Cost Benefit Analysis
of the FCTC Protocol on
Illicit Trade in Tobacco Products

A Report Prepared for ASH by Paul Johnson

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EXECUTIVE SUMMARY

Illicit trade in tobacco products is a serious global problem. It contributes to high mortality from smoking-related diseases[1], lost tax revenue ($40.5 billion globally) and growing organised crime. The current draft of the FCTC protocol proposes a number of measures – such as tighter control of the supply chain, enforcement and international cooperation - which are expected to reduce the size of illicit trade globally.

This report assesses the likely costs and benefits of such action from a UK perspective. In line with standard practice we look at the costs of regulation to industry and government, the likely impact of the regulation on behaviour and the benefits which that might bring. In this case benefits come largely from improved health and longevity which lead to reduced spending on health care and greater productivity from a healthier population. Because poorer smokers are disproportionately likely to buy illicit tobacco, effective measures to tackle smuggling will also help reduce health inequalities.

We find that under almost all plausible scenarios the benefits of the protocol are likely to exceed the costs even when only considering benefits accruing to the UK. Our central estimate of the monetary net benefits to the UK (assuming very wide international take up of the protocol) is £5.7 billion ($8.9 billion) in Net Present Value terms over a 50 year period, plus 760 premature deaths averted annually. Even on the most pessimistic assumptions benefits are likely to outweigh costs, if only marginally.

This approach to policy analysis is important because it allows policy makers to compare the benefits of a policy with its economic costs and to make comparisons between policies. There are numerous potential regulatory interventions which look initially attractive because they create benefits, but whose economic costs exceed those benefits. In this case, by contrast, we demonstrate that the benefits from implementing the protocol are highly likely to exceed the costs.

The calculations for other countries will differ. The UK is characterised by quite a significant illicit market, most legal consumption being of domestically produced cigarettes, and already significant action by government and manufacturers. Where there is currently less action by government and manufacturers, additional costs may be higher than will be the case in the UK. Conversely benefits are also likely to be higher.

In fact, of course, this is an international protocol. Costs, and particularly benefits, will depend upon the actions of other countries. Benefits to the UK increase as other countries implement the protocol and we show how that might vary. Equally, if the UK implements the protocol, that will create benefits for other countries. Because we are focussing on costs and benefits to the UK we do not take account of the positive effect of UK action on other countries.

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1. Joossens L, Merriman D, Ross H, Raw M. (2009) "How eliminating the global illicit cigarette trade would increase tax revenue and save lives" estimate that without drastic action the number of smoking-related deaths would exceed 8 million in 2030. IUATLD

Costs

We estimate that the costs of the protocol for the UK would range between £9 million and £53 million annually ($14 million - $83 million). This is equivalent to £0.2 billion - £1.1 billion ($0.3 billion - $1.7 billion) in NPV terms over a 50 year period. A large proportion of this is down to employment costs, which will vary significantly country by country, so these costs should not be assumed to be directly transferable to other countries.

In Table 1, these costs are split by component[2] and incidence (i.e. who will incur these costs).

Table 1. Estimated annual costs of the protocol (in £ and $US)

	Manufacturers	Wholesalers	Retailers	Government
Tracking and tracing	£9 million - £18 million ($14 million - $28 million)			£0 - £35 m ($0 - $55 m)
Customer verification	Customer verification is already in place		Not applicable	
Record keeping	If tracking and tracing is implemented, record keeping should not require additional expenses		Not applicable	
Enforcement and international cooperation	Not applicable	Not applicable	Not applicable	
Total	£9 million - £53 million ($14 million - $83 million)			

Source: our estimates

The table demonstrates that most uncertainty in costs is associated with additional government spending on enforcement and international cooperation. The HMRC already put significant effort and resources into tackling tobacco smuggling. In particular if the protocol comes into force across only a limited number of countries then additional costs to HMRC might be very limited. Worldwide implementation is more likely to involve additional spending, perhaps particularly in working with or assisting lower income countries. Modelling this kind of sensitivity to assumptions is a key element of a practical CBA of this sort.

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2.   We only estimate costs of those measures, which are **additional**, i.e. have not yet been implemented in the UK. For example, there will be no additional cost associated with licensing of the tobacco manufacturers because they are already licensed in the UK.

Effectiveness of the protocol

The effectiveness of the protocol is likely to depend on its geographic scope:

- If the protocol is ratified and implemented by the EU member states which are Parties to the WHO FCTC only, it would help to curb smuggling of genuine UK brands, but might have limited impact on counterfeit and 'cheap whites'[3]. This is the base case because if the UK ratifies the protocol it will be as part of the EU.

- If, on the other hand, most countries in the world which are Parties to the FCTC ratify and implement the protocol, it is expected to be highly effective.

- Finally, if the protocol is ratified and implemented by the EU and a few other Parties to the FCTC, where counterfeit and cheap whites are currently being produced, the impact initially is likely to be significant. However, over time the effectiveness of the protocol may go down because producers of counterfeit may 'relocate' to areas not covered by the protocol.

In order to reflect these possibilities, we model three highly stylised scenarios, which, however, capture the essence of the problem (Table 2).

Table 2. Protocol effectiveness: three scenarios

	Geographic scope	**Reduction in the size of illicit market in the UK**
Scenario 1	EU only	5% - 15%
Scenario 2	EU + countries-origin of counterfeit	25% - 50%
Scenario 3	Worldwide	60% - 80%

Source: our assumption

Benefits

As cheap cigarettes and HRT become less available, those who currently buy illicit tobacco products would face higher prices[4] and, consequently, reduce their consumption or stop smoking altogether.

Lower smoking prevalence would generate a number of benefits, such as:

- Reduced healthcare costs.

- Output gains due to reduced mortality.

- Reduced absenteeism.

- Years of life gained.

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3. Foreign brands that do not have a legal market in the UK or in other EU countries.
4. Illicit tobacco products tend to be twice as cheap as the legal ones

We put monetary values on the first three of these. We treat years of life gained separately. Overall, we find that the benefits of the protocol outweigh its costs for all three scenarios of the protocol's effectiveness. This is shown in figure 1.

