Cigarette tax avoidance and evasion: findings from the International Tobacco Control Policy Evaluation (ITC) Project

G Emmanuel Guindon,[1,2,3] Pete Driezen,[3] Frank J Chaloupka,[4,5,6] Geoffrey T Fong[7,8]

[1]Département d'administration de la santé, Faculté de médecine, Université de Montréal, Montréal, Quebec, Canada
[2]Institut de recherche en santé publique de l'Université de Montréal (IRSPUM), Université de Montréal, Montréal, Quebec, Canada
[3]Propel Centre for Population Health Impact, University of Waterloo, Waterloo, Ontario, Canada
[4]Department of Economics, University of Illinois at Chicago, Chicago, Illinois, USA
[5]National Bureau of Economic Research (NBER), Cambridge, Massachusetts, USA
[6]Institute for Health Research and Policy, University of Illinois at Chicago, Chicago, Illinois, USA
[7]Department of Psychology, University of Waterloo, Waterloo, Ontario, Canada
[8]Ontario Institute for Cancer Research, Toronto, Ontario, Canada

Correspondence to
Professor G Emmanuel Guindon, Département d'administration de la santé, Faculté de medicine, Université de Montréal, C.P.6128, succ. Centre-ville, Montréal, QC, Canada H3C 3J7; emmanuel.guindon@umontreal.ca

ABSTRACT

Background Decades of research have produced overwhelming evidence that tobacco taxes reduce tobacco use and increase government tax revenue. The magnitude and effectiveness of taxes in reducing tobacco use provide an incentive for tobacco users, manufacturers and others, most notably criminal networks, to devise ways to avoid or evade tobacco taxes. Consequently, tobacco tax avoidance and tax evasion can reduce the public health and fiscal benefit of tobacco taxes.

Objectives First, this study aims to document, using data from the International Tobacco Control Policy Evaluation Project (ITC), levels and trends in cigarette users' tax avoidance and tax evasion behaviour in a sample of 16 low-, middle- and high-income countries. Second, this study explores factors associated with cigarette tax avoidance and evasion.

Methods We used data from ITC surveys conducted in 16 countries to estimate the extent and type of cigarette tax avoidance/evasion between countries and across time. We used self-reported information about the source of a smoker's last purchase of cigarettes or self-reported packaging information, or similar information gathered by the interviewers during face-to-face interviews to measure tax avoidance/evasion behaviours. We used generalised estimating equations to explore individual-level factors that may affect the likelihood of cigarette tax avoidance or evasion in Canada, the USA, the UK and France.

Findings We found prevalence estimates of cigarette tax avoidance/evasion vary substantially between countries and across time. In Canada, France and the UK, more than 10% of smokers reported last purchasing cigarettes from low or untaxed sources, while in Malaysia some prevalence estimates suggested substantial cigarette tax avoidance/evasion. We also found important associations between household income and education and the likelihood to engage in tax avoidance/evasion. These associations, however, varied both in direction and magnitude across countries.

INTRODUCTION

There is overwhelming evidence that tobacco taxes reduce tobacco use, save lives and increase government tax revenue.[1–3] The magnitude and effectiveness of taxes at reducing tobacco use provide an incentive for tobacco users, manufacturers and others, most notably criminal networks, to devise ways to avoid or evade tobacco taxes. Tax avoidance by tobacco users involves legal purchasing behaviour in order to pay less or no taxes. Examples include cross-border shopping, duty-free shopping and internet purchases. Tobacco manufacturers can also engage in tax avoidance by changing their products and prices with the objective of reducing their tax liability. Tax evasion involves illegal methods of avoiding tobacco taxes. Such illegal activities include illicit trade or production of genuine[i] or counterfeit tobacco products.[4]

Tobacco tax avoidance and evasion pose an array of challenges. Relatively inexpensive, licit or illicit, tobacco products undermine public policies that seek to render tobacco products less affordable. Moreover, tax evaded cigarettes may be sold in packs or plastic bags which do not provide the information which is required by regulations, such as health warnings and information on toxic emissions, as is the case in Canada.[5] In turn, weak tax administration can undermine the public health objectives of tobacco control measures. Tobacco tax avoidance and evasion also decrease government revenue available for health and social programmes, can result in increased criminal justice expenditures, and can provide unmonitored access to cigarettes for the youth.[6] Although the magnitude of the tobacco tax avoidance and evasion problem is challenging to quantify, it remains an intractable issue which merits attention due to the many implications for policy design, government revenues and public health.

The magnitude of cigarette tax avoidance and evasion can be estimated by contrasting estimates of legal cigarettes sales based on production, trade or tax revenue data with consumption estimates based on survey data while taking into account under-reporting.[7][8] The tax authorities of the UK have used this method extensively to estimate the extent of cigarette tax avoidance/evasion.[9][10] This method is also being used in Canada in an attempt to identify trends in cigarette contraband.[11][12] Additionally, Stehr[13] used a variant of this approach to examine the tax avoidance response to tax changes in the USA.

Self-reported information obtained from survey data can also be used to measure the level of cigarette tax avoidance/evasion. In many countries, information about the source of a smoker's last or usual purchase of cigarettes can provide key tax avoidance/evasion information (eg, First Nations reserves in Canada, out of state in the USA and out of country in the European Union (EU)). This

---

[i]The production of genuine brands may be illegal if legal manufacturers declare only a fraction of their production to the tax authorities.[4]

approach has been used extensively in Canada[14–17] and also in the USA[18–20] and the UK.[21] Self-reported packaging information, or similar information gathered by the interviewers during face-to-face interviews or mail-in pack surveys can also provide key insights into tax avoidance/evasion behaviours. Examples include non-standard or missing health warnings, tax stamps or authenticity labels. For example, in Thailand, an examination of the health warnings (ie, the absence of warnings or warnings in a language other than Thai) during face-to-face interviews revealed if the cigarettes were likely to have been legally purchased or not.[22] A similar approach was used in Taiwan relying on self-reports from telephone interviews, using cigarette packs not bearing the tax seal as an indicator of tax evasion.[23] An inspection of discarded cigarette packs can also be used to determine whether all taxes have been paid.[ii] This approach has been recently used in France,[24] Canada,[25] the USA[26 27] and the UK.[28]

Our first objective is to document for a large number of countries, using novel data from the International Tobacco Control Policy Evaluation Project (ITC), levels and trends in cigarette users' tax avoidance and tax evasion behaviour. Our second objective is to explore factors associated with cigarette tax avoidance/evasion.

DATA AND METHODS
We used data from ITC surveys conducted in high-, mid- and low-income countries between 2002 and 2011; ITC surveys are longitudinal cohort surveys of tobacco use that are designed to assist policy makers in the implementation of strong evidence-based tobacco control policies. First, we used data from the first eight waves of the ITC Four Country survey (Australia, Canada, USA and UK) conducted in 2002, 2003, 2004, 2005/2006, 2006/2007, 2007/2008, 2008/2009 and 2010/2011. Second, we used data from ITC surveys conducted in four European countries: France (2006/2007, 2008), Ireland (2003/2004, 2004/2005, 2006), Scotland (2006) and the Netherlands (2008, 2010, 2011). Third, we used data from ITC surveys conducted in seven low- and middle-income countries: Bangladesh (2009, 2010), China (2006, 2007/2008, 2009/2010), Malaysia and Thailand (2005, 2006/2007, 2008, 2009), Mexico (2006, 2007, 2008/2009, 2010, 2011), Uruguay (2006, 2008/2009, 2010/2011) and Mauritius (2009, 2010, 2011).[iii] In all ITC countries (with the exception of China and Mexico[iv]), probabilistic sampling methods were employed to obtain nationally representative samples of smokers. Stratified sampling designs were employed in high-income countries where landline telephone penetration is high. Multi-stage cluster designs were employed

in low- and middle-income countries. Sampling strata were defined by geographic regions within each country. In some countries, mixed survey modes were used: in the Netherlands and in the most recent wave of data collected in the ITC Four Country survey, both telephone interviewing and web-based interviewing were employed; in Malaysia, face-to-face and telephone interviewing methods were used. Sampling weights were computed for each wave of each survey within all ITC countries so that results are nationally representative of smokers. Sampling weights account for survey non-response. More details on ITC's conceptual framework and methodology are provided by Fong et al[29] and Thompson et al.[30]

We present prevalence estimates of cigarette tax avoidance/evasion using two approaches. First, we followed Hyland et al[31] and used responses to the question: 'where did you last buy cigarettes for yourself?' to identify low or untaxed sources of cigarettes that may represent tax avoidance/evasion behaviour. We present data for individuals who responded that their last source for cigarettes was either a First Nations/Indian reserve, out of state/province/country, a duty-free outlet, a direct purchase (mail, telephone or internet), 'someone else' such as an independent seller or a military commissary. For comprehensiveness, we also present data, when relevant, for individuals who reported that their last source for cigarettes was from a friend or a relative, or who reported not knowing or refused to answer. With the exception of ITC-Netherlands, all ITC surveys include a follow-up open-ended question for individuals who responded 'other' to the question that pertains to the source of their last cigarette purchase. All open-ended responses were manually examined and recoded when possible. We were unable to recode only a negligible number of responses; such responses were coded as 'other'. Second, we present estimates based on self-reported packaging information or similar information gathered by the interviewers during face-to-face interviews. We used responses to the question (or a variant of the question): 'do you have an empty pack handy? I need to get some information about the cigarettes you smoke? If not, can you tell me if your cigarette pack has: a standard warning label, a tax stamp, security ink ….' Data are presented per source of information (ie, self-reported or interviewers). All tax avoidance/evasion prevalence estimates presented were weighted using sampling weights. The two approaches described above were not practicable in all countries; hence, we present estimates from a subset of the surveys. For each country or groups of countries, we present all available data that may represent cigarette tax avoidance/evasion. For high-income countries (Australia, Canada, France, Ireland, the Netherlands, Scotland, the UK and the USA) and for Mexico and Uruguay, we present estimates that are based on the source of a smoker's last purchase of cigarettes. For Bangladesh, China, Malaysia, Mauritius, Thailand and Uruguay, we present estimates that are based on self-reported packaging information or similar information gathered by the interviewers during face-to-face interviews.

In addition to presenting prevalence estimates, we used generalised estimation equations (GEE) to explore factors that may affect the likelihood of cigarette tax avoidance or evasion. We used a binary indicator of potential cigarette tax avoidance/evasion defined as follows: 1 if individuals reported that their last source for cigarettes was either a First Nations/Indian reserve, out of state/province/country, a duty-free store, a military commissary, someone else or a direct purchase (mail, telephone or internet); 0 otherwise. We excluded individuals who reported that their last source for cigarettes was from a friend or a relative or who reported not knowing or refused to answer. We did not

---

[ii]It is worth noting that the littered pack approach will likely overstate the extent of tax avoidance/evasion given that it picks up commuting, tourism, etc. that have nothing to do with tax avoidance. Moreover, smokers who litter may be more likely to engage in tax avoidance/evasion.

[iii]ITC surveys were also conducted in Germany (2007, 2009, 2011), New Zealand (2007/2008, 2008/2009) and in the Republic of Korea (2005, 2008, 2010): ITC-Germany omitted the most useful response categories to identify low or untaxed sources of cigarettes in all its waves; ITC-New Zealand omitted the most useful question in wave 2 while nearly 90% of respondents failed to answer in wave 1; and, estimates of tax avoidance/evasion in the Republic of Korea were not distinguishable from zero. Consequently, we do not present or use any of ITC-Germany, ITC-New Zealand and ITC-Korea data in our analyses.

[iv]ITC-China was conducted in six cities (Beijing, Changsha, Guangzhou, Shanghai, Shenyang and Yinchuan); ITC-Mexico was conducted in four cities (Mexico City, Guadalajara, Tijuana and Ciudad Juárez).

use data obtained from self-reported packaging information or similar information gathered by the interviewers during face-to-face interviews.[v] We performed this analysis using data from the following countries: Canada, the USA, the UK and France. We focus on these countries because the prevalence of tax avoidance/evasion appears to be important.[vi] We examined associations between cigarette tax avoidance or evasion and the following individual-level factors: socioeconomic status using country-specific categorical measures of household income (low, moderate, high, refused/don't know) and education (low, moderate, high, refused/don't know); categorical measures of sex, daily cigarette smoking intensity (1–10, 11–20, 21–30, >30 cigarettes/day, refused/don't know), time to first cigarette (measured in minutes, >60, 31–60, 6–30, <5, refused/don't know) and quit intention (yes, no, don't know), and a continuous measure of age and age squared (measured in units of 10 years).

