Price sensitivity and smoking smuggled cigarettes

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Background: This study analysed the socio-economic factors that influence a smoker’s decision to consume smuggled cigarettes when faced with the rising costs of legal cigarettes. We hope our findings will help public health authorities create policies that simultaneously discourage consumption of smuggled cigarettes and lower overall smoking levels.

Methods: We conducted a national telephone survey from April to June 2004. We then applied Multiple Logistic Regression to the collected data to answer the following questions: do socio-economically disadvantaged smokers differ significantly in their characteristics? If so, which characteristics are most influential in the decision to purchase smuggled cigarettes?

Results: Smokers with a personal monthly income of less than New Taiwan dollar (NT$) 10 000 are 24% more likely to smoke smuggled cigarettes than are smokers who earn NT$10 000 or more. Smokers with the least amount of education are 21% more likely to smoke smuggled cigarettes than those with higher levels of education. Smokers with the most experience purchasing smuggled cigarettes are 31% more likely to do so than those with less experience. Finally, smokers who have a personal monthly income of less than NT$10 000 and the least amount of education are 54% more likely to smoke smuggled cigarettes than those with just one—or none—of these characteristics.

Conclusion: Low-income, poorly-educated smokers are most likely to purchase smuggled cigarettes. To alter such behaviour, government must understand the motivations and opinions of this population and create marketing messages targeted specifically to their needs.

Keywords: price sensitivity, smuggled cigarettes, socio-economic status, tobacco tax

Introduction

Due to the high costs of smoking on both individual health and overburdened health care systems, governments around the world have worked hard to lower consumption rates. One of their most successful tools has been the application of excise taxes on cigarettes. Research has shown that as the cost of a pack of cigarettes rises, the rate of consumption falls. An unintended consequence of this policy, however, has been the growing consumption of illegal cigarettes. Because they are unregulated, such products often have much higher levels of carcinogenic substances than legal cigarettes, making them even more detrimental to smokers’ health and adding substantially to the costs of already overburdened health care systems. In addition, governments around the world lose billions of dollars in tax revenue.

The purpose of this study is to understand the social and economic factors that lead smokers who are particularly sensitive to price to consume illegal cigarettes instead of legal ones. Our study focuses on smokers in Taiwan, but our hope is that governments around the world will be able to use the results to craft policies that successfully curtail the purchase of illegal cigarettes and lower overall smoking rates.

Background

In the effort to lower smoking rates, one of government’s most effective tools has been that of taxation.1–3 Numerous studies have shown that when the price of cigarettes rises as the result of excise taxes, consumption falls.4–11 The Framework Convention on Tobacco Control (FCTC) concurs. The purpose of the FCTC, which is the world’s first public health treaty, is to halt the worldwide epidemic of tobacco consumption. Negotiated by the 192 member states of the World Health Organization (WHO), it went into effect on 27 February 2005 after 40 countries signed the agreement. Paragraph 1, article 6 of the treaty states: ‘Cigarette price and cigarette excise tax are effective and important measures to reduce tobacco consumption’.

On the other hand, such measures represent a win-win opportunity because cigarette taxes simultaneously reduce tobacco consumption and increase government revenues that can be used to fund educational programs to further discourage smoking. On the other hand, an unintended consequence of such policies is that rising prices lead many smokers to turn to lower-priced, unregulated, illegally-manufactured cigarettes. In 1999, WHO estimated that nearly 1% of all cigarettes consumed in Egypt, 9% of those consumed in Hungary and fully 44% of those consumed in Israel were smuggled. In 2000, the World Bank conducted a survey on cigarette consumption and found that between 6% and 8.5% of all cigarettes purchased worldwide were smuggled.12 By 2006, the trading volume of illegal tobacco accounted for 10.7% of all tobacco products sold worldwide.

