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Fighting Heart Disease & Stroke

Irish Heart Foundation

Tobacco Taxation, Smuggling & Smoking in Ireland

A report for the Irish Heart Foundation
by Howard Reed, Landman Economics

October 2011

About the Irish Heart Foundation

The Irish Heart Foundation is the national charity fighting heart disease and stroke. More people in Ireland die from these causes than from cancer, road deaths and suicide combined. We work to bring hope, relief and a better future to Irish families.

We support pioneering medical research, campaign for improved patient care and provide vital patient support and information.

In hospitals, schools and workplaces, we support, educate and train people to save lives. As a charity we depend on your ongoing support - through your donations or by giving of your time as a volunteer or on a training course.

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Contents

Executive Summary

This report is an economic analysis of the relationship between the level of cigarette taxation in Ireland, the number of smokers in the Irish population, and the size of the market for tobacco products which are smuggled into Ireland or bought legally from other countries rather than being purchased in Ireland itself and subject to Irish tobacco duties.

Over the last two decades the Irish government has imposed repeated real terms increases in tobacco tax, a strategy recommended by the World Bank and the World Health Organisation to reduce smoking prevalence and the associated economic and social costs. While Irish adult smoking prevalence has fallen, the Irish tobacco industry has argued that high retail prices for tobacco in Ireland are encouraging smuggling.

While there is considerable academic evidence from other countries that high tobacco prices are *not* the main reason for increased smuggling, until now there has been little or no evidence specifically for Ireland. This report fills that gap.

The key findings from the report are as follows:

- There is a clear negative relationship between the price of cigarettes in Ireland and smoking prevalence in Ireland, controlling for other factors. Increasing the price of a packet of 20 cigarettes by €1 would result in a decrease of about 3.8% in the number of adult smokers in Ireland – around 30,000 fewer smokers.
- Despite the fact that the price of duty-paid tobacco increased substantially in real terms between 1995 and 2005, the size of the non-Irish duty paid market (illicit tobacco and cross-border shopped[1] tobacco products) was unchanged relative to the size of the duty-paid market. In other words, increased tobacco prices in Ireland do not appear to lead to increases in tobacco smuggling.
- Further increases in tobacco taxation in Ireland would produce substantial benefits to the public finances – ranging from just under €50m per year for a 50 cent increase in the price of a packet of cigarettes, to around €183m for a €2 increase. In the context of the very difficult current economic and fiscal situation – where Ireland badly needs extra tax revenue – these figures make a powerful case for further increases in tobacco taxation.

[1] Note that here (and throughout this report) the phrase 'cross border shopped' refers to cigarettes bought from any other EU country, rather than just cross-border shopping between the Republic of Ireland and Northern Ireland.

Tobacco taxation in Ireland over the last 15 years

Between 1995 and 2009 the price of a pack of cigarettes in Ireland increased by 64 percent in real terms, leading to increased revenue from tobacco taxation over the period even though the total volume of duty-paid cigarettes sold declined by about a third.

Ireland has the highest-priced cigarettes of any of the 27 European Union countries, although the tax on cigarettes as a percentage of the retail price, at 78% (using the EU's preferred price measure) is actually below the EU average. This is because the tobacco industry uses increases in tax to disguise its own price increases, and charges much higher prices in Ireland than in other EU countries – in the process undermining its own argument that high taxation is driving increased smuggling.

Comparing the retail price of a packet of cigarettes with average hourly wages in each EU country shows that cigarettes are less affordable in Ireland than in most western European countries (with the exception of Portugal) but more affordable than in most central and eastern European countries (because of low wages in those countries).

Hand-rolling tobacco in Ireland is less heavily taxed than cigarettes and there is evidence that the latest round of tax increases on tobacco in 2009 led to smokers switching from cigarettes to hand-rolling tobacco (sales of hand-rolling tobacco rose by over 70 percent in 2009).

Smoking prevalence in Ireland, 1998-2010

This report defines smoking prevalence as the proportion of regular or occasional smokers in the Irish adult population. Evidence from three national surveys (SLÁN, the Office of Tobacco Control (OTC), and the Living in Ireland survey) covers the period between 1998 and 2010. Data from SLÁN shows that smoking prevalence for Irish adults fell from around 31% to 29% between 1998 and 2007. More recent data from OTC suggests that prevalence declined further, to 24% in 2010. The fall in prevalence was greater for men (34% in 1998 down to 25% in 2010) than for women (32% in 1998 down to 24% in 2010).

Estimating the relationship between tobacco prices and smoking prevalence in Ireland

This report uses a statistical model of smoking prevalence estimated using SLÁN data for 1998 and 2007 to estimate the responsiveness of smoking prevalence to changes in real tobacco prices in Ireland. Economists use a statistic called the **prevalence elasticity of demand** to summarise how responsive smoking prevalence is to price increases. This is defined as the percentage decrease in the number of smokers in the Irish population divided by the percentage increase in the price of tobacco in a given period. So, for example, a prevalence elasticity of -0.4 would mean that if the price of tobacco increased by 10%, the number of smokers would reduce by 4%. The bigger the negative number, the more 'responsive' or 'elastic' the demand for tobacco in Ireland is.

The statistical model used in this report looks at the relationship between smoking prevalence in SLÁN in 1998 and 2007 and changes in the real price of cigarettes, controlling for demographic factors such as gender, age, social class, education and family structure. The results suggest that the prevalence elasticity of demand for tobacco in Ireland is -0.32, implying that a €1 increase in the real price of tobacco would result in a decrease of 3.8% in the number of adult smokers in Ireland – around 30,000 fewer smokers[2].

Models were also estimated for *subgroups* of the population (for example men and women separately, different age groups and different social classes). However, there is some evidence that younger adults (those aged between 16 and 29) are more sensitive to price increases than other age groups; this is in line with findings from previous research for Ireland and other countries.

Most previous research on the responsiveness of tobacco demand to price increases in Ireland has focused on the **price elasticity of demand**. The difference between price elasticity and prevalence elasticity is that the price elasticity measures the percentage decrease in the *total number of cigarettes consumed* in response to a price increase, whereas the prevalence elasticity measures the percentage decrease in the *number of smokers*. Most previous academic studies of the price elasticity of demand for tobacco in Ireland have produced a result of around -0.5. This would imply that increases in tobacco taxation raise additional revenue because the extra revenue per duty-paid pack of

[2] This calculation is based on the latest adult population estimate from the Irish Central Statistical Office (see http://www.cso.ie/releasespublications/documents/population/current/popmig.pdf, accessed September 2011) and assuming a current smoking prevalence rate of 24% among adults.

cigarettes (or other tobacco) sold more than outweighs the reduction in the overall number of packs sold. By contrast, a recent study for the Revenue Commissioners by Reidy and Walsh (2011) estimates that the price elasticity of demand is much higher, at around -3.6. This would imply that further increases in tobacco taxation would *reduce* revenue rather than raising it. However, in 2009, when the real price of cigarettes increased by 11%, cigarette tax revenue increased by 9% rather than falling, which directly contradicts the notion that cigarette prices have risen beyond the revenue-maximising point. In contrast, our finding of a prevalence elasticity of -0.32 implies a price elasticity of demand of around -0.5 which would be in line with most previous academic studies of the demand for tobacco in Ireland.

Estimating the relationship between non-Irish duty paid tobacco consumption and tobacco retail prices in Ireland

One possible explanation for Reidy and Walsh's finding that the price elasticity of demand for tobacco is very high would be if tobacco price increases were leading to increased smuggling. The main thrust of the tobacco industry's arguments against price increases in recent years has been that price rises will increase smuggling. This report estimates how the size of the **non-Irish duty paid** (NIDP) tobacco market changed between 1995 and 2005 (the latest year for which data are available).

The NIDP market comprises:

- Tobacco products purchased legally in other countries by Irish citizens and taken into Ireland for personal consumption in Ireland (**cross-border shopped tobacco**).
- Tobacco products purchased illegally on which no duty has been paid (**smuggled tobacco**).

A recent unpublished survey by Revenue and OTC suggests that the total size of the NIDP tobacco market in Ireland was 20% of the total market, of which 14% was smuggled tobacco and 6% was cross-border shopped tobacco. An illicit tobacco market of 14% represents a loss to the Exchequer of approximately €200m per year.

The Irish Tobacco Manufacturers Advisory Committee (ITMAC) argued separately in 2009 that the NIDP market comprised 20% of the total Irish tobacco market, and that the size of the NIDP market was increasing, but has never published details of how it arrived at these estimates.

Estimating the size of the illicit tobacco market in any country is inherently a difficult process because there is no direct survey data on smuggling. The method used in this report to estimate the size of the NIDP market is based on guidance from the World Bank, and relies on estimating total tobacco consumption and Irish duty-paid consumption separately, with the difference between the two figures being equal to the size of the NIDP market.

This report uses data on tobacco expenditure in the Household Budget Survey (HBS), a survey of income and expenditure performed in Ireland every five years, to estimate the size of the total tobacco market in Ireland (including NIDP consumption). The 'grossed up' estimate of annual tobacco consumption for Ireland from HBS is compared with official figures from the Revenue Commissioners' annual Statistical Reports on total expenditure on *duty-paid* tobacco. To get an exact estimate of the size of the NIDP market it is necessary to make further assumptions about the average price which Irish households pay for non-duty-paid and illicit tobacco. Also a correction needs to be made for the well-

established fact that households interviewed for expenditure surveys such as the HBS consistently under-report their tobacco expenditure on average.

The analysis is performed for the last three years in which the HBS was conducted: 1995, 2000 and 2005. The results suggest that the size of the NIDP tobacco market was more or less constant between 1995 and 2005, relative to the size of the duty-paid tobacco market. In other words, increases in the real price of duty-paid tobacco between 1995 and 2005 seem to have had **no effect whatsoever** on the size of the NIDP tobacco market – including the illicit tobacco market.

Tobacco taxation and increased government revenue

Because there does not seem to be a relationship between the retail price of tobacco and the size of the NIDP tobacco market in Ireland, there is clear potential for tobacco tax increases to deliver net benefits to the public finances. Some of these benefits would accrue through additional revenue from tobacco taxation itself. In addition to this, there would be other revenue effects of an increase in tobacco taxation operating through reduced smoking prevalence, most of which are likely to be positive, including:

- Savings in public spending on health because less would be spent on treating smoking-related diseases.
- Increased tax receipts from people living longer healthy lives and working longer.
- Increased tax receipts from reduced workplace absenteeism.
- Reduced benefit expenditure on long-term sick and disabled people.

Table X1 below shows the expected annual increase in net revenue to the Irish public finances from tobacco taxation which would arise from a tax-induced increase in the price of cigarettes of 50 cent, 1 euro and 2 euro respectively (combined with equivalently sized price increases on other types of tobacco such as hand-rolling). The "direct benefits" figures are based on a price elasticity of demand of -0.5 (a reasonable assumption given the findings of this report on the prevalence elasticity). The "indirect benefits" are mainly based on a study by Reed (2010a) of the impact of reduced smoking prevalence on the public finances for the UK, although they include estimates of the reduction in acute healthcare costs (i.e. hospital admissions and treatments) based on research by Howell (2011a) specifically for Ireland.

Table X1. Estimated annual benefits of tobacco tax increases to the public finances

Price increase on a packet of cigarettes	€0.50	€1.00	€2.00
Smoking prevalence after increase	23.5%	23.1%	22.2%
Direct public finance benefits	€35m	€68m	€128m
Indirect public finance benefits	€14m	€28m	€55m
TOTAL	**€49m**	**€96m**	**€183m**

Notes: analysis assumes initial smoking prevalence for Ireland of 24% and an initial cigarette price of €8.47

Direct public finance benefits are increased receipts from tobacco taxation.

Indirect public finance benefits include reduced health service spending, reduced net spending on benefits, and increased revenue from direct and indirect taxes due to longer working lives and reduced workplace absenteeism.

Table X1 suggests that further increases in tobacco taxation would produce substantial benefits to the public finances – ranging from just under €50m per year for a 50 cent increase in the price of a packet of cigarettes, to around €183m for a €2 increase. Around thirty percent of the public finance benefits would accrue as a result of indirect effects of the fall in smoking prevalence, although the increase in revenues from tobacco taxation is also substantial. In the context of the very difficult current economic and fiscal situation – where Ireland badly needs extra tax revenue – these figures, although necessarily approximate, make a powerful case for further increases in tobacco taxation.

Conclusions and policy recommendations

While there seems to be no relationship between retail cigarette prices and the size of the Irish illicit market, this does not mean that the Irish authorities can afford to be complacent about smuggling or about tobacco control policy in general. Revenue and OTC estimate that the Irish illicit market comprises about 14% of total consumption. This is relatively large by the standards of high-income countries. The analysis in Chapter 4 suggests that Ireland's illicit tobacco market has been this large since at least the mid-1990s.

This report assesses the Revenue Commissioners' *Strategy on Combating the Illicit Tobacco Trade (2011-13)* to ascertain whether Revenue has set the right priorities for the next two years. Three issues stand out:

1. The strategy of "more effective and visible interventions through enhanced capability and better deployment of its resources" is the correct approach, but

needs to be properly resourced to be effective. It will probably not be enough to "maintain resources currently deployed in combating the illicit trade and periodically enhance these when required". For example, the UK, which has had great success in reducing the size of its illicit tobacco market over the last decade, now spends around £100 million per year on these activities.

2. The Irish Government needs to follow the example of the UK by introducing legal sanctions against tobacco companies whose products are smuggled (seizure payments); the current voluntarist approach has insufficient teeth to be workable.
3. For any strategy to be successful it needs to be based on accurate assessment of current smoking trends and regular data collection. The quality of data on smoking prevalence in Ireland is poor, and makes it difficult to assess whether tobacco control policy is working or not.

Based on the research presented here, this report makes the following recommendations to the Irish government:

Tobacco pricing

- At the next budget, tax on a packet of 20 cigarettes should be increased by at least 50 cent. This is likely to generate around €35 million of extra revenue.
- The Government should commit to a price escalator whereby tobacco taxes rise by a certain amount each year in future budgets (for example, 5 percent per year above inflation).
- The tax on hand-rolling and other non-cigarette tobacco should be increased to the same level as tax on cigarettes.
- If a price escalator is adopted it should apply across the board to all types of tobacco products, not just cigarettes.

Anti-smuggling operations

- Expenditure on anti-smuggling operations such as enforcement and supply chain control should be increased by around €8 million per year – equivalent to what the UK spends on these activities per head of population. If Ireland could achieve a percentage point reduction in the size of its illicit tobacco equivalent to that which the UK managed between 1998 and 2000 (a 9 percentage point drop), this would reduce the size of the illicit tobacco market in Ireland to 5 percent of the total market, bringing in around €130 million of extra revenue to the Exchequer per year. Thus, increased investment in anti-smuggling operations would pay for itself many times over.

Improving the evidence base

- The quality of evidence on smoking prevalence and the size of the non-Irish duty paid market in Ireland is currently poor compared with many other countries.

- The frequency of the SLÁN survey should be increased to at least every two years so that it can provide more up-to-date analysis of trends in smoking prevalence.
- Alternatively, the monthly telephone polling conducted by OTC up to 2010 should be extended to include a larger sample size which could be used to produce reliable estimates of smoking prevalence for subgroups of the population.
- The Revenue Commissioners should publish detailed estimates of the size of the non-Irish duty paid tobacco market – both the illicit market and legal cross-border purchases – with clearly set out methodology, along the lines of HMRC in the UK.

Introduction

Landman Economics has been commissioned by the Irish Heart Foundation to undertake an economic analysis of the relationship between the level of cigarette taxation in Ireland, the number of smokers in the Irish population, and the size of the market for tobacco products which are smuggled into Ireland or bought legally from other countries rather than being purchased in Ireland itself and subject to Irish tobacco duties.

Retail tobacco products in Ireland and other countries are subject to high levels of taxation, and with good reason: tobacco is the only legal consumer product that kills when used as intended and is highly addictive, with half of all long-term users dying from their addiction. The use of tobacco imposes significant costs on the Irish economy through increased public health service expenditure on smoking-related health conditions and increased mortality rates for smokers of working age[3]. A recent estimate by Howell (2011a) suggests that smoking-related health conditions cost the Irish health service €280 million per year through their impact on increased hospital admissions, hospital treatments and length of stay in hospital. Like many other governments in the EU, over the last two decades the Irish Government has imposed repeated real terms increases in tobacco tax, a strategy recommended by the World Bank and the WHO Framework Convention on Tobacco Control to reduce smoking prevalence and the associated economic and social costs. The strategy has had a positive impact: the proportion of smokers in the adult Irish population declined from around 31% to 29% between 1998 and 2007, and recent data from the Office of Tobacco Control (OTC) shows a further decline to 24% by 2010. However, in recent years increasing attention has been paid to the amount of tobacco consumed in Ireland which is purchased illegally after having been smuggled into the country; and also tobacco purchased legally in other EU countries by Irish citizens and taken back into Ireland (cross-border sales). Together these comprise the *non-Irish duty paid* tobacco market, which the Revenue Commissioners estimate now accounts for 20% of the tobacco consumed in Ireland.

Recent research by Revenue (Reidy and Walsh, 2011) has estimated that cigarette prices are now above the point at which revenue is maximised – implying that reductions in tobacco duties would increase revenue (at least, confining attention to the *direct* effects on excise revenues only; the research says nothing about the indirect effects). Meanwhile, the Irish tobacco industry – which has a vested interest in reducing the prices of cigarettes and other tobacco products so it can increase sales – argues that:

"The fact that Ireland has the highest retail price of tobacco in the EU is the principal reason why one in five cigarettes in Ireland is purchased in the NIDP market. Clearly many people are

[3] See Reed (2010a) and/or UK All Party Parliamentary Group on Smoking and Health (2010) for a detailed cost-benefit analysis of the impact of smoking on the United Kingdom economy through healthcare costs, reduced taxation income from shorter working lives, and the costs of workplace absenteeism for smokers.

voting with their feet and choosing to bypass the government's high tax policy by purchasing their tobacco products abroad or in the illegal supply network that has unfortunately become embedded in Irish society." (Irish Tobacco Manufacturers' Advisory Committee, 2009)

The Revenue's research on the relationship between cigarette prices and tobacco sales, and intensive lobbying by the tobacco industry, have combined to produce a situation where many Irish politicians and officials in the Departments of Finance and of Justice and Equality believe that high prices have led to increased smuggling. This was apparent, for example, in comments made by the Minister of Finance for the previous Fianna Fail Government in his Budget Speech of December 2009: *"I have decided not to make any changes to excise on tobacco in this Budget because I believe the high price is now giving rise to massive cigarette smuggling."* However, the Minister of Health in the Fine Gael/Labour coalition Government elected in 2011 has stated that he intends to seek a further increase in the price of tobacco in the 2011 Budget scheduled for later this year[4].

Academic research based on evidence from many countries around the world suggests that industry alarmism about the effects of smuggling is misplaced. As a recent study commissioned by the World Health Organisation explains:

"The tobacco industry has sometimes successfully argued to governments that they should not increase tobacco tax because this will increase the level of smuggling. The argument is that smugglers will smuggle into a country where they can make the highest profit, and this should be a country where tax is a high proportion of the price, leaving a large margin to reduce the price – by avoiding tax – and still retain a profit. A high tax margin can provide the initial incentive to smuggle; however the data show that it is not the most important factor. Other factors include the ease and cost of operating in a country, how well organised crime networks are, the likelihood of getting caught, the punishment if you are caught and so on. Other factors are more important than price… in fact the level of illicit trade is lower in regions where the price of cigarettes is higher." (Joossens *et al*, 2009)

Unfortunately, despite the fact that the global evidence base on the causes of tobacco smuggling and the best means to reduce it is quite extensive, until now there has been very little evidence specific to Ireland, meaning that the Irish debate has become dominated by unsubstantiated claims. This report aims to rectify that situation by producing the first rigorous study of the relationship between the retail price of cigarettes and other tobacco, the level of smoking prevalence, and the size of the illicit tobacco market in Ireland.

The report is structured as follows. Chapter 1 presents evidence on changes in tobacco prices in Ireland between the mid-1990s and the present day and examines how cigarette prices, the percentage of pack price that is made up of tax, and the affordability of

[4] "We have made moves on the price of cigarettes and the Minister for Health has indicated that he intends to seek a further increase in the price of tobacco in the forthcoming budget". Róisín Shortall, Minister of State in the Department of Health, Dáil debate on Public Health (Tobacco) (Amendment) Bill 2011, 15th July 2011.

cigarettes relative to average incomes varies across the EU. Chapter 2 shows how smoking prevalence in Ireland has changed between 1998 and 2010 for men and women. Chapter 3 presents an analysis of the responsiveness of smoking prevalence (the number of smokers in the adult Irish population) to cigarette prices between 1998 and 2007 – the first time that this statistic has been estimated specifically for Ireland[5]. Chapter 4 estimates the size of the non Irish duty paid tobacco market and how this has changed over time between the mid-1990s and the mid-2000s, and assesses the tobacco industry's claim that smuggling is increasing in the light of this rigorous evidence. Chapter 5 draws on evidence from the World Bank, the World Health Organisation and a range of country and regional case studies including the UK, Spain, Italy, Australia, New Zealand and California to demonstrate the effectiveness of tobacco price increases in many jurisdictions as part of an integrated tobacco control strategy, including anti-smuggling initiatives. Finally, Chapter 6 uses the evidence base in this report to draw conclusions as to the policies that would be most effective for Ireland in continuing to reduce smoking prevalence while raising revenue and tackling the illicit trade in tobacco.