We used GEE with a logit link, a binomial family, an unstructured working correlation structure (ie, no constraints are placed on correlations between repeated observations on individuals over time) and robust SEs. The above specification did not converge for the USA; we instead used an exchangeable working correlation structure (ie, all correlations within a cluster (ie, an individual) were constrained to be identical). All models are estimated using Stata/MP V.12.1 for Macintosh.

RESULTS

Tables 1–3 present estimates of tax avoidance or evasion based on respondents' self-reported source of their last purchase of cigarettes. Table 1 presents data for Canada, the USA, the UK and Australia for eight survey waves conducted between 2002 and 2010/2011. It is important to note that it is difficult to disentangle tax avoidance from tax evasion. For example, the estimates presented in table 1 are more likely to represent tax avoidance then tax evasion, with the exception of Canada where cigarettes are likely purchased illegally from First Nations reserves. In the USA, purchases from Indian reservations and from out of state are, more often than not, legally permitted; similarly, out of country and duty-free purchases are generally legal in the UK. Estimates vary substantially between countries and across time within countries. Tax avoidance/evasion appears highest in the UK: about 12.5%–17% of respondents, between 2002 and 2010/2011, reported having last purchased cigarettes from a low or untaxed source.[vii] These data suggest a downward trend between May–September 2003 and 2010/2011.

A decade ago, cigarette tax avoidance/evasion appeared to be relatively unimportant in Canada as only about 3% of respondents reported having last purchased cigarettes from a low or untaxed source. Our estimates, however, suggest a large increase—more than fourfold—between 2002 and 2008/2009 followed by a small decrease between 2008/2009 and 2010/2011. Cigarette tax avoidance/evasion in the USA appears to

have remained fairly stable during the last decade, oscillating between 5.3% and 7.6%. Unsurprisingly, because of its geographic situation and limited price differentials between states, cigarette tax avoidance/evasion appears negligible in Australia. As with levels and trends in cigarette tax avoidance/evasion, the type of cigarette tax avoidance/evasion is quite heterogeneous between countries. In Canada and the USA, low/untaxed sources of cigarettes are primarily First Nations/Indian reserve purchases while in the UK, they are primarily out of country and duty-free purchases.

Table 2 presents data for France, the Netherlands, Ireland and Scotland; table 3 presents data for Mexico and Uruguay. Out of country (but inside the EU) cigarette purchases are substantial in France and appear to be growing: 12.8% of smokers in 2006/2007 and 16.7% in 2008. In the Netherlands, Ireland and Scotland, cigarette purchases from low or untaxed sources are low but not negligible (between about 1% and 3.8% from a source outside the country). In both Netherlands and Ireland, there appears to be an upward trend in out of country purchases. Duty-free purchases are not substantial but are as high as 1.5%–3.2% in France, Ireland and Scotland. Out of country, duty-free and internet purchases appear to be negligible in Mexico between 2006 and 2011, and Uruguay between late 2006 and early 2011 (table 3).

Tables 4 and 5 present prevalence estimates of tax avoidance/evasion based on self-reported packaging information or similar information gathered by the interviewers during face-to-face interviews. Table 4 presents descriptive data for Malaysia and Thailand. The estimates suggest little evidence of tax avoidance/evasion in Thailand but substantial and increasing tax avoidance/evasion in Malaysia. Estimates for waves 2 and 3 of ITC-Malaysia also suggest self-reported information may not be reliable: estimates based on self-reports are substantially different than estimates based on pack inspection. Table 5 presents data for Mauritius, Uruguay, China and Bangladesh. The estimates suggest an important decrease in cigarette tax avoidance/evasion between early 2005 and the first half of 2008 in Mauritius and, on the whole, an increase in Uruguay. As was the case with data from Malaysia, these estimates suggest self-reported information may not be reliable. For example, the estimates based on self-reports are appreciably higher in waves 1 and 2 but lower in wave 3 in Mauritius. Estimates for China suggest substantial cigarette tax avoidance/evasion. These estimates, however, should be treated with caution. The high number of respondents and more importantly interviewers who reported or recorded not knowing suggests potentially important difficulties during the data collection process. Estimates from Bangladesh, based on a small subsample (about 16%) of respondents who provided a cigarette pack to the interviewers, suggest low but perhaps increasing cigarette tax avoidance or evasion.

Table 6 presents the results of the GEE models. In Canada, we find a statistically significant negative association between household income and the odds of engaging in cigarette tax avoidance/evasion (middle- and high-income are jointly significant; Wald test: $\chi^2 = 7.6$ and p=0.020) while in the UK we find a statistically significant positive association (Wald test: $\chi^2 = 41.4$ and p<0.001). In the USA, we find that individuals with higher education have higher odds of engaging in cigarette tax avoidance/evasion (middle- and high-education are jointly significant; Wald test: $\chi^2 = 16.2$ and p<0.001). More specifically, in the USA the odds of engaging in cigarette tax avoidance/evasion for individuals with moderate and high levels of education are 1.6 and 1.5 times higher than those of individuals with low levels of

[v]Although the prevalence of tax avoidance/evasion appears to be important in China, Malaysia, Mauritius, Thailand and Uruguay, we do not use data from these countries because of the differences we observed between estimates based on self-reports and estimates based on pack inspections.
[vi]Data on last purchased cigarettes from a low or untaxed source are also available from Australia, Ireland, the Netherlands, Mexico and Uruguay; in these countries, the prevalence of cigarette tax avoidance/evasion is small to negligible.
[vii]Estimates for the UK more likely represent tax avoidance rather than tax evasion as most of the sources of last cigarette purchases are out of state/province/country and duty free.

Table 1 Percentage of respondents reporting the source of their last purchase of cigarettes: Canada, the USA, the UK and Australia

Four Country survey	Wave 1 (November–December 2002) %	Wave 2 (May–September 2003) %	Wave 3 (June–December 2004) %	Wave 4 (October 2005–January 2006) %	Wave 5 (October 2006–February 2007) %	Wave 6 (September 2007–February 2008) %	Wave 7 (October 2008–July 2009) %	Wave 8 (July 2010–June 2011) %
Canada								
First Nations reserve	2.0	2.6	3.5	6.0***	7.8*	10.3*	10.4	9.5
Out of state/province/country	0.3	0.3	0.3	0.3	0.1	0.1	0.0	0.4
Duty free	0.6	0.7	0.7	0.4	0.7	0.7	0.7	0.7
Any direct purchase (mail, phone or internet)	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.2
Someone else (eg, independent seller)	0.2	0.1	0.5	0.7	0.6	1.1	0.5	0.4
Military	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Friends/relatives	0.1	0.3	1.2**	0.5	0.7	0.7	1.1	0.3*
Refused/don't know/other	0.0	0.3*	0.0*	0.1	0.0	0.1	0.4	0.2
n	2199	2014	1889	1774	1757	1727	1507	1245
USA								
Indian reservation	2.6	3.0	2.6	2.6	3.0	3.0	4.4	4.4
Out of state/province/country	0.7	0.4	0.8	0.2**	0.4	0.2	1.3**	0.8*
Duty free	0.4	0.2	0.2	0.4	0.3	0.0	0.1	0.4
Any direct purchase (mail, phone or internet)	0.8	1.4	1.9	1.0	0.6	0.9	1.0	0.9
Someone else (eg, independent seller)	0.0	0.0	0.2	0.2	0.6	0.4	0.1	0.0
Military	0.7	1.0	1.0	1.0	0.5	0.6	0.3	0.5
Friends/relatives	0.1	0.1	0.4	0.4	0.2	0.1	0.2	0.3
Refused/don't know/other	0.1	0.3	0.1	0.0	0.1	0.0	0.1	0.0
n	2123	1909	1924	1792	1820	1766	1516	1267
UK								
Out of state/province/country	8.6	10.4	9.7	7.8*	7.1	9.2	5.1***	5.4
Duty free	4.4	5.5	5.1	6.3	6.0	3.4	6.8***	5.8
Any direct purchase (mail, phone or internet)	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Someone else (eg, independent seller)	0.6	1.2	1.6	1.2	1.0	1.0	2.5	1.2
Friends/relatives	2.2	2.0	1.8	2.5	2.6	2.2	3.5	3.8
Refused/don't know/other	0.1	0.2	0.3	0.0	0.1	0.0	0.0	0.0
n	2400	1933	1839	1738	1721	1665	1486	975
Australia								
Out of state/province/country	0.1	0.2	0.1	0.1	0.2	0.2	0.0	0.5
Duty free	0.7	0.5	0.6	1.2	0.5	0.9	1.4	1.5
Any direct purchase (mail, phone or internet)	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0
Someone else (eg, independent seller)	0.2	0.1	0.4*	0.2	0.6	0.3	0.2	0.4
Friends/relatives	0.1	0.4	0.2	0.3	0.1	0.2	0.4	0.3
Refused/don't know/other	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
n	2304	1975	1851	1714	1823	1805	1371	1116

n Represents the total number of valid responses (ie, the denominator). *, ** and ***: significant difference at 5%, 1% and 0.1% with previous time period. These should be interpreted with great caution as the number of comparisons is absurdly high.

Table 2 Percentage of respondents reporting the source of their last purchase of cigarettes: France, the Netherland, Ireland and Scotland

	France		The Netherlands			Ireland			Scotland
	Wave 1 (December 2006–January 2007)	Wave 2 (September–November 2008)	Wave 1 (March–April 2008)	Wave 4 (May–June 2010)	Wave 5 (May–June 2011)	Wave 1 (December 2003–January 2004)	Wave 2 (December 2004–January 2005)	Wave 3 (February–March 2006)	Wave 3 (February–March 2006)
	%	%	%	%	%	%	%	%	%
Out of country (inside EU)	12.8	16.7***	1.4	2.7**	2.9	0.8	1.3	2.8	3.7
Out of country (outside EU)	1.0	1.6	0.1	0.5	0.9				
Duty free	1.5	1.5	0.7	0.3	0.8	1.7	3.2**	1.8	2.2
Any direct purchase (mail, phone or internet)	0.0	0.1	0.0	0.0	0.1	0.2	0.0	0.5	0.2
Someone else (eg, independent seller)	0.5	0.7	0.4	0.6	0.5	0.4	0.3	1.0	1.0
Refused/don't know/other†	0.1	0.0	1.3	2.4**	3.6	0.3	0.1	0.2	0.2
n	1735	1540	2224	1723	1672	1071	912	578	507

†Unlike other ITC surveys, the Netherland surveys do not contain a follow-up open-ended question for individuals who responded 'other' as the source of their last purchase of cigarettes. See text for more details; n represents the total number of valid responses (ie, the denominator). *, ** and ***: significant difference at 5%, 1% and 0.1% with previous time period. These should be interpreted with great caution as the number of comparisons is absurdly high.
EU, European Union; ITC, International Tobacco Control.

Table 3 Percentage of respondents reporting the source of their last purchase of cigarettes: Mexico and Uruguay

	Mexico					Uruguay		
	Wave 1 (September–November 2006)	Wave 2 (October–November 2007)	Wave 3 (October 2008–January 2009)	Wave 4 (January–February 2010)	Wave 5 (April–May 2011)	Wave 1 (October–December 2006)	Wave 2 (October 2008–February 2009)	Wave 3 (October 2010–January 2011)
	%	%	%	%	%	%	%	%
Out of country	0.6	0.7	0.2	1.3	0.4	0.0	0.2	0.6
Duty free	1.0	0.2*	0.1	1.3	0.3	0.2	0.7	0.3
Internet	0.0	0.0	0.0	0.9	0.0	0.2	0.0	0.0
Refused/don't know	0.1	0.4	0.7	0.7	0.0	0.0	0.1	0.1
n	1077	941	1854	394	821	887	1294	1224

n Represents the total number of valid responses (ie, the denominator). *, ** and ***: significant difference at 5%, 1% and 0.1% with previous time period. These should be interpreted with great caution as the number of comparisons is absurdly high.

i17

Table 4 Percentage of smokers' cigarette packs showing evidence of possible tax avoidance or evasion in Malaysia and Thailand

| | Malaysia | | | | | | Thailand | | | | | | | |
| | Wave 1 (January–March 2005) | | Wave 2 (August 2006–June 2007) | | Wave 3 (January–August 2008) | | Wave 1 (January–March 2005) | | Wave 2 (August 2006–June 2007) | | Wave 3 (January–August 2008) | | Wave 4 (April–November 2009) | |
Source of information	Pack %	Self-report %	Pack %	Self-report %	Pack %	Self-report %	Pack %	Self-report %	Pack %	Self-report %	Pack %	Self-report %	Pack %	Self-report %
Health warnings														
Non-standard warning labels	3.5	3.4	7.6	3.7	8.1	1.0*	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0
No warning labels	3.8	3.1	8.4*	7.1	2.3*	3.1	0.0	0.5	0.0	0.0	0.9	0.2	2.7	0.0
Refused/don't know	NA	NA	7.8	2.9	0.4***	2.5	0.0	0.0	0.0	0.3	0.0	0.4	0.0	0.0
n	633	1048	379	871	957	498	260	754	31	829	211	784	299	618
Tax stamps														
No tax stamps or security ink	9.2	9.2	13.7*	10.0	39.7**	14.3*	0.0	0.0	0.0	0.0	NA	NA	NA	NA
Refused/don't know	NA	NA	10.8	3.6	2.0	22.9***	NA	NA	0.0	0.7	NA	NA	NA	NA
n	617	1035	376	880	374	248	260	754	31	828	NA	NA	NA	NA

n Represents the total number of valid responses per item (ie, the denominator). *, ** and ***: significant difference at 5%, 1% and 0.1% with previous time period. These should be interpreted with great caution as the number of comparisons is absurdly high.
NA, not applicable.

education. We do not find statistically significant associations between socioeconomic status (measured by income or education) and the odds of engaging in cigarette tax avoidance/evasion in France. On the whole, the results suggest, that if anything, in France there are positive associations between household income and education and cigarette tax avoidance/evasion.

