

## RESEARCH PAPER

# The behaviour of purchasing smuggled cigarettes in Taiwan

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**Objective:** Since market liberalisation in 1987, the Taiwan Tobacco and Wine Monopoly Bureau (TTWMB) annual statistics indicate that both the demand for imported cigarettes as well as the number of seized smuggled packs have increased with an average revenue loss of NT\$4942 million over the past 15 years. The NT\$10 average increase in cigarette prices after Taiwan entered the World Trade Organization (WTO) and the implementation of the Tobacco and Alcohol Tax Law in 2002 are forcing policy makers to examine smuggling even more closely. This study evaluates factors that affect an individual smoker's decision to purchase smuggled cigarettes, particularly when faced with higher prices.

**Design:** 437 male smokers of imported cigarettes were drawn from a national interview survey on cigarette consumption, which the Division of Health Policy Research at the National Health Research Institutes conducted during the year 2000. Multiple logistic regression models were used to analyse the behaviour of purchasing smuggled cigarettes with respect to demographic factors, economic factors, smoking behaviour, and other variables.

**Results:** Cigarette price was the driving factor most closely linked to the purchase of smuggled cigarettes—a 1% increase in cigarette price raised the likelihood of purchasing smuggled cigarettes at least 2.60 times (95% confidence interval (CI) 1.08 to 6.26). Smokers who spent more than NT\$1000/month on cigarettes were twice as likely to purchase smuggled cigarettes as those who spent less than NT\$1000 (odds ratio (OR) 2.34, 95% CI 1.48 to 3.70). Betel nut chewers were more likely to purchase smuggled cigarettes (OR 1.80, 95% CI 1.09 to 2.90). Smokers who opposed cigarette taxation policy were 1.69 times more likely to buy smuggled cigarettes. Personal income was not significantly associated with smuggled cigarettes purchases.

**Conclusions:** This study evaluates what causes smokers to purchase smuggled cigarettes. We have determined that cigarette price is the most important factor and that betel nut vendors are the main suppliers. Our study provides policy makers with information that can help them develop effective strategies to curb cigarette smuggling after Taiwan's recent cigarette tax reform, which has increased cigarette prices.

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Reports from several developed countries indicate that raising cigarette taxes is an effective strategy for tobacco control.<sup>1–9</sup> On the other hand, tobacco companies oppose increases and argue that higher taxes provide financial incentives for smuggling. Smuggling supplies cheaper cigarettes and may stimulate consumption. As a result, it undermines the efforts to reduce the number of smokers and to reduce health costs, not to mention the tax revenue loss and criminal issues caused by smuggling. Using this reasoning, the tobacco industry was more successful in Canada (1994) and Sweden (1998) than in other countries in convincing those governments to resolve smuggling problems by lowering taxes on tobacco products.<sup>10</sup> A worldwide analysis by experts found that smuggled cigarettes accounted for 14% of the domestic sales in Taiwan in 1995.<sup>11</sup> Annual statistics from the Taiwan Tobacco and Wine Monopoly Bureau (TTWMB) show that market liberalisation since 1987 has not only increased the demand for imported cigarettes but also increased the number of seized packs of smuggled cigarettes, from 2 380 000 packs in 1986 to 21 561 000 packs in 1998, with a peak of 64 800 000 packs in 1992.<sup>12</sup> Over the past 15 years, Taiwan police have seized an average of 19 611 921 packs of smuggled cigarettes per year. This constitutes a total revenue loss of NT\$4942 million.

While the issues that surround smuggling have been examined for decades, its illegal nature makes it more difficult to evaluate than other variables that are relevant to tobacco control. Major discrepancies occur in the literature because of differences in methodology as well as in definitions of

smuggling. The methodologies used to measure smuggling include direct observation (such as the surveying of producers and retailers<sup>13</sup>), inference from international trade data, and discrepancies between tax paid sales and estimated consumption. With few exceptions, time-series or panel data analysis are the estimation methods used in most empirical analyses of cigarette smuggling.<sup>14–18</sup> The definition of cigarette smuggling varies with respect to different tax incentives, price differentials, geographical characteristics and socioeconomic conditions that may lead to different kinds of illegal activities.