[5] Previous analysis of the responsiveness of tobacco demand to tobacco prices in Ireland has focused on the overall volume of cigarettes sold rather than the number of smokers.

Chapter 1. Tobacco prices and taxation in Ireland and the rest of the EU

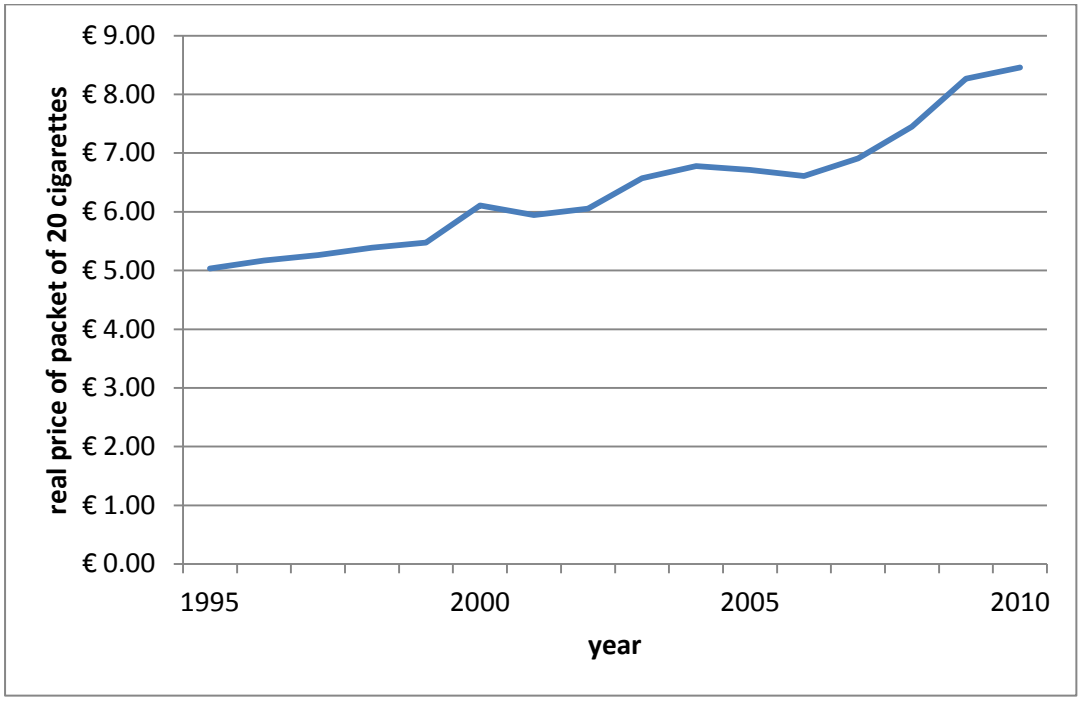
1.1 Tobacco taxation in Ireland over the last 15 years

The Irish Government has increased taxation on cigarettes by more than average price inflation (as measured by the Consumer Price Index) over recent years, so that the percentage of the pack price consisting of tax increased from 75.9 percent in 1995 to 80.1% in 2008. Figure 1 shows the price of a pack of twenty cigarettes in Ireland using the CSO's "National Average Retail Price" measure[6], deflated by the all-items CPI so that prices are expressed in 2009 terms[7]. Over the 14 years between 1995 and 2009 the price of a pack of cigarettes in Ireland increased by 64 percent in real terms.

Mostly, tobacco duty increases in Irish Budgets have tended to be incremental, with small above-inflation increases each year rather than sharp increases (as seen in Australia in 2010, for example). However, 2009 saw a particularly high price increase as the nominal price of a pack increased from €7.88 to €8.35, while the overall Irish price level (as measured by CPI) actually fell by around 4 percent due to the severe economic recession which followed the banking crisis of autumn 2008. Figure 1 shows that the real-terms increases in cigarette prices in 2008 and 2009 were much greater than in almost all the years between 1995 and 2007. This reflects the austerity measures that were taken in the budgets of 2008 and 2009 in response to Ireland's economic crisis and the resulting deficit in the public finances. The December 2009 and December 2010 Budgets both contained no increase in specific tobacco duties because of Government concerns that increased taxation would increase smuggling. Figure 1 shows that cigarette prices only increased slightly (by 2%) in 2010 compared with 2009, while total tax as a percentage of the retail price actually fell slightly from 80% in 2009 to 79% in 2010.

[6] For details see Revenue Commissioners *Statistical Report 2010*, Table EX19, note (a).
[7] The most recently published Revenue Commissioners' Statistical Report at the time of writing (October 2011) was the report for the year ended 31st December 2010.

Figure 1. Price of a Pack of 20 Cigarettes in Ireland, 1995-2010

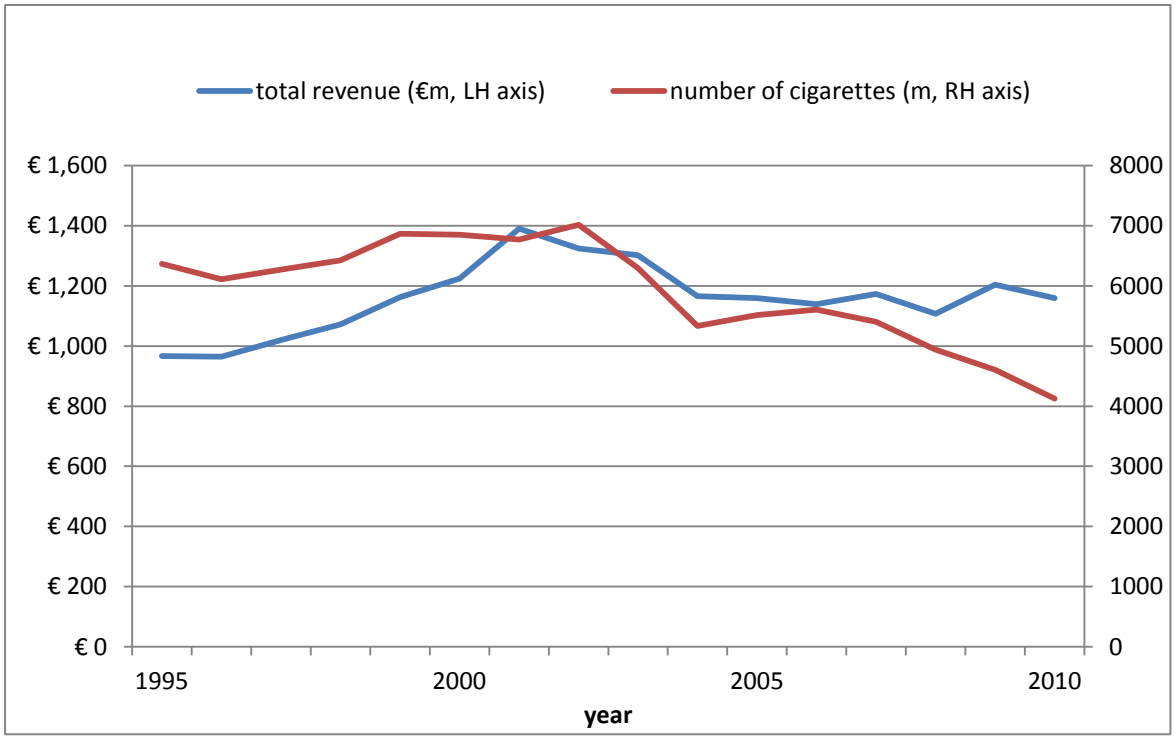


Source: Revenue Commissioners' Statistical Reports, various years. Online at http://www.revenue.ie/en/about/publications/statistical-reports.html

Cigarette prices are in real terms (deflated using 2010 CPI).

Figure 2 shows the total revenue accruing to the Irish Government from all duty-paid tobacco sales (including duty-paid cigarettes, cigars, pipe tobacco and hand-rolling tobacco) and the number of cigarettes sold each year. Again, the revenue figures are presented in real terms (at 2010 prices) using the all-items CPI to inflate figures for earlier years. Volume sales of non-cigarette tobacco are not included on Figure 2, but non-cigarette tobacco accounts for no more than 5 percent of revenue from tobacco tax receipts throughout the period. The Figure shows that total revenue from duty-paid tobacco rose between 1995 and 2001 then declined from 2002 to 2004, but has been roughly stable since then (with a slight uptick in 2009). The data on the total number of duty-paid cigarettes purchased shows a shallower increase up to 2001 and then a decline afterwards.

Figure 2. Total revenue from duty-paid tobacco sales and the volume of cigarettes sold, 1995-2010



Source: as Figure 1

Notes: revenue is in real terms at 2010 price (deflated using CPI).

1.2 Tobacco tax in Ireland and the rest of the EU

Ireland is one of 27 European Union (EU) member states within a single European market for goods and services. Each member state has its own rules for tobacco taxation, subject to EU directives on minimum and maximum levels of excise duty[8]. Tobacco taxes in the EU comprise three elements:

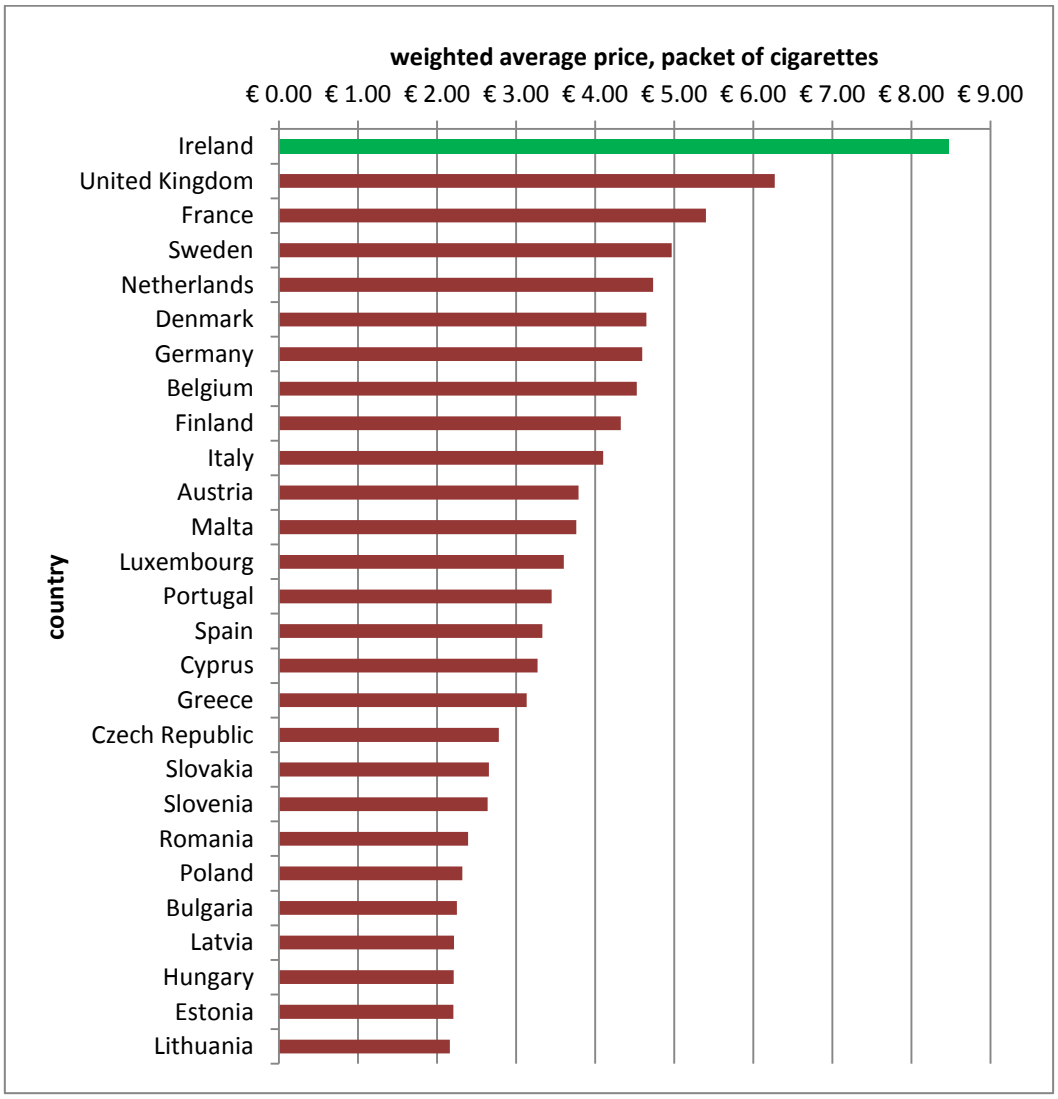
- **Specific duty** (currently €183.42 per thousand cigarettes sold).
- **Ad valorem duty** (currently 18.25% of the *overall* retail price).
- **Value Added Tax (VAT)**, currently 21% of the price *exclusive* of VAT).

[8] EU Council Directive 2010/12/EU specifies that from January 2011, the overall excise duty (specific duty and ad valorem duty excluding VAT) on cigarettes shall represent at least 57% of the weighted average retail selling price of cigarettes released for consumption, with a minimum excise duty of €64 per 1000 cigarettes. From January 2014 the minimum excise duty increases to 60% of the WAP or €90 per 1000 cigarettes. Specific duty is limited to a maximum of 76.5% of overall tobacco taxation (including VAT). Transitional arrangements permitting lower levels of excise duties apply to Bulgaria, Estonia, Latvia, Lithuania, Hungary, Poland and Romania until 2017. See http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:050:0001:01:EN:HTML for further details.

Figures 3 to 5 rank the EU member states in terms of:

- **The average price of a packet of 20 cigarettes in Euro**, using the Weighted Average Price (WAP) measure[9] (Figure 3).
- **Cigarette taxes** (including specific and ad valorem excise duties and VAT) **as a percentage of the retail price** in each country.
- **Affordability:** the price of a packet of cigarettes as a proportion of average gross hourly earnings[10] for full-time workers in each country (for the 23 EU countries where this information is available from Eurostat).

Figure 3. Average price of a packet of 20 cigarettes in 27 EU countries, July 2011



[9] From 1st January 2011, EU statistics use the WAP – defined as the total value of all cigarettes released for consumption in a country divided by the total quantity of cigarettes released for consumption – as the official measure of cigarette prices. Prior to this the Most Popular Price Category (MPPC) was used, but WAP gives a more realistic representation of average prices across all brands in each country.

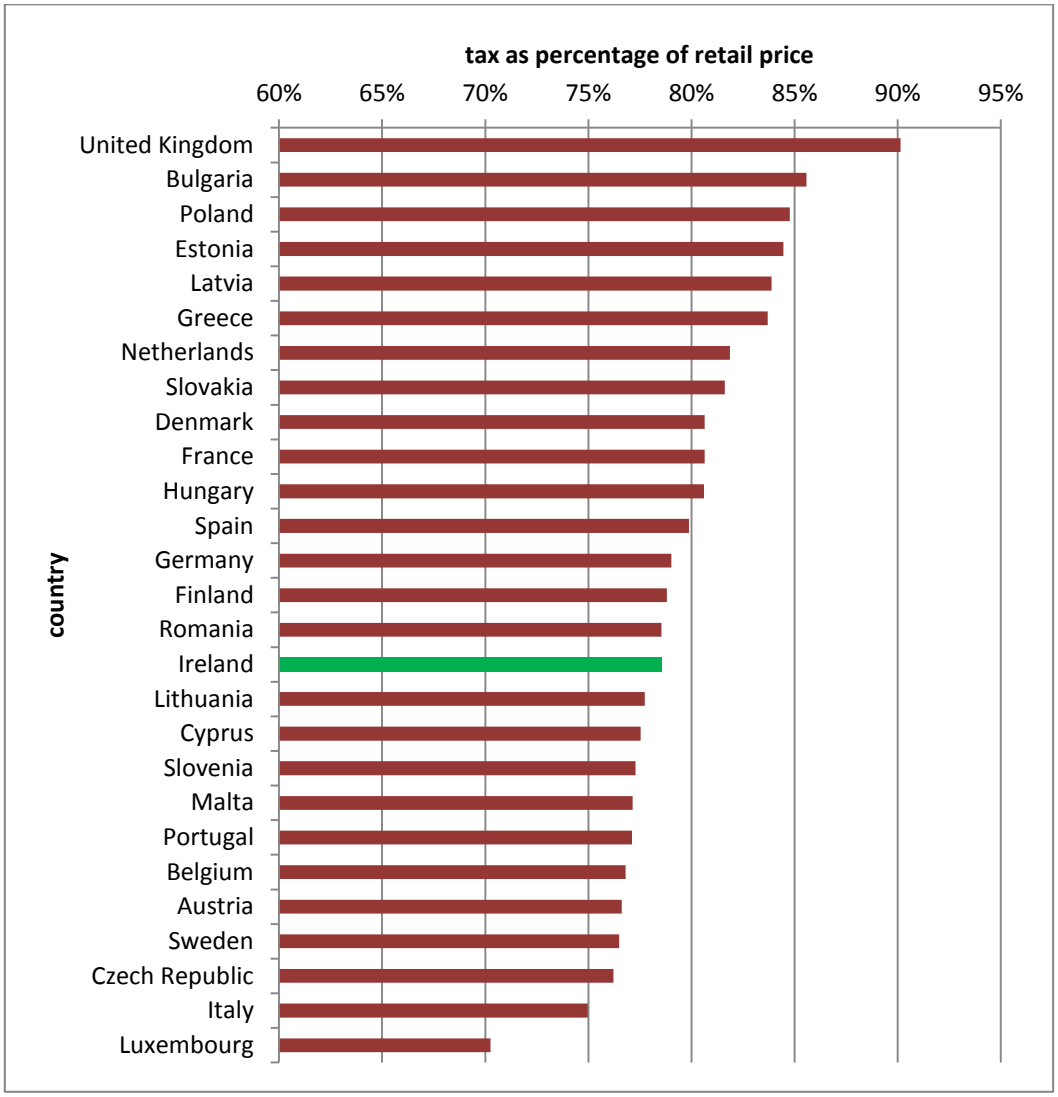
[10] While it would have been more useful in terms of disposable income available for cigarette purchases to uses average net earnings (after tax) rather than gross earnings, the data source used (Eurostat) does not contain comparable figures on net earnings across EU countries, so gross earnings had to be used instead.

Source: Eurostat data,
http://ec.europa.eu/taxation_customs/resources/documents/taxation/excise_duties/tobacco_products/rates/excise_duties-part_iii_tobacco_en.pdf

Figure 3 shows that Ireland has the highest average cigarette prices in the EU (using the weighted average price measure.) However, as Figure 4 below shows, it is not the case that the tax burden on cigarettes *as a percentage of the retail price* is particularly high in Ireland compared with other EU countries; in fact, taxation in Ireland as a percentage of the retail price, at 78%, is actually below the EU27 average[11].

[11] The discrepancy between the Eurostat figures, which state that 78% of the price of a pack of cigarettes in Ireland is tax on average, and the Irish Revenue Commissioners' figures mentioned earlier, which state that 80% of the price of a pack of cigarettes is tax, is due to the difference between the EU's preferred measure of average price and the Irish Revenue's measure.