Age is found to increase (at a decreasing rate) the odds of engaging in cigarette tax avoidance/evasion in Canada, the USA and the UK but not in France. In France, age appears to decrease (at a decreasing rate) the odds of engaging in cigarette tax avoidance/evasion; this association between age and cigarette tax avoidance/evasion is, however, not statistically significant. More specifically, in Canada, the odds of a 40-year-old are 1.33 times higher than those of a 30-year-old, while the odds of a 50-year-old are 1.20 times higher than those of a 40-year-old. We do not find that men have statistically significant higher odds to engage in cigarette tax avoidance/evasion than women in Canada, the UK and France. We do find, however, that women in the USA have statistically significant higher odds than men. On the whole, we find that heavier smokers tend to have higher odds of engaging in cigarette tax avoidance/evasion. These associations, however, are only statistically significant in Canada and the USA. We find that time to first cigarettes is likely associated with cigarette tax avoidance/evasion (the shorter the time to first cigarettes, the higher the odds). Finally, we find statistically significant associations between quit intentions and cigarette tax avoidance/evasion in the USA, the UK and France; smokers who intend to quit have lower odds of engaging in cigarette tax avoidance/evasion.

DISCUSSION
Principal findings
We find the prevalence of cigarette tax avoidance/evasion varies substantially between countries, and across time within countries. In Canada, France and the UK, more than 10% of smokers report last purchasing cigarettes from low or untaxed sources while in Malaysia, some estimates suggest substantial cigarette tax avoidance/evasion between 2005 and 2008. In Canada, the percentage of smokers reporting buying cigarettes from low or untaxed sources increased more than fourfold between late 2002 and late 2007, early 2008 but seems to have levelled off or decreased since. We find that the sources of low or untaxed cigarettes are very much country-specific. In Canada, and to a lesser extent in the USA, the main source of low or untaxed cigarettes are First Nations/Indian reserves; in the UK, it is out of country and duty-free purchases; while in France, it is out of country, but within the EU, purchases. It is important to note that our estimates of the prevalence of cigarette tax avoidance/evasion likely underestimates the proportion of total cigarettes that are purchased from low or untaxed sources as smokers who buy cigarettes from low or untaxed sources tend to be heavier smokers.[viii]

As expected we find that, on the whole, heavier and more addicted smokers are more likely to engage in tax avoidance/evasion while smokers who intend to quit are less likely. We find important associations between household income and education and the likelihood of engaging in tax avoidance/evasion. These associations, however, vary both in direction and magnitude across countries. These results highlight the importance of taking into consideration country-specific contextual factors.

[viii]This will be the case inasmuch as heavier smokers purchase a large proportion of their cigarettes from low or untaxed sources.

Table 5 Percentage of smokers' cigarette packs showing evidence of possible tax avoidance or evasion: Mauritius, Uruguay, China and Bangladesh

	Mauritius					
	Wave 1 (January–March 2005)		Wave 2 (August 2006–June 2007)		Wave 3 (January–August 2008)	
Source of information	Pack %	Self-report %	Pack %	Self-report %	Pack %	Self-report %
No tax stamps or authenticity labels	11.0	16.6	7.6	10.2	3.1	1.7
Don't know	0.8	10.6	0.2	17.2	0.1	17.8
n	210	388	335	218	305	230
	Uruguay					
	Wave 1 (October–December 2006)		Wave 2 (October 2008–February 2009)		Wave 3 (October 2010–January 2011)	
Non-standard warning labels	6.4	4.2	3.1	5.1	12.0***	5.1
No warning labels	4.6	0.6	3.6	1.8	8.5***	5.6
Don't know	0.2	0.0	0.7	0.8	3.4***	3.7***
n	305	426	361	137	765	459
	China					
	Wave 1 (March–December 2006)		Wave 2 (October 2007–February 2008)		Wave 3 (May 2009–March 2010)	
No authenticity labels	10.7	8.5	13.4*	7.2	6.3***	7.2
Don't know	10.3	0.2	5.8***	0.2	2.5***	8.9***
n	2308	1089	2455	817	2553	1191
	Bangladesh					
	Wave 1 (February–May 2009)		Wave 2 (March–June 2010)			
No tax stamps	0.4	NA	3.7**	NA		
n	368	NA	401	NA		

n Represents the total number of valid responses per item (ie, the denominator). *, ** and ***: significant difference at 5%, 1% and 0.1% with previous time period. These should be interpreted with great caution as the number of comparisons is absurdly high.
NA, not applicable.

For example, the differentials in cigarette taxes or prices between neighbouring jurisdictions are often assumed to be the key driver of cigarette tax avoidance/evasion. Although theoretically sound, such assertions ignore an array of other factors that may be equally or more important. For example, in Canada, a province-level examination of the data reveals that cigarette tax avoidance/evasion is substantial in only two provinces, Ontario and Québec, the two provinces with the lowest cigarette taxes in Canada.[32] Such findings suggest that the proximity to opportunities for tax avoidance/evasion may be one of the key factors. Other important country-level factors may include the tax effectiveness of governments' law enforcement, geographic situation (eg, long and porous borders) and the extent to which the tobacco industry tolerates or actively encourages tax evasion.

Limitations
A number of limitations merit discussion. First, most prevalence estimates presented are based on self-reported responses and, consequently, social desirability bias (when respondents provide socially desirable answers) cannot be ruled out. Responses may represent true behaviours or perceptions about what respondents thought investigators wanted to hear or a combination of both. Cigarette tax evasion, an illegal activity, may be particularly affected.[33] Imperfect recall, especially with respect to pack information, may also introduce measurement error. It is not possible to disentangle the effects of social desirability bias and imperfect recall. Both may, at least in part, explain the differences we observed between estimates based on self-reports and estimates based on pack inspections. Second, unequal spacing between waves and differences in the duration and timing of fieldwork suggest caution should be exercised when examining temporal differences. For example, as pointed out by Hyland et al,[31] wave 2 of the Four Country survey took place in the UK's summer holiday season when respondents would have been more likely to visit neighbouring countries where low or untaxed cigarettes may be more readily available compared with wave 1, which took place late in the European autumn. Third, it is difficult to disentangle tax avoidance from tax evasion. For example, carrying cigarettes across state or international borders may or may not be illegal, depending on the allowance permitted. Similarly, purchasing cigarettes on First Nations/Indian reserves is not necessarily illegal. Additional limitations include the inability to capture industry evasion, sales of untaxed cigarettes that are made in legitimate stores, and counterfeit cigarettes or cigarette with counterfeit stamps.

Implications for policy and research
Article 6.2 of the Framework Convention on Tobacco Control (FCTC), an international treaty negotiated by the member states of WHO with objective to reduce the prevalence of tobacco use and exposure to tobacco smoke, calls upon each party to adopt or maintain measures that prohibit or restrict, sales to or

Table 6 GEE models: factors associated with the odds of engaging in cigarette tax avoidance or evasion

	Canada			USA			UK			France		
	OR	95% CI	p Value	OR	95% CI	p Value	OR	95% CI	p Value	OR	95% CI	p Value
Income (ref. low)												
Mid	0.92	(0.73 to 1.16)	0.49	0.88	(0.70 to 1.10)	0.26	1.27	(1.05 to 1.54)	0.01	1.05	(0.80 to 1.38)	0.75
High	0.72	(0.56 to 0.92)	0.01	1.10	(0.85 to 1.42)	0.47	1.86	(1.53 to 2.25)	0.00	1.21	(0.87 to 1.68)	0.25
Don't know/refused	0.79	(0.56 to 1.11)	0.17	0.65	(0.40 to 1.05)	0.08	1.31	(1.02 to 1.68)	0.04	0.66	(0.32 to 1.38)	0.27
Education (ref. low)												
Mid	1.00	(0.80 to 1.24)	0.98	1.58	(1.26 to 1.99)	0.00	1.09	(0.92 to 1.30)	0.33	1.13	(0.87 to 1.47)	0.37
High	1.06	(0.79 to 1.44)	0.69	1.48	(1.10 to 1.99)	0.01	1.15	(0.91 to 1.44)	0.24	1.03	(0.75 to 1.42)	0.84
Don't know/refused	0.35	(0.02 to 5.03)	0.44	3.10	(0.35 to 27.74)	0.31	0.54	(0.25 to 1.19)	0.13	1.34	(0.28 to 6.41)	0.72
Sex (ref. men)	1.11	(0.91 to 1.35)	0.32	0.73	(0.59 to 0.90)	0.00	1.08	(0.93 to 1.25)	0.30	0.83	(0.66 to 1.05)	0.12
Age	1.95	(1.29 to 2.93)	0.00	2.18	(1.44 to 3.28)	0.00	1.69	(1.25 to 2.29)	0.00	0.66	(0.36 to 1.19)	0.17
Age squared	0.95	(0.91 to 0.99)	0.02	0.95	(0.91 to 0.99)	0.02	0.96	(0.93 to 0.99)	0.02	1.04	(0.96 to 1.12)	0.33
No. cigarettes per day (ref. 1–10 cigarettes)												
11–20 cigarettes	1.62	(1.35 to 1.95)	0.00	1.40	(1.09 to 1.80)	0.01	1.04	(0.90 to 1.19)	0.61	1.17	(0.89 to 1.53)	0.26
21–30 cigarettes	1.44	(1.13 to 1.85)	0.00	1.61	(1.19 to 2.16)	0.00	1.23	(1.02 to 1.50)	0.03	1.24	(0.75 to 2.08)	0.40
>30 cigarettes	1.91	(1.30 to 2.82)	0.00	1.69	(1.18 to 2.41)	0.00	1.18	(0.91 to 1.53)	0.21	1.34	(0.54 to 3.32)	0.53
Don't know/refused	1.70	(0.44 to 6.64)	0.44	1.05	(0.21 to 5.17)	0.96	1.22	(0.56 to 2.64)	0.62	–	–	–
Time to first cigarette (ref. >60 min)												
31–60 min	0.66	(0.50 to 0.88)	0.00	1.33	(0.98 to 1.79)	0.07	0.91	(0.75 to 1.11)	0.34	0.99	(0.74 to 1.33)	0.96
6–30 min	0.85	(0.66 to 1.09)	0.20	1.25	(0.93 to 1.69)	0.15	0.93	(0.77 to 1.11)	0.41	1.36	(1.02 to 1.81)	0.04
≤5 min	1.07	(0.80 to 1.42)	0.67	1.37	(0.99 to 1.90)	0.06	0.98	(0.80 to 1.21)	0.87	1.13	(0.73 to 1.75)	0.58
Don't know/refused	0.80	(0.52 to 1.21)	0.29	0.87	(0.36 to 2.09)	0.76	1.01	(0.64 to 1.59)	0.97	3.58	(2.71 to 4.73)	0.00
Intention to quit (ref. no)												
Yes	0.91	(0.76 to 1.09)	0.30	0.71	(0.59 to 0.85)	0.00	0.80	(0.71 to 0.89)	0.00	0.79	(0.64 to 0.97)	0.02
Don't know/refused	0.97	(0.63 to 1.48)	0.89	0.66	(0.40 to 1.09)	0.11	0.57	(0.37 to 0.89)	0.01	0.68	(0.15 to 3.12)	0.62
Wave (ref. wave 1)												
Wave 2	0.38	(0.26 to 0.55)	0.00	0.81	(0.55 to 1.21)	0.31	1.86	(1.36 to 2.56)	0.00	0.78	(0.56 to 1.08)	0.13
Wave 3	0.44	(0.31 to 0.62)	0.00	0.81	(0.56 to 1.18)	0.27	1.79	(1.31 to 2.45)	0.00	–	–	–
Wave 4	0.50	(0.36 to 0.68)	0.00	0.85	(0.59 to 1.21)	0.37	1.64	(1.23 to 2.19)	0.00	–	–	–
Wave 5	0.76	(0.57 to 1.01)	0.06	0.75	(0.53 to 1.07)	0.11	1.47	(1.11 to 1.95)	0.01	–	–	–
Wave 6	0.84	(0.65 to 1.09)	0.20	0.80	(0.57 to 1.12)	0.20	1.45	(1.11 to 1.88)	0.01	–	–	–
Wave 7	1.23	(0.97 to 1.56)	0.09	0.62	(0.45 to 0.86)	0.00	1.37	(1.05 to 1.78)	0.02	–	–	–
Wave 8	1.12	(0.89 to 1.39)	0.33	0.89	(0.66 to 1.21)	0.47	1.19	(0.92 to 1.54)	0.19			
Time-in-sample (ref. 1)*												
2	1.18	(0.99 to 1.41)	0.06	1.16	(0.96 to 1.40)	0.12	1.35	(1.15 to 1.59)	0.00	1.08	(0.77 to 1.50)	0.67
3	1.45	(1.18 to 1.79)	0.00	1.02	(0.80 to 1.30)	0.89	1.50	(1.26 to 1.78)	0.00	–	–	–
4	1.33	(1.05 to 1.68)	0.02	0.94	(0.71 to 1.25)	0.67	1.57	(1.27 to 1.93)	0.00	–	–	–
5	1.65	(1.27 to 2.15)	0.00	1.04	(0.73 to 1.49)	0.81	1.66	(1.29 to 2.14)	0.00	–	–	–
6	1.48	(1.07 to 2.05)	0.02	1.15	(0.73 to 1.81)	0.56	1.50	(1.11 to 2.04)	0.01	–	–	–
7	1.69	(1.15 to 2.48)	0.01	0.81	(0.43 to 1.55)	0.53	1.88	(1.30 to 2.72)	0.00	–	–	–
8	2.35	(1.49 to 3.69)	0.00	0.82	(0.37 to 1.81)	0.63	2.21	(1.37 to 3.56)	0.00	–	–	–
Intercept	0.01	(0.01 to 0.04)	0.00	0.00	(0.00 to 0.01)	0.00	0.02	(0.01 to 0.03)	0.00	0.63	(0.19 to 2.11)	0.46