Figure 1. Net benefits of the protocol in NPV terms
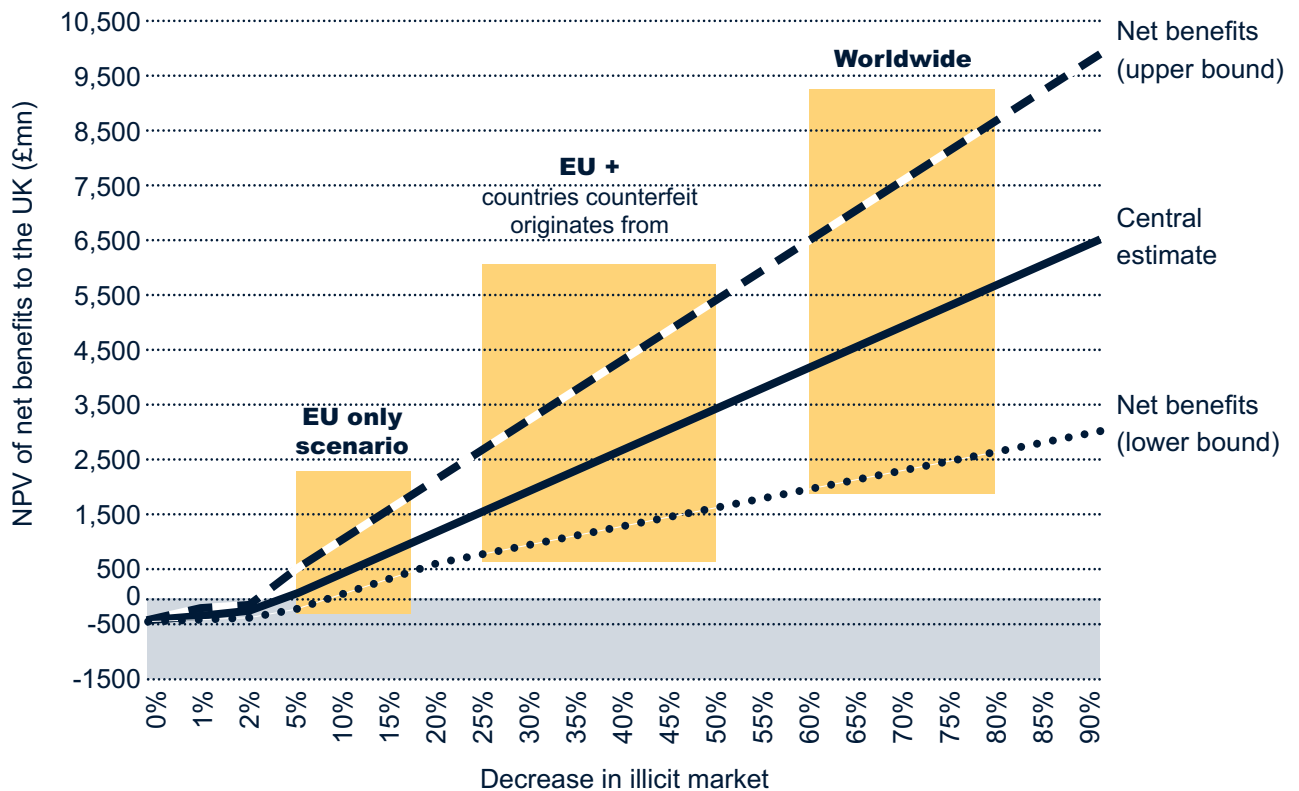
Source: our estimates. See Annex 2 table 17 for details.

The horizontal axis measures percentage reductions in the illicit market. The yellow boxes encompass the range of reductions which might follow from the protocol being enforced in (1) the EU only, (2) the EU and the main countries of origin of counterfeit and cheap white cigarettes, and (3) most of the world.

The vertical axis measures the *net present value* of benefits. The lines relate benefits to reductions in the illicit market on our most optimistic assumptions (top, dashed, line), most pessimistic (bottom, dotted, line) and central assumptions (the central, solid, line).

Specifically, we find that:

➢ The 'EU only' scenario leads to small positive net benefits, with the central estimates varying between £0.1 billion ($0.16 billion) for 5% reduction and £0.9 billion ($1.4 billion) for 15% reduction in the size of the illicit market;

➢ For the 'EU and other countries' scenario the central estimates of the net benefits vary between £1.6 billion ($2.5 billion) and £3.4 billion ($5.3 billion) for 25% and 50% reduction in the size of illicit market respectively; and

➢ The 'worldwide' scenario always produces large net benefits - the central estimate is between £4.1 billion and £5.7 billion ($6.4 billion - $8.9 billion).

One should bear in mind that our scenarios of the protocol's effectiveness are highly stylised and, therefore, should be interpreted with caution. Although our estimates of the net benefits for the 'EU only' scenario are relatively small, this scenario does not take into account potential evolution of the protocol over time. Indeed, one can think of a 'hybrid scenario' in which the protocol is initially ratified by the EU member states which are Parties to the FCTC only, with other Parties joining a few years later. In this case, limited initial benefits will be followed by higher benefits in later years, with overall results being positive and significant (welfare improving).

We also estimate the impact of the protocol on the number of deaths because of smoking-related diseases (Figure 2) and find that if the illicit market is reduced substantially (by 60% - 80%), between 569 and 759 deaths would be averted annually (based on our central estimate).

Figure 2. Number of deaths averted as a result of the Protocol (annually)
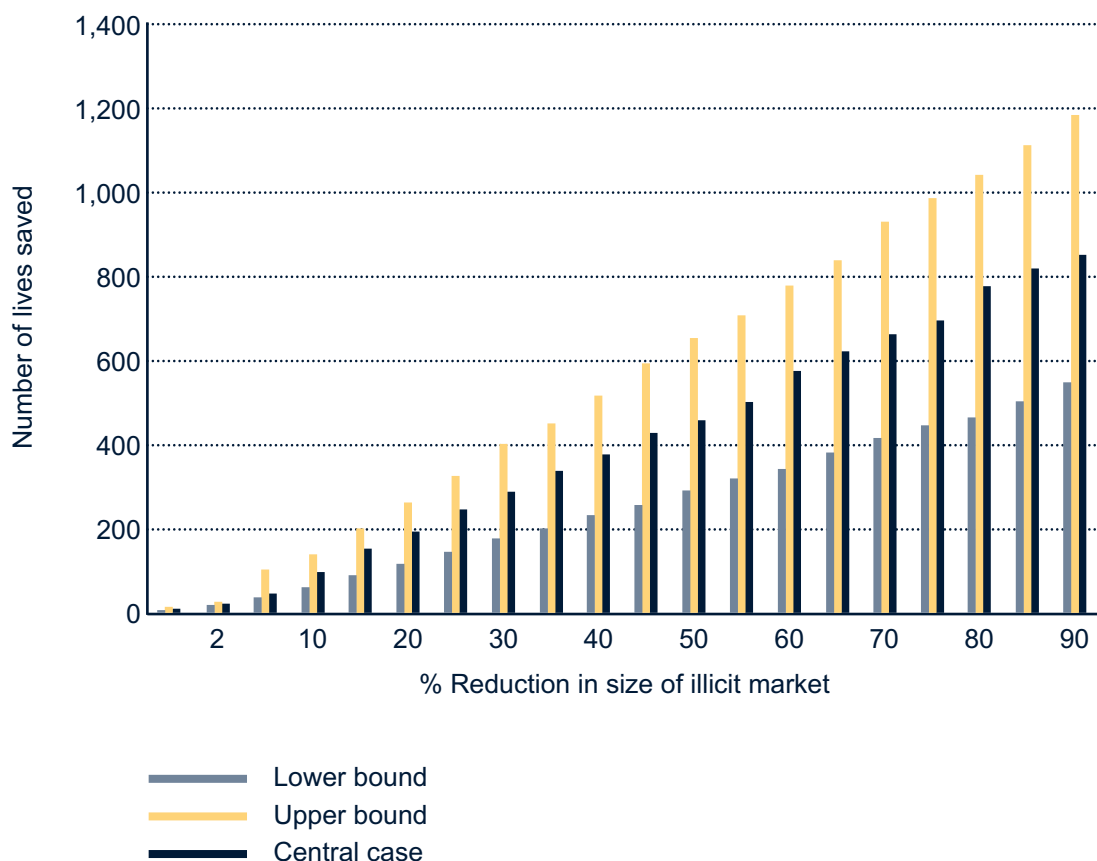
Source: our calculations. See annex 2 table 18 for details.