Figure 4. Cigarette taxes as a percentage of retail price in 27 EU countries, July 2011



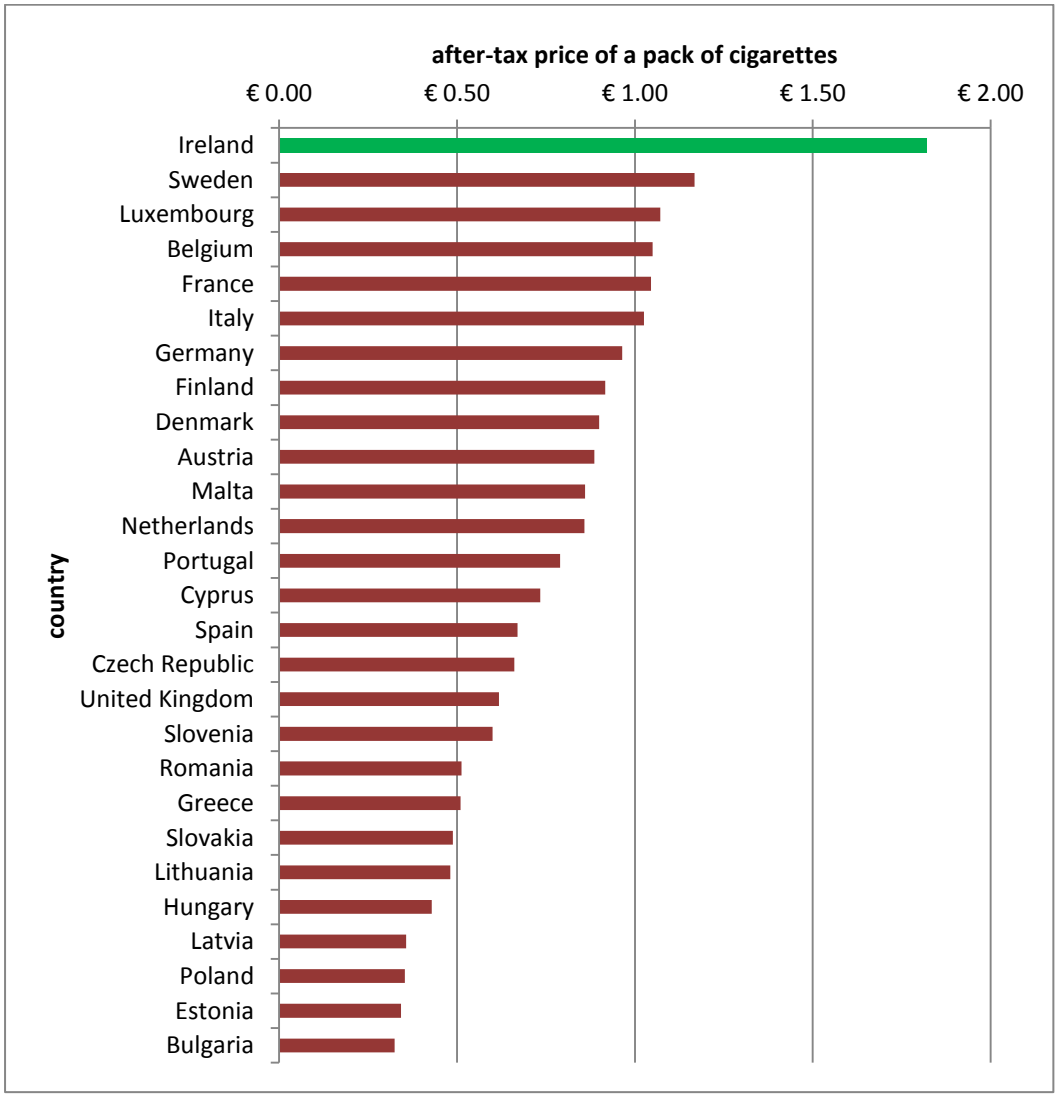
Source: as Figure 3

If the price of cigarettes *exclusive* of tax was roughly equal across different EU countries, there would be a very strong correlation between the average retail price of cigarettes in each country and tax as a share of the price. In fact, there is considerable evidence that tobacco industry pricing policies in Ireland involve 'overshifting' of tax increases to consumers. As Figure 5 below shows, prices *exclusive of tax* are much higher in Ireland than in any other EU country. Furthermore, in the decade between 2000 and 2010, although cigarette prices in Ireland increased markedly in real terms, the percentage of the average price accounted for by tax was exactly the same in 2010 as in 2000 (79 percent using the Revenue Commissioners' preferred measure of average retail price[12].) This shows that the tobacco industry in Ireland has been increasing its own revenues from

[12] Source: Revenue Commissioners *Statistical Report 2010*, Table EX19

cigarette sales at exactly the same rate as taxes have been increasing. Recent research on the Irish tobacco market has highlighted the hypocrisy of the tobacco industry in using increases in taxation to disguise their own price increases, with the industry lobbying heavily against price increases on the grounds that smuggling will increase while simultaneously raising the prices of cigarettes and other tobacco products over and above any increases in tobacco taxation[13]. The disconnect between the Irish tobacco industry's lobbying activities and its pricing behaviour is examined further in Chapter 3.

Figure 5. After-tax price of a packet of 20 cigarettes in 27 EU countries, July 2011

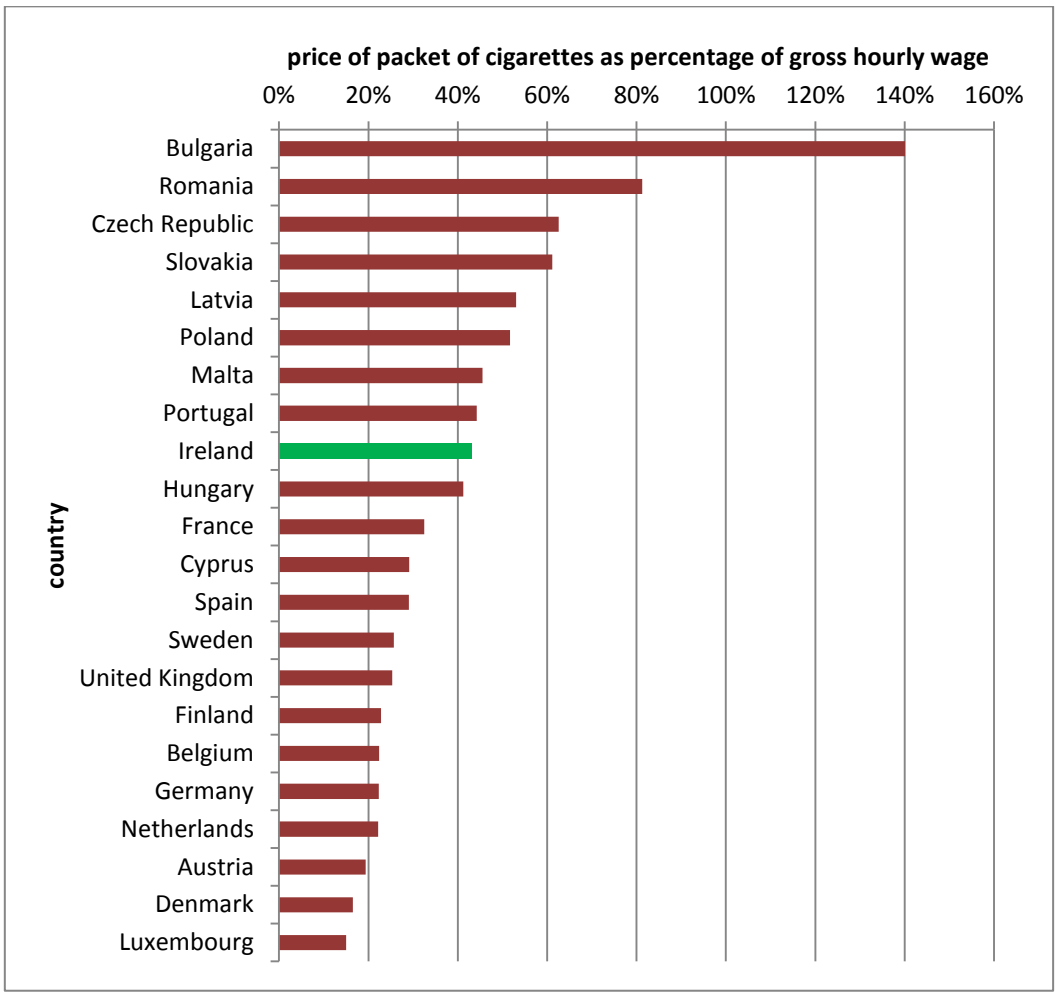


Source: as Figure 3

[13] See Howell (2011b). An international perspective on tobacco industry pricing policy and overshifting of tax increases is provided by Gilmore *et al* (2010).

How affordable are cigarettes in Ireland compared with other EU countries? Figure 6 shows that in terms of the affordability of a packet of cigarettes as a percentage of average gross hourly wages, Ireland is at an intermediate position in the EU. Cigarettes are less affordable in Ireland than in most Western European countries (with the exception of Portugal) but are more affordable than in most of the central and eastern European countries which entered the EU in 2004 or later (with the exception of Hungary). This is because although cigarettes are cheaper in central and Eastern Europe than in Ireland, wages are lower still.

Figure 6. Affordability of cigarettes in 22 EU countries, 2011



Source: price data as in Figures 3 and 4. Gross annual earnings data taken from Eurostat for the most recently available year (2007 in most cases), uprated to the 2011 price level for each country using Consumer Price Index data, and then converted into hourly earnings assuming a 35-hour week and 52-week year. Earnings data not available for Greece, Estonia, Lithuania, Slovenia or Italy.

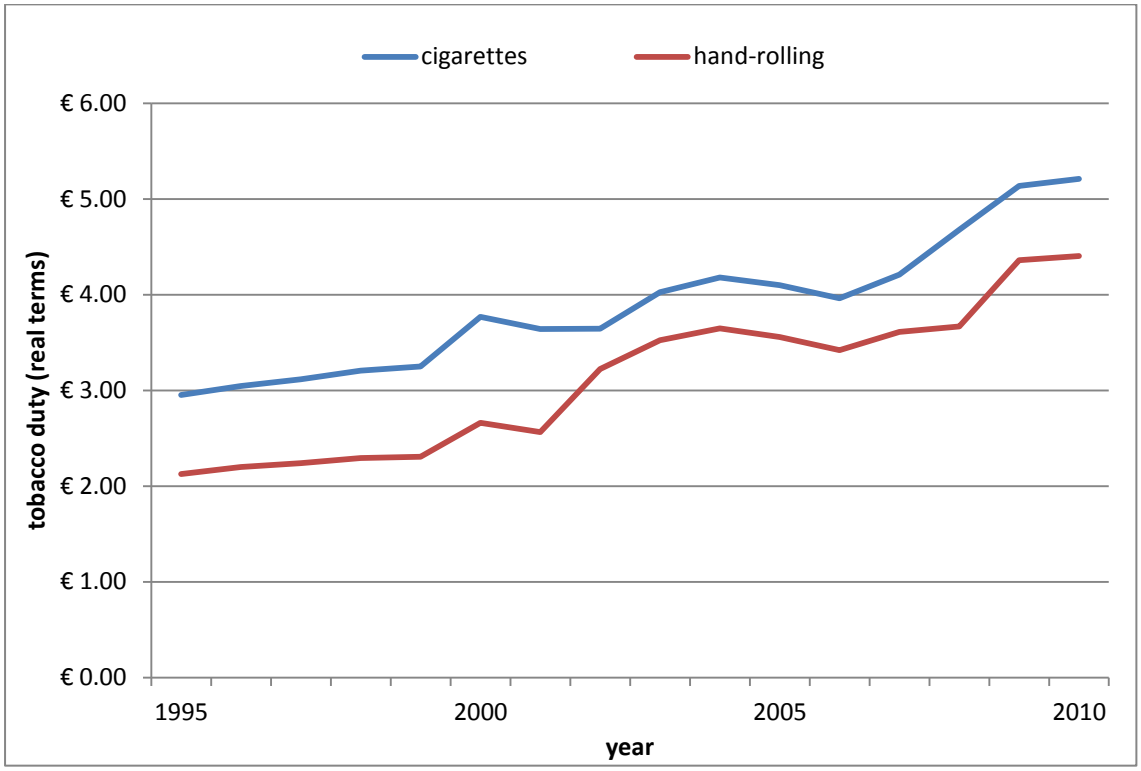
In summary, while it is true that cigarettes in Ireland are higher priced than in any other EU country, there is evidence that the tobacco industry exacerbates the size of the price difference between Irish cigarettes and other EU countries through "overshifting" of taxes onto consumers. The tax burden on Irish cigarettes as a percentage of the total retail price is less than the EU average, and cigarettes are more affordable in Ireland relative to average earnings than in several other EU countries.

1.3 Hand-rolling tobacco (HRT)

The statistics which the Revenue Commissioners collect on tobacco products other than cigarettes (e.g. HRT, cigars and pipe tobacco) are not as detailed as those collected for cigarettes. For example, Revenue does not publish a consistent retail price series for HRT. However, data on volume and revenues for each type of tobacco are published.

Figure 7 shows the rates of tobacco duty (in current prices, uprated using CPI) for a packet of 20 cigarettes and for a 25g pack of HRT (the nearest equivalent to a packet of 20 cigarettes) between 1995 and 2010. It is clear that, as in many other countries, HRT is less heavily taxed than cigarettes, although the discrepancy reduced in 2002, when cigarette duties were held constant in real terms but HRT duties rose sharply. In 2010 HRT duties were about 15 percent lower than cigarette duties, while tax made up about 60% of the price of a typical pack of hand-rolling tobacco compared with 80% of the average price of a packet of cigarettes (using the Irish Government's preferred average price measure).

Figure 7. Tobacco duty rates on cigarettes and hand-rolling tobacco



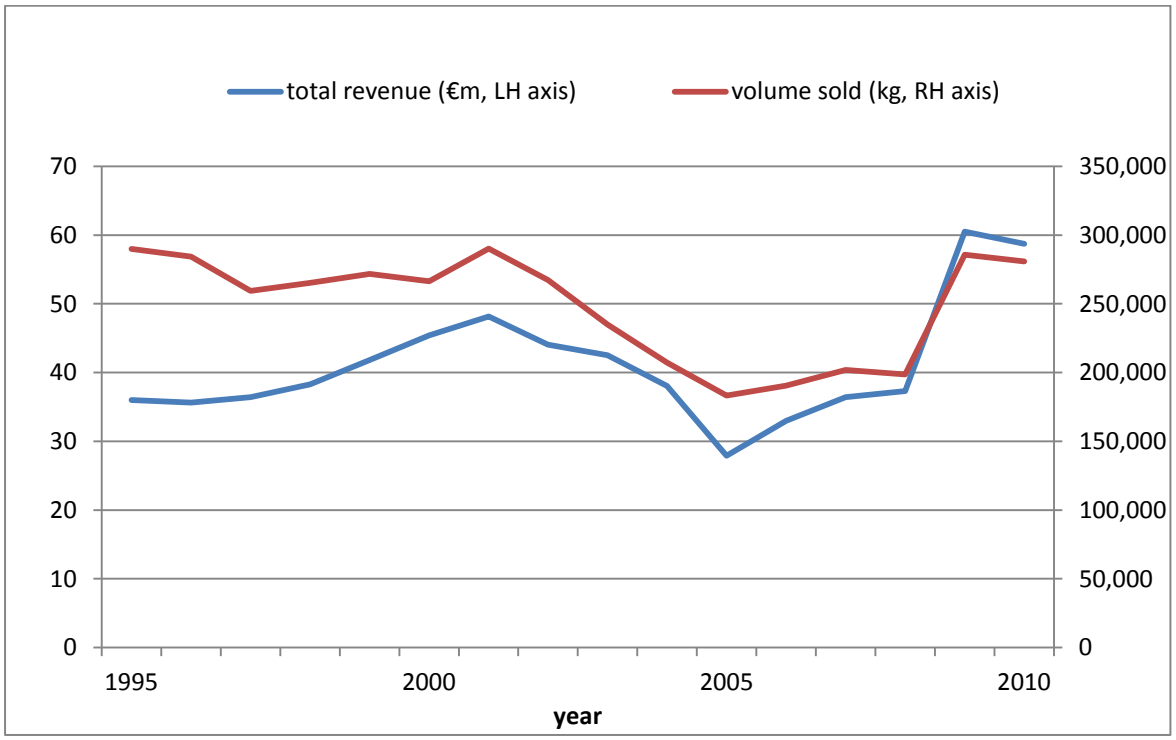
Source: Revenue Commissioners' Statistical Reports, various years.

Notes: figures for cigarettes include specific and ad valorem duty. Figures for HRT include specific duty only (HRT is not subject to ad valorem duty). Neither series includes VAT because the absence of data on retail prices for HRT products means that the VAT cannot be calculated precisely for the HRT data.

Figure 8 shows total tax revenue (in real terms) on sales of non-cigarette tobacco and the total volume of duty-paid sales (in kilograms) between 1995 and 2010. As with Figure 2 for cigarettes, total revenue has increased relative to the volumes of non-cigarette tobacco sold, as real duty rates have increased. Between 2001 and 2008, the volume of non-cigarette tobacco sold fell by about one-third, from 290,000 kg per year to 199,000. However 2009 saw a sharp reversal of this trend, as the volume of tobacco sold rose to around 286,000 – an increase of 44 percent. Within this total, fine-cut hand-rolling tobacco sales rose by over 70 percent in 2009. Given that HRT is cheaper than cigarettes per gramme of tobacco, the shift into HRT has been interpreted as a result of the large real terms duty increases introduced in 2009, combined with the fall in real average incomes resulting from the severe economic recession which began in 2008. However, it is important to recognise that even in 2009, non-cigarette tobacco was only a small part of the Irish duty-paid market; Revenue statistics show that total revenue from cigarette sales in 2009 was €1.16bn, compared with €61m for other tobacco. In other words, tax receipts

from non-cigarette tobacco made up only 5 percent of total tobacco revenues in 2009. In 2010, duty on hand-rolling tobacco was frozen in real terms, while the volume of hand-rolling tobacco sold fell slightly compared to 2009.

Figure 8. Total revenue and volume sales of non-cigarette tobacco in Ireland, 1995-2010



Source: Revenue Commissioners' Statistical Reports, various years.

Notes: revenue is in real terms at 2010 price (deflated using CPI).

Chapter 2. Smoking prevalence in Ireland, 1998-2010

Smoking prevalence in a country is normally defined as the total number of smokers in that country. This report focuses on smoking prevalence among people aged 16 and over[14]. While the Revenue Commissioners hold aggregate data on the total volume of cigarettes and other tobacco sold each year, the aggregate statistics do not provide information on the actual number of smokers in Ireland at any given time. Instead, it is necessary to use data from large-scale survey datasets to measure smoking prevalence. For Ireland, there are two sources of recent survey data which are suitable:

Survey of Lifestyle, Attitudes and Nutrition (SLÁN)

SLÁN is a cross-sectional survey conducted on behalf of the Department of Health and Children at periodic intervals. To date there have been three SLÁN surveys – in 1998, 2002, and most recently 2007. The 2007 survey interviewed around 10,000 adults and asked a range of questions about health and lifestyle, including questions on smoking and drinking. The 2002 and 2007 surveys (but not the 1998 survey) include information on household incomes. All three waves include demographic information (e.g. age, marital status, household structure) and some information on social class, labour market status and educational attainment.

Office of Tobacco Control (OTC)

The Office of Tobacco Control was established in 2002 to advise the Irish Government on the control and regulation of tobacco products, and to organise research on smoking and tobacco in Ireland[15]. The OTC was amalgamated with the Health Service Executive in 2011 as a result of rationalisation measures designed to address Ireland's current fiscal crisis. From July 2002 until June 2010, the OTC collected monthly telephone polling data on smoking prevalence from around 1,000 respondents per month. This means that data on annual smoking prevalence is available from June 2003 to June 2010 inclusive.

Between 1994 and 2001, there was a third source of data: the **Living in Ireland** survey (the Irish component of the European Community Household Panel (ECHP) survey) also collected data on smoking prevalence among panel members. However, ECHP finished in 2001.

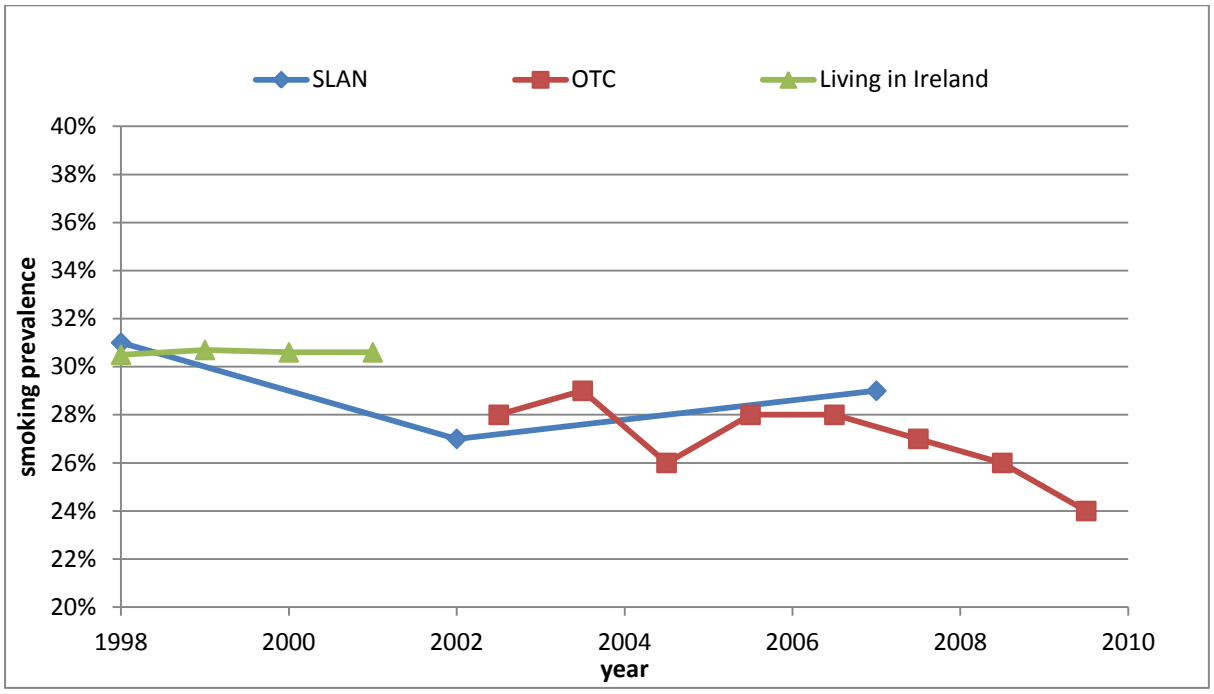
Figure 9 shows smoking prevalence for the whole adult sample (panel a) and for men and women separately (panels b and c) for each of the three data sources, between 1994 and 2010.