Age and age squared measured in units of 10 years; For Canada, the UK and France: GEE (link=logit, family=binomial, working correlation structure=unstructured), for the USA: GEE (link=logit, family=binomial, working correlation structure=exchangeable); * average time-in-sample: Canada=2.5, USA=2, UK=2.5, France=1.5.
GEE, generalised estimating equation.

importations by international travellers of tax- and duty-free tobacco products.[34] The proportion of smokers who report obtaining duty-free cigarettes at last purchase is substantial only in the UK (between about 3.5% and 7% during the past decade). Duty-free cigarette purchases are appreciably lower in other high-income countries but by no means negligible. Moreover, even if the true prevalence of duty-free cigarette purchases is on average only 1% (or even lower), such prevalence estimate represent considerable tax revenue losses. Additionally, there is some evidence that the availability of duty-free cigarettes has enabled cigarette tax evasion.[4] Duty-free cigarette allowances are limited in several countries; some countries such as Barbados, Singapore and Sri Lanka have gone further and no

longer permit any duty-free allowances for cigarettes.[4] In November 2012, the Protocol to Eliminate Illicit Trade in Tobacco Products was adopted by the parties to the FCTC. The new protocol's aim is to combat illegal trade in tobacco products through control of the supply chain and international cooperation. A key measure of the protocol is the commitment of each party to establish a global tracking and tracing system.

Most of the prevalence estimates of cigarette tax avoidance/evasion presented are national averages (with the exception of China and Mexico, ITC surveys are nationally representative). National estimates may hide important and policy-relevant regional differences. For example, the fourfold increase between 2002 and 2008/2009 in Canada was due in great part to an

increase in purchasing on First Nations reserves within the province of Ontario. Similarly, an inspection of the pattern of tax avoidance in France shows that it was almost entirely due to smokers in border regions purchasing their cigarettes from the bordering countries.[35] Additional promising avenues for research include the examination of the effects of country-level factors on tax avoidance/evasion and the effects of tax avoidance/evasion on purchasing behaviour (eg, prices paid and quantities purchased) and on the pass-through rate for cigarettes.[36]

What this paper adds

- ▸ The magnitude and effectiveness of taxes at reducing tobacco use provide an incentive for tobacco users, manufacturers and others, most notably criminal networks, to devise ways to avoid or evade tobacco taxes.
- ▸ The magnitude of cigarette tax avoidance/evasion is challenging to quantify.
- ▸ We find that the extent and the type of cigarette avoidance/evasion vary substantially between countries and across time. We also find important associations between household income and education and the likelihood of engaging in cigarette tax avoidance/evasion.

REFERENCES

1. Chaloupka FJ, Warner KE. The economics of smoking. In: Culyer AJ, Newhouse JP. eds. *Handbook of health economics*. Amsterdam: Elsevier Science, North-Holland, 2000:1539–627.
2. Gallet CA, List JA. Cigarette demand: a meta-analysis of elasticities. *Health Econ* 2003;12:821–35.
3. International Agency for Research on Cancer. *IARC handbooks of cancer prevention: tobacco control. Volume 14. Effectiveness of price and tax policies for control of tobacco*. Lyon: International Agency for Research on Cancer, 2011.
4. World Health Organization. *WHO technical manual on tobacco tax administration*. Geneva: WHO, 2010.
5. Health Canada. *Contraband cigarettes: tobacco smoke analysis*. Ottawa: Health Canada, 2010.
6. RCMP. *Contraband tobacco enforcement strategy*. Ottawa: Royal Canadian Mounted Police, 2008.
7. IARC Working Group on Methods for Evaluating Tobacco Control Policies. *IARC handbooks of cancer prevention, tobacco control, Vol. 12: methods for evaluating tobacco control policies*. Lyon: International Agency for Research on Cancer, 2008.
8. Merriman D. Tool 7. Smuggling. Understand, measure and combat tobacco smuggling. World Bank economics of tobacco toolkit. Yurekli A, de Beyer J. eds. World Bank, 2002.
9. HM Customs and Excise. *Measuring indirect tax fraud*. London: HMCE, 2001.
10. HM Revenue and Customs. *Tackling tobacco smuggling—building on our success. A renewed strategy for HM Revenue & Customs and the UK Border Agency*. London: HMRC, UKBA, 2011.
11. Physicians for a Smoke-Free Canada. *The Canadian tobacco market place. Estimating the volume of Contraband Sales of Tobacco in Canada. Updated—April 2010*. Ottawa: Physicians for a Smoke-Free Canada, 2010.
12. Physicians for a Smoke-Free Canada. *The Canadian tobacco market place. Estimating the volume of Contraband Sales of Tobacco in Canada in 2009. Updated —January 2011*. Ottawa: Physicians for a Smoke-Free Canada, 2011.
13. Stehr M. Cigarette tax avoidance and evasion. *J Health Econ* 2005;24:277–97.
14. Callaghan RC, Veldhuizen S, Ip D. Contraband cigarette consumption among adolescent daily smokers in Ontario, Canada. *Tob Control* 2011;20:173–4.
15. Callaghan RC, Veldhuizen S, Leatherdale S, et al. Use of contraband cigarettes among adolescent daily smokers in Canada. *CMAJ* 2009;181:384–6.
16. Leatherdale ST, Ahmed R, Vu M. Factors associated with different cigarette access behaviours among underage smoking youth who usually smoke contraband (native) cigarettes. *Can J Public Health* 2011;102:103–7.
17. Luk R, Cohen JE, Ferrence R, et al. Prevalence and correlates of purchasing contraband cigarettes on First Nations reserves in Ontario, Canada. *Addiction* 2009;104:488–95.
18. DeCicca P, Kenkel DS, Liu F. Excise tax avoidance: the case of state cigarette taxes. NBER Working Paper No. 15941. NBER Working Paper Series. Cambridge: National Bureau of Economic Research, 2010.
19. Emery S, White MM, Gilpin EA, et al. Was there significant tax evasion after the 1999 50 cent per pack cigarette tax increase in California? *Tob Control* 2002;11:130–4.
20. Chiou L, Muehlegger E. Crossing the line: direct estimation of cross-border cigarette sales and the effect on tax revenue. *B.E. J Econ Anal Policy Contrib Econ Anal Policy* 2008;8.
21. Taylor AJ, Langdon M, Campion P. Smuggled tobacco, deprivation and addiction. *Eur J Public Health* 2005;15:399–403.
22. Sarntisart I. *An economic analysis of tobacco control in Thailand. HNP discussion paper, economics of tobacco control paper no 15*. Washington: The World Bank, 2003.
23. Chen H-F, Chen S-H, Lee J-M, et al. Who are the potential smokers of smuggled cigarettes? *Asian Econ J* 2010;24:221–34.
24. Lakhdar CB. Quantitative and qualitative estimates of cross-border tobacco shopping and tobacco smuggling in France. *Tob Control* 2008;17:12–16.
25. Barkans M. *Contraband tobacco on post-secondary campuses in Ontario*. [Master of Arts, Applied Health Sciences]. St. Catharines: Department of Community Health Sciences, Faculty of Applied Health Sciences, Brock University, 2010.
26. Kurti MK, von Lampe K, Thompkins DE. The illegal cigarette market in a socioeconomically deprived inner-city area: the case of the South Bronx. *Tob Control* 2013;22:138–40.
27. Merriman D. The micro-geography of tax avoidance: evidence from littered cigarette packs in Chicago. *Am Econ J-Econ Polic* 2010;2:61–84.
28. Wilson N, Thomson G, Edwards R, et al. Estimating missed government tax revenue from foreign tobacco: survey of discarded cigarette packs. *Tob Control* 2009;18:416–18.

29 Fong GT, Cummings KM, Borland R, *et al*. The conceptual framework of the International Tobacco Control (ITC) Policy Evaluation Project. *Tob Control* 2006;15 (Suppl 3):iii3–11.

30 Thompson ME, Fong GT, Hammond D, *et al*. Methods of the International Tobacco Control (ITC) Four Country Survey. *Tob Control* 2006;15(Suppl 3):iii12–18.

31 Hyland A, Laux FL, Higbee C, *et al*. Cigarette purchase patterns in four countries and the relationship with cessation: findings from the International Tobacco Control (ITC) Four Country Survey. *Tob Control* 2006;15(Suppl 3):iii59–64.

32 Ontario Tobacco Research Unit. *The tobacco control environment: Ontario and beyond. Monitoring and evaluation series. Tobacco taxes: monitoring update (April 24, 2011)*. Toronto: Ontario Tobacco Research Unit, 2011.

33 Krumpal I. Determinants of social desirability bias in sensitive surveys: a literature review. *Qual Quantity* 2013;47:2025–47.

34 World Health Organization. *Framework convention on tobacco control*. Geneva: World Health Organization, 2003.

35 Nagelhout GE, van den Putte B, Allwright S, *et al*. Socioeconomic and country variations in cross-border cigarette purchasing as tobacco tax avoidance strategy. Findings from the ITC Europe Surveys. *Tob Control* 2014;23: i30–i38.

36 Harding M, Leibtag E, Lovenheim MF. The heterogeneous geographic and socioeconomic incidence of cigarette taxes: evidence from nielsen homescan data. *Am Econ J Econ Policy* 2012;4:169–98.