CHAPTER 1

INTRODUCTION

We have been commissioned by Action on Smoking and Health (ASH) to undertake a cost benefit analysis (CBA) of the FCTC protocol on illicit trade in tobacco products which is currently being negotiated.

Illicit trade in tobacco products is a serious global problem. It contributes to high mortality from smoking-related diseases[5], lost tax revenue ($40.5 billion globally[6]) and growing organised crime.

The Conference of the Parties to the WHO Framework Convention of Tobacco Control (FCTC) recognised that international collaboration for the control of illicit trade is an important area of tobacco control, and the Parties to the FCTC are now negotiating an Illicit Trade protocol. This protocol is intended to provide a binding legal framework for international regulation of tobacco production and distribution and for international cooperation between enforcement authorities.

The aim of this report is to assess the impact of the protocol on the UK. That includes identifying and quantifying all benefits and costs associated with the protocol and calculating the net benefits (i.e. benefits minus costs).

It is intended that the protocol, if implemented, will help to curb tobacco smuggling and, hence, limit availability of cheap smuggled and counterfeit tobacco products in the UK. As illicit tobacco products become less available, smokers, facing higher prices, would reduce their consumption or stop smoking altogether. That would improve their health and longevity resulting in a range of benefits, such as savings to the healthcare system, improved productivity and higher output, and lives saved (or premature deaths averted).

A cost-benefit framework is a general approach to evaluating government interventions. This type of analysis can be undertaken before a policy has been implemented (ex ante) or when the policy is underway (ex post). CBA helps governments to understand whether an intervention is likely to represent 'value for money' and to choose the most cost-effective intervention from several alternatives.

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5.   Joossens L., Merriman D., Ross H. and Raw M. (2009)" How eliminating the global illicit cigarette trade would increase tax revenue and save lives" estimate that without drastic action the number of smoking-related deaths would exceed 8 million in 2030. IUATLD

6.   Ibid

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1 INTRODUCTION

This project is funded by UK funders (ASH, the British Heart Foundation and Cancer Research UK) and, therefore, its main focus is on the impact of the protocol on the UK. However, this report provides a general methodology which may be useful by other Parties involved in similar decision making process.

The rest of the report is structured as follows:

- CHAPTER 2
  Describes tobacco industry in the UK and analyses the evolution of the illicit market;

- CHAPTER 3
  Provides an overview of the protocol and discusses our approach to the study;

- CHAPTER 4
  Presents the costs of the protocol by component;

- CHAPTER 5
  Identifies and quantifies the benefits;

- CHAPTER 6
  Discusses the protocol's effectiveness;

- CHAPTER 7
  Quantifies the net benefits; and

- CHAPTER 8
  Provides conclusions and step-by-step summary of our analysis.

CHAPTER 2

TOBACCO INDUSTRY IN THE UK

The UK tax paid tobacco market is worth over £8 billion[7]. The market is dominated by cigarettes, which represent 93.3% of the total duty paid market (in value terms). The share of other tobacco products - hand rolling tobacco (HRT) and cigars - is 6.7%. In volume terms, this is equivalent to 2.4 billion packs of cigarettes and 3.5 million kilograms of HRT[8].

The market is dominated by two manufacturers: Imperial Tobacco, with a market share of 47.9% and Gallaher Group (part of Japan Tobacco International), with 35.8%. Altria Group has a considerably smaller share (6.8%). Smokers choose between multiple brands, ranging from 'economy' (£3.50 - £4.00 per pack) to premium (up to £6.00 per pack). According to the Tobacco Manufacturers' Association (TMA), the recommended Retail Price (RRP) of a typical pack in the Most Popular Price Category (MPPC) is £5.44[9]. However, the actual average price paid by consumers for legal cigarettes tends to be 8-10% lower[10].

Tobacco smuggling into the UK grew markedly in the mid-1990s following the removal of routine border controls between EU states. In 2000, more than 1 cigarette in 5 smoked in the UK was smuggled and tobacco smuggling was costing over £3bn a year in lost tax revenue[11].

In 2000, the Government launched the Tackling Tobacco Smuggling strategy and a range of other initiatives (discussed in detail below). Since then the size of the illicit market in cigarettes has been reduced from 20% to 13% by 2006/07[12]. In the remainder of this chapter, we:

➢ discuss the evolution of the illicit tobacco market in the UK, both in terms of its size and composition; and
➢ provide information on background characteristics of those who buy illicit tobacco products.

This gives us a clear picture of the scale of the problem and provides us with a 'starting point' for our analysis.

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7. HMRC, Tobacco Bulletin, Feb 2009
8. HMRC (2008) "Measuring Indirect tax gaps – 2008"
9. The TMA website, http://www.the-tma.org.uk/page.aspx?page_id=42
10. West R. (2008) "Smoking and smoking cessation in England: Findings from the smoking toolkit study" Cancer Research UK
11. "Tackling tobacco smuggling together", HMRC, 2008, page 1
12. Ibid, page 4

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2 TOBACCO INDUSTRY IN THE UK

2.1 EVOLUTION OF THE ILLICIT MARKET

2.1.1 Size of illicit market

The HMRC estimates the size of illicit market in tobacco and other products. *"Measuring Indirect Tax Gaps -2008"* describes the methodology and provides the estimates for the last 5 years. The HMRC relies on various data sources, including the General Household Survey (GHS), data on UK duty paid consumption (based on returns to HMRC) and information on cross border shopping (based on the International Passenger Survey). Given that there are some uncertainties involved in these estimates, the HMRC produces a range of estimates, using the mid-point as the base case scenario.