When discussing smuggled cigarettes, it is important to understand that they consist of two different categories: counterfeit and genuine. Genuine cigarettes have been manufactured by a legitimate factory, but they have not received any tax-paid markings. Counterfeit cigarettes have been manufactured in illegal, unregulated factories. The illegal trade in tobacco products has two particularly detrimental consequences. The first is that it costs governments around the

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world approximately $40–$50 billion annually in lost tax revenue. The second is that counterfeit cigarettes often have even more severe health consequences than legal cigarettes do. In tests conducted in England, researchers found that counterfeit cigarettes had 60% more coke tar, 80% more nicotine and 133% more carbon monoxide than legal cigarettes did. Researchers also discovered that they contained much higher levels of carcinogenic heavy metals. For example, they had three times the amount of arsenic, five times the amount of cadmium and six times the amount of lead.\textsuperscript{14,15}

The situation in Taiwan

Although lowering smoking levels is challenging for countries around the world, it has been particularly challenging in Taiwan because the price of cigarettes has traditionally been quite low when compared to prices in other Asian countries. If one takes the average amount of work needed to purchase a pack of cigarettes as a proxy for cigarette purchasing power, it would take an Indian 77 min of work, an Indonesian 62 min, a Chinese 56 min and a Taiwanese only 7–10 min to purchase a pack of domestic cigarettes.

In a study conducted by the Taiwan Bureau of Health Promotion (2007), it was found that approximately 1300 million people around the world smoked cigarettes in 2006; approximately 5 million of these or 0.38% (5/1300) of all smokers, were Taiwanese. Even though this figure is relatively small, 21.84% of all Taiwanese (39.56% of men and 4.12% of women) smoked cigarettes in 2006.\textsuperscript{16} Given the detrimental effects of smoking on longevity and life quality, such figures represent an enormous health burden. In fact, the annual healthcare and medical costs in Taiwan due to smoking are approximately NT$20 billion.

To reduce the number of smokers, the Taiwanese government implemented two new taxes on cigarettes in 2002. The first was a tobacco and wine tax of NT$11.8, and the second was a health and welfare tax of NT$5. As a result, each pack of 20 cigarettes was levied an overall tax of NT$16.8 (in addition to a 5% sales tax). This brought the retail cost of each pack of cigarettes to NT$42.2, around 40% of which consisted of taxes.

This level was still relatively low when compared with high-income countries. As a result, in 2006 the government increased the health and welfare tax from NT$5 to NT$10, which brought the retail price of each pack of cigarettes to approximately NT$51.8. The result of the twice-levied health surcharge on tobacco products was encouraging. The prevailing rate of male smokers went from 48.2% in 2002 to 39.56% in 2006. This implies that higher prices did lead some people to stop smoking. Consequently, increasing the health surcharge on tobacco tax has become one of Taiwan’s most important policy instruments for tobacco control.

Unfortunately, the number of illegal cigarettes smuggled into the country has skyrocketed during the same period. Worldwide export statistics suggest that smuggled cigarettes now account for ~14% of all cigarettes sold in Taiwan; this contrasts with 4% for China and 10% for Hong Kong.\textsuperscript{17} In 1986, the government intercepted approximately 2.4 million counterfeit packs of cigarettes; between 2000 and 2004, it intercepted over 15 million packs. Part of the challenge is that counterfeit cigarettes in Taiwan cost half the price of legal cigarettes. Another is the close geographic proximity of Taiwan to mainland China, where >85% of all counterfeit cigarettes in the world are manufactured.

The literature on smuggled cigarettes

To date, few studies have been conducted that focus on the behaviours of smokers who choose to purchase smuggled cigarettes. One reason for this is that respondents are hesitant to answer questions that deal with illegal activities. This is true in Taiwan as well, where most literature has focused on how the increase of cigarette prices affects consumption. However, a few recent studies have found that socio-economic factors, such as degree of addiction, personal income and level of education, play a strong role in individual decision-making.\textsuperscript{18–20} Tsai et al.\textsuperscript{21} as well as Lee and Chen\textsuperscript{22} researched why Taiwanese smokers purchased smuggled cigarettes and found that the major impetus was to avoid the high cost of legal cigarettes. Tsai et al.\textsuperscript{23} found that levying a health surcharge on tobacco caused cigarette prices to increase, which encouraged low-income smokers to turn to counterfeit cigarettes to maintain their smoking habits and control expenditures.