卷烟税的避税和逃税：国际烟草控制政策评估（ITC）项目的发现

G Emmanuel Guindon,[1,2,3] Pete Driezen,[3] Frank J Chaloupka,[4,5,6] Geoffrey T Fong[7,8]

[1]Département d'administration de la santé, Faculté de médecine, Université de Montréal, Montréal, Quebec, Canada
[2]Institut de recherche en santé publique de l'Université de Montréal (IRSPUM), Université de Montréal, Montréal, Quebec, Canada
[3]Propel Centre for Population Health Impact, University of Waterloo, Waterloo, Ontario, Canada
[4]Department of Economics, University of Illinois at Chicago, Chicago, Illinois, USA
[5]National Bureau of Economic Research (NBER), Cambridge, Massachusetts, USA
[6]Institute for Health Research and Policy, University of Illinois at Chicago, Chicago, Illinois, USA
[7]Department of Psychology, University of Waterloo, Waterloo, Ontario, Canada
[8]Ontario Institute for Cancer Research, Toronto, Ontario, Canada

通讯作者：
Professor G Emmanuel Guindon
地址：
Département d'administration de la santé, Faculté de medicine, Université de Montréal, C.P.6128, succ. Centre-ville, Montréal, QC, Canada H3C 3J7
电子邮箱：
emmanuel.guindon@umontreal.ca

摘要

背景 近几十年的研究，为烟草税在减少烟草使用并增加政府税收方面提供了决定性证据。税收在减少烟草使用方面的幅度和有效性，促使烟草消费者、制造者还有其他利益相关者，最为显著的是犯罪集团，产生了想方设法避税或逃税的动机，而烟草税上的避税和逃税行为会降低公共健康水平并减少来自烟草税的财政收益。

目的 首先，本研究的目的是利用ITC项目的调查数据，来记录16个低收入、中收入和高收入样本国家卷烟使用者的避税和逃税行为的水平和趋势。其次，本研究将探索与卷烟税的避税和逃税相关的因素。

方法 我们利用ITC项目在16个国家进行调查的数据，来估算在这期间各个国家的卷烟税的避税/逃税的严重程度和类型。我们利用吸烟者自报的最近一次购买卷烟的渠道或包装信息，或是调查员通过面对面调查收集到的其他类似信息，来衡量避税/逃税行为。我们利用广义估计方程来探索在加拿大、美国、英国和法国，哪些个体因素可能会影响卷烟税的避税或逃税。

结果 我们发现卷烟避税/逃税流行率的估算值在不同国家、不同时间段的变化相当大。在加拿大、法国和英国，超过10%的吸烟者表示最近一次购买的卷烟来自低税或未上税的货源，另外马来西亚的一些估算也表明烟草避税/逃税情况相当严重。我们也发现家庭收入和受教育水平与发生避税/逃税行为的可能性之间的重要联系。但是这些联系在不同国家间的方向和幅度均存在差异。

前言

有大量证据表明，烟草税可以减少烟草使用，挽救生命，同时提高政府税收收入[1-3]。税收在减少烟草使用方面的幅度和有效性，使得烟草使用者、制造者以及其他利益相关者，尤其是犯罪集团，产生了想方设法避税或逃税的动机。烟草使用者的避税包括为了少缴税或不缴税进行的合法购买行为，比如跨境购买、免税购买以及网络购买。烟草制造者也可以通过改变产品和价格等方式进行避税以减轻自己的税务责任。逃税涉及使用非法手段来避免烟草税。这些非法行为包括走私贸易或者不如实申报

真货[i]产量或者假冒的烟草制品[4]。

烟草的避税和逃税带来了一系列的挑战。合法或不合法的相对廉价的烟草产品破坏了那些致力于提高烟草产品价格的公共政策。而且，逃税卷烟通常会以盒装或者塑料袋装的形式售卖，无法提供监管所需的信息，比如加拿大的例子，没有健康警示和有毒释放物的信息[5]。另一方面，薄弱的税收监管会破坏烟草控制措施这一公共健康目标。烟草的避税和逃税同时也减少了可用于医疗和社会项目的政府收入，增加刑事司法支出，并给青少年提供了无监管途径接触卷烟的机会[6]。虽然量化烟草避税和逃税问题极具挑战，但由于其影响涉及政策设计、政府收入和公共健康等诸多课题，这一棘手的问题值得关注。

卷烟避税和逃税的幅度可通过对比合法卷烟的销售量和消费量来估计。销售量的估计基于合法香烟的生产、交易或税收的调查数据，而消费量的估计在调查数据的基础上同时考虑到了漏报消费的情况[7,8]。英国的税务机关已经广泛地使用这种方法来估计卷烟避税/逃税的程度[9,10]，加拿大也使用这种方法来确定卷烟走私的趋势[11,12]。另外，Stehr[13]使用该方法的一个变体来检验美国税收改变对避税行为的影响。

从调查数据获得的自报信息也可用于测量卷烟税避税/逃税的程度。在许多国家，有关吸烟者最近一次或者经常购买卷烟的渠道信息，可以提供关键的避税/逃税信息（比如，加拿大原住民保留地，美国州外以及欧盟国（EU）外）。该方法已在加拿大[14-17]、美国[18-20]以及英国[21]广泛应用。自报包装信息、调查员通过面对面或邮件调查收集的类似信息也可以提供是否存在避税/逃税行为的关键信息。例子包括不标准或者缺少健康警示、印花税票或防伪标签等。比如，通过在泰国面对面调查过程中对健康警示的检查（即警示缺失或者非泰语警示）可推断出该卷烟是否为合法购买[22]。台湾采用了一种类似的方法，依靠来自电话采访的自报信息，以未携带税印的卷烟烟盒作为逃税的指标[23]。另外，检查被丢弃的卷烟烟盒也可用于判断卷烟是否交纳了所有税项[ii]。这种方法最近被法国[24]、加拿大[25]、美国[26,27]和英国[28]采用。

---

[i]如果合法的制造商只向税务机关申报他们的其中一部分产量，如此生产的真货品牌也可能是违法的[4]。

我们的研究目的是利用ITC项目新收集的数据，记录多国家的卷烟使用者的避税和逃税行为的水平和趋势。其次是要探讨与卷烟避税/逃税相关的因素。

数据和方法

我们使用ITC项目在2002年到2011年间在高、中和低收入国家调查所得到的数据。ITC项目是涉及烟草使用各方面的纵向队列调查，它的设计旨在帮助政策制定者实施强有力的、以证据为基础的烟草控制政策。首先，我们使用了ITC项目2002年、2003年、2004年、2005/2006年、2006/2007年、2007/2008年、2008/2009年和2010/2011年在四个国家（澳大利亚、加拿大、美国和英国）进行的前8轮调查数据。之后我们使用了ITC项目在法国（2006/2007年，2008年）、爱尔兰（2003/2004年，2004/2005年，2006年）、苏格兰（2006年）和荷兰（2008年，2010年，2011年）四个欧洲国家进行调查的数据。最后我们使用ITC项目在7个中低收入国家所调查的数据，即孟加拉（2009年，2010年）、中国（2006年，2007/2008年，2009/2010年）、马来西亚和泰国（2005年，2006/2007年，2008年，2009年）、墨西哥（2006年，2007年，2008/2009年，2010年，2011年）、乌拉圭（2006年，2008/2009年，2010/2011年）和毛里求斯（2009年，2010年，2011年）[iii]。所有ITC项目国家（除了中国和墨西哥[iv]）都使用了概率抽样方法以获得吸烟者的全国代表性样本。固定电话普及率比较高的高收入国家使用了分层抽样的设计。中低收入国家使用了多阶段整群抽样设计。抽样层根据在每个国家内的地理位置划分。另外一些国家使用了混合的调查模式：荷兰以及ITC项目四国调查最近一轮的数据收集使用了电话与互联网调查两种方法；马来西亚用了面对面调查和电话调查。在ITC项目国家每项调查的每一轮都计算了抽样权重，因此所得结果具有吸烟者的全国代表性。抽样权重考虑了调查的不应答情况。更多有关ITC项目的概念性框架和方法的细节由Fong等人[29]和Thompson等人[30]提供。

我们采用两种方法对卷烟避税/逃税流行率进行估算。第一种，我们按照Hyland等人的方法，利用对"你最近一次

从哪里为自己买烟？"问题的应答来判定低税或未上税的卷烟渠道，这可能代表存在避税/逃税行为。我们列出了各受访者自报的最近一次卷烟购买渠道：或是原住民/印第安人保留地，或是州外/省外/境外，或是免税零售点，或是直接购物（邮寄，电话或者网络），或是"其他人"，比如个体卖家或部队小卖部。为了全面性，我们也给出了那些自报其最后的卷烟来自友人、亲戚、或者不认识的人、或者拒不回应的相关数据。除了ITC荷兰项目，其他所有ITC项目调查都要包括一个自由回答问题以针对那些以"其他"来回答最近购买卷烟的渠道问题的受访者。所有的自由回答问题都尽可能人工检验和重新编码。如果某类回复因数量极少而不另编码的话，我们把此类的回复编码为"其他"。第二种，我们给出基于自报的包装信息或调查者通过面对面调查收集的类似信息所得到的估计。我们使用了对"你手头有空的烟盒吗？我需要得到一些关于你所吸卷烟的信息。如果没有，你能告诉我你的卷烟烟盒是否有标准的警示标志、印花税票、防伪油墨……"等问题（或者诸如此类的问题）。每种数据按来源列出（比如自报还是调查所得）。所有列出的避税/逃税流行率估算都使用了抽样权重加权。以上描述的两种方法并非在所有国家都通行，因此，我们呈列了来自这些调查的一个子集的估计。对于每一个国家或者每一组国家，我们呈列了能代表卷烟避税/逃税的所有可用数据。对于高收入国家（澳大利亚、加拿大、法国、爱尔兰、荷兰、苏格兰、英国和美国）以及墨西哥和乌拉圭，我们给出了基于吸烟者最近一次购买卷烟来源的估计。对于孟加拉、中国、马来西亚、毛里求斯、泰国和乌拉圭，我们给出了基于自报包装信息或调查者通过面对面调查收集类似信息的估计。

除了针对流行率的估计，我们运用广义估计方程（GEE）来探讨可能影响卷烟避税或逃税的因素。我们同时采用了二分类法对潜在的卷烟避税/逃税情况进行了如下定义：如果个体报告他们最后的卷烟渠道是原住民/印第安人保留地、周外/省外/境外、免税零售点、军队小卖部、其他人或者是直接购物（邮寄，电话或者网络）则为1，否则为0。我们排除了那些报告最后的卷烟货源为来自友人或亲戚、或者不认识的人、或者拒不回应的个体。我们没有使用自报的包装信息或调查者通过面对面调查收集的类似信息[v]。我们使用以下国家的数据进行分析：加拿大、美国、英国和法国。我们关注这些国家是因为避税/逃税流行率在这些国家显得很重要[vi]。我们分析了卷烟避税或逃税与以下个体水平的因素之间的关系：运用了按特定国家分类的家庭收入指标衡量的社会经济水平（低、中、高、拒绝回答/不知道）和受教育水平（低、中、高、拒绝回答/不知道）、性别的分类变量、日吸烟强度（1–10支，11–20支，21–30支，>30支/天，拒绝回答/不知道）、吸第一根卷烟的时间（以分钟测量，>60分钟，31–60分钟，6–30分钟，<5分钟，拒绝回答/不知道）及戒烟意向（是，否，拒绝回答/不知道），还有对年龄及年龄平方的连续度量（以10年为单位测量）。

我们使用了广义估计方程的对数形式、二分类系列、非结构化的运算相关结构（即不对相同个体随时间变化的重复观察值设置相关关系的约束条件）和稳健标准差。我们没有将以上设定应用于美国样本，而是以可替换的运算相关结构代替（即每一个群组（即个体）内的相关关系要一致）。所有的模型都是用Macintosh的Stata/MOV.12.1估计的。

[ii]值得一提的是收集丢弃烟盒的方法收效甚微，因为该方法包括了在通勤、旅游等与避税毫无关联的情形，这很有可能高估避税/逃税的程度。此外，丢弃烟盒的吸烟者更可能参与避税/逃税。

[iii]ITC项目调查也在德国（2007，2009，2011）、新西兰（2007/2008，2008/2009）和韩国（2005，2008，2010）进行过：ITC项目德国调查忽略了在几轮调查中最为有用的、用以判断低税或未上税的卷烟货源的分类指标；ITC项目新西兰调查在第二轮调查中忽略了最为有用的问题，而且在第一轮调查中将近90%的调查对象没有回应该问题；另外，韩国避税/逃税的估计不能与0区分。所以，我们在分析中不呈列或使用ITC项目德国调查、新西兰调查和韩国调查的任何信息。

[iv]ITC项目中国调查在6个城市（北京、长沙、广州、上海、沈阳和银川）进行；ITC项目墨西哥调查在四个城市（墨西哥市、Guadalajara、Tijuana和Ciudad Juárez）进行。