[14] Clearly, smoking prevalence among children is also a very important public health issue. However, the main SLÁN survey and the OTC data are based on interviews with adults only, and so it is not possible to measure children's smoking prevalence in Ireland with these data sources. However, there was a national children's' health survey accompanying SLÁN which does provide some data on prevalence in children.

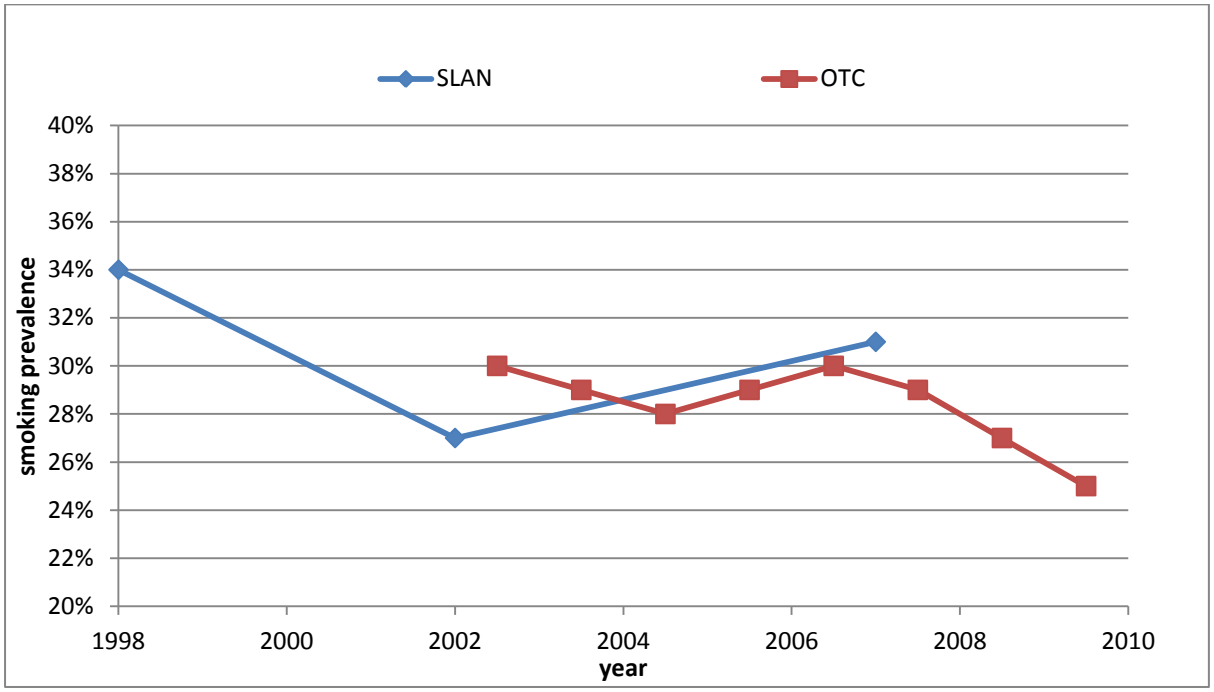
[15] Full details of the functions of the OTC can be found at http://www.otc.ie/about_us.asp

Figure 9: smoking prevalence in Ireland, 1998-2010

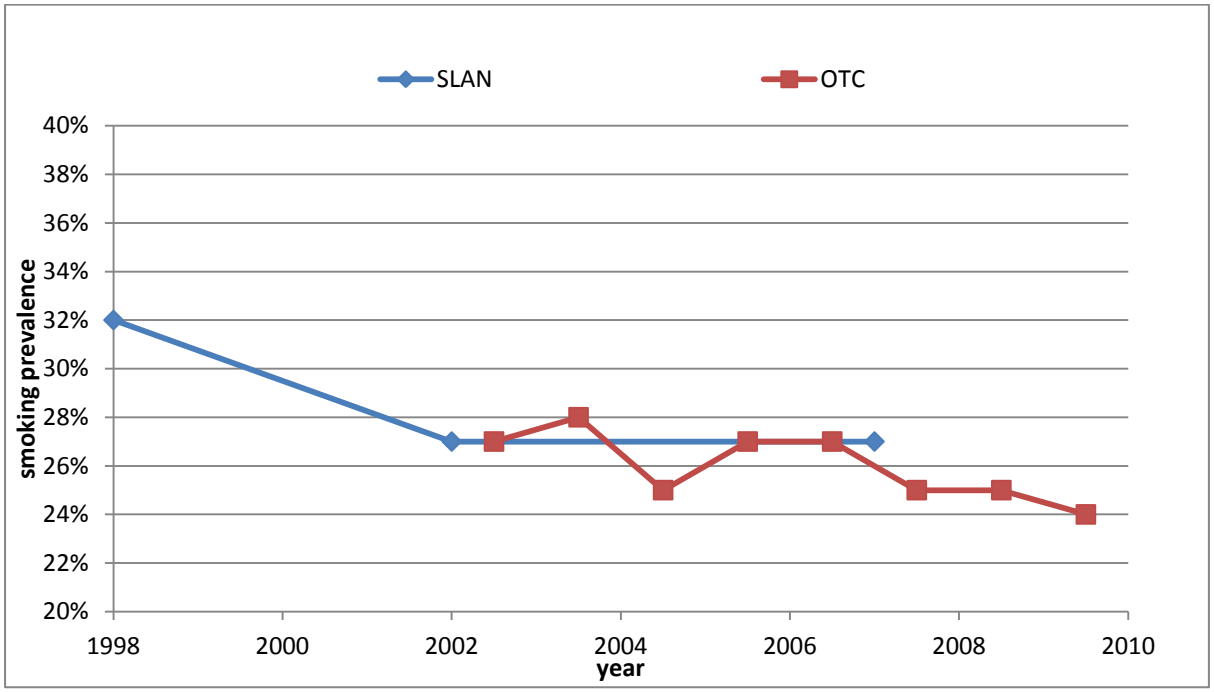
a. All adults



b. Men



c. Women



Source: SLÁN data - URLs: http://www.SLÁN06.ie/SLÁN2007MainReport.pdf (2007), http://www.nuigalway.ie/hbsc/documents/SLÁN03pdf.pdf (2002), http://www.dohc.ie/publications/pdf/SLÁN_1998.pdf (1998).

OTC: http://www.otc.ie/research.asp#section1

Living in Ireland: figures as reported in Layte and Whelan (2004). Layte and Whelan only report figures for the whole sample rather than men and women separately, so Living in Ireland data is only included in panel a.

The figures for the adult population in Ireland as a whole in panel (a) suggest that smoking prevalence in Ireland declined from about 30 or 31 percent of the population in 1998 to 24 percent by (the twelve months ending) June 2010. However, within these two time periods, the different data sources tell different stories. If the Living in Ireland data are to be believed, prevalence was static at around 30.5 percent between 1998 and 2001. By contrast, the SLÁN data show a steep decline in the rate of smoking prevalence from 31 percent to 27 percent between 1998 and 2002. SLÁN then shows a modest rise to 29 percent by 2007. By contrast, the OTC data for the twelve months ending June 2003 suggest a prevalence rate of around 28 percent, declining slightly to 28 percent by June 2007, with a steeper subsequent decline to 24 percent by June 2010[16].

Looking at the SLÁN data in isolation one would draw the conclusion that smoking prevalence fell sharply between 1998 and 2002, followed by a subsequent rise between 2002 and 2007. However, comparing SLÁN with the other data sources, the 1998 and 2007 prevalence estimates from SLÁN are roughly in line with the other data sources available at the time, whereas the 2002 SLÁN data seems to underestimate smoking prevalence (even though there is no precise overlap with the SLÁN data for 2002). This is borne in mind below when using the SLÁN data to derive an elasticity of smoking prevalence; the analysis in this report treats the 1998 and 2007 data as more reliable than the 2002 data (due to cross-verification against other data sources).

Analysis of the data on prevalence for men and women separately suggests that the reduction in prevalence for men (9 percentage points between 1998 and 2010) has been slightly greater than the reduction for women over the same period (7 percentage points). In particular, combining the SLÁN data for 2007 with the OTC data for the three years 2007 to 2010 suggests a steeper decline for men (6 percentage points) than women (3 percentage points) over this later period.

Overall, it is clear that smoking prevalence declined significantly for both men and women over the period 1998 to 2010 although the exact pattern of the decline looks slightly different according to which survey data are used.

[16] In May 2008 the sampling frame of the Ipsos MBRI telephone poll (which is used to collect the OTC smoking prevalence data) was changed to include mobile phone numbers; prior to this only landlines had been used. This change resulted in an increase in prevalence of about 3% from May 2008 onwards. The OTC data presented in Figure 3 have been recalibrated to pre-2008 levels to avoid a jump in the series in 2008. The downwards trend in the data was evident both before and after May 2008. For more information see the section "methodological changes to survey", URL http://www.otc.ie/research.asp

Chapter 3. Estimating the relationship between tobacco prices and smoking prevalence in Ireland

This chapter uses a statistical model of smoking prevalence, estimated using SLÁN data, to examine the relationship between the trends in tobacco prices and taxation detailed in Chapter 1 and the trends in tobacco prevalence analysed in Chapter 2. Before presenting new estimates of the responsiveness of smoking prevalence to tobacco prices in Ireland, the chapter first summarises the results of previous research on this topic for Ireland and other similar countries.

3.1 Previous research on the elasticity of demand for tobacco products

Typically, when faced with higher prices for a good or service, consumers tend to reduce their consumption of that good or service. For tobacco products, the effect is likely to be threefold:

- Some smokers will smoke less.
- Others will stop smoking altogether.
- Smoking take-up may also decline, increasing the number of non-smokers.

In this report we are particularly interested in the **prevalence elasticity of demand** for tobacco products in Ireland. This is a negative number[17] which corresponds to the percentage decrease in the number of smokers in the Irish population which occurs in response to an increase in the price of tobacco. So, for example, a prevalence elasticity of -0.4 would mean that a 10 percent increase in the tobacco price leads to a 4 percent reduction in the number of smokers in Ireland. In such a case, if smoking prevalence before the price increase was 30 percent, after the price increase it would be 30 minus (4 percent of 30) = 28.8 percent[18].

The prevalence elasticity is a particularly important concept when looking at the health benefits – and the wider financial benefits to the Irish economy – of reduced smoking. This is because most of the health effects of smoking occur regardless of the amount of cigarettes smoked per day. Quitting smoking altogether has much stronger health effects than reducing consumption but still carrying on smoking[19]. In terms of the additional costs of smoking (e.g. increased health service spending, lost productivity due to shorter

[17] It is theoretically possible for the prevalence elasticity to be positive, but it would be counter-intuitive for smoking rates to *increase* in response to an increase in price.
[18] Note that this is a percentage decrease NOT a percentage point decrease.
[19] For evidence on the health benefits of reduced consumption compared with quitting see Gotfredsen *et al* (2002) and West (2006).

working lives and increased absenteeism and so on) it is the change in smoking prevalence which is the main driver, rather than the change in tobacco consumption *per* se.

Despite the importance of smoking prevalence as a concept, in practice there has been more research on the **price elasticity of demand** for tobacco products – i.e. the decrease *in overall consumption* of tobacco (by volume) which occurs in response to an increase in the tobacco price, than the decrease in the *number of smokers* which occurs in response to a tobacco price increase. However, there are a number of papers which look at both the price elasticity and the prevalence elasticity. Most studies which look at both measures find that the prevalence elasticity is around one-half to three-quarters of the size of the price elasticity[20].

Most estimates of the price elasticity of demand for tobacco are produced using one of two types of econometric study:

- **Time-series models** which examine the relationship between overall consumption of tobacco products and the price of tobacco controlling for changes in other variables where possible, using aggregate data from national accounts.
- **Microeconometric models** which use individual-level data on smoking behaviour from surveys and examine the relationship between the amount of tobacco bought and/or smoking prevalence and the price of tobacco, controlling for other individual characteristics and (where possible) other changes to the smoking environment (e.g. workplace smoking bans).

The two techniques have different strengths and weaknesses. Time-series models use aggregate data on tobacco sales which does not suffer from the sampling or reporting errors which can affect survey data. On the other hand, estimates of tobacco sales are normally based on duty-paid sales in the country being examined only, and do not include any illicitly purchased (smuggled) tobacco, or tobacco bought legally elsewhere by individuals for consumption at home (for example, legal tobacco sales in other EU countries by Irish people when abroad). So time series models are usually only capable of estimating the elasticity of consumption on *duty-paid* tobacco, which may differ considerably from the overall price elasticity of tobacco.

Models based on survey data, by contrast, are able to look at the price elasticity of overall tobacco consumption, provided that the amount of tobacco purchased is accurately recorded in surveys (however, as explained in the next section, there is evidence that households in surveys under-report tobacco consumption on average). Microeconometric models are also able to estimate the prevalence elasticity, which is not usually possible in a time-series analysis because aggregate data for a country on the number of cigarettes sold gives us no information about the *number of smokers*. Microeconometric models are also

[20] See US Surgeon-General (2004) for a summary.

able to break the population down according to several key variables (e.g. men/women, different age groups, different social classes, different income groups) and estimate price and prevalence elasticities separately for these different subgroups[21].

A survey of global evidence on the price elasticity of tobacco demand in developed countries by Jha and Chaloupka (1999) found that most studies estimated price elasticities of between -0.5 and -1. Madden (2003) reviews a number of previous estimates of price elasticity of tobacco demand in Ireland based in data from the 1960s through to the 1990s and finds that "these studies have produced broadly comparable results with a median estimate for the price elasticity of tobacco of around -0.5, which is in line with results from elsewhere in the world." The Office of Tobacco Control (2002) estimated a price elasticity of -0.6.

More recently, in a paper published by the Revenue Commissioners, Reidy and Walsh (2011) estimate the price elasticity of demand for duty-paid cigarettes in Ireland using quarterly data on the volume of cigarettes sold and average price in each quarter, as well as other control variables such as average disposable income, and controls for the introduction of various other tobacco control policy measures over the period covered by their data (2002 to 2009). Their estimate for the price elasticity of demand is -3.6 which is extremely high in the context of previous research both for Ireland and elsewhere. Reidy and Walsh argue that the main reason for this result is that their analysis looks at consumption of duty-paid cigarettes rather than all cigarettes – or indeed other forms of tobacco such as hand-rolling tobacco. They rationalise the result as reflecting consumers switching from duty-paid cigarettes to illicit smuggled tobacco and/or tobacco purchased legally from other countries (cross-border shopping). An elasticity of -3.6 on duty-paid tobacco implies that further increases in the level of cigarette taxation would *reduce* overall revenue, in contrast to previous estimates for Ireland, which suggested that cigarette prices were below the revenue-maximising level.

How does Reidy and Walsh's conclusion that cigarette prices in Ireland are now above the revenue-maximising point compare with the "raw" evidence on revenues in Figure 2 in Chapter 1 of this report? Although real revenue from excise duties fell somewhat between 2001 and 2008 (from about €1.4bn to €1.2bn), over this period the real price of a packet of 20 cigarettes increased by around 25 percent. Holding all other variables constant, an elasticity of -3.6 would imply that consumption of duty-paid cigarettes would fall by around *90 percent* – whereas in fact the reduction in volumes of sales over this period was less than 30 percent. Of course, all other variables were *not* constant over the period 2001 to 2008 – in particular, real incomes grew strongly and this may help explain why tobacco tax revenue did not collapse over the period, as a "raw" prediction from the Reidy and Walsh paper would imply. However, it should be noted that in 2009, when the real price of cigarettes increased by 11 percent (the largest annual increase for almost a decade),

[21] Previous research on price elasticities of tobacco by population subgroup includes Layte and Whelan (2004) for Ireland and Townsend *et al* (1994) for the UK.

revenue from duty-paid tobacco sales actually *increased* by almost 9 percent, at the same time as average real disposable incomes fell in the wake of the 2008 economic crisis and subsequent recession. The tobacco sales figures for 2009 seem to be in complete contradiction to Reidy and Walsh's suggestion that the revenue-maximising level for cigarette taxes in Ireland has now been reached.

Furthermore, Reidy and Walsh's estimate is completely out of line with comparable time-series model results by Czubek and Johal (2010) from the UK Government's revenue department (HMRC). Czubek and Johal use time series data but over a much longer time period of 1982 to 2009. Their estimated elasticity is around -1.0, which is still somewhat higher than previous UK estimates[22] but still seems more plausible than the result from Reidy and Walsh's analysis.

Reidy and Walsh admit that their estimated elasticity is very high compared with the vast majority of previous research. They argue that the result reflects substitution from duty-paid cigarettes purchased in Ireland, and that the elasticity for the *overall* Irish tobacco market – rather than the duty-paid market alone – would be much lower. The relationship between duty-paid and the size non-Irish duty paid market is analysed in detail in Chapter 4 of this report. In brief, the results in Chapter 4 do not support Reidy and Walsh's interpretation of their result; there seems to be no evidence that the size of the non-Irish duty paid market has increased over time (at least as recently as 2005).

3.2 New research on the prevalence elasticity of tobacco in Ireland

This report produces the first estimates in the literature (to the best of the author's knowledge) on the prevalence elasticity of tobacco in Ireland (as opposed to the price elasticity). The SLÁN data, which contains data on whether people smoke occasionally, regularly, or not at all, as well as a number of other important explanatory variables, is the dataset used to estimate the prevalence elasticity. Previous empirical research on tobacco consumption in Ireland has not used SLÁN to calculate elasticities as it does not have information on the number of cigarettes smoked by each smoker, or tobacco expenditure per household. However the fact that smoking prevalence is recorded along with a number of other useful covariates makes it well-suited for current purposes.

After examining the trends in smoking indicated by the SLÁN, OTC and Living in Ireland datasets in Figure 9, it was decided to use the SLÁN data from 1998 and 2007 for the main calculations of the prevalence elasticity, rather than the 2002 data. This is because the 2002 SLÁN data seems to underestimate smoking prevalence compared with the Living in

[22] For example, a review of the literature by Townsend (1996) found the estimated elasticity for the UK was around -0.5 on average. More recently, research by Cullum and Pissarides (2004) for HMRC found an elasticity of -0.7 (using a different type of time-series model to that used in the more recent paper by Czubek and Johal).

Ireland data for 2001 and also the OTC data for 2003. By contrast, the 1998 SLÁN data matches up a lot better with the Living in Ireland data for 1998, and the 2007 SLÁN data also matches up reasonably well with the OTC data for 2007. The response rate for SLÁN in 2002 was particularly low at only 53%, compared with a 63% response rate for the 1998 and 2007 surveys, and although each dataset was reweighted in an attempt to correct for non-response when calculating smoking prevalence statistics, it is harder to do this the lower the response rate is. However, while the main report presents results using the 1998 and 2007 surveys only, Appendix A presents additional results which use the 2002 data as well.

This analysis models smoking prevalence in both time periods as a function of cigarette prices in each year (using the National Average Retail Price measure[23] as reported in the Revenue Commissioners' Statistical Report each year), plus a number of other control variables which are standard in models of this type:

- Gender.
- Age category (16-24, 25-29, 30-34, 35-39, 40-44, 45-59, 50-54, 55-59, 60-64, 65-69, 70 and over).
- Social class (1-2, 3-4, 5-6, missing[24]).
- Highest level of education undertaken (primary, secondary, tertiary).
- Relationship status (single, married/cohabiting).
- Children in the household (yes/no).

Unfortunately, household income is not included in the 1998 SLÁN data (although there is an income variable in the 2007 SLÁN data), so it could not be used in the analysis as a control variable. However, Appendix A presents some results using the 2002 and 2007 which use income as an extra control variable.

A model like this, where the dependent variable (smoking or non-smoking) is a binary variable, is best estimated using either a logit, logistic or probit regression; here, a probit is used. When constructing the dependent variable for whether each individual in SLÁN is a smoker or not, there is a choice as to whether people who report themselves as "occasional" rather than "regular" smokers should be classified as smokers or non-smokers. The results discussed in this chapter include occasional smokers in the smoker category, which is normal practice for this kind of analysis.

There were slight changes in the wording of the questions about smoking in the 2007 SLÁN survey compared with 1998. These are summarised in Appendix B at the end of the report. It is impossible to be certain how much these changes in wording might have affected the measured changes in smoking prevalence in SLÁN. However, as shown in

[23] This is the same price measure used for the graph of real cigarette prices in Figure 1.
[24] The social class measure is based on employment status, so people who are not in work have social class listed as missing.

Chapter 1 both the 1998 and the 2007 SLÁN data seem to match up well with other surveys conducted at or near the same time.

The analysis assumes that all smokers face the same (duty-paid) cigarette price in each time period. Given that this is a two-period model (1998 and 2007), this means that the elasticity for smoking prevalence can be derived as:

(regression adjusted % reduction in smoking, 1997 to 2008) / (% change in price, 1997 to 2008)

Because this is a model using individual level data, the same technique can be used to estimate prevalence elasticities for subgroups of the population, in particular:

- Separate estimates for men and women.
- Different age categories.
- Different social classes.
- Different education groups.

