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Measuring Malaysia's Illicit Tobacco Trade: An Excise Tax Gap Analysis

RESEARCH

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ABSTRACT

There is a lack of independent data regarding the illicit tobacco trade in Malaysia. Tobacco Industry (TI) commissioned data has previously been criticised for overestimating the illicit tobacco trade and for a lack of methodological transparency. The aim of this study is to present an independent overview of Malaysia's illicit tobacco market by measuring the country's factory-made cigarette excise tax gap. Using data sourced from Malaysian government publications we calculate the excise tax gap between 2011 and 2019 based on existing approaches whereby the excise tax actually paid is compared with that theoretically due based on estimates of total tobacco consumption. For sensitivity analysis, we established 4 different scenarios of tobacco consumption levels.

Our central estimate is that the tax gap increased from 49% (2012) to 65% (2017), indicating that about two-thirds of cigarettes consumed were illicit, untaxed cigarettes. Increases in the tax gap occurred when taxes increased (e.g., 2014) and when they did not (e.g., 2017), and a slight decline was also evident when taxes were unchanged (e.g., 2012). The size of the tax gap was sensitive to the consumption estimates, where a 10% increase in consumption was generally associated with 3–5 percentage point increase in the tax gap. This study, to our knowledge, is the first independent estimate of Malaysia's tax gap/rate of the illicit tobacco trade. We suggest the Malaysian government maintain its tax policies whilst strengthening its anti-illicit tobacco trade measures, including ratifying the Protocol to Eliminate Illicit Trade in Tobacco Products.

Highlights

- An independent view of the illicit tobacco trade in Malaysia by measuring the country's tobacco excise tax gap.
- Insights into the accuracy of TI estimates on Malaysia's tobacco trade.
- Suggestions for actions that should be taken by the Malaysian government to combat the illicit tobacco trade.
- Government Survey data is used to measure consumption which isn't available each year, so yearly consumption estimates are produced via linear interpolation between survey waves.
- Consumption estimates cover those aged 15 or above.

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INTRODUCTION

Article 1 of the WHO Framework Convention on Tobacco Control (FCTC) defines illicit trade as any activities prohibited by law which occur from the production through to the final purchase of a product (WHO 2003). For the illicit tobacco trade this specifically includes products which have been produced legally but are then smuggled, as well as counterfeits and other illegally manufactured products. Such products are problematic because they are generally cheaper than licit sources and hence undermine tobacco excise taxes designed to deter tobacco use via price increases (Chaloupka, Yurekli & Fong 2012). It has been estimated that eliminating the global illicit tobacco trade would reduce cigarette consumption levels by 2 percentage points, thereby avoiding more than 164,000 premature deaths per year from 2030 onwards (Joossens et al. 2010). The illicit tobacco trade is notoriously difficult to measure due to its illegal nature and intricacy of analysis (Joossens, Luk & Raw 2012). As such there is limited data regarding the extent of the illicit tobacco trade in most countries and regions across the world, with the tobacco industry (TI) being a major provider of such data either directly or via commissioning third-party reports. There is thus a lack of independent data, both for specific countries, and at the regional/global level.

Malaysia is no exception as, in the absence of independent data on the country's illicit tobacco trade, studies commissioned or conducted by British American Tobacco (BAT) and Japan Tobacco International (JTI) have been (to the best of our knowledge) the only source of such data (JTI 2018; OE 2019; Tobacco 2020). For instance, an industry-commissioned study addressing Malaysia's illicit trade (published in 2018) claims the Malaysian government lost MYR 4.5 billion (approx. USD1.1bn) in excise duty in 2017 alone, with the illicit tobacco trade accounting for 56% of the overall tobacco market (OE 2019). The report also suggests Malaysia tops the world as the largest consumer of illicit tobacco by market share, followed by Brazil (50%), Ecuador (41%), Panama (34%), and the UAE (33%) (OE 2019). However, various industry funded estimates on illicit tobacco trade have been criticised for failing to meet the standards of peer reviewed publications and for producing inflated estimates (Ross 2015; Gallagher et al. 2019). Thus, there is a crucial need for independent research to verify the extent of the illicit tobacco trade in Malaysia.