Taiwan's tobacco industry was a monopoly and monopsony of the TTWMB, a government run manufacturer which controlled the input material and output cigarette markets. Before 1987, the year that Taiwan agreed to open its cigarette market to US producers, high tariffs and quotas on imported cigarettes protected the TTWMB. Until that time, the tobacco industry in Taiwan was a domestic demand industry with imports comprising less than 2% of total cigarette consumption.<sup>12</sup> After 1987, foreign cigarettes were imported legally only by TTWMB, with the TTWMB stamp of certification on cigarette packs. Both domestic and imported cigarettes were subject to an in-kind tax, called *monopolistic profit*, which made up nearly 47% of the retail price.<sup>19</sup>

On 28 March 1999, the Taiwan government passed the Tobacco and Alcohol Tax Law, which was implemented on 1 January 2002 when Taiwan entered the World Trade Organization (WTO); it earmarked an additional tax of NT\$5 per pack. Once the new taxation scheme under the Tobacco and Alcohol

Tax Law is implemented, TTWMB will be privatised over five years much like the system in Japan.

Currently domestic cigarettes are subject to an NT\$11.8 tobacco tax, a NT\$5 health and welfare tax per pack, and a profit tax of 5%. Foreign cigarettes are subject to these same taxes plus an additional tariff of 27%. After Taiwan entered the WTO on 1 January 2002, the average price of imported cigarettes increased by NT\$10. Also, foreign cigarettes are no longer exclusively sold by TTWMB but also by importers; consequently, imported cigarettes are no longer subject to the TTWMB certification stamp.

Although researchers have not empirically evaluated cigarette smuggling in Taiwan, the recent price increases focus attention on this problem which profoundly influences smoking and the cigarette market. As mentioned earlier, smuggling is the argument most used by the tobacco industry to counter the policies of those governments that intend to reduce cigarette consumption through taxation. The tobacco industry argues that market forces cause smuggling and that increased cigarette taxes will reduce legal but not total sales. Because smuggled cigarettes will be more affordable, smokers may actually increase cigarette consumption.

However, recent studies have shown that the correlation between high prices and high levels of smuggling does not exist in some regions<sup>20</sup> where smuggling is not caused principally by "market forces" but by fraud—the illegal evasion of import duties. Moreover, a number of recent criminal investigations and convictions in several countries provide evidence of tobacco industry complicity in such smuggling schemes.<sup>21</sup> Needless to say, this hardly lends credence to tobacco industry arguments.

On the other hand, it is true that revenues are lower because of legal and illegal efforts to avoid taxes. But this does not mean necessarily that cigarette tax revenues will fall as a result of higher taxes. Research on cigarette smuggling has proved that countries need not make a choice between higher cigarette tax revenues and lower cigarette consumption.<sup>11</sup> Nevertheless, smuggling is a consideration worldwide in the tobacco control policy of taxation, particularly in those countries that are encouraged to liberalise their markets. Taiwan is no exception.

Using the data collected from a face-to-face interview survey that took place in Taiwan during the year 2000, we examined factors that determined smuggled cigarette purchases, particularly when consumers faced higher prices.

## DESIGN

### Data collection

The data were drawn from a three stage, random sampled, face-to-face interview survey on cigarette consumption in 107 townships and two metropolitan areas in Taiwan during 2000. The Division of Health Policy Research at the National Health Research Institutes conducted this survey which covered a 3824 non-institutionalised civilian population aged 12–64 years (545 teenagers, 1644 female adults, and 1636 male adults). The response rate was 55%.

Among the 1636 male adults, 49.19% (n = 830) were current smokers, 54.4% (n = 437) of whom identified at least one foreign brand of cigarettes that they smoked. The prevalence rates of smoking of 545 teenagers and 1643 female adults were 8.62% (n = 47) and 4.1% (n = 68), respectively. Among these, 80.9% (n = 38) and 67.7% (n = 46) smoked imported cigarettes, and 47.7% (n = 18) and 26.1% (n = 12) had purchased smuggled cigarettes. Because of the low prevalence rates of smoking in teenagers and females, the sample size for their groups was insufficient for multiple regression analysis for the purpose of this paper.