Such patterns have been noted in communities around the world. For example, Wiltshire et al.\textsuperscript{24} investigated smuggled cigarettes in two different socio-economic neighbourhoods in Edinburgh, Scotland, and found that smokers with lower incomes purchased counterfeit cigarettes to reduce their smoking costs. Taylor et al.\textsuperscript{25} studied the Hull and East Riding region in Yorkshire, England, and found that people who purchase smuggled cigarettes are heavy smokers, live in low-income areas and have high levels of addiction. Most of them do, however, have a job.

The purpose of this study

The purpose of this study was to collect relevant socio-economic statistical data regarding the relationship between individual smoking behaviour and smuggled cigarettes. We expect that the results will help to clarify why some smokers are more inclined to smoke smuggled cigarettes than others are. Our hope is that such information will help public health authorities create policies that will simultaneously discourage the increasing consumption of counterfeit cigarettes and lower overall smoking levels.

Methods

To evaluate the influence of social and economic factors on smokers’ decisions to buy smuggled cigarettes, the study classified price sensitivity degrees into four categories:

1. a price increase on a pack of legal cigarettes of less than NT$10;
2. an increase of NT$10 to NT$30;
3. an increase of more than NT$30; and
4. non-price reasons (such as quality).

A price increase of less than NT$10 indicates smokers who are sensitive to price. A non-price reason indicates smokers who are not sensitive to price.

The study contained three types of independent variables:

1. social demographic factors, such as a smoker’s age, education level, and degree of urbanization;
2. economic factors, such as personal monthly income; and
3. smoking characteristics, such as initial smoking age, cigarette consumption expenditures, smoking degree and experience purchasing smuggled cigarettes.

The age of the smoker was calculated according to the year of birth.

To collect the raw data, we conducted a telephone survey from April to July 2004, during which we asked the following question: ‘If the current market price per pack of cigarettes is approximately NT$50, how much of a price increase would make you want to buy or smoke smuggled cigarettes?’
Subjects were chosen according to the population and ratio of male to female smokers in Taiwan. They consisted of current smokers over the age of 15 and came from 23 counties and cities in Taiwan. For the purposes of this study, we defined current smokers as 'people who have smoked at least 100 cigarettes during their lifetime and who currently smoke every day or every other day'. We defined smuggled cigarettes as 'illegally smuggled, untaxed cigarettes or brands without tax-paid markings, including domestic and foreign products'.

The study obtained 1345 valid survey samples. According to these samples, 4.75% of current smokers (n = 64) selected 'cigarette price increasing by NT$5–$10'; 3.79% (n = 51) selected 'cigarette price increasing by NT$5 to $30'; 5.2% (n = 70) selected 'cigarette price increasing by over NT$31'; 61.85% (n = 832) chose 'not to buy smuggled cigarettes due to quality'; 24.38% (n = 328) selected 'other reasons' (including smoking cessation, smoking smuggled cigarettes regularly, having no ideas, etc.).

Many respondents said they chose not to buy smuggled cigarettes. This points to a limitation in our study, which failed to capture the reasons for respondents’ decisions not to buy smuggled cigarettes. Consequently, this will require additional study in the future. After eliminating data loss and the responses of interviewees who had stopped smoking, who smoked smuggled cigarettes often, or who had no ideas, 997 valid samples were obtained for empirical analysis.

Results

Table 1 summarizes the odds ratios (OR) and 95% Confidence intervals associated with demographic information and smoking characteristics for price-sensitive smokers. It also presents both single and interactive effects. Analysis of the OR indicates that smokers who have experience purchasing smuggled cigarettes (OR = 2.968), a personal monthly income that is less than NT$10 000 (OR = 1.052), and a junior high school education or below as price sensitivity declines. This result could be contradictory to common understanding; in addition, it is possibly biased because we did not adjust for smokers who have both low levels of education and higher income levels. Therefore, we use the interactive terms of low income and lower education level as well as low income and purchasing experience of smuggled cigarettes to resolve this potential problem; at the same time, we exclude the single factors of purchasing experience and lower education level. The interactive effect is extremely significant for smokers with low incomes and less education as well as for low incomes and purchasing experience.