结果

表1-3给出了基于调查对象自报的最近一次购买卷烟渠道避税逃税行为的估计。表1给出了加拿大、美国、英国和澳大利亚在2002年到2010/2011年进行的8轮调查的数据。值得注意的是我们很难从逃税行为中区分出避税。比如，表1呈列的估计更可能是代表避税而非逃税，而加拿大除外，因为该地卷烟是从原住民保留地非法购买的。在美国，从印第安人保留地或者本州外购买大多是合法的并被允许的；类似的，在英国从境外或者免税地点购买通常也是合法的。对各国之间以及各国之内不同时间段的估计变化很大。英国的避税/逃税率最高：2002年到2010/2011年间大约12.5%-17%的调查对象报告其最近一次购买的卷烟来自低税或未上税的货源[vii]。这些数据在2003年到2010/2011年间的5月到9月呈现出下降趋势。

十年之前，加拿大的卷烟避税/逃税行为显得并不严重，只有大约3%的调查对象报告最近一次卷烟购自低税或未上税的渠道。但是我们的估计在2002年到2008/2009年间有一个超过四倍的较大涨幅，随后的2008/2009和2010/2011年之间有一个小幅的下降。美国的卷烟避税/逃税在近十年之间保持相对稳定，在5.3%到7.6%之间浮动。不出所料，澳大利亚因其地理位置以及各州间较小的价格差异，卷烟避税/逃税显得微不足道。就避税/逃税的水平和趋势而言，各国之间卷烟避税/逃税的类型差异很大。在加拿大和美国，低税/未上税的卷烟来源地主要是原住民/印第安保留地，而在英国主要是境外购买及免税购物。

表2显示了法国、荷兰、爱尔兰和苏格兰的数据；表3显示了墨西哥和乌拉圭的数据。境外（但在欧盟范围内）卷烟购买在法国很普遍而且比例还在上升：2006/2007年为12.8%，2008年为16.7%。在荷兰、爱尔兰和苏格兰，从低税或未上税的渠道购买卷烟的情况比较少，但并非微不足道（1%到3.8%来自境外）。在荷兰和爱尔兰，境外购买似乎有上升趋势。在法国、爱尔兰和苏格兰的免税购买不是很多，但比例也高达1.5%-3.2%。境外、免税和网络购买在墨西哥2006年至2011年间和在乌拉圭2006年至2011年前期几乎微不足道（表3）。

表4和表5显示了基于自报包装信息或调查者通过面对面调查收集到的类似信息的避税/逃税率估计。表4显示了马来西亚和泰国的描述性数据。估算显示在泰国几乎没有避税/逃税的迹象，而在马来西亚却有大量且越来越多的避税/逃税现象。ITC项目马来西亚的第2轮和第3轮调查的估计也显示自报信息可能不可靠：基于自报信息的估计与基于烟盒包装信息检查的估计大相径庭。表5显示了毛里求斯、乌拉圭、中国和孟加拉的数据。此估计显示在毛里求斯卷烟避税/逃税从2005年早期到2008年上半年有一个较大的下降

，而乌拉圭的整体情况呈上升趋势。和马来西亚一样，这些估计也显示自报信息可能不可靠。比如，在毛里求斯基于自报信息的估计在第1轮和第2轮的调查中相当高，但是在第3轮的调查中却较低。对中国的估计显示存在大量的避税/逃税。但是，这些估计需谨慎对待。大量的调查对象回应"不知道"或调查员报告记录为"不知道"，这一现象说明在数据收集过程中存在较大困难。基于向调查员提供卷烟烟盒的调查对象的一个小的子样本（16%），来自孟加拉的估计提示了低、但有可能上升的卷烟避税/逃税比例。

表6显示了广义估计方程模型的结果。在加拿大我们发现了家庭收入（中等收入和高收入联合显著；Wald检验：$\chi^2=7.6$ 且 p=0.020）和参与避税/逃税比率之间的显著负向相关关系，然而在英国我们发现了二者有显著正向相关关系（Wald检验：$\chi^2=41.4$ 且p<0.001）。在美国，我们发现有较高受教育水平的个体参与避税/逃税的比率较高（中等受教育水平和高受教育水平联合显著；Wald检验：$\chi^2=16.2$ 且 p<0.001）。具体而言，在美国，有中等受教育水平和有高受教育水平的个体比有低受教育水平的个体参与卷烟避税/逃税的比率分别高1.6倍和1.5倍。在法国我们没有发现社会经济地位（通过收入和受教育水平度量）和参与卷烟避税/逃税的比率之间存在显著关系。整体而言，如果此结果有任何意义的话，在法国家庭收入和受教育水平与卷烟避税/逃税的比率有正向关联。

在加拿大、美国、英国，我们发现随着年龄的增加（以递减的比例）参与卷烟避税/逃税的比率也在增加，而在法国却并非如此。在法国，似乎随年龄的增加（以递减的比例）参与卷烟避税/逃税的比率会降低；但是，年龄与卷烟避税/逃税之间的关联无统计学意义。具体而言，在加拿大，40岁人群避税逃税的比率比30岁人群高1.33倍，而50岁人群避税逃税的比率比40岁人群高1.20倍。在加拿大、英国和法国，我们没有发现男性参与卷烟避税/逃税的比率在统计学意义上比女性更高。但是，我们确实发现美国的女性避税逃税的比率显著高于男性。总体而言，我们发现烟瘾较大者参与卷烟避税/逃税的比率更高。但是，这种关联只在加拿大和美国有统计学意义。我们发现吸第一支卷烟时间的长短似乎和卷烟避税/逃税的比率有相关关系（吸第一支卷烟的时间越短该比率越高）。最后，我们发现在美国、英国和法国，戒烟意向和卷烟避税/逃税之间的关联有统计学意义；打算戒烟的吸烟者参与卷烟避税/逃税的比率较低。

讨论

主要发现

我们发现卷烟避税/逃税流行性在国家间以及各国家内随时间的变化差别很大。在加拿大、法国和英国，超过10%的吸烟者报告最近一次卷烟购自低税或未上税的渠道；而在马来西亚，一些估计显示在2005年到2008年有相当多的卷烟避税/逃税行为。在加拿大，吸烟者报告自低税或未上税渠道购买卷烟的百分比在2002年后期到2007年后期期间增加了超过4倍，但是自从2008年早期该百分比好像已经趋于平稳或者下降。我们发现获得低税或未上税卷烟渠道的国家特征性很强。在加拿大，获得低税或未上税卷烟的主要渠道为原住民/印第安人保留地，在美国该程度要更低一点；在英国的主要渠道是境外或免税购买，而在法国的主要渠道是欧盟范围内的境外购买。需要指出的很重要的一点是我们对卷烟避税/逃税流行性的估计可能低估了购自低税或未上税渠道的

---

[v] 尽管在中国、马来西亚、毛里求斯、泰国和乌拉圭避税/逃税的流行率显得很重要，但因为我们观察到的基于自报信息的估计和基于烟盒检查的估计之间的差异，我们并没有使用来自这些国家的数据。

[vi] 我们也有澳大利亚、爱尔兰、荷兰、墨西哥和乌拉圭的关于最近一次从低税或未上税的渠道购买卷烟的数据；在这些国家，避税/逃税的流行率较小可忽略不计。

[vii] 对于英国的估计更有可能代表避税而非逃税，因为绝大部分最后购买卷烟的渠道是州外/省外/境外和免税的地点。

表1 被调查者报告其最近一次购买卷烟的购货渠道的百分比：加拿大、美国、英国和澳大利亚

	第1轮（2002年11月-12月）	第2轮（2003年5月-9月）	第3轮（2004年6月-12月）	第4轮（2005年10月-2006年1月）	第5轮（2006年10月-2007年2月）	第6轮（2007年9月-2008年2月）	第7轮（2008年10月-2009年7月）	第8轮（2010年7月-2011年6月）
四国调查	%	%	%	%	%	%	%	%
加拿大								
原住民保留地	2.0	2.6	3.5	6.0***	7.8*	10.3*	10.4	9.5
州外/省外/境外	0.3	0.3	0.3	0.3	0.1	0.1	0.0	0.4
免税	0.6	0.7	0.7	0.4	0.7	0.7	0.7	0.7
任何直接购买（邮寄、电话或网络）	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.2
其他人（如个体卖家）	0.2	0.1	0.5	0.7	0.6	1.1	0.5	0.4
军用	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
朋友/亲戚	0.1	0.3	1.2**	0.5	0.7	0.7	1.1	0.3*
拒绝回答/不知道/其他	0.0	0.3*	0.0*	0.1	0.0	0.1	0.4	0.2
n	2199	2014	1889	1774	1757	1727	1507	1245
美国								
原住民保留地	2.6	3.0	2.6	2.6	3.0	3.0	4.4	4.4
州外/省外/境外	0.7	0.4	0.8	0.2**	0.4	0.2	1.3**	0.8*
免税	0.4	0.2	0.2	0.4	0.3	0.0	0.1	0.4
任何直接购买（邮寄、电话或网络）	0.8	1.4	1.9	1.0	0.6	0.9	1.0	0.9
其他人（如个体卖家）	0.0	0.0	0.2	0.2	0.6	0.4	0.1	0.0
军用	0.7	1.0	1.0	1.0	0.5	0.6	0.3	0.5
朋友/亲戚	0.1	0.1	0.4	0.4	0.2	0.1	0.2	0.3
拒绝回答/不知道/其他	0.1	0.3	0.1	0.0	0.1	0.0	0.1	0.0
n	2123	1909	1924	1792	1820	1766	1516	1267
英国								
州外/省外/境外	8.6	10.4	9.7	7.8*	7.1	9.2	5.1***	5.4
免税	4.4	5.5	5.1	6.3	6.0	3.4	6.8***	5.8
任何直接购买（邮寄、电话或网络）	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
其他人（如个体卖家）	0.6	1.2	1.6	1.2	1.0	1.0	2.5	1.2
朋友/亲戚	2.2	2.0	1.8	2.5	2.6	2.2	3.5	3.8
拒绝回答/不知道/其他	0.1	0.2	0.3	0.0	0.1	0.0	0.0	0.0
n	2400	1933	1839	1738	1721	1665	1486	975
澳大利亚								
州外/省外/境外	0.1	0.2	0.1	0.1	0.2	0.2	0.0	0.5
免税	0.7	0.5	0.6	1.2	0.5	0.9	1.4	1.5
任何直接购买（邮寄、电话或网络）	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0
其他人（如个体卖家）	0.2	0.1	0.4*	0.2	0.6	0.3	0.2	0.4
朋友/亲戚	0.1	0.4	0.2	0.3	0.1	0.2	0.4	0.3
拒绝回答/不知道/其他	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
n	2304	1975	1851	1714	1823	1805	1371	1116

n代表有效的回应的总人数（即分母）。*，** 和***：与前一时期在5%、1%和0.1%水平的显著性差异。进行比较的频数非常之高，所以解释这些数据需极其谨慎。

卷烟总数的比例，因为自低税或未上税货源购买卷烟的吸烟者有烟瘾较大的倾向[viii]。

[viii]这将成为烟瘾较大的吸烟者自低税或未上税货源购买其大部分所吸卷烟的重要例子。

表2 被调查者报告其最近一次购买卷烟的购货渠道的百分比：法国、荷兰、爱尔兰和苏格兰

	法国		荷兰			爱尔兰			苏格兰
	第1轮（2006年12月-2007年1月）%	第2轮（2008年9月-11月）%	第1轮（2008年3月-4月）%	第4轮（2010年5月-6月）%	第5轮（2011年5月-6月）%	第1轮（2003年12月-2004年1月）%	第2轮（2004年12月-2005年1月）%	第3轮（2006年2月-3月）%	第3轮（2006年2月-3月）%
境外（欧盟范围内）	12.8	16.7***	1.4	2.7**	2.9	0.8	1.3	2.8	3.7
境外（欧盟范围外）	1.0	1.6	0.1	0.5	0.9				
免税	1.5	1.5	0.7	0.3	0.8	1.7	3.2**	1.8	2.2
任何直接购买（邮寄、电话或网络）	0.0	0.1	0.0	0.0	0.1	0.2	0.0	0.5	0.2
其他人（如个体卖家）	0.5	0.7	0.4	0.6	0.5	0.4	0.3	1.0	1.0
拒绝回答/不知道/其他†	0.1	0.0	1.3	2.4**	3.6	0.3	0.1	0.2	0.2
n	1735	1540	2224	1723	1672	1071	912	578	507