Because income information is not included in the 1998 SLÁN the analysis is unable to estimate elasticities at different points in the income distribution. However, Appendix A contains some estimates for income groups using the 2002 and 2007 SLÁN data (these have not been included in the main text because of the unreliability of the 2002 data.)

This modelling approach has three main limitations. First, because there are only two time periods it is impossible to separate out the effect of increases in the price of tobacco on smoking prevalence compared with any other policy changes designed to reduce smoking which came into force between 1998 and 2007. Table 2 below contains a summary of non-price tobacco control policies in Ireland (such as smokefree legislation and advertising bans) and the time that each policy was introduced. It is clear that several such policies came into force between 1998 and 2007, and, other things being equal, each of these would have been expected to have some negative impact on smoking prevalence (at least in the medium to long term). To the extent that these other anti-smoking policies are important, they lead to "omitted variable bias" in the model: the model will attribute too much of the decrease in smoking prevalence to price increases, resulting in the prevalence elasticity being over-estimated.

Table 2. Tobacco control policies in Ireland, 1986-2010

Measure	Description and Timing
Bans on direct advertising of tobacco	TV and radio adverts: 1971 Magazines and newspaper adverts (restricted): 1978, 1991 Magazines and newspaper adverts (banned): 2000 Point of sale displays, kiosks: 2009
Bans on indirect advertising of tobacco	Sponsored events with tobacco brand names: 2000 Promotional discounts: 1991
Bans on certain types of distribution	Single or unpacked cigarettes: 2007 Minimum pack size of 20 cigarettes: 2007
Minimum age for buying tobacco products	Set to 16 years in 1988 Set to 18 years in 2002
Smoke free public areas	Restaurants, pubs and bars, theatres and cinemas: 2004 Indoor workplaces and offices: 2004
Smoke free public transport	Buses, taxis, trains, air transport: 2004
Health warnings on cigarette and other tobacco packets	Introduced 1991 Size increased 2003

Source: HSE (2010)

Second, the fact that the model does not include household income as an explanatory variable leads to another potential bias. To the extent that increased income is positively associated with cigarette consumption, omitting income from the model leads to an underestimate of the impact of cigarette prices on smoking prevalence. However, previous research on the determinants of cigarette consumption in Ireland suggests that income is not significant, at least when data for only a single time period are used in the analysis[25]. Also, the model includes other variables which are proxies for household income to some extent – particularly education level and social class – so the effects of omitting income from the regression are likely to be relatively minor.

Finally, the model does not include price data for other types of duty-paid tobacco (e.g. hand-rolling tobacco) which might affect prevalence. Also, it does not include information on the availability or price of tobacco from other non-Irish duty-paid sources, for example illicitly obtained tobacco and tobacco bought abroad for consumption at home. These omitted variables should be borne in mind when discussing the results, which are nonetheless interesting because the duty-paid tobacco price is one of the main policy levers available to governments in influencing smoking prevalence. The next chapter of the report estimates the size of the non-duty-paid market in Ireland using a different set of techniques.

[25] See Madden (2003) and Layte and Whelan (2004).

Table 3 shows the estimates of prevalence elasticity for the SLÁN adult sample as a whole, and different subgroups of the sample, which arise from the model outlined above. Full results from the probit regressions are contained in Appendix A of the paper.

Table 3: Estimation results – the relationship between cigarette prices and smoking prevalence controlling for other explanatory variables

Sample	Regression-adjusted % pt reduction in smoking: 1998-2007	Standard error	| z-value |	Estimated prevalence elasticity
All adults	**-1.44**	**0.76**	**1.88**	**-0.32**
By gender				
Male	-1.84	1.24	1.49	-0.40
Female	-1.54	1.04	1.48	-0.34
By age group				
16-29	**-10.18**	**2.32**	**4.37**	**-1.75**
30-44	**+3.15**	**1.47**	**2.13**	**+0.67**
45-59	+1.11	1.98	0.56	+0.28
60 and over	+0.19	2.88	0.07	+0.04
By social class				
1-2 (highest)	-0.11	1.33	0.09	-0.03
3-4 (middle)	-0.11	1.36	0.08	-0.02
5-6 (lowest)	**+3.50**	**2.10**	**1.66**	**+0.68**
By highest educ.				
tertiary	-0.80	1.29	0.62	-0.21
secondary	-0.33	1.15	0.29	-0.06
primary	+2.19	2.12	1.02	+0.55

Source: author's own analysis of SLÁN data

Notes: prevalence elasticity estimates shown in bold when underlying coefficient is significant at the 10% level. Results shown in normal typeface are insignificant at the 10% level.

The results from the analysis of SLÁN for the whole adult population in Ireland show that, controlling for other determinants of smoking in the sample, smoking prevalence declined by just over 1.4 percentage points between 1998 and 2007. This result is statistically significant at the 10% level (but not the 5% level) and compares with a "raw" drop in prevalence in SLÁN (not adjusting for other factors) of 3.8 percentage points. The implied prevalence elasticity for adults in Ireland is -0.32. On the assumption that the prevalence elasticity is between one-half and three-quarters of the price elasticity, this implies a price elasticity for Ireland of between about -0.43 and -0.64 – which would be in line with most

previous research for Ireland (except for the recent paper by Reidy and Walsh discussed earlier).

Given that the whole-sample prevalence elasticity estimate is only of borderline statistical significance, it is not surprising that most of the subgroup elasticities are not statistically different from zero. The elasticity estimates for men and women are very close to the whole sample estimates, and are not statistically significant. Breaking the sample down by age group, the elasticity estimate for adults aged under 30 is strongly negative, at -1.75. The fall in smoking prevalence for this group without adjusting for other factors is 5.1 percentage points, whereas the regression-adjusted fall is 10.2 percentage points. This is the only subgroup for whom Reidy and Walsh's price elasticity estimate of -3.6 seems plausible. However, given that this model measures changes in smoking prevalence over a nine-year period, care needs to be taken in interpreting the results for any one age group. The composition of the 16-29 age group will have changed dramatically between 1998 and 2007 as most of the adults who were in this age group in 1998 will have moved up to the next age group by 2007, to be replaced by new young adults who were children aged under 16 in 1998. If the smoking patterns of the new generation of young adults are markedly different from the previous generation then it is entirely plausible that we could see a large negative prevalence elasticity, this being largely a consequence of changes in the composition of the 16-29 age group rather than changes in behaviour for adults aged 16 to 29 in 1998.

Conversely, the estimate of prevalence elasticity for 30-44 year olds is *positive* (an elasticity of +0.67), and statistically significant. On the face of it this seems a very strange result, because it implies that an increase in cigarette prices is associated with rising consumption. However, if smoking prevalence is higher in one particular cohort of Irish people than others (i.e. the cohort which is aged 16-29 in 1998, and then 25-38 by 2007) then changes in the composition of each age group over time could explain the effects seen here, regardless of the behavioural effects of cigarette prices for any individual smoker. As a matter of fact, the unadjusted figures for smoking prevalence in SLÁN for 16-29 year olds in 1998 are 41.2%, whereas for 30-44 year olds in 2007 the equivalent figure is 32.2% - a drop of 9 percentage points. By contrast, the unadjusted figure for 30-44 year olds in 1998 is 32.5% whereas the figure for 45-59 year olds in 2007 is 26.1% - a smaller drop of 6 percentage points, though still substantial. It is probably the case that these differing patterns for different cohorts of smokers help explain the wildly varying elasticities for different age groups in the SLÁN analysis. However, without proper panel data (i.e. following individual smokers and non-smokers over the whole time period) it is impossible to be sure. For adults aged 50 and over, the prevalence elasticities produced by the model are not statistically significant.

The breakdown by social class only produces a significant estimate for the lowest social class – where the elasticity has the "wrong" sign at +0.68. Again this is probably a result of changes in the composition of the lowest social class between 1998 and 2007. The

breakdown by education group produces estimates of prevalence elasticity that are all insignificantly different from zero.

To summarise the results, the overall prevalence elasticity is estimated to be -0.32 – a figure which is in line with most recent evidence for Ireland and other comparable countries. The model fails to produce significantly different estimates for most of the subgroups examined, but the most robust finding is that young people's smoking behaviour seems to be more sensitive to tobacco prices than other age groups. Again this is in line with previous research on tobacco price sensitivity.

3.3 Illustrating the impact of price increases on smoking prevalence

Table 4 below shows the estimated impact of increases in retail cigarette prices in Ireland on smoking prevalence for the adult population, given the results from Table 3. The results assume a starting cigarette price of €8.47 (the weighted average price for Ireland from the most recent Eurostat data) and an initial figure of 24% for smoking prevalence (the most recently available estimate from the OTC). Table 4 illustrates the impact of price increases of 50 cent, 1 Euro and 2 Euro on a packet of cigarettes.

Table 4. Illustrative impact of cigarette price increases on smoking prevalence for Irish adult population

Increase in retail price of cigarettes	Reduction in smoking prevalence	New prevalence rate [current rate 24%]
€0.50	0.5% pts	23.5%
€1.00	0.9% pts	23.1%
€2.00	1.8% pts	22.2%

Source: author's calculations based on results from Table 3.

Initial cigarette price assumed to be €8.47 (from Eurostat data used in Figure 3).

Initial prevalence rate assumed to be 24% (from OTC data, June 2010).

Table 4 shows that, based on the prevalence elasticities estimated using the SLÁN data, a €1 increase in the retail price of cigarettes would reduce smoking prevalence by just under 1 percentage point, while a €2 increase in the retail price would reduce smoking prevalence by just under 2 percentage points.

Because the prevalence elasticity estimated in this report is relatively low (at -0.32) it is very likely that the price elasticity of demand is also inelastic, meaning that increases in the amount of tax per packet of cigarettes will increase overall revenue from tobacco

taxation. However, in order to make precise estimates of the extra revenue it is necessary to take account of the extent to which increases in the price of cigarettes and other tobacco might cause smokers to substitute into smuggled tobacco or tobacco purchased legally from other EU countries. Thus, this report looks next at the size of the non-Irish duty paid market since the mid-1990s, before returning to the question of how much extra revenue can be raised from increased tobacco taxation (including extra income from tobacco taxation, and also indirect effects like reductions in health service spending on smoking-related diseases) in Chapter 6.

Chapter 4. Estimating the relationship between non-Irish duty paid tobacco consumption in Ireland and tobacco retail prices

Chapter 3 showed that, based on the evidence on smoking prevalence in Ireland since the late 1990s, it is likely that increases in the taxation of cigarettes and other tobacco products would reduce smoking prevalence, with consequent beneficial effects for reductions in healthcare costs and increased tax revenue from longer healthy working lives. However, the effect of price increases on revenue from the taxation of tobacco itself will depend on whether the price increases lead to an increase in the illicit tobacco trade, as well as consumption of cigarettes legally purchased abroad. The main thrust of arguments against price increases in recent years has been that price rises will increase smuggling, despite evidence from the World Bank, the WHO and recent academic research that this is largely not the case. The wider evidence base on the determinants of tobacco smuggling is discussed in Chapter 5; this chapter estimates the size of the **non-Irish duty paid** (NIDP) tobacco market and how it has changed between 1995 and 2005, to assess whether the tobacco industry's claims that tobacco price rises are encouraging smoking are justified.

In any given time period, tobacco consumption in Ireland is made up of three separate elements:

1. Tobacco products purchased legally in Ireland (**duty paid tobacco**).
2. Tobacco products purchased legally in other countries by Irish citizens and taken into Ireland for personal consumption in Ireland (**cross-border shopped tobacco**). If purchased elsewhere in the EU duty will have been paid on these products at the rates applying in the country where the purchase was made. If purchased outside the EU no duty is payable but the amounts which can be legally purchased are restricted (normally to 800 cigarettes per person per trip).
3. Tobacco products purchased illegally on which no duty has been paid (**smuggled tobacco**).

This chapter attempts to estimate the current size of the NIDP market, which comprises elements 2 and 3 combined. The chapter also presents an estimate of whether the NIDP market is growing over time (relative to the size of the duty-paid market) and by how much.

4.1 Existing research on the non-Irish-duty-paid tobacco market in Ireland

The Revenue Commissioners do not publish an official estimate of the extent of evasion of duty on tobacco products in Ireland. However, in recent years Revenue and the Office of Tobacco Control have jointly commissioned surveys using market research data which attempt to estimate the sales of cigarettes untaxed in Ireland but purchased legitimately abroad (category 2 above) and illicitly purchased cigarettes (category 3 above). The most recent survey suggests that approximately 20 percent of cigarettes consumed in Ireland were untaxed[26]. This figure comprised 14 percent of illicit consumption and 6 percent of tobacco legitimately purchased abroad. Assuming that illicit tobacco makes up 14 percent of the total Irish tobacco market, this represents a loss to the Exchequer of approximately €200 million. However, both OTC and Revenue are clear that this 14 percent figure should be viewed as at best a rough estimate.

The Irish Government has also released data on the quantity of contraband cigarettes intercepted and seized by Customs in recent years; this is summarised in Table 5 below. The figures show a very substantial increase in the number of cigarettes seized, with the annual seizure figure more than quadrupling between 2006 and 2009. Figures for 2010 and the first half of 2011 show some reduction in the amounts seized. While these figures suggest some increase in the size of the smuggled tobacco market after 2006, the number of seizures is not an exact linear function of the size of the illicit market at any point, but also depends on the effectiveness of anti-smuggling operations in Ireland. In July 2010 the Revenue Commissioners organised a "National Tobacco Blitz" in which over 600 seizures of illicit cigarettes and/or other tobacco were achieved, with a total market value of around €5m. However, the total market value of seizures in 2010 was much greater than this, at around €48m.

[26] Written answer by Minster for Finance, Michael Noonan TD, Dáil, 5 May 2011. URL: http://debates.oireachtas.ie/dail/2011/05/05/00052.asp

Table 5. Quantity and market value of contraband cigarettes intercepted and seized by Irish Customs, 2006-09

Year	Number of duty-paid cigarettes sold (m)	Number of cigarettes seized (m)	Revenue lost from seized cigarettes (€m)
2006	5,604.9	52.4	14.4
2007	5,401.7	74.5	20.5
2008	4,940.6	135.2	39.5
2009	4.607.1	218.5	54.8
2010	4,128.0	178.3	47.6
2011 (Jan-June)		63.8	

Source: Number of duty-paid cigarettes sold: Revenue Commissioners Report year ending 31st December 2009, http://www.revenue.ie/en/about/publications/statistical/2009/excise.pdf

Figures for number of duty-paid cigarettes sold not available for 2010 and 2011 yet because the Revenue Commissioners' Reports for these years have not yet been released.

Source: 2006-08 figures on number of cigarettes seized and revenue lost from seized cigarettes, Parliamentary Question to Minister for Finance, Brian Lenihan TD, 22 September 2009, http://debates.oireachtas.ie/dail/2009/09/22/00100.asp

2009 and 10 figures on number of cigarettes seized: http://www.who.int/fctc/reporting/ireland_5y_report.pdf

2009 figure on revenue lost from seized cigarettes: author's own calculation from number of duty-paid cigarettes sold and number of cigarettes seized.

2011 (January-June) statistics on seizures, Department of Finance written answer, 14 July 2011, http://debates.oireachtas.ie/dail/2011/07/14/00069.asp

2011 statistics on number of duty-paid cigarettes sold were not yet available at the time of writing.

Tobacco industry representatives in Ireland have been claiming for many years that tobacco smuggling is on the increase. The Irish Tobacco Manufacturers Advisory Committee (ITMAC), in its submission to Ireland's Commission on Taxation in 2009, estimates that "approximately 20% of cigarettes smoked in Ireland are not purchased duty-paid in legitimate retail outlets in the country." This estimate of the NIDP market matches up with Revenue's own estimate; however, ITMAC gives no details of how its own estimate is obtained. ITMAC also claims that the NIDP market is likely to increase in size to 25 percent of the total Irish market "within the next 12 to 24 months" – again, no details of how this estimate is arrived at are given. ITMAC claims that "the fact that Ireland has the highest retail price of tobacco in the EU is the principal reason why one in five cigarettes in Ireland is purchased in the NIDP market". However, no evidence for a causal link between

high cigarette prices and the levels of smuggling currently experienced in the Irish market is provided in the ITMAC submission. In short, the ITMAC figures have no obvious grounding in any rigorous methodology. Because ITMAC and Retailers Against Smuggling (an Irish retailers' lobbying group which receives funding from the tobacco industry) offer no independently verifiable methodology for estimating smuggling or the impact of tobacco (duty-paid) price increases on smuggling, this report will focus on Revenue's estimates of the market and the author's own calculations for the rest of the analysis in this chapter.

The tobacco industry's attitude towards smuggling is also somewhat disingenuous given its track record on pricing. As explained in Chapter 2, there is substantial evidence that despite the tobacco industry's protestations that tax-induced price increases lead to greater smuggling, the industry uses tax increases to disguise its own price increases. If the tobacco industry was genuinely concerned about reducing smuggling, and believed its own rhetoric, it is unclear why the industry would add extra price increases on top of tax increases in this way. In fact, as discussed in Chapter 5, there is evidence that the tobacco industry has itself been acquiescent in smuggling at various times and places in the past (for example, exporting cigarettes through Andorra in the 1990s), although in the 2000s tobacco firms were more compliant with anti-smuggling initiatives in the face of legal action from governments in the EU and North America.

Chapter 6 discusses the Irish Government's own record on anti-smuggling initiatives and its future plans as set out in the Revenue's *Strategy On Combating the Illicit Tobacco Trade (2011-2013).*

4.2 New estimates of size of the non-Irish duty paid tobacco market, 1995-2005

Estimating the size of the illicit tobacco market in any country is inherently a difficult process because, as with most illicit activities, there are no direct surveys on smuggling. Therefore, the extent of the illicit market in Ireland has to be derived by an indirect approach. Recent guidance from the World Bank for researchers aiming to estimate the extent of smuggling in a country (Merriman, 2002) suggests five different methods for doing so:

Method 1: observe the tobacco producers and ask them for smuggling data.

Method 2: observe smokers directly and ask them about their methods of obtaining tobacco.

Method 3: monitor and analyse data on the export and import of tobacco by using trade data to check whether reported export data on tobacco from exporting countries (e.g. to

Ireland) correspond with Ireland's reported tobacco imports. If reported imports are lower than reported exports the difference is assumed to be due to smuggling.

Method 4: compare the sale of tobacco with estimated consumption of tobacco by using household surveys.

Method 5: compare the sale of tobacco with estimated consumption of tobacco by using a mathematical formula and household inference.

Of these five approaches, Method 4 is the most suitable for use on Irish data. Method 1 – asking the producers – is inherently unreliable because the tobacco industry has a vested interest in arguing that smuggling is a large – and growing – problem, as this is a position which supports the industry's call for reductions in tobacco taxation. The ITMAC submission to the Commission on Taxation discussed earlier in this chapter is an example of this strategy. Method 2 requires survey data with information on where tobacco users source their tobacco from, but unfortunately no data of this kind is currently collected in Ireland. Method 3 is difficult to implement in the European Union's single market given the complex intra-country trade patterns which exist in the EU, and also takes no account of "bootlegging" – the importation of tobacco products purchased legally in a lower-tax country (such as the central and eastern European countries) for consumption in a higher-tax country such as Ireland[27]. Method 5 involves the construction and estimation of an econometric model for consumption in Ireland and a comparison with similar models for other countries whose geographical location makes them less susceptible to smuggling (such as Australia). This would be a very complex and costly undertaking (beyond the scope of this report). Moreover, such a model is not tractable without making a number of restrictive assumptions about consumer behaviour which are likely to mean that the estimates from this approach are in practice less reliable than Method 4 (which is considerably easier to implement).

In adapting World Bank Method 4 for estimating the size of the illicit tobacco market in Ireland, this report draws on the work of Her Majesty's Revenue and Customs (HMRC) in the UK, which has been publishing detailed estimates of the size of the illicit tobacco market in the UK (see HM Revenue and Customs 2010). HMRC's method involves estimating total tobacco consumption and legitimate tobacco consumption separately, with illicit consumption identified as the difference between the two figures:

NIDP Market = (Total Consumption – Irish duty-paid Consumption) (equation 1)

[27] Note that purchase of duty-paid tobacco by Irish citizens in other EU states for personal use in Ireland is legal, but purchase duty-paid of tobacco in other EU states for *resale* in Ireland is illegal. "Bootlegging" refers to the latter.

This equation provides an estimate of the volume of goods supplied through the illicit market, which can then be turned into an estimate of the proportion of the total market that is supplied through the illicit market:

NIDP Market Share = (NIDP Market / Total Consumption) (equation 2)

The details of the methodology used here differ slightly from HMRC's methodology, because overall the quality of data available for Ireland is unfortunately not as good as for the UK. The estimate of total consumption in this report is taken from the Household Budget Survey (HBS), which is a survey of income and expenditure performed every five years in Ireland for the purposes of uprating the weighting in the Consumer Price Index. Households in the HBS complete a diary of all expenditure they make over a two-week period and this is then converted to an annual measure, summed across households and grossed up to national population totals (allowing for differential non-response by different types of households) to produce population-wide estimates of expenditure on different products.