Malaysia's tobacco market makes an interesting case study for measuring the illicit tobacco trade in part due to its strategic geographical location at the midpoint of Southeast Asia, with its ports (Port Klang, Penang Port, and Johor Port) known as some of the busiest container ports for goods transhipment in the world. Malaysia also shares numerous borders with adjacent countries (e.g., Indonesia, Thailand, Singapore, Brunei, and The Philippines) which presents many opportunities for smuggling tobacco by either sea or land (Rejab & Zain 2006; Tiigah & Siu 2020). These factors are important as illicitly imported tobacco products are often smuggled, either indirectly (e.g., false declaration during transhipment) (CPPS 2018) or directly (e.g., kretek; the prominent Indonesian-made clove cigarettes smuggled by small boats landing near the shore and unloaded onto trucks for distribution) (CPPS 2018). Another factor relevant to the illicit trade in Malaysia is a significant demand for kreteks from immigrants from neighbouring Indonesia (Arnez 2009; Rasmara 2020), but most of which cannot be sold legally due to generally exceeding the legal limit on tar levels in any form of cigarette (KKM 2021). Furthermore, illicit locally-manufactured tobacco products have also been associated with counterfeit tax stamps that are openly sold in shops/street-markets (Star 2012; CPPS 2018).

The calculation of excise tax gaps has been adopted in several countries (e.g., UK, Latvia, and Australia) as a way of independently estimating the level of the illicit tobacco trade (ATO 2016; HMRC 2017; Jurušs, Šmite-Roķe & Gasūne 2018). This refers to the difference between the excise tax actually paid and the tax that should have been paid if all tobacco consumed in the country was legally sold and taxed. Such analysis is important in offering authorities estimates of the amount of tax revenue shortages through noncompliance and avoidance, and hence informing policy (Thackray & Alexova 2017). This paper therefore aims to provide an independent view of the illicit tobacco trade in Malaysia by: i) providing an overview of Malaysia's illicit tobacco market by measuring the country's tobacco excise tax gap; and ii) providing insights into the accuracy of TI estimates of Malaysia's illicit tobacco trade.

METHODOLOGY

TOBACCO DUTY AND DATA

We aimed to use the official government data whenever possible throughout the data collection process. We use official government data on tobacco excise duty revenue (MOF 2011–2019) covering 2011–2017 (actual data), and 2018–2019 (official government *estimates* as actual data has yet to be published). Information on excise duty rates was sourced from the formal Malaysian Excise Duty Gazette (RMCD 2004–2017), supplemented by the periodic revisions to those which were sourced from the Southeast Asia Tobacco Control Alliance (SEATCA)(SEATCA 2019) repository due to being unavailable directly from official sources whom did not respond to our queries on this matter. Malaysia's tax system changes mid-year (e.g., April) and since the data are sourced on a calendar year basis, we had to assume that only one tax regime applied for the entire year and hence take the one that applied for the greater number of months (e.g., April to December). The Import value of tobacco imports was collected from official monthly external trade statistics (DOSM 2012–2016a), and the sales value of locally manufactured tobacco products from official monthly manufacturing statistics (DOSM 2012–2016b).

TOBACCO CONSUMPTION AND DATA

Data on the total number of yearly cigarettes (sticks) consumed (KKM 2010–2019) was estimated from the government's official National Health and Morbidity (NHMS) survey produced once every four years. Only data for the years 2011 and 2019 were used for the consumption estimates, as the consumption data for 2015 (on the cigarettes smoked per day) were found to be skewed, inconsistent, and unlikely to be accurate (which was then confirmed to be the case by relevant government ministries) and hence was excluded. We therefore used linear interpolation to estimate the number of smokers and their levels of consumption for the years 2012 to 2018 using the data from 2011 and 2019 (see Supplemental Material). While this approach/source is imperfect, it is, to the best of our knowledge, the most comprehensive publicly available consumption data available.

We focus solely on Factory Made cigarettes (FM) (including *kretek*) as these account for 99% of tobacco products consumed in Malaysia (based on excise duty paid (MOF 2011–2019)). Not only is this very representative of the entire market while avoiding unnecessary complications around the remaining 1%, but data on excise duty revenue on cigars and roll-your-own tobacco is not consistently available for the period of analysis.

As daily smoking frequency in the survey was captured using consumption ranges (e.g., 1 to 4 cigarettes, or 5 to 9 cigarettes per smoker per day) and the percentage of smokers within each, we estimated consumption using a weighted average approach. The highest consumption range was open ended (greater than 24 cigarettes per day), so for our weighting we took this range to be 25 to 34 cigarettes by applying the same size of range used in the previous band (15 to 24 sticks range).