Figures 1 and 2 illustrate the relationship between the probability of inclination to smoke smuggled cigarettes and levels of increase in cigarette price (less than NT$10, NT$10 to NT$30 and more than NT$30) for smokers with different personal monthly income levels and education levels. Overall, there is a linear relationship between less education, lower personal income and purchasing experience.

In Table 2, the OR of single effects on smokers indicates that there is an increasing probability of those who have purchasing experience of smuggled cigarettes and junior high school education or below as price sensitivity declines. This implies that smokers whose personal monthly income is less than NT$10 000 are more likely to smoke smuggled cigarettes due to price effects than smokers with monthly incomes of more than NT$10 000.

However, as shown in figure 2, smokers with a junior high school education or below and price sensitivity have a 48% probability of smoking smuggled cigarettes. This compares to a probability of 2% for less price-sensitive smokers who have a senior high school education. The findings clearly indicate that smokers who have a junior high school education or below and who have a high price sensitivity to cigarette price increases are the most likely category to smoke smuggled cigarettes.

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Single effect</th>
<th>Interactive effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urbanization degree of residence</td>
<td>0.738 (0.342–1.593)</td>
<td>0.724 (0.357–1.469)</td>
</tr>
<tr>
<td>Initial smoking age</td>
<td>0.927 (0.891–0.964)**</td>
<td>0.954 (0.923–0.987)***</td>
</tr>
<tr>
<td>Cigarette consumption expenditure</td>
<td>1.000 (0.999–1.000)**</td>
<td>1.000 (0.999–1.000)</td>
</tr>
<tr>
<td>Light smoker</td>
<td>0.525 (0.278–0.992)**</td>
<td>0.873 (0.496–1.538)</td>
</tr>
<tr>
<td>Having purchasing experience of smuggled cigarettes</td>
<td>2.968 (1.832–4.811)***</td>
<td>–</td>
</tr>
<tr>
<td>Age&lt;25</td>
<td>0.045 (0.006–0.358)**</td>
<td>0.017 (0.002–0.132)***</td>
</tr>
<tr>
<td>26&lt;Age&lt;65</td>
<td>0.440 (0.229–0.879)**</td>
<td>0.333 (0.179–0.622)**</td>
</tr>
<tr>
<td>46&lt;Age&lt;65</td>
<td>0.805 (0.465–1.394)</td>
<td>0.915 (0.542–1.544)</td>
</tr>
<tr>
<td>Personal monthly income&lt;NT$10 000</td>
<td>1.052 (0.597–1.855)</td>
<td>–</td>
</tr>
<tr>
<td>10 001&lt;Personal monthly income&lt;NT$30 000</td>
<td>1.201 (0.640–2.253)</td>
<td>2.653 (1.540–4.571)***</td>
</tr>
<tr>
<td>30 001&lt;Personal monthly income&lt;NT$50 000</td>
<td>0.432 (0.195–0.956)**</td>
<td>0.818 (0.404–1.657)</td>
</tr>
<tr>
<td>Junior high school education or below</td>
<td>10.456 (5.627–19.431)***</td>
<td>–</td>
</tr>
<tr>
<td>Personal monthly income&lt;NT$10 000 × Having purchasing experience of smuggled cigarettes</td>
<td>0.135 (0.038–0.475)**</td>
<td>–</td>
</tr>
<tr>
<td>–</td>
<td>3.343 (1.633–6.842)***</td>
<td></td>
</tr>
<tr>
<td>Personal monthly income&lt;NT$10 000 × Junior high school education</td>
<td>–</td>
<td>2.630 (1.510–4.582)***</td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.762</td>
<td>0.718</td>
</tr>
</tbody>
</table>