The most recent HBS wave for which results are currently available took place between October 2004 and December 2005. Previous surveys were carried out in 1999-2000 and 1994-95. The report from each HBS wave contains an estimate of average weekly tobacco expenditure per household, and this can be converted to an annual figure combined with information from the Central Statistics Office on the number of households in Ireland in any given year to give an estimate of total tobacco expenditure, including Irish duty-paid tobacco, tobacco legitimately purchased outside Ireland by Irish residents, and illicitly purchased tobacco.

This estimate can then be compared with official figures from the Revenue Commissioners' annual Statistical Reports on the total net receipts from tobacco taxation, which, when divided by the overall percentage of tax in the retail price of tobacco[28], provides an estimate of total gross expenditure on Irish duty-paid tobacco. If households in the HBS report their expenditure on tobacco correctly, the current size of the NIDP market (in value terms) is obtained by subtracting the total value of expenditure on Irish duty-paid tobacco from the grossed-up overall expenditure on tobacco from the HBS. By making some assumptions about the average price which Irish households pay for NIDP

[28] Note that the figure on the overall percentage of the retail price of cigarettes which is tax, rather than a figure for the overall percentage of tax in tobacco sales overall (including other types of tobacco such as hand-rolling) is used here as a simplification, because Revenue does not publish separate figures on the percentage of the retail price which is tax for non-cigarette tobacco. However, as tobacco other than cigarettes is only a small proportion of the overall duty-paid market in Ireland, this does not affect the figures used in the analysis substantially.

tobacco per packet of 20 cigarettes (or per pack of hand-rolling tobacco, etc.) the size of the NIDP market in volume terms can be calculated[29].

This seems a relatively straightforward calculation, but unfortunately, it is well known that using grossed-up estimates from household surveys such as HBS results in *underestimates* of tobacco expenditure at an aggregate level. This is because households on average under-report their tobacco expenditure in household surveys. There is a large body of academic evidence for a variety of developed countries showing that this is a major problem for the accuracy of household expenditure surveys (see Appendix C for a summary.)

Hence this section uses a two-stage approach to estimate the size of the smuggled market and how it has changed over time. First, estimated overall tobacco consumption from the HBS is calculated and compared with actual figures for duty-paid consumption from Revenue. Table 6 below shows the calculations involved. The first column of the results shows average weekly tobacco spend per household, taken directly from the HBS reports for each wave of the relevant year's survey. The second column is the number of households in Ireland for each year as estimated by the CSO. The third column is calculated by converting average weekly tobacco spend per household into an annual measure and multiplying it by the total number of households. The fourth column is total tobacco duty receipts for each year as taken from Table EX18 of the Revenue Commissioner's report. The fifth column uses Table EX19 of the Revenue Commissioner's report to calculate the percentage of the retail price of the Most Popular Price Category of cigarettes which is made up of tobacco duty. Dividing total duty receipts by the percentage of the retail price which is tobacco duty gives column six, which is total expenditure on duty-paid tobacco for each year. The final column is the ratio of estimated duty-paid spending over total spending. Note that if the HBS were an accurate survey of overall tobacco expenditure, with no under-reporting, it would be impossible for this ratio to have a value of more than 1 based on equation (1) above, because NIDP spending cannot be less than zero. Therefore, the fact that the estimated ratio for each year has a value of almost 2 is evidence of severe under-reporting in the HBS.

Despite this, provided that the level of under-reporting in the HBS is constant over time, the results suggest that size of the NIDP market is not increasing relative to the size of the duty-paid market. In other words, based on these results, it is simply not the case that tobacco smuggling has become a much worse problem over time, as tobacco industry

[29] This last part of the methodology differs from the UK HMRC's methodology for estimating the size of the non-UK duty paid tobacco market because HMRC uses data on the *volume* of tobacco consumed (both the numbers of cigarettes, and the weight of hand-rolling tobacco) based on UK survey data on how much individuals smoke in volume, rather than value, terms. By contrast there is no dataset in Ireland with sufficient detail on tobacco consumption volumes at the individual or household level which would enable a volume-based estimate of the overall tobacco market to be made, and so this analysis is forced to use a value-based estimate instead.

representatives have repeatedly claimed. In fact, between 1995 and 2005 there was no growth in the NIDP market *at all* compared to the Irish duty-paid market.

Table 6. Comparing duty-paid tobacco spending with total tobacco expenditure estimates: assuming no under-reporting of expenditure in the Household Budget Survey

Year	Average weekly tobacco spend per household	Number of households in Ireland	Total Annual tobacco spending	Total tobacco duty receipts	Tobacco duty: % of retail price	Total duty-paid spending	Ratio (duty-paid/total spending)
1995	€10.09	1,095,237	€576.2m	€668m	58.6	€1,140m	1.98
2000	€12.44	1,222,198	€792.8m	€959m	61.5	€1,559m	1.97
2005	€12.19	1,414,316	€899.0m	€1,080m	61.0	€1,772m	1.97

Data sources: Average weekly tobacco spend per household: Household Budget Survey data

Number of households in Ireland: Central Statistics Office

Total tobacco duty receipts: Revenue Commissioners' report (various years), Table EX18.

Tobacco duty as percentage of retail price: Revenue Commissioners' report (various years), Table EX19.

Notes: average weekly tobacco spend figure is across all households including non-smoking households.

HBS data collection for the row labelled "2005" actually runs from October 2004 to December 2005, but has been labelled 2005 as a simplifying measure, and similarly for earlier years.

Figures for 1995 converted from Irish pounds into Euro using an exchange rate of £1 = €1.2697 (the fixed exchange rate used from 1999 until the introduction of the Euro in 2002)

On the assumption that the extent of under-reporting in the HBS was stable between 1995 and 2005, Table 6 shows that the size of the non-Irish-duty-paid market was fairly constant over time relative to the size of the duty-paid market. But how large was the NIDP market at any given time? To estimate this it is necessary to make an assumption about the extent of under-reporting in the Household Budget Survey. In addition, to estimate the size of the smuggled market in *volume* rather than value terms (for example, the number of NIDP

cigarettes consumed in Ireland as a proportion of total consumption) it is necessary to make an assumption about the average price of NIDP tobacco. Following a review of evidence by Joossens *et al* (2009) on the prices paid for NIDP tobacco in a number of developed countries where tobacco duties are relatively high, the working assumption made here is that the cost of NIDP cigarettes in Ireland is exactly *half* the cost of duty-paid tobacco at any point in time. This is necessarily a rough approximation but is in line with previous research for similar markets such as the United Kingdom. In terms of the non-illicit NIDP market (i.e. cross-border shopping), Table 1 of this report showed that cigarette prices in many EU countries were significantly below the Irish duty-paid price (less than half in many cases), and so the assumption that people buying cigarettes in other EU countries are paying half the Irish price (on average) does not seem implausible.

Table 7 shows, given various assumptions about the extent of under-reporting in the HBS, what the implied size of the non Irish duty paid market would be in Ireland in 2005, given the other assumptions made in this analysis.

Table 7. Implied size of the non-Irish duty paid market for tobacco in Ireland in 2005, based on various scenarios for the extent of under-reporting in the HBS

Under-reporting (% of tobacco expenditure reported in HBS)	Ratio (duty-paid/total spending)	Value of total Irish tobacco market	Volume of total Irish tobacco market (number of cigarettes, m)	Size of NIDP market (% of total market volume)
50	0.985	€1,799m	5,817	2.9
45	**0.887**	**€1,999m**	**7,059**	**20.0**
40	0.788	€2,249m	8,611	34.4
30	0.591	€2,998m	13,267	57.4

Notes: analysis assumes that Irish tobacco market is 100% comprised of cigarettes. This is a simplifying assumption for illustrative purposes but does not affect the overall results substantially.

NIDP tobacco price assumed to be 50% of the Irish duty-paid tobacco price in 2005.

Each row in Table 7 corresponds to a different assumption about the extent of under-reporting in the HBS, ranging from a relatively optimistic assumption in the top row (that 50% of aggregate tobacco expenditure is reported in HBS) to a relatively pessimistic assumption (that only 30% of aggregate expenditure is reported in HBS). Note that the maximum proportion of tobacco expenditure that is accurately reported in HBS for 2005 cannot be more than about 51 percent because a figure higher than this would imply that the NIDP market is less than zero – which is impossible. If 50 percent of tobacco expenditure is reported in HBS, this implies that the total Irish tobacco market (including duty-paid and NIDP) in 2005 was worth around €1.8bn, of which only 2.5% (by volume) was NIDP – which seems implausibly low.

At the other extreme, if only 30% of aggregate expenditure is recorded in HBS, the total Irish tobacco market was worth almost €3bn in 2005, of which over half (around 57 percent) was NIDP. This level of smuggling and/or cross-border shopping would be much greater than even the level which the tobacco industry thinks is plausible. An intermediate level of under-reporting (assuming that HBS captures 40 percent of tobacco expenditures) would imply a NIDP market share by volume of around 34 percent – which seems large, but not impossible, and in line with the most pessimistic tobacco industry estimates. The figure for HBS reporting which produces an estimate in line with the most recent Revenue/OTC estimate for the size of the NIDP market (20 percent) is that 45 percent of overall tobacco expenditure is reported in HBS.

Is it plausible that only 45 percent of actual tobacco expenditure is reported in the Household Budget Survey? This figure would indicate that the under-reporting problem for tobacco in the HBS is relatively large by international standards, but not so large as to be implausible. For example, Garner *et al* (2009) estimate that the US Consumer Expenditure Survey recorded only 38 percent of overall tobacco expenditure in 2003. Appendix C of this report gives more details on previous research on under-reporting of tobacco expenditures in surveys.

Sadly, in the absence of specific research on the reliability and robustness of the HBS data, it is impossible to give a reliable "point estimate" of the size of the non-Irish-duty-paid tobacco market. It is also impossible, using the methodology presented here, to give an estimate of how the NIDP market breaks down into tobacco purchased legitimately outside Ireland by Irish residents for personal use, and illicitly purchased tobacco. What the results here do suggest, however, is that (at least from 1995 until 2005) the NIDP market appears to have been stable in size, despite the fact that the real price of a packet of cigarettes increased by around 35 percent over this period. This suggests that price increases - at least in the ranges observed in this report – are *not* a primary driver of the size of the smuggled tobacco market in Ireland. This finding directly contradicts the tobacco industry's repeated assertion that smuggling has been a growing problem over time.

Obviously it is a shame that the most recent currently available data from the HBS is from as far back as 2005, as it would be very useful to have an estimate of what has happened to the NIDP tobacco market over the last six years. Initial results from the 2009-10 HBS are due to be released at the end of 2011, too late to be included in this report.

It is important to be clear that the results here are not meant to imply that tobacco smuggling is not a problem for the Irish economy – just that tobacco tax increases are not making the problem worse. As will be discussed in Chapters 5 and 6 of this report, if the NIDP market represents 20% of the total tobacco market, that is a bigger share than most other comparable EU countries, and it is important for the Irish Government to work towards decreasing the size of the smuggled market in particular. However, decreasing

tobacco taxation – or even holding it constant in real terms – would *not* be the best way to reduce smuggling. Instead, Ireland needs to invest in anti-smuggling measures as part of an integrated tobacco control strategy. The next chapter of this report looks at evidence from countries which have achieved reductions in the size of the smuggled tobacco market over the last twenty years, to show how Ireland can do the same.

Chapter 5. International evidence on combating tobacco smuggling and wider tobacco control policies: the lessons for Ireland

This chapter is divided into two sections. The first section looks at evidence from international organisations such as the World Bank and the World Health Organisation (WHO) on the approaches which are most effective in countering tobacco smuggling, as well as recent academic evidence from international data sources. The second section looks at a range of countries and/or states which have managed to reduce smoking prevalence markedly over the last decade or longer by combining anti-smuggling measures with other policies in an integrated approach to tobacco control.

5.1 Evidence from international sources

The World Bank and World Health Organisation

Research from the World Bank (summarised in Merriman 2002) suggests that the main factors leading to increased smuggling are:

- the tobacco industry's own role in facilitating smuggling.
- unlicensed distribution of cigarettes and other tobacco.
- lax anti-smuggling legislation.
- weak enforcement of anti-smuggling legislation.
- official corruption.
- the existence of entrenched smuggling networks.

Price is not a key driver for increased smuggling, although in some cases increasing tobacco taxation can make matters worse if a large illicit tobacco market already exists due to one or more of the factors listed above.

The World Bank suggests four general categories of policies to combat smuggling including:

1. Reducing incentives for smuggling by harmonising tax and pricing policies.
2. Reducing the supply of smuggled tobacco by regulating transport and retail sales.
3. Reducing demand for smuggled tobacco by influencing consumers not to purchase smuggled products (e.g. through mass media campaigns).
4. Increasing the certainty and severity of punishment through enhanced law enforcement and prosecution.

Tobacco pricing is only a factor in the first of these four categories. Moreover, as discussed in Chapter 2 it is important to be aware that pricing is as much a consequence of multinational tobacco producers pricing-to-market by setting prices to maximise profits under different demand conditions, and this is largely outside the control of the tax system. Harmonisation of tax rates (for example EU Minimum Excise Duty legislation) also helps reduce smuggling between different EU member states, and will increase tax over time in the EU countries where tax rates are currently lowest.

As the WHO (2011a) puts it, *"high tax increases may provide financial incentives for smuggling… when enforcement and tax laws are weak, penalties are small, and it takes a long time to prosecute smugglers;"* but, *"increased smuggling does not automatically follow tax increases; good governance is a more important determinant of smuggling than differences in tax rates. Countries should strengthen tax administration and customs enforcement capacity, particularly where there are high levels of smuggling and/or tax evasion."*

Global estimates of the size of the illicit tobacco trade and the gains from eliminating it

Recent research by Joossens, Merriman, Ross and Raw (2009) for the WHO produces updated country estimates of the illicit cigarette market around the world, using what was then the most up-to-date data. Globally, the research estimates that 11.6% of the global cigarette market in 2007 was illicit, equivalent to 657 billion cigarettes a year and US $40.5 billion in lost revenue.

Joosens *et al* produce clear evidence that higher income countries, where cigarettes are more expensive, have lower levels of smuggling than lower income countries. The total illicit market in 2007 averaged 9.8% in high income countries compared with 16.8% in low income countries. There were a number of countries with very low tobacco tax but high smuggling rates: for example Pakistan (17%), Bolivia (46%), Albania (40-50%), Georgia (49%), Macedonia (30%) and Bosnia and Herzegovina (35-45%). Conversely, there were a number of countries with high tobacco tax but very low smuggling rates, most obviously New Zealand (1%) and Australia (6.4%).

These findings are crucial because they stand in direct contradiction to the tobacco industry claim that the overall level of smuggling is dependent on cigarette price. It is also worth noting that if the estimate by OTC and the Revenue Commissioners that the illicit market in Ireland is 14% of the total market is accurate, this is relatively high compared with most other high income countries. However, the size of the Irish illicit market appears to be a consequence of factors *other than* price – because, as shown in the previous Chapter, the non-Irish duty paid market was no bigger in 2005 than it was in 1995, despite substantial price increases on duty-paid tobacco.

Joossens *et al* reach the same conclusion as the World Bank research discussed above with regard to the main factors driving smuggling:

"a high tax margin [on duty paid tobacco] can provide the initial incentive to smuggle; however the data show that it is not the most important factor. Other factors include the ease and cost of operating in a country, how well organised crime networks are, the likelihood of getting caught, the punishment if you are caught, and so on."

Crucially as regards European countries with high duty-paid tobacco prices located near to other European countries with lower prices, the paper points out that in Norway in January 2008, a packet of Marlboro cost the equivalent of 12 US dollars (the highest retail price for tobacco anywhere in the world), only 6 percent of survey respondents had seen tobacco products during the previous 12 months which they believed were smuggled. By contrast, in Lithuania, where Marlboro cost $2 per packet in 2008 (the cheapest price in the EU), 36% of respondents had seen smuggled cigarettes. This simple comparison suggests that retail price is *not* the main determinant of the size of the illicit tobacco market in any country, and means that the high retail price of cigarettes in Ireland cannot, in itself, be the main explanation for Ireland's large illicit tobacco market. If price were the main factor, then it would be inconceivable that Norway – where retail cigarette prices are even higher than Ireland, and which is nearer than Ireland to the Baltic states such as Latvia and Lithuania, which have very low retail cigarette prices – has such a small illicit tobacco market.

Anti-smuggling measures in the WHO Framework Convention on Tobacco Control Protocol on Illicit Trade in Tobacco Products

The WHO Framework Convention on Tobacco Control (FCTC) was first established in 2003 in response to the rapid globalisation of the tobacco epidemic and the growing magnitude of the health burden associated with tobacco use (see WHO, 2003). Today, the FCTC is one of the most rapidly embraced treaties in the history of the United Nations, with 173 parties covering 87% of the world's population (WHO 2011b).

Since 2007 negotiations have been underway for a Protocol on Illicit Trade in Tobacco Products which builds upon and complements the provisions in Article 15 of the FCTC. The Protocol is expected to be finalised in a final round of negotiations in 2012. Box 1 lists the main measures which the current version of the draft protocol includes the following measures with respect to supply chain control, offences and sanctions, and international enforcement and cooperation:[30]

[30] Full details of the current progress of the protocol are available on the WHO website at http://www.who.int/fctc/protocol/illicit_trade/en/. A useful summary of developments up to the end of 2009 is provided by Johnson (2009), Chapter 3.

Box 2. Measures in the FCTC Draft Protocol on Illicit Trade in Tobacco Products

Supply chain control measures

- **Licensing** of key participants in the supply chain, including manufacturers and primary processors, commercial importers and exporters, wholesalers, brokers, distributors and manufacturers of equipment and key inputs. All parties that sign up to the protocol are required to "establish a competent authority… to issue, renew, suspend, revoke and/or cancel licences" and "apply control and verification measures to the international transit of tobacco, tobacco products and manufacturing equipment."
- **Customer identification and verification** – Requirements to ensure that key participants in the supply chain conduct due diligence with respect to customers and contractors with whom they transact, including: obtaining information about their identity and business dealings; monitoring their activities to detect transactions that do not appear to be commensurate with product demand; reporting any suspicious transactions; and terminating business relationships where relevant laws have been broken.
- **Tracking and tracing** – All parties which sign up to the protocol should establish a tracking and tracing system for all tobacco products and manufacturing equipment. That requires "unique, secure and non-removable marking" affixed to all master cases, cartons and when technology is sufficiently developed, packs of cigarettes and other tobacco products. These markings should enable relevant authorities in any Party to get information quickly and securely on the date and location of manufacture, the first customer, the identity of any known subsequent purchasers, the intended market of retail sale, etc. This information should be recorded by the time of first shipment and uploaded to a clearing-house database, to which national enforcement agencies (the Revenue Commissioners and An Garda Síochána in Ireland) would have access.
- **Record-keeping** – All key participants in the supply chain are required to maintain complete and accurate records of all relevant transactions. If requested, they should supply the competent authorities with information on details of shipments, intended shipping destinations, identity of purchasers, intended retail markets, and other general information on market volumes, trends and forecasts. As appropriate, Parties should co-operate on establishing a system for sharing these records.
- **Security and preventative measures** – Participants in the supply chain are required to take all reasonably practicable measures to prevent diversion into illicit trade channels; these include restrictions on acceptable methods of payment, and obligations not to supply products in amounts that exceed legitimate demand.

Enforcement

The draft protocol contains the following enforcement measures:

- Measures to ensure as far as appropriate that engagement in illicit trade is treated as a serious offence.
- Measures to enable search of premises and seizure of evidence.
- Measures to enable confiscation and seizure and identification, tracing and freezing of property, equipment and assets, including proceeds of crime.

- Recovery of unpaid taxes and duties from the producer or manufacturer of seized products ("seizure payments").
- Measures to ensure the destruction of confiscated property (while allowing for use for training or law enforcement purposes).
- Use of special investigative techniques, such as controlled delivery, electronic and other forms of surveillance and undercover operations.
- Measures for the enhancement of law enforcement capacity.
- Measures to ensure necessary public education and awareness-raising.

International cooperation

The draft protocol contains the following measures relating to international cooperation:

- Information sharing between parties, including general, statistical and operational information (subject to appropriate safeguards).
- Assistance and cooperation with respect to training and scientific, technical and technological matters.
- Exercise of jurisdiction.
- Establishment of joint investigations.
- Law enforcement cooperation, including with respect to prevention, detection, investigation, prosecution and punishment of offences covered by the protocol.
- Cooperation for purposes of confiscation of property, equipment or assets, including proceeds of crime.
- Provision of mutual legal assistance in relation to criminal offences covered by the protocol.
- Transfer of proceedings for the prosecution of criminal offences covered by the protocol.
- Appropriate cooperation with non-Parties to the protocol.

Although the FCTC Protocol is currently still in negotiation, when complete it will represent a "gold standard" for anti-smuggling policy. It is therefore a very useful reference point against which to assess Ireland's current anti-smuggling measures and Chapter 6, which features an assessment of the Revenue Commissioners' 2011-2013 strategy on combating the illicit tobacco trade.