### Measure

We defined current smokers as those who had smoked at least 100 cigarettes and had smoked within the last month. These

smokers were asked to list three brands of cigarettes that they used most and to provide price information. If any of the listed brands were foreign, individuals were defined as smokers of imported cigarettes; if all the listed brands were domestic, they were defined as smokers of domestic cigarettes. Smokers of imported cigarettes were asked where smuggled cigarettes could be bought and whether they had ever purchased smuggled cigarettes, namely imported cigarette packs that did not have a TTWMB certification stamp. Survey participants were also asked whether their friends purchased smuggled cigarettes and why they thought their friends purchased smuggled cigarettes.

### Data analysis

We studied smuggled cigarette purchasing behaviour in males who smoked imported cigarettes and distinguished the imported cigarette smokers from smokers of domestic cigarettes by using basic descriptive analysis such as percentage and mean, with  $\chi^2$  test and *t* tests. The same descriptive statistics were used to present our dependent variables: the group that did not purchase smuggled cigarettes and the group that did. We conducted logistic regression analyses to examine the likelihood of purchasing smuggled cigarettes with respect to independent variables. Descriptive statistics and multiple logistic regression included four groups of independent variables: (1) demographic factors—age, education, urbanisation of living area, marital status, and employment status; (2) economic factors—personal monthly income and cigarette price; (3) smoking behaviour—daily consumption and monthly tobacco expenditure; and (4) other factors—attitude toward cigarette taxation and betel nut chewing behaviour. The living areas were classified in three categories: metropolitan, general county, and rural areas. Personal income was measured in two ways: one divided smokers into three classes—below NT\$20 000/annum, NT\$20 000–40 000/annum, and above NT\$40 000/annum; the other was taken as a natural logarithm of continuous variable of personal monthly income. The cigarette price variable for each brand was measured in two ways and taken in logarithmic form: one was the self reported cigarette price, and the other was the average township price per pack. We calculated township level averages to reflect the local market price and to avoid the possible multi collinearity problem with the monthly expenditure on smoking variable. Those who smoked more than 20 cigarettes/day were identified as heavy smokers and the dummy variable was included in the analysis. Monthly expenditure on cigarette consumption was constructed as a dummy variable with the threshold set at NT\$1000 (where US\$1 = NT\$35) and also as a continuous variable in logarithmic form. We analysed the effect of participants' attitudes toward cigarette taxation policy. This variable reflected their attitudes toward a policy than may threaten self interest. This attitude variable was ascertained by asking participants whether they agreed or disagreed with the imposition of the cigarette tax aimed at reducing smoking or whether they had no comment. We also controlled for the confounding factor of whether the smokers were betel nut chewers.

## RESULTS

The first column of table 1 shows characteristics of the male smokers in this study. Among 803 smokers, 38.7% (n = 311) were under 35 years of age, 32.5% (n = 261) were not married, 20.2% (n = 162) had an undergraduate or graduate degree, 15.2% (n = 122) lived in the two metropolitan areas, and 16.1% (n = 129) were unemployed. Average monthly income was NT\$36 589.8 (std = 32 542) and on average they spent NT\$1044.7 (std = 1059.8) on smoking each month. The average self reported cigarette price was NT \$36.59 (std = 12.49); 14.69% (n = 118) of them smoked more than 20 cigarettes a day; 25% (n = 202) chewed betel nuts. With regard to