Cigarettes

The available data suggests that the HMRC has made significant progress in tackling smuggling of cigarettes, reducing the size of the illicit market from 20% in 2001/02 to 13% in 2006/07 (Figure 3 below). The range in 2006/07 was between 9% (lower bound) and 17% (upper bound)[13].

Figure 3. Cigarettes: Illicit market share estimates
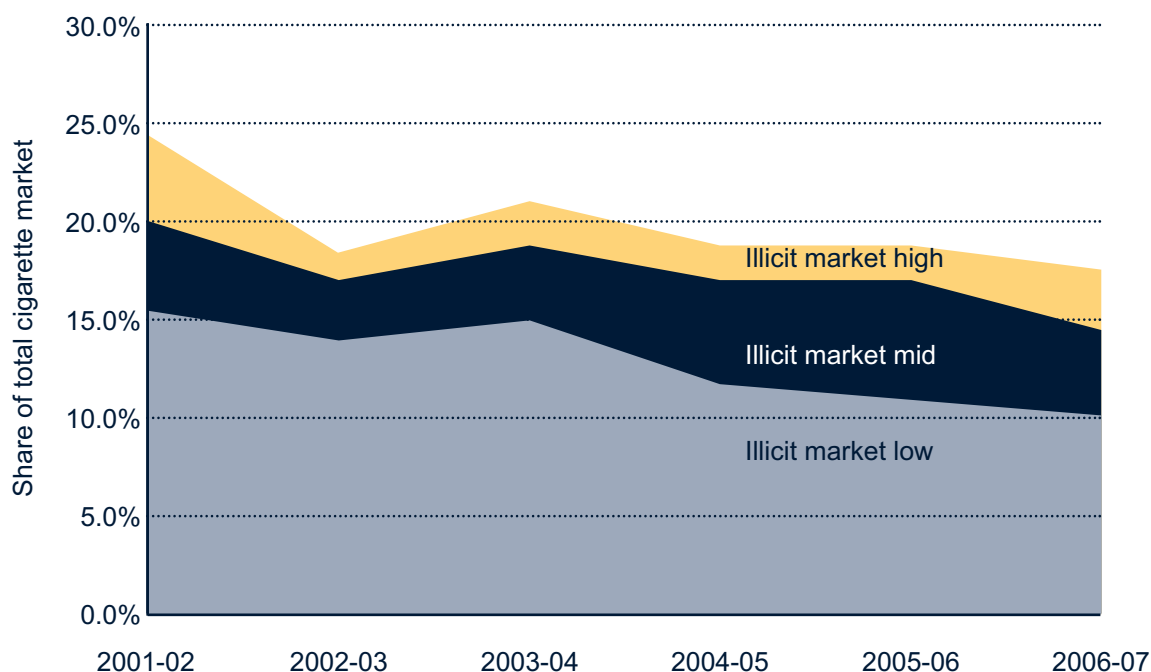
Source: HM Revenue and Customs

13.   We note that the upper bound of the HMRC range is similar to the estimate produced by the Tobacco Manufacturers' Association (TMA). The TMA estimate that in 2007 around 27% of cigarette consumption was non UK duty paid (NUDP). Given that cross-border shopping is approximately 8% of total cigarette market, the remaining 19% is illicit trade.

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The main actions contributing to this reduction in cigarette smuggling are the following:

- In 2000, the HMRC launched the Tacking Tobacco Smuggling strategy, investing an extra £209 million to fund 1,000 additional front line and investigative staff[14].

- In 2000, the European Commission (EC) and ten Member States took a number of tobacco companies to court in the US accusing the companies of cigarette smuggling, laundering the proceeds of narcotics trafficking and price fixing[15]. The case was unresolved when on 9 July 2004 the EC and the Member States agreed to drop their case against PMI in return for the Agreement, under which PMI agreed to pay the EC $1 billion over 12 years and to control future smuggling of its cigarettes through a range of supply control measures (including tracking and tracing). JTI signed a similar agreement with the EC on 14 December 2007.

- The House of Commons Health Select Committee's report, released in June 2000, recommended that criminal proceedings should be considered against another tobacco company - British American Tobacco (BAT) - if the allegations that it facilitated tobacco smuggling proved to be true. Both the HSC report and the Committee of Public Accounts "Tobacco smuggling" report (which focused on smuggling of Imperial Tobacco products) were effective at influencing the tobacco manufacturers' behaviour and tackling tobacco smuggling.

- In 2002 and 2003, the leading UK tobacco manufacturers signed the Memoranda of Understanding (MoU), which required the tobacco manufacturers to control the supply chain and placed greater responsibility for smuggled cigarettes on their producers. These were voluntary non-binding agreements, which depended for their effectiveness on the tobacco manufacturers' goodwill.

- In 2006, the UK government introduced legislation making measures to combat illicit trade enforceable. The UK Finance Act 2006 makes it a legal duty for tobacco manufacturers not to facilitate smuggling. Those who do not take sufficient steps to prevent smuggling of their products into the UK are subject to fines up to £5 million.

- In April 2009, the UK government joined other EU member states in signing anti-smuggling agreements with two international tobacco manufacturers - PMI and JTI (discussed above).

While significant progress has been made in tackling cigarette smuggling, smuggling in HRT remains a serious problem.

HRT

According to the HMRC estimates, the size of the illicit market in HRT has remained relatively stable in the last 5-6 years - between 50% and 60% of total HRT consumption. That means that more than half of HRT consumed in the UK is illegal.

In 2006, the government set a target to reduce the HRT illicit market share by 1,200 tonnes (equivalent to 20% by 2007/08)[16]. It is not yet known whether this target has been met.