†与ITC其他的调查不同，荷兰的调查不包括对其最近一次购买卷烟的渠道回应"其他"的个体的随访的开放性问题。详情可参看文章；n代表有效回应的总数（即分母）。*, ** 和***：与前一时期在5%、1%和0.1%水平的显著性差异。进行比较的频数非常之高,所以解释这些数据需极其谨慎。

EU，欧洲联盟；ITC，国际烟草控制政策评估项目。

表3 被调查者报告其最近一次购买卷烟的购货渠道的百分比：墨西哥和乌拉圭

	墨西哥					乌拉圭		
	第1轮（2006年9月-11月）%	第2轮（2007年10月-11月）%	第3轮（2008年10月-2009年1月）%	第4轮（2010年1月-2月）%	第5轮（2011年4月-5月）%	第1轮（2006年10-12月）%	第2轮（2008年10-2009年2月）%	第3轮（2010年10-2011年1月）%
境外	0.6	0.7	0.2	1.3	0.4	0.0	0.2	0.6
免税	1.0	0.2*	0.1	1.3	0.3	0.2	0.7	0.3
网络	0.0	0.0	0.0	0.9	0.0	0.2	0.0	0.0
拒绝回答/不知道	0.1	0.4	0.7	0.7	0.0	0.0	0.1	0.1
n	1077	941	1854	394	821	887	1294	1224

n代表有效的回应的总人数 （即分母）。*, ** 和***：与前一时期在5%、1%和0.1%水平的显著性差异。进行比较的频数非常之高,所以解释这些数据需极其谨慎。

表4 马来西亚和泰国吸烟者的卷烟烟盒显示了可能的避税或逃税的百分比

	马来西亚						泰国							
	第1轮（2005年1月-3月）		第2轮（2006年8月-2007年6月）		第3轮（2008年1月-8月）		第1轮（2005年1月-3月）		第2轮（2006年8月-2007年6月）		第3轮（2008年1月-8月）		第4轮（2009年4月-11月）	
信息来源	烟盒%	自报%	烟盒%	自报%	烟盒%	自报%	烟盒%	自报%	烟盒%	自报%	烟盒%	自报%	烟盒%	自报%
健康警示														
无标准的警示标识	3.5	3.4	7.6	3.7	8.1	1.0*	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0
无警示标识	3.8	3.1	8.4*	7.1	2.3*	3.1	0.0	0.5	0.0	0.0	0.9	0.2	2.7	0.0
拒绝回答/不知道	NA	NA	7.8	2.9	0.4***	2.5	0.0	0.0	0.0	0.3	0.0	0.4	0.0	0.0
n	633	1048	379	871	957	498	260	754	31	829	211	784	299	618
印花税票														
无印花税票或防伪油墨	9.2	9.2	13.7*	10.0	39.7**	14.3*	0.0	0.0	0.0	0.0	NA	NA	NA	NA
拒绝回答/不知道	NA	NA	10.8	3.6	2.0	22.9***	NA	NA	0.0	0.7	NA	NA	NA	NA
n	617	1035	376	880	374	248	260	754	31	828	NA	NA	NA	NA

n代表有效的回应的总数（即分母）。*, ** 和***：与前一时期在5%、1%和0.1%水平的显著性差异。进行比较的频数非常之高, 所以解释这些数据需极其谨慎。

NA，不适用。

表5 吸烟者卷烟烟盒显示可能避税或逃税的百分比：毛里求斯、乌拉圭、中国和孟加拉

	毛里求斯					
	第1轮 （2005年1月-3月）		第2轮 （2006年8月-2007年6月）		第3轮 （2008年1月-8月）	
信息来源	烟盒%	自报%	烟盒%	自报%	烟盒%	自报%
无印花税票或防伪标签	11.0	16.6	7.6	10.2	3.1	1.7
不知道	0.8	10.6	0.2	17.2	0.1	17.8
n	210	388	335	218	305	230
	乌拉圭					
	第1轮 （2006年10月-12月）		第2轮 （2008年10月-2009年2月）		第3轮 （2010年10月-2011年1月）	
无标准的警示标识	6.4	4.2	3.1	5.1	12.0***	5.1
无警示标识	4.6	0.6	3.6	1.8	8.5***	5.6
不知道	0.2	0.0	0.7	0.8	3.4***	3.7***
n	305	426	361	137	765	459
	中国					
	第1轮 （2006年3月-12月）		第2轮 （2007年10月-2008年2月）		第3轮 （2009年5月-2010年3月）	
无防伪标签	10.7	8.5	13.4*	7.2	6.3***	7.2
不知道	10.3	0.2	5.8***	0.2	2.5***	8.9***
n	2308	1089	2455	817	2553	1191
	孟加拉					
	第1轮 （2009年2月-5月）		第2轮 （2010年3月-6月）			
无印花税票	0.4	NA	3.7**	NA		
n	368	NA	401	NA		

n代表有效的回应的总数（即分母）。*, ** 和***：与前一时期在5%、1%和0.1%水平的显著性差异。进行比较的频数非常之高, 所以解释这些数据需极其谨慎。

表6 广义估计方程模型：与参与卷烟避税或逃税比率相关的因素

	加拿大			美国			英国			法国		
	OR	95% CI	p Value	OR	95% CI	p Value	OR	95% CI	p Value	OR	95% CI	p Value
收入（以低收入为参考）												
中	0.92	(0.73 to 1.16)	0.49	0.88	(0.70 to 1.10)	0.26	1.27	(1.05 to 1.54)	0.01	1.05	(0.80 to 1.38)	0.75
高	0.72	(0.56 to 0.92)	0.01	1.10	(0.85 to 1.42)	0.47	1.86	(1.53 to 2.25)	0.00	1.21	(0.87 to 1.68)	0.25
不知道/拒绝回答	0.79	(0.56 to 1.11)	0.17	0.65	(0.40 to 1.05)	0.08	1.31	(1.02 to 1.68)	0.04	0.66	(0.32 to 1.38)	0.27
受教育水平（以低水平为参考）												
中	1.00	(0.80 to 1.24)	0.98	1.58	(1.26 to 1.99)	0.00	1.09	(0.92 to 1.30)	0.33	1.13	(0.87 to 1.47)	0.37
高	1.06	(0.79 to 1.44)	0.69	1.48	(1.10 to 1.99)	0.01	1.15	(0.91 to 1.44)	0.24	1.03	(0.75 to 1.42)	0.84
不知道/拒绝回答	0.35	(0.02 to 5.03)	0.44	3.10	(0.35 to 27.74)	0.31	0.54	(0.25 to 1.19)	0.13	1.34	(0.28 to 6.41)	0.72
性别（以男性为参考）	1.11	(0.91 to 1.35)	0.32	0.73	(0.59 to 0.90)	0.00	1.08	(0.93 to 1.25)	0.30	0.83	(0.66 to 1.05)	0.12
年龄	1.95	(1.29 to 2.93)	0.00	2.18	(1.44 to 3.28)	0.00	1.69	(1.25 to 2.29)	0.00	0.66	(0.36 to 1.19)	0.17
年龄的平方	0.95	(0.91 to 0.99)	0.02	0.95	(0.91 to 0.99)	0.02	0.96	(0.93 to 0.99)	0.02	1.04	(0.96 to 1.12)	0.33
每日吸烟量（以1-10支卷烟为参考）												
11-20 支	1.62	(1.35 to 1.95)	0.00	1.40	(1.09 to 1.80)	0.01	1.04	(0.90 to 1.19)	0.61	1.17	(0.89 to 1.53)	0.26
21-30 支	1.44	(1.13 to 1.85)	0.00	1.61	(1.19 to 2.16)	0.00	1.23	(1.02 to 1.50)	0.03	1.24	(0.75 to 2.08)	0.40
> 30 支	1.91	(1.30 to 2.82)	0.00	1.69	(1.18 to 2.41)	0.00	1.18	(0.91 to 1.53)	0.21	1.34	(0.54 to 3.32)	0.53
不知道/拒绝回答	1.70	(0.44 to 6.64)	0.44	1.05	(0.21 to 5.17)	0.96	1.22	(0.56 to 2.64)	0.62	-	-	-
吸第一支卷烟的时间（以> 60 min为参考）												
31-60 min.	0.66	(0.50 to 0.88)	0.00	1.33	(0.98 to 1.79)	0.07	0.91	(0.75 to 1.11)	0.34	0.99	(0.74 to 1.33)	0.96
6-30 min.	0.85	(0.66 to 1.09)	0.20	1.25	(0.93 to 1.69)	0.15	0.93	(0.77 to 1.11)	0.41	1.36	(1.02 to 1.81)	0.04
≤ 5 min.	1.07	(0.80 to 1.42)	0.67	1.37	(0.99 to 1.90)	0.06	0.98	(0.80 to 1.21)	0.87	1.13	(0.73 to 1.75)	0.58
不知道/拒绝回答	0.80	(0.52 to 1.21)	0.29	0.87	(0.36 to 2.09)	0.76	1.01	(0.64 to 1.59)	0.97	3.58	(2.71 to 4.73)	0.00
戒烟意向（以否为参考）												
是	0.91	(0.76 to 1.09)	0.30	0.71	(0.59 to 0.85)	0.00	0.80	(0.71 to 0.89)	0.00	0.79	(0.64 to 0.97)	0.02
不知道/拒绝回答	0.97	(0.63 to 1.48)	0.89	0.66	(0.40 to 1.09)	0.11	0.57	(0.37 to 0.89)	0.01	0.68	(0.15 to 3.12)	0.62
轮次（以第1轮为参考）												
第2轮	0.38	(0.26 to 0.55)	0.00	0.81	(0.55 to 1.21)	0.31	1.86	(1.36 to 2.56)	0.00	0.78	(0.56 to 1.08)	0.13
第3轮	0.44	(0.31 to 0.62)	0.00	0.81	(0.56 to 1.18)	0.27	1.79	(1.31 to 2.45)	0.00	-	-	-
第4轮	0.50	(0.36 to 0.68)	0.00	0.85	(0.59 to 1.21)	0.37	1.64	(1.23 to 2.19)	0.00	-	-	-
第5轮	0.76	(0.57 to 1.01)	0.06	0.75	(0.53 to 1.07)	0.11	1.47	(1.11 to 1.95)	0.01	-	-	-
第6轮	0.84	(0.65 to 1.09)	0.20	0.80	(0.57 to 1.12)	0.20	1.45	(1.11 to 1.88)	0.01	-	-	-
第7轮	1.23	(0.97 to 1.56)	0.09	0.62	(0.45 to 0.86)	0.00	1.37	(1.05 to 1.78)	0.02	-	-	-
第8轮	1.12	(0.89 to 1.39)	0.33	0.89	(0.66 to 1.21)	0.47	1.19	(0.92 to 1.54)	0.19			
入样次数（以1次为参考）*												
2	1.18	(0.99 to 1.41)	0.06	1.16	(0.96 to 1.40)	0.12	1.35	(1.15 to 1.59)	0.00	1.08	(0.77 to 1.50)	0.67
3	1.45	(1.18 to 1.79)	0.00	1.02	(0.80 to 1.30)	0.89	1.50	(1.26 to 1.78)	0.00	-	-	-
4	1.33	(1.05 to 1.68)	0.02	0.94	(0.71 to 1.25)	0.67	1.57	(1.27 to 1.93)	0.00	-	-	-
5	1.65	(1.27 to 2.15)	0.00	1.04	(0.73 to 1.49)	0.81	1.66	(1.29 to 2.14)	0.00	-	-	-
6	1.48	(1.07 to 2.05)	0.02	1.15	(0.73 to 1.81)	0.56	1.50	(1.11 to 2.04)	0.01	-	-	-
7	1.69	(1.15 to 2.48)	0.01	0.81	(0.43 to 1.55)	0.53	1.88	(1.30 to 2.72)	0.00	-	-	-
8	2.35	(1.49 to 3.69)	0.00	0.82	(0.37 to 1.81)	0.63	2.21	(1.37 to 3.56)	0.00	-	-	-
截距	0.01	(0.01 to 0.04)	0.00	0.00	(0.00 to 0.01)	0.00	0.02	(0.01 to 0.03)	0.00	0.63	(0.19 to 2.11)	0.46

年龄和年龄的平方以10年为单位；对于加拿大、英国和法国：GEE（连接函数=对数，系列=二项分类，运算相关矩阵结构=非结构化型相关）；对于美国：GEE（连接函数=对数，系列=二项分类，运算相关矩阵结构=可替换型相关）；*入样次数平均值：加拿大=2.5，美国=2，英国=2.5，法国=1.5。
GEE：广义估计方程