**Table 1** Descriptive information of male smokers

	Male smokers (n=803)			Male imported cigarette smokers (n=437)		
	Imported cigarette smokers (n=437)	Domestic cigarette smokers (n=355)	p Value†	Purchasing smuggled cigarettes (n=185)	Not purchasing smuggled cigarettes (n=245)	p Value‡
<b>Demographic factors</b>						
Age (years)						
18–34	51.72	23.94	*	56.22	48.57	
35–64	48.28	76.06		43.78	51.43	
Marital status						
No	41.42	22.54	*	44.32	39.59	
Yes	58.58	77.46		55.68	60.41	
Education						
Preliminary or lower	10.30	26.76	*	12.43	8.57	
Junior high school	24.03	25.92		18.92	28.16	
High school	40.05	32.96		13.78	37.14	
Undergraduate or graduate	25.63	14.08		24.86	26.12	
Missing	0.00	0.28				
Urbanisation						
Metropolitan areas	18.31	11.83	*	18.92	18.37	
General counties	59.04	57.75		55.68	61.22	
Rural areas	22.65	30.42		25.41	20.41	
Employed						
No	13.73	19.44	*	10.81	16.33	
Yes	86.27	80.56		89.19	83.67	
<b>Economic factors</b>						
Personal monthly income						
<NT\$20K	19.68	28.73	*	17.30	21.63	
NT\$20–40K	39.13	39.15		43.24	36.33	
≥NT\$40K	37.99	29.01		36.76	38.78	
Missing	3.20	3.10		2.70	3.27	
Personal monthly income (in NT\$; mean/std)	40542/34802	30744/24709	*	43031/30188	38577/30188	
Cigarette price per pack (in NT\$; mean/std)	45.78/9.80	25.62/2.56	*	47.2/12.9	44.53/6.14	*
<b>Smoking behaviour</b>						
Smoking >20 cigarettes daily						
No	84.21	81.97		83.24	84.90	
Yes	12.81	17.46		12.97	12.65	
Missing	2.97	0.56		3.78	2.45	
Monthly expenditure on smoking						
NT\$1–1000	35.70	66.48	*	27.03	41.63	*
≥NT\$1000	61.10	30.14		71.35	53.88	
Missing	3.20	3.38		1.62	4.49	
Monthly expenditure on smoking (\$NT; mean/std)	1233.6/1297.2	808.8/563.9	*	1483.1/1756.3	1044.6/746.7	*
<b>Other factors</b>						
Attitude toward cigarette taxation						
Favour	29.75	25.92		22.16	35.92	*
No opinion	23.57	28.17		26.49	20.82	
Oppose	46.45	45.92		51.35	42.86	
Missing	0.23	0.00		0.00	0.41	
Betelnut chewer						
No	71.17	73.24		64.86	75.92	*
Yes	27.00	23.66		33.51	22.04	
Missing	1.83	3.10		1.62	2.04	

\*p&lt;0.05, two tailed test.

† $\chi^2$  test for categorical independent variables; ‡ t test for continuous independent variables.

cigarette taxation, 45.57% (n = 366) opposed and 27.65% (n = 222) favoured the taxation policy.

With respect to our study sample, among the 437 (54.4%) smokers of imported cigarettes, 51.72% (n = 226) were under 35 years of age, 41.42% (n = 181) were not married, 25.63% (n = 112) had an undergraduate or graduate degree, 18.31% (n = 80) lived in metropolitan areas, and 13.73% (n = 60) were unemployed. Their average monthly income was NT\$40 542 (std = 34 802) and on an average they spent NT\$1233.6

(std = 1297.2) on smoking each month. The average self reported cigarette price was NT\$45.78 per pack (std = 9.80); 12.81% (n = 56) smoked more than 20 cigarettes a day and 27% (n = 118) also the chewed betel nuts. With regard to cigarette taxation, 46.45% (n = 203) opposed and 29.75% (n = 130) favoured the policy. The smokers of imported cigarettes differed from the domestic cigarette smokers: they were more likely to be under the age of 35, not married, not living in rural areas, employed, and spending more on smoking.

**Table 2** Logistic regressions of behaviour of purchasing smuggled cigarettes of 437 Taiwan male imported cigarette smokers in year 2000