In order to allow for measurement error in both the consumption survey and our use of linear interpolation, we developed four different consumption estimates (ultra-low, lower, central, and upper), of which the lower and higher consumption estimates increased/decreased by 10% relative to our central estimates to offer some sensitivity analysis in our calculations (Chen et al. 2015; Goodchild, Valavan et al. 2020) (see Supplemental Material). Furthermore, since we are dealing with point estimates, we could not create confidence intervals thus the sensitivity analysis is important to develop the different consumption scenarios. For our central estimate, mean cigarettes smoked per day was calculated by multiplying the mid-point of each survey band by the proportion of smokers in that band (e.g., 2.5 cigarettes for the 1 to 4 cigarette band, was multiplied by 0.2 if 20% of smokers were in that band) and then adding these across all bands to get an overall weighted average. This was then multiplied by 365 to give yearly estimates of per capita consumption, and by the reported smoking population to give the total number of sticks consumed per year. For our ultra-low estimates, we repeated this process but took the lowest possible value for the number of cigarettes consumed within each band (e.g., the 5 to 9 cigarette band was assumed to be 5).

TAX GAP CALCULATION

Our aim was to compare the tax revenue actually generated with estimates of the tax that should have been paid if all tobacco was purchased legally. There were two types of excise tax

regime being imposed on tobacco during the study period – a specific duty system (2016–2019) and a mixed system of specific and *ad valorem* (2011–2015). For the years that only specific duty was imposed, the consumption estimates were multiplied by the duty rate to estimate the duty theoretically owed. We were therefore able to produce the tax gap by comparing the excise duty actually paid to the tax theoretically owed and then express this in percentage points.

COMPLICATION WITH AD VALOREM DUTY CALCULATION

In 2011 to 2015, a mixed excise system of specific and *ad valorem* duty was imposed (see Table 1).

Table 1 Duty Rate per Stick of FM Cigarettes.

Source: (RMCD 2004–2017; SEATCA 2019).

YEAR	DUTY RATE PER STICK (MYR)	*AD VALOREM* (%)	DATE INTRODUCED
2011	0.21	20	31 October 2010
2012	0.21		
2013	0.22		31 October 2012
2014	0.25		27 September 2013
2015	0.25		
2016	0.4	N/A	5 November 2015
2017	0.4		1 April 2017
2018	0.4		
2019	0.4		

This was problematic as it increased the complexity of calculating the tax theoretically owed. The challenge is that there will be no final selling price available in the tax theoretically owed scenario, and since this is needed to calculate *ad valorem* duty, this type of duty payment needs to be estimated. We therefore did this by assuming the ratio between specific and *ad valorem* tax would be the same in the estimated scenarios as it was with the duty actually paid.

To calculate the ratio actually paid, we first needed to calculate the amount of *ad valorem* tax paid since this was not provided in government publications. Therefore in line with government rules for calculating the duty payable, the *ad valorem* element of the tax actually paid was calculated as being 20% of the goods value (for imported products) (DOSM 2013) or sales value (for locally manufactured products) (DOSM 2016) that are available. We added both the goods value and sales value to work out the total value of sales and then calculated 20% of this as the *ad valorem* duty to be paid. We then deducted this estimate of *ad valorem* duty from the total duty paid, thereby identifying the remainder as the specific duty paid. The specific duty paid was then calculated as a proportion of the total duty actually paid. When calculating the tax theoretically owed, the estimated consumptions were first multiplied by the specific tax rate to work out the total specific duty owed, and this was then divided by the proportion of *ad valorem* to specific duty identified in actual payments (as above), thereby estimating the overall duty theoretically owed.

In order to help clarify all of these methods, in our full results tables (See also Supplemental Material) we have offered brief formulas within the column titles for the different calculations adopted.

RESULTS

CONSUMPTION

Our estimates of consumption (Table 2) show total tobacco consumption declined each year between 2011–2019 in all scenarios (see also the Supplemental Table 1A and 2A, and Supplemental Box, for the calculations of average cigarettes consumed per person/year). Overall, our central estimates show Malaysian smokers above the age of 15 consumed more than 21.5 billion sticks of cigarettes a year from 2011–2019. For the lower estimates, our findings show smokers consumed at least 19.4 billion sticks a year with a difference of 2.1 billion less sticks relative to the central estimates. The upper estimates suggest the smokers consumed more than 23.7 billion sticks a year with a difference of at least 2.1 billion more sticks a year than the central estimates. Finally, the ultra-low estimate is that consumption was more than 16.7 billion sticks per year, with a difference of approximately 4.8 billion fewer compared to the central estimate.

Table 2 Overall Estimated Tobacco Product Consumption for the Period from 2011 to 2019.

Source: (KKM, 2010–2019) and authors' own calculations.

* Years where linear interpolation values apply.