我们发现，总体看来烟瘾较大且成瘾较严重的吸烟者更有可能参与避税/逃税，而打算戒烟的吸烟者则很少参与，这与预期一致。我们发现家庭收入和受教育水平和参与避税/逃税的可能性之间有重要关联。但是，这些关联在不同国家间的方向和幅度都是有差异的。这些结果强调了考虑与国家背景特征相关因素的重要性。

例如，相邻司法管辖区域间卷烟税或价格的差异通常被假设为卷烟避税/逃税的关键驱动力。尽管理论上合理，但是这样的主张忽略了一系列其他可能同等重要甚至更重要的因素。例如，对加拿大省级数据的一次检验显示卷烟避税/逃税只在安大略省和魁北克省两个省大量存在，这两个省是加拿大卷烟税最低的。这样的发现说明能够接触避税/逃税的机会可能是一个关键因素。其他重要的国家级的因素可能包括政府法律的税收效力、地理位置（即长的和易跨越的边境）及烟草业容忍或者鼓励逃税的程度。

研究局限性

以下是几个值得讨论的研究局限。第一，大部分流行率的估计是基于自报的回答，因此不能排除社会期望偏差（当被调查者提供社会所期望的答案时产生）。这些答案可能代表真实的行为或者被调查者认为的对调查者想听到内容的认知，或者两者的结合。尤其是卷烟税逃税，作为一种非法活动，可能会被影响[33]。不完整的回忆，尤其是对于烟盒信息的回忆，也可能导致评估误差。剔除社会期望偏差和不完整回忆的影响是不可能的。两者可能全部，或至少部分解释了我们所观察到的基于自报的估计和基于烟盒检查的估计之间的差异。第二，各轮调查间隔时间的不等以及实地调查的时长和时段的差异表明应审慎检验时间性差异。举个例子，正如Hyland等人所指出的[31]，四国调查第二轮在英国的暑假进行，与第一轮欧洲秋天的调查相比，调查对象更有可能游访更易获得低税或未上税卷烟的邻国。第三，很难从逃税中区分出避税。比如，携带卷烟跨越州或国际边境可能是合法的或违法的，这取决于所允许的免税额。类似的，在原住民/印第安人保留地购买卷烟不一定违法。另外，此研究局限性还包括没有能力捕捉烟草业逃税、在合法商店销售未上税卷烟、以及存在假卷烟或带有假税票的卷烟的现象。

对于政策和研究的影响

《烟草控制框架公约》是由WHO的成员国协商制定的、以减少烟草使用的流行率和烟草烟雾的暴露为目的国际性公约。其6.2条款呼吁各方采取措施，禁止或限制向国际旅行者出售或由其进口免税烟草产品[34]。报告最近一次购买的是免税卷烟的吸烟者的比例只在英国比较高（过去10年在3.5%到7%之间）。在其他高收入国家购买免税卷烟的比例相对较低但绝不是可以忽略不计。而且，即使购买免税卷烟的真实流行率平均只有1%（或者甚至更低），此流行率估计也显示出可观的税收损失。另外，有证据显示免税卷烟的可及性使得卷烟逃税成为可能。免税卷烟的免税额仅限于几个国家；一些国家比如巴巴多斯，新加坡和斯里兰卡已经更甚一步，不再允许任何数额的免税烟草出入境。在2012年11月，《烟草控制框架公约》的各缔约方采纳了消除烟草产品非法贸易协议。这个新协议的目的是通过控制供应链

和国际协作抵制烟草产品非法贸易。该协议的关键措施是各方承诺建立一个全球追踪和贸易的系统。

大多数卷烟避税/逃税流行率的估计是全国性均值（中国和墨西哥除外，ITC项目调查是具有全国代表性的）。全国性估计可能会隐藏重要的和政策相关的区域性差异。比如，加拿大在2002年到2008/2009年间上升了4倍，很大部分可归因于安大略省原住民保留地购买量的上升。类似的，对法国的避税模式的观察显示避税几乎全是由边境地区吸烟者跨国购买他们的卷烟产生的[35]。需进一步改进相关研究的方式包括检验关于避税/逃税的国家性因素的影响和避税/逃税对购买行为（即所付价格和购买数量）及卷烟跨境率的影响[36]。

本文贡献

▶ 税收在减少烟草使用方面的幅度和有效性激励了烟草消费者、生产者和其他利益相关者，尤其是犯罪集团，寻找烟草税避税或逃税的方法。

▶ 量化卷烟避税/逃税的幅度极具挑战性。

▶ 我们发现卷烟避税/逃税的程度和类型在不同国家间和不同时段间的差异很大。我们也发现了家庭收入和受教育水平与参与卷烟避税/逃税的可能性之间有重要关联。

the French Institute for Health Promotion and Health Education (INPES), the French National Cancer the Netherlands Organisation for Health Research and Development (ZonMw) (the Netherlands), Cancer Research UK (C312/A6465 and C312/A3726), NHS Health Scotland (RE065), Flight Attendants' Medical Research Institute (FAMRI), GlaxoSmithKline (3516601), Pfizer (Ireland),和 the Malaysian Ministry of Health and ThaiHealth Promotion Foundation。Geoffrey T Fong获得 the Ontario Institute for Cancer Research 的 Senior Investigator Award 和 the Canadian Cancer Society Research Institute 的 Prevention Scientist Award 的支持。SILNE项目由欧盟委员会通过 FP7 HEALTH-F3-2011-278273提供资金支持。

利益冲突 无。

出处和同行审查 未开展；外部同行已评审。

数据共享声明 获得批准的研究者在被ITC数据管理中心清理的数据发布的2年后可获得来自ITC项目（ITC）的数据。有意使用ITC数据的研究者需要通过提交一份国际烟草控制数据存储库（ITCDR）请求申请以获得批准，并且在之后签署ITCDR数据使用协议。数据使用的审批条件和数据使用协议的内容网上有介绍（http://www.itcproject.org）。

参考文献

1 Chaloupka FJ, Warner KE. The economics of smoking. In: Culyer AJ, Newhouse JP. eds. *Handbook of health economics*. Amsterdam: Elsevier Science, North-Holland, 2000:1539–627.

2 Gallet CA, List JA. Cigarette demand: a meta-analysis of elasticities. *Health Econ* 2003;12:821–35.

3 International Agency for Research on Cancer. *IARC handbooks of cancer prevention: tobacco control. Volume 14. Effectiveness of price and tax policies for control of tobacco*. Lyon: International Agency for Research on Cancer, 2011.

4 World Health Organization. *WHO technical manual on tobacco tax administration*. Geneva: WHO, 2010.

5 Health Canada. *Contraband cigarettes: tobacco smoke analysis*. Ottawa: Health Canada, 2010.

6 RCMP. *Contraband tobacco enforcement strategy*. Ottawa: Royal Canadian Mounted Police, 2008.

7 IARC Working Group on Methods for Evaluating Tobacco Control Policies. *IARC handbooks of cancer prevention, tobacco control, Vol. 12: methods for evaluating tobacco control policies*. Lyon: International Agency for Research on Cancer, 2008.

8 Merriman D. Tool 7. Smuggling. Understand, measure and combat tobacco smuggling. World Bank economics of tobacco toolkit. Yurekli A, de Beyer J. eds. World Bank, 2002.

9 HM Customs and Excise. *Measuring indirect tax fraud*. London: HMCE, 2001.

10 HM Revenue and Customs. *Tackling tobacco smuggling—building on our success. A renewed strategy for HM Revenue & Customs and the UK Border Agency*. London: HMRC, UKBA, 2011.

11 Physicians for a Smoke-Free Canada. *The Canadian tobacco market place. Estimating the volume of Contraband Sales of Tobacco in Canada*. Updated—April 2010. Ottawa: Physicians for a Smoke-Free Canada, 2010.

12 Physicians for a Smoke-Free Canada. *The Canadian tobacco market place. Estimating the volume of Contraband Sales of Tobacco in Canada in 2009*. Updated—January 2011. Ottawa: Physicians for a Smoke-Free Canada, 2011.

13 Stehr M. Cigarette tax avoidance and evasion. *J Health Econ* 2005;24:277–97.

14 Callaghan RC, Veldhuizen S, Ip D. Contraband cigarette consumption among adolescent daily smokers in Ontario, Canada. *Tob Control* 2011;20:173–4.

15 Callaghan RC, Veldhuizen S, Leatherdale S, *et al*. Use of contraband cigarettes among adolescent daily smokers in Canada. *CMAJ* 2009;181:384–6.

16 Leatherdale ST, Ahmed R, Vu M. Factors associated with different cigarette access behaviours among underage smoking youth who usually smoke contraband (native) cigarettes. *Can J Public Health* 2011;102:103–7.

17 Luk R, Cohen JE, Ferrence R, *et al*. Prevalence and correlates of purchasing contraband cigarettes on First Nations reserves in Ontario, Canada. *Addiction* 2009;104:488–95.

18 DeCicca P, Kenkel DS, Liu F. *Excise tax avoidance: the case of state cigarette taxes. NBER Working Paper No. 15941. NBER Working Paper Series*. Cambridge: National Bureau of Economic Research, 2010.

19 Emery S, White MM, Gilpin EA, *et al*. Was there significant tax evasion after the 1999 50 cent per pack cigarette tax increase in California? *Tob Control* 2002;11:130–4.

20 Chiou L, Muehlegger E. Crossing the line: direct estimation of cross-border cigarette sales and the effect on tax revenue. B.E. *J Econ Anal Policy Contrib Econ Anal Policy* 2008;8.

21 Taylor AJ, Langdon M, Campion P. Smuggled tobacco, deprivation and addiction. *Eur J Public Health* 2005;15:399–403.

22 Sarntisart I. *An economic analysis of tobacco control in Thailand. HNP discussion paper, economics of tobacco control paper no 15*. Washington: The World Bank, 2003.

23 Chen H-F, Chen S-H, Lee J-M, *et al*. Who are the potential smokers of smuggled cigarettes? *Asian Econ J* 2010;24:221–34.

24 Lakhdar CB. Quantitative and qualitative estimates of cross-border tobacco shopping and tobacco smuggling in France. *Tob Control* 2008;17:12–16.

25 Barkans M. *Contraband tobacco on post-secondary campuses in Ontario*. [Master of Arts, Applied Health Sciences]. St. Catharines: Department of Community Health Sciences, Faculty of Applied Health Sciences, Brock University, 2010.

26 Kurti MK, von Lampe K, Thompkins DE. The illegal cigarette market in a socioeconomically deprived inner-city area: the case of the South Bronx. *Tob Control* 2013;22:138–40.

27 Merriman D. The micro-geography of tax avoidance: evidence from littered cigarette packs in Chicago. *Am Econ J-Econ Polic* 2010;2:61–84.

28 Wilson N, Thomson G, Edwards R, *et al*. Estimating missed government tax revenue from foreign tobacco: survey of discarded cigarette packs. *Tob Control* 2009;18:416–18.

29 Fong GT, Cummings KM, Borland R, *et al*. The conceptual framework of the International Tobacco Control (ITC) Policy Evaluation Project. *Tob Control* 2006;15 (Suppl 3):iii3–11.

30 Thompson ME, Fong GT, Hammond D, *et al*. Methods of the International Tobacco Control (ITC) Four Country Survey. *Tob Control* 2006;15(Suppl 3):iii12–18.

31 Hyland A, Laux FL, Higbee C, *et al*. Cigarette purchase patterns in four countries and the relationship with cessation: findings from the International Tobacco Control (ITC) Four Country Survey. *Tob Control* 2006;15(Suppl 3):iii59–64.

32 Ontario Tobacco Research Unit. *The tobacco control environment: Ontario and beyond. Monitoring and evaluation series. Tobacco taxes: monitoring update (April 24, 2011)*. Toronto: Ontario Tobacco Research Unit, 2011.

33 Krumpal I. Determinants of social desirability bias in sensitive surveys: a literature review. *Qual Quantity* 2013;47:2025–47.

34 World Health Organization. *Framework convention on tobacco control*. Geneva: World Health Organization, 2003.

35 Nagelhout GE, van den Putte B, Allwright S, *et al*. Socioeconomic and country variations in cross-border cigarette purchasing as tobacco tax avoidance strategy. Findings from the ITC Europe Surveys. *Tob Control* 2014;23: i30–i38.

36 Harding M, Leibtag E, Lovenheim MF. The heterogeneous geographic and socioeconomic incidence of cigarette taxes: evidence from nielsen homescan data. *Am Econ J Econ Policy* 2012;4:169–98.