Number of observations | 997

95% CIs are in parentheses. Significant at **P<5% and ***P<1%, respectively.
We conducted an empirical evaluation of probability and the influences that incline price sensitive smokers to purchase smuggled cigarettes in response to price increases of legal cigarettes. The evaluation focuses on demographic factors and consumers' smoking characteristics, thereby overcoming the drawbacks of previous studies. Our results indicate that 24% of price sensitive smokers with a personal income of less than NT$10,000 are likely to smoke smuggled cigarettes, as are 21% of price sensitive smokers with low levels of education. Smokers who belong to both the income less than NT$10,000 category and to low level of education are 54% more likely to smoke smuggled cigarettes in response to price increases than those in other categories. This study also finds that light smokers with low levels of addiction are less likely to purchase smuggled cigarettes than are heavy smokers, who have a higher probability of buying smuggled cigarettes to save money and continue their smoking habits. This result is consistent with that found in studies conducted by Taylor et al.\textsuperscript{25} and Chaloupka and Warner.\textsuperscript{26}

The results of this study indicate that price sensitive smokers with low levels of income and education are strongly inclined to smoke smuggled cigarettes as the price of legal cigarettes rises. In the effort to lower overall rates of smoking, it is critical that governments apply different marketing strategies targeted at different socio-economic groups. It is especially important

Table 2 OR for key factors explaining different price sensitive smokers inclination to smoke smuggled cigarettes

<table>
<thead>
<tr>
<th>Single effect</th>
<th>Interactive effect</th>
<th>Cigarette price increase level</th>
<th>More than NT$30</th>
<th>Less than NT$10</th>
<th>NT$10–NT$30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urbanization degree of residence</td>
<td>0.727 (0.263–2.008)</td>
<td>0.786 (0.265–2.336)</td>
<td>0.999 (0.998–0.999)***</td>
<td>0.999 (0.998–0.999)***</td>
<td>0.999 (0.998–0.999)***</td>
</tr>
<tr>
<td>Cigarette consumption expenditure</td>
<td>0.996 (0.996–0.996)***</td>
<td>0.998 (0.998–0.998)***</td>
<td>0.996 (0.996–0.996)***</td>
<td>0.996 (0.996–0.996)***</td>
<td>0.996 (0.996–0.996)***</td>
</tr>
<tr>
<td>Light smoker</td>
<td>0.040 (0.023–0.071)***</td>
<td>0.039 (0.021–0.074)***</td>
<td>0.053 (0.031–0.091)***</td>
<td>0.051 (0.030–0.089)***</td>
<td>0.116 (0.077–0.175)***</td>
</tr>
<tr>
<td>Having purchasing experience of smuggled cigarettes</td>
<td>2.765 (1.571–5.038)**</td>
<td>3.171 (1.735–5.782)**</td>
<td>0.771 (0.372–1.797)***</td>
<td>0.000 (0.000–0.000)</td>
<td>0.000 (0.000–0.000)</td>
</tr>
<tr>
<td>Age&lt;25</td>
<td>0.000 (0.000–0.001)</td>
<td>0.000 (0.000–0.001)</td>
<td>0.000 (0.000–0.001)</td>
<td>0.000 (0.000–0.001)</td>
<td>0.000 (0.000–0.001)</td>
</tr>
<tr>
<td>Personal monthly income&lt;NT$10,000</td>
<td>8.207 (4.440–15.171)***</td>
<td>4.860 (2.652–9.490)***</td>
<td>1.962 (1.373–2.798)***</td>
<td>1.942 (2.791–10.423)***</td>
<td>0.870 (0.399–1.898)</td>
</tr>
<tr>
<td>Senior high school</td>
<td>1.010 (0.525–1.944)</td>
<td>1.010 (0.525–1.944)</td>
<td>1.010 (0.525–1.944)</td>
<td>1.010 (0.525–1.944)</td>
<td>1.010 (0.525–1.944)</td>
</tr>
</tbody>
</table>

95% CIs are in parentheses. Significant at *P < 0.10%, **P < 0.5% and ***P < 1%, respectively.
that governments understand the motivations, attitudes, opinions and behaviours of people with low levels of income and education so they can develop effective strategies that successfully help this segment of the population stop resorting to smuggled cigarettes and, indeed, stop smoking altogether.

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Conflicts of interest: None declared.

Key points

- Evaluating the probabilities and influences on price-sensitive smokers who buy smuggled cigarettes in response to increases in the price of legal cigarettes: demographic factors and characteristics.
- Providing an important reference for public health authorities around the world who are designing policies to prevent the purchase of smuggled cigarettes and to encourage people to stop smoking altogether.

References


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