5.2 Anti-smuggling measures and other tobacco control strategies in selected countries and jurisdictions

The United Kingdom: successful reduction in smuggling through investment in countermeasures

In the early 1990s when governed by the centre-right Conservative Party, the UK was one of the leading exponents of a strategy of increasing tobacco taxation as a public health

measure aiming to reduce smoking prevalence. In 1993 the Chancellor of the Exchequer, Kenneth Clarke, committed to raise taxes by an escalator of 3% above inflation every year, saying that "I believe that the approach we are adopting in Britain is the most effective way to reduce smoking."[31] The incoming centre-left Labour government in 1997 continued and enhanced this strategy, increasing the escalator to 5% per year.

However, the tobacco price increases following the introduction of the tax escalator in 1993 did not lead to significant declines in smoking prevalence as predicted: indeed, smoking prevalence remained static during this time. There are a number of likely reasons for this. First, the UK did not put in place a comprehensive strategy which in other jurisdictions has proven the most effective means of ensuring that smoking prevalence declines (as shown in the case study below for California, for example). Second, the illicit market for tobacco grew rapidly from the mid-1990s onwards, from below 3% market share for illicit cigarettes in 1996-97 to 21% and rising by 2000-01. As prices went up smokers were switching to cheap and illicit tobacco rather than reducing consumption or quitting, so smoking prevalence held up while government revenues fell.

The tobacco industry had always argued that increasing taxes led to increases in smuggling, but in the 1990s the industry facilitated the growth of the illicit market in the UK by allowing the export of their cigarettes to countries where there was no end market, from whence they were smuggled back into the UK. According to customs officials at that time, Andorra was the largest source of smuggling in Europe, importing 9 million cigarettes a day, half of which were British brands, but officially exporting none. An investigation at the time concluded that this was enough cigarettes for every man, woman and child in Andorra to smoke 140 cigarettes a day[32]. Fuelling the cheap and illicit market in this way sustained sales while at the same time supporting the industry's argument that higher taxes led to increases in smuggling.

In 1998 the UK Government launched its first comprehensive strategy to drive down smoking (Department of Health, 1998), which included measures to tackle smuggling such as additional resources for UK Customs and Excise to extend anti-smuggling enforcement measures. The anti-smuggling strategy was subsequently updated and improved a number of times, most recently in a combined strategy published by the UK Borders Agency (UKBA) and HMRC in 2008. The joint UKBA/HMRC statement strategy announced a number of action points, including:

- Introducing new technology and IT to improve effectiveness at the UK border and increasing the chances of detection.

[31] Budget speech, UK House of Commons, *Hansard*, 30th November 1993.
[32] BBC *The Money Programme*: "Cigarette giants in smuggling scandal". 8th November, 1998. http://news.bbc.co.uk/1/hi/business/210260.stm

- Establishing Service Level Agreements with port and airport operators at key locations.
- Modernising and strengthening customs powers needed by UKBA at the UK's borders (e.g. strengthened powers to search containers).
- Introducing a nationwide network of inland excise enforcement teams to implement the UK's inland tobacco strategy.
- Developing a cross-Government communications strategy designed to change attitudes to illicit tobacco products.
- Taking the lead in negotiations on new global agreements to tackle the illicit trade in tobacco (e.g. the WHO Framework Convention on Tobacco Control).

In 2006 the UK Government's anti-smuggling strategy was reinforced by supply chain legislation making it a legal duty for manufacturers not to facilitate smuggling with fines up to £5 million if they fail to comply.

The UK Government now spends around £100 million a year tackling smuggling including employing around 2,000 full-time equivalent staff working on detection, investigation and intelligence, the deployment of 19 X-ray scanners at ports to identify illicit tobacco in shipments, and media campaigns to support the anti-smuggling strategy.

The UK has also signed up to the EU Agreements with transnational tobacco companies PMI, JTI and most recently BAT which require the tobacco manufacturers to control their supply chains and to make seizure payments to the EU and member states if their products are found to have been diverted to the illicit market in their jurisdictions.

The UK's anti-smuggling strategy has been highly effective, with the illicit market for cigarettes, which was on a steep upward trajectory before 2000, falling from a 21% market share in 2000-01 to 12% in 2007-08. In addition the comprehensive tobacco control strategy put in place has led to significant declines in smoking prevalence, from 28% in 1999 to 21% by 2008.

There have been substantial fiscal benefits to the UK from tobacco control policies overall. As Reed (2010b) points out, the total cost of tobacco control policy measures in the UK is currently around £300 million per year. A one percentage point drop in smoking prevalence in the UK is estimated to produce a net revenue gain of around £240 million per year through NHS cost savings, increased tax revenue due to extra years of working life and reduced workplace absenteeism and reduced payments of disability benefits. Overall, the reduction in smoking prevalence between 1999 and 2008 is estimated to have delivered net annual revenue benefits to the UK of £1.7 billion per year. On top of this, the reduction in the size of the illicit market is estimated to have delivered additional revenues of up to £1.2 billion per year.

However, while much has been achieved in the UK, more needs to be done. The market share of illicit cigarettes is still high at 12% of cigarettes and 48% of hand-rolled tobacco

compared to only 5% of spirits (for example). The total revenue losses from tobacco smuggling are also much higher at £2.1 billion compared to only £0.1 billion for spirits (HMRC 2010).

Overall, the British experience shows that additional investment in anti-smuggling policies can deliver substantial benefits to the exchequer. Anti-smuggling policies are particularly effective as part of an integrated tobacco control strategy including health interventions, mass media campaigns, advertising bans and restrictions on smoking (including bans on smoking in workplaces, pubs and restaurants).

Tackling large-scale cigarette smuggling elsewhere in the EU: evidence from Spain and Italy

Research by Joossens and Raw (2008) shows that smuggling was reduced during the late 1990s and early 2000s in two of the western European countries where it was a particularly large problem – Spain and Italy – by tackling large-scale cigarette smuggling operations which had been built up with the complicity of transnational tobacco companies.

Italy began to experience a serious problem with cigarette smuggling in the late 1980s, with criminal organisations taking advantage of access to the Adriatic Sea to smuggle tobacco. By 1998, when smuggling in Italy peaked, the volume of illicit tobacco was estimated to be around 15% of the market (ERC Group, 2007). The smuggling involved primarily American manufactured cigarettes. In November 2000 in New York the European Community filed a civil action against the tobacco companies Phillip Morris (PMI) and RJ Reynolds, accusing the companies of "an ongoing global scheme to smuggle cigarettes, launder the proceeds of narcotics trafficking, obstruct government oversight of the tobacco industry, fix prices, bribe foreign public officials, and conduct illegal trade with terrorist groups and state sponsors of terrorism." In 2001 ten EU countries, led by Italy, joined the lawsuit.

In 2004 the EC and member states dropped the case against PMI in return for an enforceable and legally binding agreement whereby PMI agreed to pay the EC $1 billion over 12 years and was also liable for substantial additional "seizure" payments if smuggled PMI cigarettes were seized by authorities in the future. PMI was also required to introduce tracking and tracing systems for its cigarettes and measures to monitor its distribution system and the contractors supplied.

From the late 1990s onwards there was a striking fall in seizures and a substantial rise in legal duty-paid cigarette sales. By 2006 it was estimated that cigarette smuggling had fallen to around 2% or less of the total Italian market (ERC Group, 2007).

In Spain, where the market share of smuggled tobacco was running at around 16% in the early 1990s, the government increased the resources devoted to anti-smuggling measures by a factor of ten, from €4 million per year to almost €40 million. By 2002 the market share of smuggled cigarettes had decreased to 2% while annual cigarette tax revenue rose from €2.3 billion to €5.2 billion. As with Italy, American brands were a key source for the contraband trade.

To take action against large-scale smuggling, Spain collaborated with the European Fraud Office (OLAF) to prevent cigarettes illegally entering Spain from Gibraltar and Andorra. This action included sealing the Spain-Andorra border and political pressure on the Andorran government by the EC and member states, which forced Andorra to pass legislation making it illegal to smuggle tobacco into neighbouring countries. The Spanish

customs authorities argue that the key to success in reducing the size of the illicit tobacco market was reducing large-scale supply into Spain at container level, through intelligence, customs activity and improved national and European cooperation and technology. These measures, including the investigations of US tobacco companies and the 2000 EC lawsuit mentioned above, resulted in the supply of American cigarettes into the illegal market in Spain being cut off.

The evidence from Spain and Italy shows that measures to control the tobacco supply chain are a vital component of anti-smuggling policy, and the emphasis that the WHO FCTC protocol on the illicit tobacco trade places on measures of this kind is very important. For Ireland, where estimates from the Revenue and this report suggest that the current share of illicit tobacco is around the levels suffered by Spain and Italy in the early 1990s, the lesson seems clear: supply chain control has to be a key part of Government strategies to reduce the size of the Irish smuggled tobacco market.

Recent evidence on the impact of cigarette price increases: Australia and New Zealand

Australia and New Zealand have historically had relatively low rates of tobacco smuggling. They are included in this round-up particularly because of their recent experiences in increasing tobacco taxation as a successful strategy for reducing smoking prevalence.

Australia

In April 2010 the Australian government increased the price of cigarettes by 25%. The price of an average 30-packet of cigarettes is now approximately $15 AUS (around €10.65). The Australian 2010 National Drug Strategy Household Survey Report (Australian Institute of Health and Welfare, 2011) shows smoking prevalence decreasing from 19.1% of people aged 14 and over in 2004 to 17.9% in 2007, to 16.6% in 2010. There was also a big decline in the proportion of young people taking up smoking between 2007 and 2010. This is probably at least partly attributable to the price increases.

New Zealand

New Zealand has a history of using substantial price increases to reduce smoking prevalence. Between 1998 and 2000 there was a 20% increase in the price of tobacco. At the same time the New Zealand government announced a 40% increase in the funding for tobacco control based on WHO recommendations (Allen *et al*, 2000). By 2007, the level of smuggling of tobacco products into New Zealand was only around 1% (Joossens *et al*,

2009). Between 1996/97 and 2006/07, adult smoking prevalence in New Zealand fell from 25.2 percent to 18.7 percent (ASH New Zealand, 2009).

On 28 April 2010 the New Zealand government began a new phase in its tobacco control strategy with a further 24 percent increase in the excise rate for loose-leaf tobacco and a 10 increase in the duty rate for factory made cigarettes. This was the first step in a new tobacco escalator policy where tobacco taxes will rise by 10% each year; the next increase took place in January 2011.

The increase in the price of loose-leaf tobacco was a response to the gradual growth in the hand-rolling tobacco market as a share of the overall tobacco market in New Zealand, which was largely a consequence of taxation per gramme of hand-rolling tobacco being significantly less than the equivalent tax for cigarettes, and a consequent retail price discount for hand-rolling tobacco compared with cigarettes. By 2010 around 50 percent of smokers were using hand-rolling tobacco (ASH New Zealand, 2011). This is a much bigger share than the hand-rolling tobacco market in Ireland (which is less than 5% of the total Irish tobacco market), but nonetheless the experience of New Zealand is instructive: it is necessary to raise tax on hand-rolling tobacco to discourage substitution by smokers from cigarettes into loose leaf tobacco as prices increase.

California: the benefits of an integrated tobacco control strategy

In the US many aspects of tobacco control policy are the responsibilities of state legislatures rather than the federal government. The state of California has a long history of successful tobacco control initiatives. In 1988 California voters enacted Proposition 99 which increased tobacco tax by twenty-five cents per pack and devoted 20% of the revenue from the measure to fund tobacco control activities. A sustained period of effective tobacco control policy measures followed, resulting in the Californian adult smoking prevalence declining from 21% in 1989 to just 12% in 2010 (California Department of Public Health, 2011), despite vigorous lobbying against the Californian strategy by the tobacco industry and its political allies (Glantz *et al*, 2000).

The California Tobacco Control Program funds mass media campaigns, local health department initiatives and services and the campaigns run by community based organisations. The overall approach of the Program is 'social norm change': indirectly influencing current and potential future tobacco users by creating a social milieu and legal climate in which tobacco becomes less desirable, less acceptable and less accessible (California Department of Health Services, 1988).

5.3 Key points from international evidence in the Irish context

The key findings which emerge from reviewing the international literature on smuggling and country case studies are as follows:

- **Increases in price are not a major contributing factor to increased smuggling**. The main drivers of increased smuggling in countries across the world are poorly designed and/or poorly enforced anti-smuggling legislation, entrenched smuggling networks which facilitate the unlicensed distribution of cigarettes and other tobacco, and in some cases official corruption and the tobacco industry's own role in facilitating smuggling. If the smuggled market is already large and well-established in this country, then price increases can exacerbate the situation, but price increases do not normally contribute to increased smuggling when a well-designed and resourced anti-smuggling strategy is in place. This finding further undermines the claims of the tobacco industry that high prices are the main factor driving smuggling in Ireland.
- **It is possible for countries with high levels of smuggling to reduce smuggling to much lower levels** by investing more in anti-smuggling measures and technologies such as scanners, tracking and tracing, and by taking on vested interests in the tobacco industry – through legal action if necessary – to ensure the industry's cooperation in anti-smuggling initiatives. Evidence from the UK, Spain and Italy shows this very clearly.
- **Anti-smuggling policies work best as part of an integrated package of tobacco control measures** including mass media campaigns, support through public health services and social networks for smokers who want to quit, restrictions on the advertising and display of cigarettes, bans on smoking in public places, and repeated real terms price increases. Evidence from California, Australia, New Zealand and the UK shows that integrated, evidence-based tobacco control policies can be extremely effective at reducing smuggling and smoking prevalence at the same time, while delivering substantial net benefits to the public finances.

Chapter 6. Conclusions and Policy Recommendations

6.1 Conclusions

This report has attempted to answer three key questions about the relationship between smoking prevalence, the retail price of cigarettes and tobacco, and the size of the illicit and cross-border tobacco markets in Ireland. Firstly, what is the relationship between the price of duty-paid tobacco and the proportion of the adult population who smoke? Secondly, is there any evidence that increasing tobacco taxes leads to more smuggling? Thirdly, what are the lessons from international evidence for Irish anti-smuggling policy?

In answer to the first question, the analysis of the SLÁN data in Chapter 3 suggests that the sensitivity of Irish smoking prevalence to price increases (the "prevalence elasticity") is in the region of around -0.3 – a figure that compares reasonably with the most rigorous evidence for other countries. Assuming that smoking prevalence in Ireland is currently 24% of the adult population (the most recent figure from the OTC), this implies that a 10% increase in the retail price of tobacco products in Ireland - a rise of about 85 cent, given current prices - would reduce prevalence to about 23.2%. As shown in Table 4, a rise of €2 euro in the price of a packet of cigarettes would result in a reduction in prevalence to around 22%.

Because smoking prevalence appears to be relatively unresponsive to changes in price (in economists' terminology, prevalence is "inelastic"), increases in tobacco taxation would raise additional revenue for the Irish exchequer. Based on the relationship between the prevalence and the price elasticities of demand for tobacco found in previous academic research, it seems reasonable to conclude that the price elasticity of demand for tobacco is around -0.5. Table 8 below shows the expected annual increase in revenue from tobacco taxation which would arise from a tax-induced increase in the price of cigarettes of 50 cent, 1 euro and 2 euro respectively (combined with equivalently sized price increases on other types of tobacco such as hand-rolling).

In addition to this, there would be other revenue effects of an increase in tobacco taxation operating through the public finances, most of which are likely to be positive. Earlier research by the author for the UK (Reed 2010a) used an econometric model of the effects of changes in smoking prevalence on the wider economy to estimate the following impacts on the public finances:

- **Savings in public spending on health** – Howell (2011a) has recently calculated that smoking-related illnesses cost the Irish health service around €280 million per year through increased costs of hospital admissions, treatments and inpatient stays. Note that because of limitations with the available data, Howell's figure excludes the cost of smoking-related illnesses to the outpatient components of

the health service (e.g. GP consultations, outpatient prescriptions) and so the total annual costs to the health service will be even greater than this.

- **Increased tax receipts from additional working life** – people of working age whose deaths are averted through giving up smoking (or not starting smoking) due to the tobacco tax increase will have longer working lives and hence pay more in income tax and social insurance contributions to the Exchequer. They will also spend at least some of their additional disposable income and hence pay more VAT.
- **Increased tax receipts from reduced absenteeism** – the extra output from reduced absenteeism among people who stop smoking (or never take up smoking) following the tax increase leads to increased income tax, social insurance contributions and VAT receipts.
- **Reduced spending on benefits related to sickness and disability** – smoking is associated with increased ill health in the population as well as increased mortality. The model estimates the reduction in expenditure on benefits for people of working age with long-standing health conditions which would result from a reduction in smoking caused by the tax increase.
- **Increased spending on benefits for retired people** – increased longevity as a result of reductions in smoking leads to some increased spending on pensions and other benefits for people over retirement age because of reduced working-age mortality.

Unfortunately no detailed study of the impact of changes in smoking prevalence on the Irish economy has been conducted along the lines of Reed (2010a) for the UK economy. However as a rough guide to what the wider benefits of a reduction in the number of smokers in Ireland on the public finances might be, it is possible to use the estimates in Reed (2010b) as a percentage of the UK output (measured as Gross Domestic Product) and convert them into equivalence percentages of Irish Gross Domestic Product (except in the case of the health service costs, where the estimate from Howell (2011a) is used instead). Appendix D shows the detailed calculations for an illustrative decrease of one percentage point in smoking prevalence.

It should be stressed that this is only a rough guide to the wider fiscal benefits of reduced smoking prevalence as patterns of health expenditure, the structure of the tax system, employment and population demographics are likely to differ considerably between the two countries. However, as an approximate illustration of the wider benefits of reducing smoking to the public finances, it is a useful guide.

Table 8 below shows the direct benefits to the public finances from increased tobacco tax receipts – and the estimated indirect benefits from reduced spending on health and benefits, and increased tax receipts – that would be expected to arise from an increase in the price of an average packet of cigarettes.

Table 8. Estimated annual benefits of tobacco tax increases to the public finances

Price increase on a packet of cigarettes	€0.50	€1.00	€2.00
Direct public finance benefits	€35m	€68m	€128m
Indirect public finance benefits	€14m	€28m	€55m
TOTAL	**€49m**	**€96m**	**€183m**

Notes: direct public finance benefits are increased receipts from tobacco taxation.

Indirect public finance benefits include reduced health service spending, reduced net spending on benefits, and increased revenue from direct and indirect taxes due to longer working lives and reduced workplace absenteeism.

Table 8 suggests that further increases in tobacco taxation would produce substantial benefits to the public finances – ranging from just under €50m per year for a 50 cent increase in the price of a packet of cigarettes, to just under €185m for a €2 increase. Around 30 percent of the public finance benefits would accrue as a result of indirect effects of the fall in smoking prevalence, although the increase in revenues from tobacco taxation is also substantial. In the context of the very difficult current economic and fiscal situation – where Ireland badly needs extra tax revenue – these figures, although necessarily approximate, make a powerful case for further increases in tobacco taxation.

Many commentators have been concerned that recent increases in tobacco taxation have increased the extent of tobacco smuggling in Ireland. However, the analysis in Chapter 3 of this report shows *no relationship at all* between tobacco prices and the NIDP market, at least up to 2005. And while it is true that the volume of seizures of illicit tobacco has increased in the last five years, this seems mainly due to increased enforcement activity rather than an underlying increase in the size of the illicit market. Moreover, there is considerable evidence that the Irish tobacco industry has been using tax increases as a cover for increases in the non-tax element of the prices of cigarettes and other tobacco – behaviour which is inconsistent with the industry's protestations that high prices are driving smuggling. In short, based on the research presented here there is no reason to think that further tobacco prices would lead to an increase in the size of the illicit tobacco market in Ireland.

However, this certainly does not mean that the Irish authorities can afford to be complacent about smuggling or about tobacco control policy in general. Revenue and OTC estimate that the Irish illicit market comprises about 14% of total consumption. This is relatively large by the standards of high-income countries. The analysis in Chapter 4 suggests that Ireland's illicit tobacco market has been this large since at least the mid-1990s.

Analysis of international evidence from the World Bank and WHO, and the experience of countries such as the UK, Italy and Spain which have managed to achieve significant reductions in the size of their illicit tobacco markets suggests that a number of key policies are important.

Firstly, anti-smuggling operations need to be well designed so as to maximise compliance. Because the Irish illicit market is relatively large and well-established by international standards, it is likely that entrenched smuggling networks exist. Hence, the enforcement agencies – the Revenue Commissioners and An Garda Síochána – need to have sufficient powers to tackle these through the kinds of measures set out in the draft FCTC Protocol on illicit trade in tobacco products – including confiscation and seizure of the proceeds of smuggling, and "seizure payments" – the recovery of unpaid taxes and duties from the producer or manufacturer of seized products. Supply chain control measures such as tracking and tracing of tobacco products and manufacturing equipment, and complete and accurate records of all relevant transactions, are also essential.

Secondly, it is important for anti-smuggling activities to be adequately funded and staffed. The UK now spends around £100 million per year on tackling smuggling, approximately one third of its total budget for tobacco control policies, with around 2,000 full-time equivalent staff engaged in anti-smuggling activities (Reed, 2010b). Italy increased its expenditure on anti-smuggling policies by a factor of ten during the 1990s. In both cases the additional expenditure recouped itself many times over through increased revenue from duty-paid tobacco sales.

