

- Total government revenue from cigarettes (i.e. the sum of excise tax, VAT, import tax and import levies)
- Total expenditure on cigarettes

Example of the output section (Scenario 1)

Outputs	Premium	Popular	Economy	Total
Base scenario				
Composition of the retail price				
Net-of tax price	93,45	58,67	23,89	
Specific Excise tax	102,20	102,20	102,20	
VAT	29,35	24,13	18,91	
Retail price	225,00	185,00	145,00	
Quantity (million packs)	4,0	42,5	3,5	50,0
Aggregate numbers (million rupees)				
Industry revenue	374	2493	84	2951
Excise tax revenue	409	4344	358	5110
VAT revenue	117	1026	66	1209
Total expenditure by buyers	900	7863	508	9270
Scenario 1				
Composition of the retail price				
Net-of tax price	102,80	63,36	23,41	
Specific Excise tax	117,53	117,53	117,53	
VAT	33,05	27,13	21,14	
Retail price	253,38	208,03	162,08	
Quantity (million packs)	3,9	40,8	3,4	48,0
Aggregate numbers (million rupees)				
Industry revenue	399	2585	79	3062
Excise tax revenue	456	4794	396	5646
VAT revenue	128	1107	71	1306
Total expenditure by buyers	984	8485	546	10015
Percentage changes				
Retail price	12,6	12,4	11,8	
Consumption	-2,9	-4,0	-3,7	-3,9
Industry revenue	6,8	3,7	-5,7	3,8
Excise tax revenue	11,6	10,4	10,7	10,5
VAT revenue	9,3	7,9	7,6	8,0
Excise tax plus VAT	11,1	9,9	10,2	10,0
Total expenditure by buyers	9,3	7,9	7,6	8,0

The exercise is repeated exactly for Scenario 2 and 3 where the specific excise tax is increased by 40% and 30% respectively for the first year and 15% and 20% respectively for the following years.