ULTRA-LOW ESTIMATES	YEAR	2011	2012*	2013*	2014*	2015*	2016*	2017*	2018*	2019
	Overall Number of Smokers (Age 15 and above) (A)	4,747,000	4,750,693	4,754,386	4,758,079	4,761,772	4,765,465	4,769,158	4,772,851	4,776,548
	Average number of cigarettes consumed per person/year (sticks) (B)	4,102.97	4,026.96	3,950.95	3,874.94	3,798.93	3,722.92	3,646.91	3,570.90	3,494.88
	Product Consumption (sticks) (A) × (B) = (C)	19,476,774,855	19,130,826,930	18,784,317,595	18,437,246,850	18,089,614,695	17,741,421,130	17,392,666,156	17,043,349,772	16,693,438,192
LOWER ESTIMATES	**YEAR**	**2011**	**2012***	**2013***	**2014***	**2015***	**2016***	**2017***	**2018***	**2019**
	Overall Number of Smokers (Age 15 and above) (A)	4,747,000	4,750,693	4,754,386	4,758,079	4,761,772	4,765,465	4,769,158	4,772,851	4,776,548
	Average number of cigarettes consumed per year/person (sticks) (B)	4,699.36	4,619.60	4,539.84	4,460.08	4,380.32	4,300.56	4,220.80	4,141.04	4,061.25
	Product Consumption (sticks) (A) × (B) = (C)	22,307,846,492	21,946,285,943	21,584,136,286	21,221,397,523	20,858,069,651	20,494,152,673	20,129,646,587	19,764,551,393	19,398,734,071
CENTRAL ESTIMATES	**YEAR**	**2011**	**2012***	**2013***	**2014***	**2015***	**2016***	**2017***	**2018***	**2019**
	Overall Number of Smokers (Age 15 and above) (A)	4,747,000	4,750,693	4,754,386	4,758,079	4,761,772	4,765,465	4,769,158	4,772,851	4,776,548
	Average number of cigarettes consumed per year/person (sticks) (B)	5,221.51	5,132.76	5,044.01	4,955.26	4,866.51	4,777.76	4,689.01	4,600.26	4,512.50
	Product Consumption (sticks) (A) × (B) = (C)	24,786,496,103	24,384,155,126	23,981,158,642	23,577,506,650	23,173,199,151	22,768,236,145	22,362,617,631	21,956,343,609	21,554,148,967
UPPER ESTIMATES	**YEAR**	**2011**	**2012***	**2013***	**2014***	**2015***	**2016***	**2017***	**2018***	**2019**
	Overall Number of Smokers (Age 15 and above) (A)	4,747,000	4,750,693	4,754,386	4,758,079	4,761,772	4,765,465	4,769,158	4,772,851	4,776,548
	Average number of cigarettes consumed per year/person (sticks) (B)	5,743.66	5,646.18	5,548.70	5,451.22	5,353.74	5,256.26	5,158.78	5,061.30	4,963.74
	Product Consumption (sticks) (A) × (B) = (C)	27,265,145,713	26,823,259,489	26,380,653,278	25,937,327,080	25,493,280,894	25,048,514,721	24,603,028,561	24,156,822,414	23,709,563,864

TAX GAP

Based on the consumption data outlined above, we then calculated the tax gaps for the different scenarios (Table 3 – see also Supplemental Table 3A for the full calculations). For the years between 2011 to 2017 where actual government data was used (as opposed to government estimates for 2018–2019), there was a gradual increase in the tax gap in all scenarios except for the year 2012 where it dropped by approximately 2% in the central estimate relative to 2011 (51% to 49%). Although the total excise duty actually collected was consistent across the period of study at more than MYR3 billion (2011–2017), it is noticeably lower in the final two years where only estimated data are available (and hence it is unsurprising that tax gaps were higher in these years). However, the estimated tax owed has shown changes in all scenarios, varying in the central estimate between MYR6.40 billion (2017) to MYR8.95 billion (2012).

Table 3 Tobacco Tax Gap between the Period of 2011–2019.

Notes: * Estimation made due to the absence of data on the reporting year.

Sources: (RMCD 2004–2017; KKM 2010–2019; MOF 2011–2019; DOSM 2012–2016a, b; SEATCA 2019) and authors' own calculations.