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14.   HM Customs and Excise (2008) Tackling tobacco smuggling together, HM Treasury, page 1
15.   United States District Court "European Community complaint against Philip Morris, R.J. Reynolds and Japan Tobacco", Eastern District of New York, New York, 3 November 2000
16.   HM Customs and Excise (2008) Tackling tobacco smuggling together, HM Treasury, page 5

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Figure 4. HRT: Illicit market share estimates
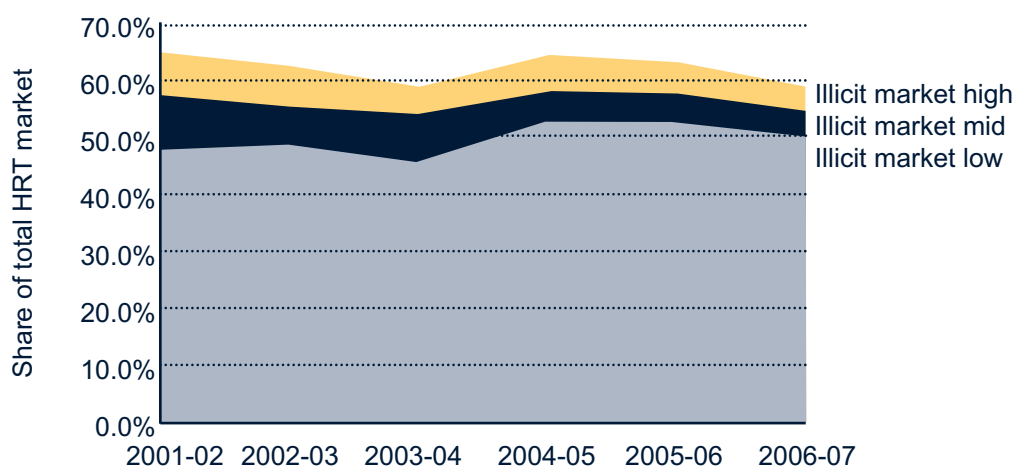
Source: HM Revenue and Customs

Combined illicit market

For the purposes of our analysis, we combine the two markets – cigarettes and HRT – into one 'tobacco products' market. This is because:

- The HRT market is important and should not be ignored. Although small as a share of the UK duty paid tobacco market, it represents c. 18% of UK consumption. Moreover, the illicit trade problem in HRT is more severe than in cigarettes (56% vs. 13%). And the FCTC protocol is one of the means of addressing this problem.

- IIt is not possible to treat the HRT market separately in our analysis. This is because most information available to us on harmful effects of smoking (e.g. the NHS costs, number of premature deaths and absenteeism) does not separate the effect of smoking HRT from the effect of smoking cigarettes.

Therefore, we need to aggregate the two markets and assess the impact of the protocol on the size of the combined illicit market.

Relying on volume estimates from the HMRC "Measuring Indirect Tax Gap - 2008" and assuming that 15 grams[17] of HRT is equivalent to 1 pack of cigarettes (20 sticks), we combine the two illicit markets in one, taking into account their relative shares in total consumption (Table 3).

We find that the combined illicit market represents between 16% and 24% of total consumption, with the central estimate - 20.2%.

Table 3. Illicit tobacco market in 2006/07 (cigarettes and HRT combined)

	Share of total consumption	Share of illicit market		
		Low	Central	High
Cigarettes	82%	9%	13%	17%
HRT	18%	48%	53%	59%
Total	100%	16%	20%	24%

Source: our calculations based on the HMRC figures

In our following analysis, we rely on the central estimate of the size of the illicit market (20.2%)

17. As in West R, Townsend J., Joossens L., Arnott D. and Lewis S. (2008) "Why combating tobacco smuggling is a priority" BMJ 337: a1933

2.1.2 Composition of the illicit market

The composition of the illicit market has also evolved over time.

Cigarettes

In 2000/01, most illicit cigarettes were genuine products manufactured in the UK, exported to continental Europe (to Andorra, Spain, France, etc.) and then smuggled back to the UK. The combination of measures implemented by the HMRC, such as the MoU, changes in the legislation and penalty payments, led to tighter controls of the supply chain and to a reduction in this category of smuggled products.

However, genuine UK brands have been recently replaced by two other categories – counterfeit and non-UK brands (so called 'cheap whites'). The latter category was virtually unheard of a few years ago. It consists of brands that would not normally be found for sale duty-paid in the UK. It is worth noting, however, that some of these cigarettes are legally produced in their country of origin (mainly Russia and China) and smuggled to the UK.

It is difficult to assess the composition of the illicit market. One source of information is on large seizures. In 2007/08, genuine UK brands represented 10% of the large seizures, with counterfeit and non-UK brands equally split (roughly 45%). However, from our discussions with the HMRC, we understand that the large seizures may not be representative of the illicit market as a whole. The industry estimates counterfeit to represent 3% of the UK market[18], this is equivalent to 15% of the illicit market.

Although there is uncertainty over the overall composition of the market, it is clear that this is a market in which actions to close one route for illicit products can have the effect of making other routes more attractive. In the context of the FCTC protocol and other proposals, it demonstrates the importance of international and comprehensive action.

HRT

The composition of the illicit market in HRT appears to be significantly different. The large seizures in 2007/08 were dominated by genuine UK brands (75%), with counterfeit and non-UK brands being 15% and 10% respectively. As with the illicit cigarette market, the composition of the illicit HRT market may not be exactly the same as the composition of the large HRT seizures. However, the evidence seems to suggest that this illicit market is still dominated by genuine UK brands.

If we consider the market for tobacco products as a whole, counterfeit and cheap whites seem to be a growing threat. However, genuine brands (particularly HRT) are still estimated by both HMRC and the tobacco industry to form a significant part of the illicit market, indicating that there is still considerable scope for improving the domestic supply chain controls.

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18.   TJI interview with Christopher Ogden, TMA chief executive, on 22 Oct 2008, http://www.tobaccojournal.com/
       Standing_up_for_commercial_freedom_of_speech_is_essential.49259.0.html

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2.2 SMOKERS CHARACTERISTICS

2.2.1 Smoking prevalence

According to the GHS, smoking prevalence has fallen dramatically in the UK since 1970s (Figure 5). Between 1975 and 1990, this was mainly driven by smokers quitting and becoming ex-smokers. However, this trend has changed in the last 15 years. While the share of ex-smokers remains largely stable, the share of non-smokers is growing, indicating a lower take up among young people.

Figure 5. Evolution of smoking prevalence and smoking cessation between 1974 and 2007