Independent variables	Model 1		Model 2		Model 3	
	OR	95% CI	OR	95% CI	OR	95% CI
<b>Demographic factors</b>						
Age (years)						
18–34	1.00					
35–64	0.74	(0.46 to 1.20)	0.74	(0.46 to 1.18)	0.71	(0.44 to 1.15)
Marital status						
No	1.00					
Yes	0.86	(0.52 to 1.36)	0.86	(0.54 to 1.37)	0.89	(0.56 to 1.42)
Education						
Preliminary or lower	1.00					
Junior high school	0.30	(0.14 to 0.67)	0.35	(0.16 to 0.77)	0.34	(0.15 to 0.74)
High school	0.59	(0.28 to 1.26)	0.66	(0.31 to 0.38)	0.68	(0.32 to 1.42)
Undergraduate or graduate	0.54	(0.24 to 1.21)	0.61	(0.28 to 1.33)	0.61	(0.28 to 1.35)
Urbanisation						
Metropolitan areas	1.00					
General counties	0.88	(0.51 to 1.51)	0.87	(0.52 to 1.48)	0.87	(0.52 to 1.48)
Rural areas	1.01	(0.52 to 1.97)	1.03	(0.53 to 1.99)	1.01	(0.53 to 1.96)
Employed						
No	1.00					
Yes	1.20	(0.53 to 2.71)	1.41	(0.65 to 3.05)	1.46	(0.67 to 3.17)
<b>Economic factors</b>						
Personal monthly income						
<NT\$20K	1.00					
NT\$20–40K	1.31	(0.61 to 2.80)	–		–	
≥NT\$40K	1.23	(0.55 to 2.75)	–		–	
Ln personal monthly Income	–		1.03	(0.74 to 1.43)	1.00	(0.72 to 1.38)
Ln estimated retail cigarette price per pack	2.77	(1.14 to 6.72)	2.60	(1.08 to 6.26)	–	
Ln reported retail cigarette price per pack	–		–		3.96	(1.01 to 15.46)
<b>Smoking behaviour</b>						
Smoking >20 cigarettes daily						
No	1.00					
Yes	0.69	(0.36 to 1.34)	0.64	(0.33 to 1.25)	0.64	(0.32 to 1.25)
Monthly expenditure on smoking						
NT\$1–1000	1.00					
≥NT\$1000	2.34	(1.48 to 3.70)	–		–	
Ln monthly expenditure on smoking	–		1.51	(1.21 to 1.90)	1.52	(1.20 to 1.92)
<b>Other factors</b>						
Attitude toward cigarette taxation						
Favour	1.00					
No opinion	1.68	(0.94 to 3.01)	1.59	(0.90 to 2.81)	1.58	(0.90 to 2.80)
Oppose	1.64	(0.99 to 2.73)	1.69	(1.01 to 2.79)	1.66	(1.01 to 2.75)
Betelnut chewer						
No	1.00					
Yes	1.79	(1.09 to 2.91)	1.80	(1.11 to 2.90)	1.71	(1.06 to 2.77)
	$\chi^2(16)=50.88$		$\chi^2(15)=56.34$		$\chi^2(15)=52.54$	

CI, confidence interval; OR, odds ratio

Stratifying the group who smoked imported cigarettes showed differences between those who purchased smuggled cigarettes and the comparison group. One hundred eighty five male imported cigarette smokers had purchased smuggled cigarettes. The purchase of smuggled cigarettes was positively associated with a monthly expenditure on smoking higher than NT\$1000 (odd ratio (OR) 2.04, 95% confidence interval (CI) 1.54 to 3.39) and with chewing betel nuts (OR 1.79, 95% CI 1.09 to 2.91). Individuals who purchased smuggled cigarettes were more likely to be opposed to cigarette taxation (OR 2.02, 95% CI 1.29 to 3.18) or to hold no opinion on that policy (OR 1.71, 95% CI 1.03 to 2.85).

Table 2 shows the results from three multiple logistic regressions on the likelihood that one would purchase smuggled cigarettes among the 437 males who smoked imported cigarettes. Model 1 regresses the behaviour of purchasing smuggled cigarettes on estimated township level retail cigarette price in logarithmic form, on categorical monthly income, dichotomous monthly expenditure on smoking, and on other independent variables. Model 2 replaces monthly income and monthly expenditure with continuous variables, and model 3 evaluates self reported retail price in logarithmic form.

All three models showed consistent, strongly positive results linking the purchase of smuggled cigarettes with particular attitudes toward cigarette taxation and with chewing

betel nuts. Using model 2 as an example, we found that those who opposed cigarette taxation were 1.69 (95% CI 1.01 to 2.79) times more likely to purchase smuggled cigarettes than those who did not. Betel nut chewers were more likely to purchase smuggled cigarettes than their counterparts (OR 1.80, 95% CI 1.10 to 2.90).