ULTRA-LOW ESTIMATES	YEARS	TOTAL EXCISE DUTY ACTUALLY PAID (MYR)	TOTAL ESTIMATED DUTY OWED (MYR)	TAX GAP (MYR)	TAX GAP (%)
	2011	3,183,387,071	5,112,653,399	1,929,266,328	**38%**
	2012	3,268,662,470	5,021,842,069	1,753,179,599	**35%**
	2013	3,256,894,351	5,165,687,339	1,908,792,988	**37%**
	2014	3,396,853,195	5,761,639,641	2,364,786,446	**41%**
	2015	3,294,617,613	5,653,004,592	2,358,386,979	**42%**
	2016	3,529,332,413	7,096,568,452	3,567,236,039	**50%**
	2017	3,144,948,294	6,957,066,462	3,812,118,168	**55%**
	2018*	2,305,987,000	6,817,339,909	4,511,352,909	**66%**
	2019*	2,454,600,000	6,677,375,277	4,222,775,277	**63%**
LOWER ESTIMATES	**YEARS**	**TOTAL EXCISE DUTY ACTUALLY PAID (MYR)**	**TOTAL ESTIMATED DUTY OWED (MYR)**	**TAX GAP (MYR)**	**TAX GAP (%)**
	2011	3,183,387,071	5,855,809,704	2,672,422,633	**46%**
	2012	3,268,662,470	5,760,900,060	2,492,237,590	**43%**
	2013	3,256,894,351	5,935,637,479	2,678,743,128	**45%**
	2014	3,396,853,195	6,631,686,726	3,234,833,531	**49%**
	2015	3,294,617,613	6,518,146,766	3,223,529,153	**49%**
	2016	3,529,332,413	8,197,661,069	4,668,328,656	**57%**
	2017	3,144,948,294	8,051,858,635	4,906,910,341	**61%**
	2018*	2,305,987,000	7,905,820,557	5,599,833,557	**71%**
	2019*	2,454,600,000	7,759,493,628	5,304,893,628	**68%**
CENTRAL ESTIMATES	**YEARS**	**TOTAL EXCISE DUTY ACTUALLY PAID (MYR)**	**TOTAL ESTIMATED DUTY OWED (MYR)**	**TAX GAP (MYR)**	**TAX GAP (%)**
	2011	3,183,387,071	6,506,455,227	3,323,068,156	**51%**
	2012	3,268,662,470	6,400,840,721	3,132,178,251	**49%**
	2013	3,256,894,351	6,594,818,627	3,337,924,276	**51%**
	2014	3,396,853,195	7,367,970,828	3,971,117,633	**54%**
	2015	3,294,617,613	7,241,624,735	3,947,007,122	**55%**
	2016	3,529,332,413	9,107,294,458	5,577,962,045	**61%**
	2017	3,144,948,294	8,945,047,052	5,800,098,758	**65%**
	2018*	2,305,987,000	8,782,537,444	6,476,550,444	**74%**
	2019*	2,454,600,000	8,621,659,587	6,167,059,587	**72%**
UPPER ESTIMATES	**YEARS**	**TOTAL EXCISE DUTY ACTUALLY PAID (MYR)**	**TOTAL ESTIMATED DUTY OWED (MYR)**	**TAX GAP (MYR)**	**TAX GAP (%)**
	2011	3,183,387,071	7,157,100,750	3,973,713,679	**56%**
	2012	3,268,662,470	7,041,105,616	3,772,443,146	**54%**
	2013	3,256,894,351	7,254,679,651	3,997,785,300	**55%**
	2014	3,396,853,195	8,105,414,712	4,708,561,517	**58%**
	2015	3,294,617,613	7,966,650,279	4,672,032,666	**59%**
	2016	3,529,332,413	10,019,405,889	6,490,073,476	**65%**
	2017	3,144,948,294	9,841,211,424	6,696,263,130	**68%**
	2018*	2,305,987,000	9,662,728,966	7,356,741,966	**76%**
	2019*	2,454,600,000	9,483,825,546	7,029,225,546	**74%**

Of particular note is that between 2015 and 2016 the estimated tax owed and tax gap both increased from MYR7.24 billion to MYR9.11 billion, and from MYR3.95 billion to MYR5.58 billion, respectively. One potential explanation for the significant increase in both estimated tax owed and the tax gap was the very large increase in legal imports of FM that took place at the same time (MOF 2011–2019), which may indicate a similar increase in illegal imports. Overall, increases in the tax gap were noted when both cigarette taxes increased (e.g., 2014) and when they did not (e.g., 2017), and a slight decline was also evident when taxes were unchanged (e.g., 2012).

COMPARISON WITH INDUSTRY ESTIMATES

Table 4 depicts the results of the present study relative to previous TI produced or commissioned estimates of Malaysia's illicit tobacco market share. Perhaps surprisingly, the results of the present study have higher estimates for the tax gap than the TI figures. This difference is largest in 2014, where our central estimate is 20 percentage points higher than the TI's estimates. In the years following 2014, the difference declined to the lowest of approximately 6 percentage points in 2019. Such difference might be due to alternative method and data sources adopted by the industry, for example, usage of Empty Pack Survey (EPS) estimation as compared to our approach of using tobacco excise duty calculation (Tobacco 2021).