Source: GHS
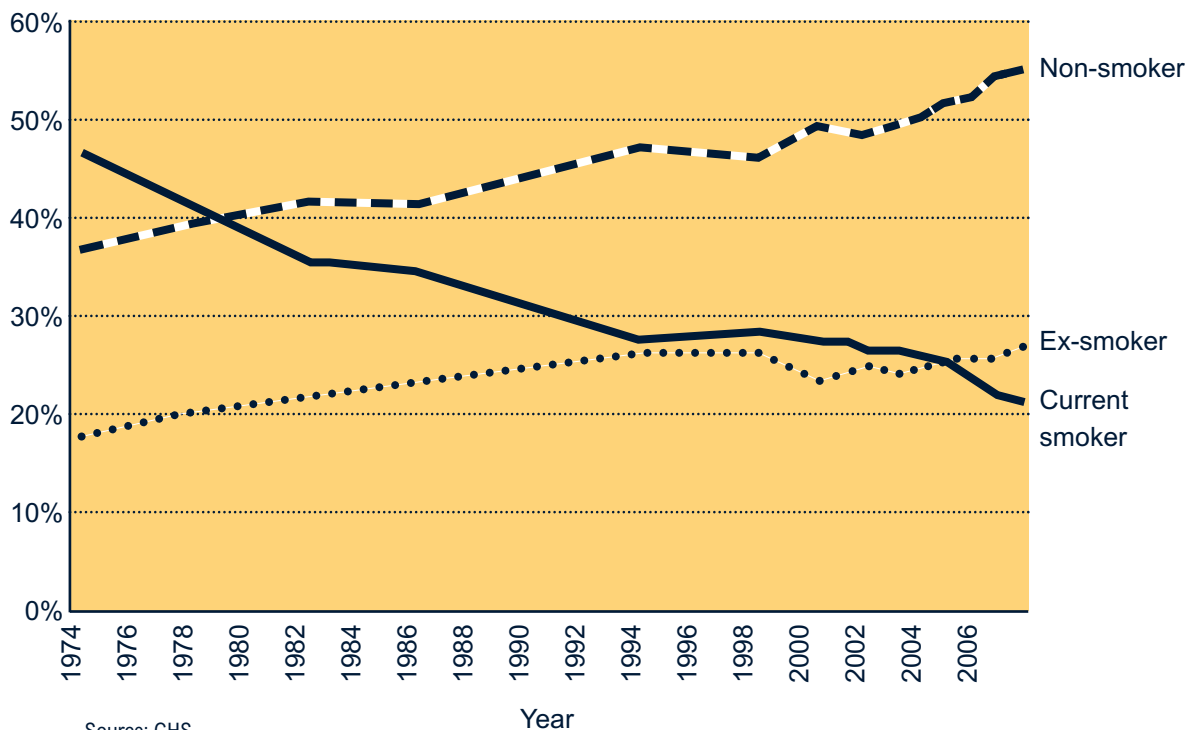
The GHS also provides the split of smokers by background characteristics. Smoking prevalence tends to be higher among young people (20-24 year olds) and those from semi-skilled and unskilled manual occupations.

The GHS, however, does not address the issue of illicit tobacco products. We analyse the Smoking Toolkit data to assess how many smokers buy these products and what we know about these people.

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2.2.2 Who buys illicit tobacco products?

While the size and composition of illicit tobacco market in volume terms is regularly assessed by the HMRC, less information is available on those who buy illicit tobacco products. It is notoriously difficult to collect information on illicit activities as survey respondents tend to under-report them. Recently, an attempt has been made to collect data on smokers and their behaviour as part of the Smoking Toolkit Study.

The Smoking Toolkit Study is a monthly series of national household surveys of a representative samples of approximately 1,700 adults (16+) in England with a special focus on those who have smoked within the past year (c. 500). In total, more than 46,000 adults have participated in the survey since November 2006; c. 12,000 of them are smokers[19]. The study is currently being funded by Cancer Research UK and the Department of Health.

Using this data, we estimate that between 21% and 45% of all smokers in the UK may buy illicit tobacco products. These two estimates are based on the respondents' answers to two survey questions on sources and share of illicit products[20]. It appears that the lower bound (based on responses to Q1) underestimates the scale of the problem as respondents are likely to under-report obviously illegal activities[21]. The upper bound (based on Q2), on the other hand, may overstate it, as some respondents may have confused illicit products and legal tobacco products bought, for example, on sale (referring to both as 'cheap cigarettes'). Therefore, in our analysis we rely on a mid point - 33%.

This estimate, when combined with our estimates of the size of the illicit market in volume terms (20.2%[22]), implies that these 33% of smokers buy 61% of cigarettes and HRT from illicit sources.

The Smoking Toolkit data provide clear evidence that those who buy illicit tobacco are more likely to be young (Figure 6) and belong to semi-skilled and unskilled occupations (Figure 7).

19. West R. (2008) "Smoking and smoking cessation in England: findings from the Smoking Toolkit Study"
20. These questions are as follows:
    (Q1) In the last 6 months, have you bought any cigarettes or hand rolled tobacco from any of the following: Pub (somebody who comes round selling cigarettes cheap), People who sell cheap cigarettes on the street, People in the local area who are a ready supply of cheap cigarettes, Buy them cheap from friends.
    (Q2): Thinking of all the cigarettes or hand rolled tobacco you have bought in the last 6 months, apart from what you bought abroad yourself, roughly how much of it would you say you got cheap?
21. This figure, in combination with the HMRC estimate of the size of illicit market, would also imply that these people buy only illicit tobacco products, which, according to their responses to another survey question, does not appear to be the case.
22. See Chapter 2.1.1 for more details

Figure 6. Percentage of smokers buying illicit tobacco products, by age
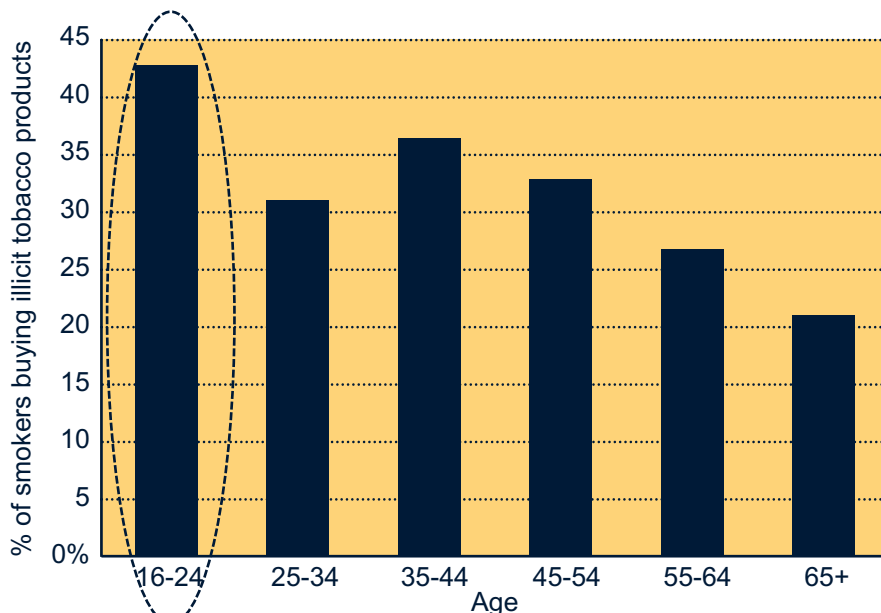
Source: our analysis of the Smoking toolkit data