Thirdly, the tobacco industry's own role in facilitating smuggling needs to be tackled, by the threat of legal action if necessary. For example, it was necessary for the European Community and member states including Spain and Italy to initiate legal action against Phillip Morris International and RJ Reynolds before reaching a legally binding agreement with the tobacco companies to pay compensation to the EC, introduce tracking and tracing technology and monitoring measures and rendering the companies liable for "seizure" payments if their cigarettes are seized by authorities in the future. Similarly, in 2006, following the failure of voluntary agreements with the tobacco industry, the UK government introduced legislation making it a legal duty for tobacco manufacturers not to facilitate smuggling, with fines of up to £5 million for firms who fail to comply.

Finally, anti-smuggling measures work best as part of a coherent package of tobacco control measures including investment in support through health services and social networks for smokers trying to quit, mass media and educational campaigns about the dangers of smoking and the problems caused by tobacco smuggling, restrictions on the availability of tobacco and on smoking in public locations, and tax increases. The goal, as in California which successfully pioneered this strategy, is to accomplish a change in social norms whereby smoking becomes increasingly unacceptable.

With these objectives in mind, it is useful to assess the Revenue Commissioners' *Strategy on Combating the Illicit Tobacco Trade (2011-13)*, the main points from which are reproduced in Box 2 below, to ascertain whether Revenue has set the right priorities for the next two years.

Examining Revenue's strategy in detail, three issues stand out. Firstly, the strategy of "more effective and visible interventions through enhanced capability and better deployment of its resources" is absolutely the correct approach, but will need to be properly resourced to be effective. It will probably not be enough to "maintain resources currently deployed in combating the illicit trade and periodically enhance these when required"; ideally, the amount spent on anti-smuggling activities needs to increase to the per capita levels seen in the UK, of around £100 million per year. National and regional 'blitz' operations such as those used in July 2010 have been highly effective but will involve additional resourcing if they are to be a regular feature of tobacco control policy in Ireland – as would be advisable. This is also the case for compliance activities (e.g. increasing visits to retailers to verify sales figures and test the legality of tobacco products being sold).

Secondly, the Irish Government needs to follow the example of the UK in taking a tougher line with the tobacco industry – through legislation on seizure payments. The only reference to the tobacco industry in the Revenue Strategy is a commitment to "further develop cooperation with… trade bodies including Irish Tobacco Manufacturers Advisory Committee." Based on the evidence in this report, ITMAC's repeated assertions that increases in tobacco taxation would lead to greater smuggling appear to be groundless, and the tobacco industry has provided no substantive empirical evidence to support its assertions. Revenue should challenge the industry to provide evidence to back up its claims. It is also important that Ireland follows the example of the UK by introducing legal sanctions against tobacco companies whose products are smuggled (seizure payments); the current voluntarist approach has insufficient teeth to be workable.

Finally, for any strategy to be successful it needs to be based on an accurate assessment of current smoking trends and regular data collection. The quality of data in smoking prevalence in Ireland is poor. The main survey that has been used for estimates of smoking prevalence, SLÁN, was only undertaken three times during the decade 1998-2007, and is now four years out of date. One of those three SLÁN surveys (in 2002) suffered from very low sample response which appears to have given a misleading picture of progress in tackling smoking prevalence between 1998 and 2002; conversely, the increase in measured prevalence between 2002 and 2008 (which seems to have been driven by the unrepresentativeness of the 2002 sample) has been misrepresented by the tobacco industry, certain politicians and other commentators as evidence of the failure of tobacco control and pricing policy in Ireland. The data from the Office of Tobacco Control show that prevalence has in fact been falling since 2003 and especially between 2007 and 2010, but while the OTC survey is useful for regular updates on smoking prevalence it lacks the

range of data in SLÁN which can be used to calculate responsiveness of smoking prevalence to price changes controlling for other factors. Meanwhile, the fact that the Household Budget Survey data is only collected every 5 years means that it is difficult to get regular updates on the size of the non Irish duty paid tobacco market. Ireland needs to invest in better data on smoking prevalence if it is to have clear feedback on whether tobacco control policy is working or not.

Box 3 Revenue's Strategy on combating the illicit tobacco trade (2011-2013)

Strategy 1: Reduce demand for contraband tobacco

1. Educate the public on the negative aspects of contraband, i.e. tax loss, criminality and increased health risks.

2. Optimise media coverage for prosecutions, significant seizures and enforcement initiatives.

Strategy 2: Maintain compliance of legitimate trade

3. Ensure existing controls continue to be efficient and effective and contribute to fair trading conditions for all legitimate traders, while minimising the compliance burden.

4. Improve communications with, and intelligence gathering from, legitimate traders.

5. Closely monitor the excise duty collection figures for both cigarettes and other tobacco products.

6. Increase visits to targeted retailers to verify sales figures and test the legality of tobacco products being sold.

Strategy 3: More effective and visible interventions

7. Maintain resources currently deployed in combating the illicit trade and periodically enhance those when required.

8. Continue to review the effectiveness of detection processes and technologies to ensure that performance is optimised.

9. Improve and increase the use of profiling and intelligence, and implement the agreed recommendations from the 2010 profiling conference.

10. Increase the number of inland and frontier operations, including national and regional blitz-type operations, resulting in increased seizures of illicit tobacco products and associated assets such as cash and modes of transport.

11. Increase the use of analytics and trend analysis to inform the nature and frequency of interventions.

12. Increase the use of assessments as an enforcement tool.

Strategy 4: Increase cooperation

13. At Organisational Level: Build on cooperation at inter Regional/Divisional level, and utilise maximum flexibilities in the deployment of staff on control and enforcement activities.

14. At National Level: Further develop cooperation with:

- Other state agencies, including the Criminal Assets Bureau, An Garda Síochána, the Department of Social Protection and the Office of Tobacco Control.
- Trade bodies, including ITMAC and RGDATA.
- Airline/shipping/transport companies, port and airport authorities, and their agents.

15. At International Level: maintain strong relationships with OLAF and other Tax and Customs Administrations, and continue to support and influence the agenda of the Framework Convention on Tobacco Control (FCTC).

Strategy 5: Increase prosecutions

16. Increase the number of summary prosecutions taken and the number of indictable cases referred to the DPP for prosecution.

17. Review and put in place more effective identification measures that target cases suitable for prosecution.

18. Assess the effectiveness and deterrent value of prosecutions, penalties and seizures of modes of transport.

6.2 Policy Recommendations

Tobacco pricing

- At the next budget, tax on a packet of 20 cigarettes should be increased by at least 50 cent. Based on the calculations in this report, this is likely to generate around €35 million of extra revenue.
- The Government should commit to a price escalator whereby tobacco taxes rise by a certain amount each year in future budgets (for example, 5 percent per year above price inflation).

- The tax on hand-rolling and other non-cigarette tobacco should be increased to the same level as tax on cigarettes. This would involve increasing the tax on hand-rolling tobacco until it makes up around 80 percent of the total retail price (from a current level of around 60 percent).
- If a price escalator is adopted it should apply across the board to all types of tobacco products, not just cigarettes.

Anti-smuggling operations

- Expenditure on anti-smuggling operations such as enforcement and supply chain control should be increased by around €8 million per year – equivalent to what the UK spends on these activities per head of the population. If Ireland could achieve a percentage point reduction in the size of its illicit tobacco equivalent to that which the UK managed between 1998 and 2000 (a 9 percentage point drop), this would reduce the size of the illicit tobacco market in Ireland to 5 percent of the total market, bringing in around €130 million of extra revenue to the Exchequer per year. Thus, increased investment in anti-smuggling operations would pay for itself many times over.

Improving the evidence base

- The quality of evidence on smoking prevalence and the size of the non-Irish duty paid market in Ireland is currently poor compared with many other countries.
- The frequency of the SLÁN survey should be increased to at least every two years so that it can provide more up-to-date analysis of trends in smoking prevalence.
- Alternatively, the monthly telephone polling conducted by OTC up to 2010 should be extended to include a larger sample size and a wider range of personal characteristics variables (e.g. age, social class) which could be used to produce reliable estimates of smoking prevalence for subgroups of the population.
- The Revenue Commissioners should publish detailed estimates of the size of the non-Irish duty paid tobacco market – both the illicit market and legal cross-border purchases – with clearly set out methodology, along the lines of HMRC in the UK.

Appendix A: Additional results on the elasticity of smoking prevalence in Ireland

This Appendix presents results from the analysis of SLÁN which supplement Table 3 in the main report. Table 3 uses only the data from the 1998 and 2007 SLÁN surveys because of doubts about the reliability of the 2002 SLÁN data in comparison to other Irish data sources from approximately the same time period. This appendix presents results from a model which includes all three waves of SLÁN.

This has the advantage that results can be broken down by income group and we can derive additional results using income as a control variable. However, the low incidence of smoking in the 2002 survey means that the estimated elasticities based on a comparison of the 1998 and 2007 SLÁN data are likely to be too high, whereas in the comparison of the 2002 and 2007 SLÁN data – where headline prevalence rates rose substantially, despite substantial increases in tobacco taxation – the elasticities have the "wrong" sign (i.e. an increase in the price of tobacco is associated with *rising* rather than falling prevalence, controlling for other factors).

Table A.1. Results from three-wave SLÁN analysis

	1998 vs 2002			2002 vs 2007		
Sample	**Regression adjusted prevalence change (%)**	**|z-value |**	**Estimated prevalence elasticity**	**Regression adjusted prevalence change (%)**	**|z-value |**	**Estimated prevalence elasticity**
All adults	**-2.9**	**3.60**	**-0.75**	**+1.4**	**1.80**	**+0.39**
By gender						
Male	**-3.2**	**2.49**	**-0.82**	+1.4	1.18	+0.38
Female	**-3.0**	**2.77**	**-0.79**	+1.1	1.10	+0.29
By age group						
16-29	**-3.6**	**1.79**	**-0.70**	**-5.3**	**2.20**	**-1.05**
30-44	**-3.0**	**1.95**	**-0.74**	**+5.3**	**3.68**	**+1.37**
45-59	**-3.6**	**2.09**	**-1.04**	**+3.4**	**2.01**	**+1.06**
60 and over	**5.3**	**1.93**	**+2.29**	-1.9	1.41	-0.80
By social class						
1-2 (highest)	**-4.1**	**3.15**	**-1.23**	**+3.4**	**2.81**	**+1.20**
3-4 (middle)	-2.1	1.36	-0.50	+1.3	0.95	+0.33
5-6 (lowest)	-1.3	0.57	-0.28	**+4.7**	**2.22**	**+0.97**
By highest educ.						
Tertiary	**-3.5**	**2.52**	**-1.03**	**+2.7**	**2.52**	**+0.89**
secondary	**-2.7**	**2.10**	**-0.64**	+1.8	1.45	+0.44
Primary	-0.1	0.07	-0.03	+1.8	0.98	+0.52
By income						

Q1 (lowest)	n/a			3.3	1.45	+0.79
Q2	n/a			**5.2**	**2.82**	**+1.52**
Q3	n/a			**3.6**	**2.18**	**+1.04**
Q4 (highest)	n/a			0.0	0.05	0.00

Source: author's analysis of SLÁN data, 1998, 2002 and 2007 waves.

The results using all three waves of SLÁN show a large estimated negative prevalence elasticity of -0.75 based on the 1998 to 2002 data, but then a *positive* elasticity of 0.39 for the 2002 to 2007 data. This pattern – of a negative elasticity for the 1998-2002 period, followed by a positive elasticity for the 2002-07 period – holds for almost all of the subgroups as well. The only subgroup for which the estimated prevalence elasticity is significant and negative is 16 to 29 year olds. Overall, the results from the 2002 SLÁN survey – where measured smoking prevalence was much lower than either 1998 or 2007 – is the main factor driving the results.

The estimated prevalence elasticities by income subgroup (available for the 2002 to 2007 period only) are hard to interpret because for three of the four subgroups, the elasticities are positive.

Appendix B. Smoking Prevalence Questions in SLÁN: the three survey waves compared

The questions that the modelling in chapter 3 uses to assess smoking prevalence are as follows:

1998 survey

Question C1. Do you smoke cigarettes now?

If respondent answers "yes, regularly" or "yes, occasionally (usually less than 1 per day)" they are counted as a *smoker*

If respondent answers "no" they are counted as a *non-smoker*

Note that the follow up questions make it clear that both pre-manufactured and hand-rolled cigarettes are included in the definition of "cigarettes" used here.

2002 survey

The survey question wording and routing for 2002 is exactly the same as the 1998 survey.

2007 survey

Question D2. Have you yourself smoked at least 100 cigarettes in your entire life?

If respondent answers "yes" go to Question D3.

If respondent answers "no" they are counted as a *non-smoker*.

Question D3: Do you now smoke every day, some days, or not at all?

If respondent answers "every day" or "some days", they are counted as a *smoker*

If respondent answers "not at all" they are counted as a *non-smoker*

Analysis

The wording of the smoking questions in the 1998 and 2002 surveys on the one hand, and the 2007 survey on the other, is clearly different, but this only matters to the extent that a respondent would be classified as a smoker under the 1998 wording but a non-smoker under the 2007 wording (or vice-versa), as this could lead to bias in the model estimates of the responsiveness of smoking prevalence to price changes. Fortunately, it is likely that most regular or occasional smokers would be classified as a smoker in both cases. The exception would be someone who smoked less than 100 cigarettes in their entire lifetime, who would be classified as a non-smoker even if they were an occasional smoker who had started in the last few weeks. It is likely that this category will not comprise many of the people in SLÁN 2007, but a few people (in particular young people who may not have been smoking for very long) could be affected.

Overall, despite the unfortunate differences in question wording between the SLÁN surveys, it is possible to have a good degree of confidence that the questions are approximately comparable in terms of identifying the same people in each wave. This is backed up by analysis of the 1998 and 2007 waves in the main report, which show a good degree of alignment between smoking prevalence measures from SLÁN and those from the Living in Ireland survey (for 1998) and the OTC data (for 2007).

Appendix C: Under-reporting of tobacco consumption in household expenditure surveys

This appendix offers an overview of academic studies in the last thirty years which have examined the extent of under-reporting of tobacco consumption in household surveys. Table B.1 on the next page gives a summary of the findings of several studies from developed countries covering a period between 1974 and 2008. In each case, the method used to assess the extent of under-reporting involves comparing grossed-up estimates of tobacco consumption from household surveys with aggregate data from excise duty receipts or national accounts data on consumption (which for cigarettes, are normally derived from excise duty receipts anyway).

As shown in Table C.1, estimates of the extent of under-reporting in household surveys range from only 1% (in Italy in 1990) to 62% (using the US Consumer Expenditure Survey data in 2003). There are a number of methodological issues which can affect the results. Firstly, most of the papers in this literature – particularly the older papers – do not control for the size of the illicit or cross-border shopped tobacco market in these calculations. Thus, what is being estimated in most cases is household tobacco consumption compared to *duty-paid* aggregate tobacco consumption. An exception is the paper Gallus *et al* (2010), which argues that the finding that under-reporting in Italy was only 1% in 1990 is biased downwards because tobacco smuggling in 1990 in Italy was very substantial, whereas by 2001 it was greatly reduced (see Chapter 4 for further details). As the existence of an illicit or cross-border shopped tobacco market means that estimated tobacco consumption from aggregate data on tobacco duties is an underestimate of the total size of the tobacco market, the results in Table C.1 should be taken as underestimates of the true extent of under-reporting in most cases.

Secondly, the household surveys differ in their reliability. For example, in the US the National Health Interview Surveys examined by Hatziandreu *et al* (1988) are generally thought to be more reliable than the Consumer Expenditure Survey data examined by Garner *et al* (2009) because of differences in the survey questions and the interview techniques used.

Given these two issues, under-reporting of tobacco consumption at the household level is generally thought to be a consequence of two factors:

(1) The failure of the sampling frame for the survey to cover groups whose use of tobacco is particular high (e.g. homeless or itinerant people, residents of institutions such as care homes and prisons, merchant seamen).
(2) The social unacceptability of tobacco use in many countries (increasingly so over time in many cases) which provides an incentive to under-record tobacco consumption.

Unfortunately, no academic research has previously examined the extent of under-reporting of tobacco consumption in the Irish Household Budget Survey or any other survey of tobacco use in Ireland. However, given the evidence from comparable countries over recent decades, it does not seem implausible that the degree of under-reporting of tobacco expenditure in the HBS might be 50 percent, or even higher. Table 7 in the main report analyses the implications of underreporting of between 30 and 50 percent for the size of the non-Irish-duty-paid tobacco market in Ireland.

Table C.1. Previous Research on under-reporting of tobacco consumption in household surveys

Authors	Country	Time period	Methodology	Estimated extent of under-reporting
Kemsley, Redpath and Holmes (1980)	United Kingdom	1976	Comparison of grossed-up tobacco expenditure per household from UK Family Expenditure survey with aggregate tobacco consumption calculated from excise duty receipts	21%
Hatziandrieu *et al* (1989)	United States	1974-1985	Comparison of self-reported cigarette consumption data from National Health Interview Surveys and National Household Surveys on Drug Abuse with data from cigarette excise taxes from US Department of Agriculture	Varies between 22% and 31%. No clear trend over time
De Meyrick and Yusuf (2006)	Australia	1989-2001	Comparison of Australian Household Expenditure Survey with aggregate data sources from national accounts	40%
Garner, McClelland and Passero (2009)	United States	1992-2003	Comparison of Consumer Expenditure Survey data with data for cigarette consumption from national accounts	1992: 43% 2003: 62%
Gallus *et al* (2011)	Italy	1990-2008	Comparison of 9 representative population-based surveys on smoking conducted in 1990 and annually between 2001 and 2009 with official data from legal tobacco sales.	1990: 1% 2001: 25% 2008: 35%

Appendix D: Estimates of the net revenue gains from a 1 percentage point drop in smoking prevalence

In 2010 Landman Economics estimated a model of the impact of reductions in smoking prevalence on the public finances in the UK (Reed, 2010a). The model included the following public finance impacts of reduced smoking prevalence:

- **Savings in public spending on health** – Howell (2011a) calculates that the annual cost of hospital treatment of smoking-related diseases in Ireland is around €280 million. As the risk of developing diseases falls (due to lower smoking prevalence and decreasing risks for ex-smokers), so does the cost of the treatments.
- **Increased tax receipts from additional working life** – people of working age whose deaths are averted through giving up smoking (or not starting smoking) due to the tobacco tax increase will have longer working lives and hence pay more in income tax and social insurance contributions to the Exchequer. They will also spend at least some of their additional disposable income and hence pay more VAT.
- **Increased tax receipts from reduced absenteeism** – the extra output from reduced absenteeism among people who stop smoking (or never take up smoking) following the tax increase leads to increased income tax, social insurance contributions and VAT receipts.
- **Reduced spending on benefits related to sickness and disability** – smoking is associated with increased ill health in the population as well as increased mortality. The model estimates the reduction in expenditure on benefits for people of working age with long-standing health conditions which would result from a reduction in smoking caused by the tax increase.
- **Increased spending on benefits for retired people** – increased longevity as a result of reductions in smoking leads to some increased spending on pensions and other benefits for people aged over retirement age because of reduced working-age mortality.

This appendix calculates the benefits to the public finances in Ireland arising from a one percentage point drop in smoking prevalence. For the health service costs component of the public finance benefits, the €280m per year figure from Howell (2011a) is used. For the other components (increased tax receipts and changes in benefits spending), the analysis

uses figures calculated by Reed (2010b) for the UK All Party Parliamentary Group on Smoking and Health which show the benefits to the UK public finances of a one percentage point drop in smoking prevalence. Because no equivalent model has been estimated for Ireland, this appendix converts each figure into a proportion of UK Gross Domestic Product (a measure of output for the whole economy) and then calculates the public finance effects of a one percentage point reduction in smoking prevalence for the Irish economy on the assumption that the effects for Ireland are the same size as a proportion of GDP as for the UK. These results should only be taken as a rough approximation as a detailed model of the benefits of reduced smoking to the public finances for Ireland would have to take into account the differences in demographics, the distribution of earnings, tax and welfare systems between the two countries.

Table D.1 shows the calculations used to provide the estimates of the public finance impacts of a one percentage point drop in smoking prevalence that are used in Table 9 in the main report.

Table D.1. Estimated net revenue gains from a 1 percentage point drop in smoking prevalence – UK and Ireland

Cost/benefit	**Revenue gain/loss:**	
	UK	**Ireland**
Health service cost savings	£74m	€12m
Extra tax revenue from extra years of working life	£40m	€5m
Extra tax revenue from reduced workplace absenteeism	£45m	€5m
Reduced disability benefits	£90m	€10m
Increased pensioner benefits	-£10m	-€1m
TOTAL	**£240m**	**£31m**

Source: UK figures taken from Reed (2010b)

Health service cost savings figure for Ireland calculated from Howell (2011a).

Other figures for Ireland calculated based on estimates for the UK from Reed (2010b), adjusted to take account of the relative size of Gross Domestic Product for the two countries (see text above) and assuming that each cost/benefit effect will be the same proportion of GDP in Ireland as it is for the UK.

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