Table 4 Tax Gap Comparison Between TI's Estimates and Present Study.

Source: Tobacco 2020; JTI 2018; and authors' own calculations.

YEAR	OXFORD ECONOMICS COMMISSIONED BY BAT MALAYSIA (%)	JTI MALAYSIA (%)	PRESENT STUDY ULTRA-LOW ESTIMATES (%)	PRESENT STUDY LOWER ESTIMATES (%)	PRESENT STUDY CENTRAL ESTIMATES (%)	PRESENT STUDY UPPER ESTIMATES (%)	DIFFERENCE WITH CENTRAL ESTIMATES (%)
2011	N/A	N/A	38	46	51	56	N/A
2012	N/A	N/A	35	43	44	54	N/A
2013	36	N/A	37	45	51	55	+15
2014	34	N/A	41	49	54	58	+20
2015	37	39	42	49	55	59	+16 to +18
2016	52	52	50	57	61	65	+9
2017	56	56	55	61	65	68	+9
2018*	59	59	66	71	74	76	+16
2019*	62	62	63	68	72	74	+6

DISCUSSION

Our study, which is (to our knowledge) the first independent estimate of the illicit tobacco market in Malaysia, found a significant gap in Malaysian tobacco excise tax, with approximately 59% of potential tax revenue going uncollected throughout the period of study (2011–2019).

It is noteworthy that the central estimate tax gap increased between 2015 (55%) and 2016 (61%) coinciding with an increase in the excise duty rate for FM. Taxation of FM changed from a mixed duty system of 20% of the sales value plus MYR0.25 per stick, to a totally specific tax of MYR0.40 per stick (WBG 2019). However, there was also a 2% decrease in the tax gap between 2011 and 2012 when there was no increase on the excise tax. Similarly, between 2016 and 2018 tobacco taxation was unchanged while the tax gap increased by 4% in 2017, and a further 9% in 2018 (although this is based on estimated tax revenue data). Overall, the increases in the tax gap were noted when both cigarette taxes increased and when they did not. This suggests the increase in the tax gap is not as simply and predominantly linked with increases in taxation as the TI continues to suggest (JTI 2018).

Other previously identified drivers of the global illicit tobacco trade are likely be relevant here (e.g., nearby borders, enforcement measures, levels of corruption) (CPPS 2018; WBG 2019). As such the relationship between product price and illicit tobacco in Malaysia seems to be one factor amongst many, rather than the key driver of the problem. This is in line with studies from elsewhere that demonstrate that price is not a primary driver of the illicit tobacco trade (Nguyen & Nguyen 2020; Tiigah & Siu 2020).

One particular driver that should not be understated is the role of organised crime groups which have clearly established illicit tobacco trade routes into Malaysia, seemingly facilitated by endemic corruption (WBG 2019; NST 2021; TI 2021). It seems likely that organised crime syndicates are paying off politicians and government officers to allow the illicit products to enter and then be distributed in Malaysia via the normal supply chain. This is likely to be particularly problematic as once such an illicit route has been established, it is relatively hard to close due to its lucrative nature, as evidenced by the Paraguayan domestic cigarette manufacturers where the supply route for the illicit trade to Brazil and Argentina created by the Transnational Tobacco Companies (TTCs) has offered an enduring business opportunity for smugglers (Iglesias et al. 2018; WBG 2019). As such, the presence of such established routes for illicit tobacco highlights why tax increases are not the key driver of it. Tax-induced price increases of licit tobacco will give criminals scope for increasing the price of illicit products, and hence will change the profit margins of illicit supply. However, such changes do not fundamentally change the incentive of continuing to engage in such activities as the enterprise would likely be lucrative with or without the tax increase. The issue is therefore the enduring nature of the established illicit supply channels.

Overall, our estimates are higher than those of TI-commissioned reports. Despite literature often finding TI estimates to be exaggerated, our estimates have not found this to be the case with data on Malaysia. Our paper is not the first to present estimates of a countries' illicit tobacco trade which are ultimately higher than the TI's estimates. For example, recent research on South Africa's market (a country which also has some of the highest rates of illicit in the world) found the estimates are higher by 3 to 8 percentage points as compared to the TI's in the year 2018 (Vellios, van Walbeek & Ross 2020, 2021). Like Malaysia, estimates of South Africa's illicit tobacco trade are particularly high, regardless of the source. Given that evidence has found that industry-commissioned reports on illicit tobacco trade in several countries and regions have been exaggerated when compared to independent estimates (Gallagher et al. 2019), it is perhaps the case that countries with particularly high rates of illicit, such as Malaysia, are outliers rather than the norm in terms of the accuracy of TI estimates. In any case, our findings are nationally representative for this particular country context only and hence do not validate the accuracy of TI estimates of illicit tobacco trade in other countries. Ultimately, having independent data against which industry associated data can be compared, is useful in and of itself.