Figure 7. Percentage of smokers buying illicit tobacco products, by occupation
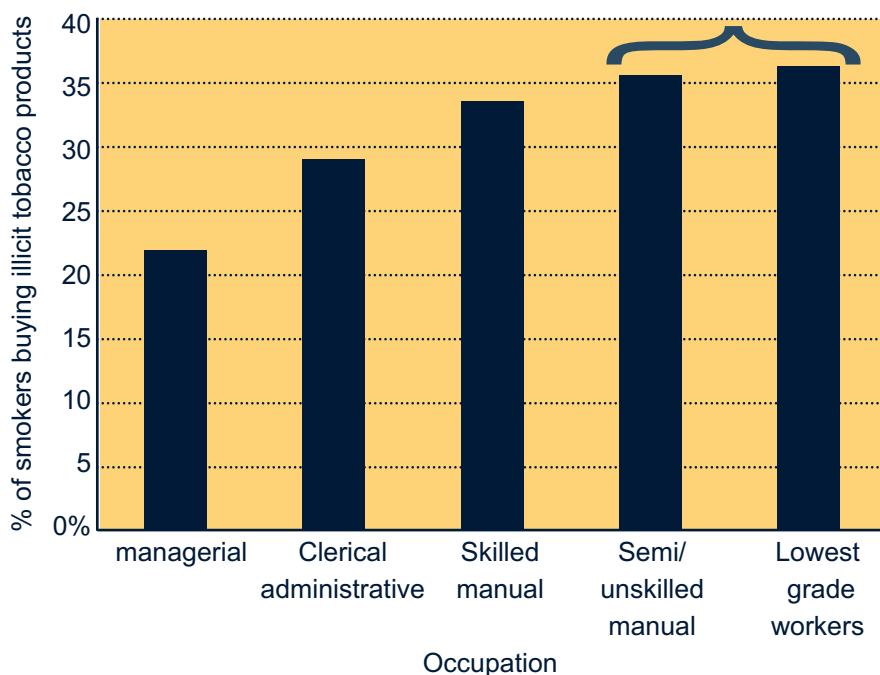
Source: our analysis of the Smoking toolkit data

This information is important for our understanding of potential impacts of the protocol. As we discuss, in Chapter 5, these groups are found to be more price sensitive and, therefore, more likely to stop smoking when 'cheap' tobacco products disappear than older more affluent smokers. In the following chapters, we discuss the protocol itself and estimate its potential costs and benefits.

OVERVIEW OF THE PROTOCOL AND OUR APPROACH TO ESTIMATING ITS COSTS AND BENEFITS

3.1 OVERVIEW OF THE PROTOCOL

The protocol is still evolving through negotiation. The latest version of the protocol was published by the WHO FCTC on 23 April 2009. This cost benefit analysis is based on the measures set out in the current Chair's text of the protocol, which is the basis for negotiations at the third Intergovernmental Negotiating Body meeting in Geneva beginning on 28th June 2009. Specific obligations are included with respect to supply chain control, offences and sanctions, and international enforcement and cooperation. Below, we briefly summarise these requirements in turn.

3.1.1 Supply chain control

There are several supply chain control measures proposed for the protocol, such as:

- **Licensing** of key participants of 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 markings" 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 (HMRC and UKBA in the UK) 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.

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- **Security and preventive 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.

3.1.2 Enforcement and international cooperation

The draft protocol contains the following enforcement measures[23]:

- 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 (referred to in the Chairperson's text as '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; and
- Measures to ensure necessary public education and awareness-raising.

International cooperation

- Information sharing between Parties, include 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; and
- Appropriate cooperation with non-Parties to the protocol.
- To enable confiscation of proceeds of crime;
- To levy seizure payments;
- To destroy confiscated tobacco, counterfeit, contraband cigarettes and equipment, etc.

When assessing the costs of these measures, we first attempt to establish whether any of these measures have already been implemented in the UK. This is important as only additional (new) elements should be taken into account in the CBA (as only these measures may result in additional benefits, over and above those achieved in the past).

23.   http://apps.who.int/gb/fctc/PDF/it3/FCTC_INB_IT3_3-en.pdf

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3.2 OUR APPROACH TO THE STUDY

The main purpose of this report is to consider the costs and benefits of the proposed protocol and hence to perform a cost benefit analysis. In the following chapters we consider the costs, possible benefits and likely impacts of the protocol before putting them together in Chapter 7 where we compare them in order to provide a sense of the possible net impact.

A CBA uses a standard and relatively straightforward toolkit in order to assist decision making. In doing this CBA we follow the guidance set out in the UK Treasury's *Green Book*[24] and methods used across government in Regulatory Impact Assessments (RIAs). Similar techniques are used in policy appraisal at the EU level, by international agencies, in the US, Canada and numerous other countries.

We go through the main issues in this particular CBA systematically in the subsequent chapters considering how we might estimate the costs of the protocol, what its impact might be and how its effects can be valued.

To carry out such an analysis we first of all need to be able to compare effects using a single metric. To do that, effects need to be monetised where possible. In this case we need, for example, to put monetary values on improvements in health resulting from any reduced levels of smoking resulting from the introduction of the protocol. As we discuss in Chapter 5 we largely do this by considering the direct economic effects of better health and greater longevity - i.e. we consider effects on productivity, health care costs and longer working lives.

3.2.1 Issues

The basic CBA will account for *costs* of the protocol for government, producers and retailers, and *economic benefits* arising from improved health among any of those who may reduce smoking as a result of the protocol.

Before going in to the details of the cost and benefit calculations it is worth noting a number of particular issues and decisions that need to be made. These cover the discount rate to use, how to treat tax revenues and how to account for the impact on the welfare of smokers of increased cost of smoking. These are all issues on which it is possible to reach a clear decision.

Discount rate

In order to compare costs and benefits which accrue at different times it is important to convert streams of costs and benefits into *Net Present Values*. That is, costs or benefits which accrue in the future need to be discounted back to the present and aggregated. Costs or benefits

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24.   The Green Book: appraisal and evaluation in central government. http://www.hm- treasury.gov.uk/data_greenbook_index.htm

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accruing at a later date are generally considered to be of lower value than those accruing immediately. The standard real discount rate recommended by the Treasury Green Book is 3.5%[25], and that is the rate we use throughout this analysis. This is particularly important in this analysis because whilst many of the costs of the protocol will begin accruing immediately, benefits in terms of better health will take rather longer to become evident. We calculate the Net Present Value of the costs and benefits over a 50 year period as the benefits are likely to accrue over the entire generation. We do not include any costs and benefits thereafter because there are many uncertainties involved over a longer time horizon.