The purchase of smuggled cigarettes was significantly associated with higher cigarette price, measured either as the estimated average township level price or as the self reported price. Table 2 shows that a 1% increase in cigarette price raised the likelihood of purchasing smuggled cigarettes (model 2: OR 2.60, 95% CI 1.08 to 6.26) and that the self reported price increase had an even greater effect (model 3: OR 3.96, 95% CI 1.01 to 15.46). The level of monthly expenditure on smoking was associated with buying smuggled cigarettes: those who spent more than NT\$1000 each month were more likely to purchase smuggled cigarettes than those in the reference group (model 1: OR 2.34, 95% CI 1.48 to 3.70). Models 2 and 3 showed that a 1% increase in monthly spending on smoking raised the likelihood of purchasing smuggled cigarettes (model 2: OR 1.51, 95% CI 1.21 to 1.90; model 3: OR 1.52, 95% CI 1.20 to 1.92). Purchases of smuggled cigarettes were not significantly associated with personal income.

Of 803 male smokers, 332 (41.34%) reported that their friends had bought smuggled cigarettes. They thought that their friends bought the smuggled products because they were cheaper (27.71%) or tasted better (57.53%). About 39% of the 803 male smokers pinpointed the betel nut vendor as the chief source of smuggled cigarettes.

## DISCUSSION

Cigarette smuggling becomes a more difficult problem when countries propose raising cigarette taxes either to increase tax revenue or to reduce smoking. Firstly, the number of smuggled cigarettes is hard to estimate—official and unofficial sources do not provide reliable data because the illegality makes the channel, carrier or sources difficult to track. Secondly, the identification of smuggled cigarettes is often biased by faked certification stamps on bogus cigarettes. Thirdly, on the demand side, the prevalence of purchasing smuggled cigarettes is likely to be under reported because consumers are unwilling to admit they have engaged in illegal behaviour. All these reasons explain why there are limited studies on smuggling in cigarette research.

Smuggling is a major concern when taxes increase the price of cigarettes. However, findings correlating high cigarette price and smuggling are contradictory<sup>20</sup> and most current knowledge on smuggling is based on descriptive information or is drawn from the analysis of aggregate country level or state level data. At this time, there is limited information or analysis of purchasing smuggled cigarettes at the individual level; particularly lacking is direct measurement of the effect that increased price has on purchasing smuggled cigarettes.

Our study is based on a national interview survey on cigarette consumption in CY 2000. Although it is subject to the limitations of under reporting and recall bias, it provides up-to-date information on smoking and important findings on cigarette smuggling from the demand side, both of which are particularly important to policymakers in Taiwan who have imposed new cigarette taxes after entering the WTO.

Economic factors are important—higher cigarette price is significantly associated with the purchase of smuggled cigarettes. This implies that smuggled cigarette demand will increase after raising taxes. The likelihood of buying smuggled cigarettes among smokers of imported cigarettes might grow as much as 56.8 times in response to the 21.85% increase in cigarette price after imposing the new cigarette tax (\$10 price increase on NT\$45.77 per pack of imported cigarettes).

Finally, betel nut vendors were identified as the main source of smuggled cigarettes. This study provides policymakers with

## What this paper adds

Smuggling is a major concern when taxes increase the price of cigarettes. However, findings correlating high cigarette price and smuggling are contradictory and most current knowledge on smuggling is based on descriptive information or is drawn from the analysis of aggregate country level or state level data. At this time, there is limited information or analysis of purchasing smuggled cigarettes at the individual level; particularly lacking is direct measurement of the effect that increased price has on purchasing smuggled cigarettes.

This study analyses the data drawn from a national interview survey on cigarette consumption in CY 2000. The results show that economic factors are important: higher cigarette price is significantly associated with the purchase of smuggled cigarettes. This implies that smuggled cigarette demand will increase after raising taxes. This study provides up-to-date information on smoking and important findings on cigarette smuggling from the demand side, both of which are particularly important to policymakers in Taiwan who have imposed new cigarette taxes after entering the World Trade Organization.

information which they can use to solve smuggling problems which arise in response to Taiwan's cigarette tax reform implemented on 1 January 2002.

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