According to our central estimates, the 6% increase in the tax gap in 2016 coincided with a cigarette factory closures in Malaysia. Philip Morris International (PMI) closed its Malaysian cigarette production facilities in 2012 (Star 2012), followed by both British American Tobacco (BAT) and Japan Tobacco International (JTI) in 2015 (Li 2017; Anwar 2020). Following these events, import volumes have increased significantly, especially from Indonesia which is both a neighbouring country and a low-cost producer (Rejab & Zain 2006; CPPS 2018; DOSM 2019). While the increase in illicit might be a coincidence, it might also be explained by the re-location of production facilitating illicit tobacco supply chains.

POLICY IMPLICATIONS

The Malaysian government has adopted numerous actions (Hassan et al. 2018; WBG 2019; KKM 2020; WHO 2020) to address both tobacco consumption in general and the illicit tobacco trade in particular, including ratifying the WHO Framework Convention on Tobacco Control (FCTC) in 2005 (MOH 2015). However, the size of the tax gap found herein shows that significantly more needs to be done to improve tax policies and enforcement. A good starting point would be for Malaysia to ratify the FCTC Protocol to Eliminate Illicit Trade in Tobacco Products (Ross 2016). The protocol's objective of eliminating all forms of illicit trade in tobacco products through specific collaboration among countries would be beneficial (Goodchild et al. 2020), especially with implemention of Article 8: the tracking and tracing method to monitor tobacco product movements between countries through identification markings so that the incidence of tobacco smuggling could be minimized (Ross 2016). Malaysia does not yet have a tracking and tracing system for tobacco products in place as envisioned by the Protocol to Eliminate Illicit Trade in Tobacco Products (SEATCA 2014).

In addition, it is also essential to boost co-operation with other countries' law enforcement agencies, as recently highlighted by the seizures made by The European Anti-Fraud Office (OLAF) during its joint operation with Royal Malaysian Customs Department (OLAF 2020). Such collaborations would also encourage future partnerships in terms of intelligence information

sharing and capacity building (WBG 2019), but critically, should not involve the TI, given that FCTC Article 5.3 requires parties to protect their public health policies from the "vested interests of the TI" (WHO 2008). These actions could help shut down the established illicit supply chains which seem to underpin the current high levels of illicit.

Another related area of reform for Malaysia could be to address corruption by enforcement officers (Ross 2016; CPPS 2018), and also the routine sale of counterfeit tobacco tax stamps in shops/street-markets (Star 2012; CPPS 2018). Strengthening anti-smuggling enforcement mechanisms is also critical, including tightening sea and land border controls and identifying smuggling mechanisms so that the importation of tobacco products can be firmly observed and controlled (WBG 2019). Indeed, in light of the extensive corruption in Malaysia, it is also crucial to enhance the internal co-operation within the government agencies overseeing the laws relating to the cigarette trade, taxation, consumption, supply and demand. In particular, measures to collectively identify the presence of organised crime, especially when involving politicians and those in positions of power, are needed to combat the full range of activities facilitating the illicit tobacco trade.

There have been a number of other proposals suggested in Malaysia to curb the illicit tobacco trade, including halving the tobacco excise tax rate for a two-year pilot study and the introduction of a new type of cheaper FM that are taxed at a lower rate via a new excise tier (Bertoletti, 2020). Adopting such measures would be good for the TI as they would be able to sell cheaper tobacco products but would ultimately encourage further tobacco sales (particularly if illicit prices were also to drop) at the cost of public health and reduce the size of the tax base. Furthermore, there is no reason to believe this would actually reduce the size of the illicit tobacco market with previous literature showing that countries with lower tax rates often have higher rates of cigarette smuggling (Joossens, Luk & Raw 2012; WBG 2019). Such action would likely just reduce the profit margins in the illicit supply routes, rather than entirely remove the incentive to engage in such activities. The previous measures outlined earlier targeting the illicit supply chains and associated corruption would be more beneficial by ensuring the current rates of duty are enforced with targeted policy and operational law enforcement (Foltea 2020).

Appropriate measures to address the size of the tax gap would not only be welcome for enhancing government tax revenues but would also offer public health benefits. Tobacco would generally become more expensive to purchase, thereby encouraging quit attempts and discouraging uptake. Furthermore, they may offer scope for strengthening FCTC implementation more generally as measures like health warnings and standardised packaging become more feasible.

STRENGTHS AND LIMITATIONS

This study contributes (to our knowledge) the first independent estimates of tobacco tax gap in Malaysia which are crucial in providing insights into Malaysia's illicit tobacco trade, the accuracy of TI/TI-commissioned reports on this, and for informing government's future policy decisions.

While the estimates presented should be reasonably robust, given they use official government data and employ an existing methodology, the study is nonetheless subject to several limitations. Firstly, our estimates of consumption are taken from survey data, which may produce inaccurate results due to underreporting (Liber & Warner 2018) of consumption. Furthermore, these data do not capture illegal cigarette outflow from the country (e.g., to Singapore, where the FM cigarettes are far more expensive than Malaysia) and cigarette consumption by migrants who reside in Malaysia but were not represented in the survey. However, we believe the usage of weighted averages to estimate yearly consumption and the scenarios presented, helps to account for these nuances.

Consumption estimates relied on official data from 2011 and 2019 since the 2015 data was excluded due to unreliability. Error may therefore be present due to the need to employ linear interpolation between these two data points. Nevertheless, in the absence of other independent estimates on smoking trends, this represented the best data available.

Several reports suggest around 3% of tobacco product consumption is among Malaysian adolescents aged 13 to 14 (approximately 15% of total Malaysia's population) (KKM 2019, 2020). However, data on smoking prevalence made available from the official government source were only for those aged 15 years and above. This suggests we will have slightly

under-estimated overall tobacco consumption and hence the tax gap, although the impact is unlikely to be large given the number of individual children involved, and hence the number of additional sticks smoked.

Finally, as the tax system changes during mid-year and the data are sourced on calendar year basis, we had to assume that only one tax regime applied for the entire year. Tax gap estimates for such years (2011 to 2015) will therefore feature slightly greater error within the calculations although this is likely to be relatively small. Furthermore, as the actual data for 2018 and 2019 excise tax revenue was unavailable, official estimates for these years were used. Given differences between estimates and actual data in recent years, it seems likely that these estimates could be quite inaccurate. As such, the estimates for the tax gap in those years need to be treated with additional caution.

CONCLUSION

Our findings are the first independent estimates of Malaysia's tobacco tax gap. As such they are offer the Malaysian government important insights as they look to address the issue of illicit tobacco and protect public health. They also allow the government to avoid sole reliance on TI-associated studies which are usually not peer-reviewed, and from which, data are regularly used to support TI narratives that tobacco taxes fuel the illicit tobacco trade (Ulucanlar & Gilmore 2016; JTI 2018; Gallagher et al. 2019; Tobacco 2020).

Our findings indicate the industry's estimates of Malaysia's illicit tobacco trade do not appear to be exaggerated, with illicit tobacco trade indeed being a major problem in the country. However, the relationship between the tax gap and tax increases indicates that the Malaysian government's tax policies cannot clearly be attributed to the country's levels of illicit tobacco trade in the way the industry suggest. As such, we suggest the Malaysian government should consider ratifying the FCTC Protocol to Eliminate Illicit Trade in Tobacco Products (Ross 2016; WHO 2018), alongside other measures, in an effort to further reduce all forms of illicit tobacco trade in tobacco products in the country.

DATA ACCESSIBILITY STATEMENT

All data generated or analysed herein are publicly available from the listed sources.

ADDITIONAL FILE

The additional file for this article can be found as follows:

- **Supplementary File 1.** Supplemental Material to accompany Measuring Malaysia's Illicit Tobacco Trade: An Excise Tax Gap Analysis. DOI: https://doi.org/10.31389/jied.151.s1

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COMPETING INTERESTS

JRB owns 10 shares in Imperial Brands for research purposes. The shares were a gift from a public health campaigner and are not held for financial gain or benefit. All dividends received are donated to health-related charities, and proceeds from any future share sale or takeover will be similarly donated.

AUTHOR CONTRIBUTIONS

All authors formulated the research idea after discussion about the topic. RK developed the initial research design, with JRB and AWAG contributing to the improvement of the design. RK wrote the first draft of the paper, identified the sources, and performed the initial tax gap calculation. JRB helped to refine the tax gap calculations. JRB and AWAG provided critical feedback, and all authors contributed to drafting and editing of the paper. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

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