The treatment of tax revenues

One effect of a successful protocol would be to increase the cost of smoking for those currently making use of illicit tobacco products. To maintain their current level of smoking they would need to spend more essentially because they would need to pay tax which is currently being unlawfully evaded. This, arguably (we come to why it is arguable below) would make them worse off. However, there is an equal and opposite effect on others because increased tax revenue for government from tobacco products should result in reduced taxes or increased spending elsewhere in the economy. Therefore we don't include increased tax payments by smokers as a cost.

Nor do we include such payments as a benefit, though there may be a case for doing so given that what is being sought here is a decrease in illegal tax evasion. That is not to say that studies which focus on the tax losses associated with smuggled and counterfeit products are in any sense misguided. It is just that they are focussing on a different question. The issue that the tax authorities need to consider is whether marginal additional resources devoted to collecting revenue by reducing the amount of tax evaded through tobacco smuggling are worthwhile relative to spending those resources trying to increase compliance elsewhere in the tax system. In tax evasion, as in policing, the optimal policy is never going to be to spend so much that you ensure there is no crime[26]. For the purposes of this study we don't take a view of this.

The benefits we identify are *in addition* to any benefits that may arise from increased tax collection. From the government's point of view they need to be taken into account when considering how much effort to put into countering tax evasion. In this case the optimal effort to reduce tax evasion will be greater than that suggested by the standard approach which simply considers the amount of revenue raised against costs of raising revenues. The additional benefits from action are substantial.

We do not try to quantify at all some of the other benefits from enforcing collection of tax revenues and reducing evasion in this case, including reducing organised criminal activity.

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25.   This incorporates an allowance for expected annual economic growth of 2% and a combination of "pure rate of time preference" and "catastrophe risk" which are estimated at 1.5% between them.

26.   Indeed, when it comes to tax evasion it is not even optimal to equate the marginal cost of raising extra revenue to the increase in revenue raised. Shaw, Slemrod and Whiting (2009) consider these issues in detail. (http://www.ifs.org.uk/mirrleesreview/reports/admin_compliance.pdf)

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The impact on smokers

There will be two groups among the smokers who currently use illicit tobacco products - those who continue to smoke as much as before and just pay more tax, and those who reduce their tobacco consumption or give up altogether. As we have already discussed, where behaviour doesn't change but tax rises we can effectively net off the increased payments by smokers from reduced taxes elsewhere. Where the policy changes behaviour (reduces smoking) this would usually be considered a distortion created by the tax system and hence an economic "welfare" cost. Smokers are made worse off because their decisions over what to consume have been altered and there is no offsetting increase in tax revenues. It looks like this implies a cost which should be included in the analysis.

There are three reasons for rejecting this view as too simplistic, two of which are common to any tax rise *and* one of which is specific to taxes on tobacco (and other addictive products).

The first reason is that the impact on tax revenues will actually depend on the extent to which smoking falls and what ex smokers do with the money they previously used on cigarettes. Someone who currently depends entirely on illicit tobacco is currently paying no tax on that spending. If their illicit supply becomes unavailable and they give up smoking then they will switch their spending elsewhere, likely to goods on which VAT or other excise duties are payable. So even in this case there will be an offsetting rise in tax revenues. There will be a group for whom there is no such offsetting rise - those who continue to use illicit product but have to pay a higher price for it than before.

Secondly, we need to avoid double counting tax costs. Suppose the new policy does raise tax revenue, and at the same time leaves some other smokers worse off because their consumption decision is altered. If the increased revenue leads to reductions in other taxes then the distorting impact of those taxes will be reduced. In other words one should only count any negative economic impact of tobacco taxes on smokers *if* one is sure that those effects are greater than the effects of other taxes - income tax, VAT etc. Given that there is an extensive literature on the welfare effects of these taxes we see no reason to make that supposition.

Thirdly, there is the specific question in this instance as to whether increases in tobacco taxes really do make smokers worse off at all. By this we do not mean that they might be made better off because they end up healthier. Rather that there is evidence that smokers and potential smokers see increased taxes, or in this case increased enforcement, as a welfare enhancing thing in its own right. In the standard economic model consumers make rational decisions, and taxes which alter their behaviour are welfare reducing.

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This model has been extended to account for addictive behaviour[27]. In fact there are numerous reasons for rejecting this view. Jonathan Gruber and co-authors[28] have pointed out its many flaws, and indeed find evidence that smokers and potential smokers actually value higher taxes as devices to increase their own commitment to give up. Decisions over consumption of addictive products are not made rationally, and applying the standard rational choice models in looking at welfare effects is just wrong.

In sum, interactions with other parts of the tax system make it unclear that increased taxes on smokers reduce economic welfare overall and may well actually increase it (all ignoring actual health and other benefits). We conclude that the most appropriate, and indeed conservative, assumption to make is that the net immediate welfare impact from increased taxes on smokers is zero.

In the following chapters we model numerous scenarios to take account of the uncertainties over the costs of the proposed protocol, of its effectiveness in reducing the availability of cheap tobacco and over the impacts of effective price increases on behaviour and hence on health and economic costs. In doing that we have had to make a number of decisions, consistent with economic theory and evidence. In particular we have chosen a discount rate of 3.5%, we are treating increased tax revenues as transfer payments and therefore not as an element in an economic assessment and we ignore any immediate welfare costs or benefits of increased effective taxation through improved enforcement.

In addition we will not try to monetise the benefits from possible lives saved nor from the welfare gained from increased healthy life – though these may be substantial and we record those possible effects separately.

Finally, we should stress that throughout we are considering only the impacts on costs and benefits in the UK. This is necessary to make the exercise tractable. We hope that we end up with a framework which is applicable to any country. But we do stress throughout that the benefits to the UK, or any other country, will depend not only on actions carried out here but on actions elsewhere – hence some benefits felt in the UK will depend on others bearing costs. In addition the benefits of UK participation will be felt well beyond the UK – others will benefit from costs borne in the UK. In that sense this is necessarily a partial analysis.

27.   See for example the work of Gary Becker (the Nobel prize winning economist) and Kevin Murphy Becker, Gary S., and Kevin M. Murphy. "A Theory of Rational Addiction." Journal of Political Economy 96 (August 1988): 675–700
        For example Gruber, Jonathan and Koszegi, Botond. (2004). "Tax Incidence When Individuals are Time Inconsistent: The Case of Cigarette Excise Taxes," Journal of Public Economics, 88(9-10), August 2004, 1959-1988.
28.   Gruber, Jonathan and Mullainathan, Sendhil (2005). "Do Cigarette Taxes Make Smokers Happier?," Advances in Economic Analysis and Policy Advances in Economic Analysis and Policy Vol. 5: No. 1, Article 4 (2005). Available at http://www.bepress.com/bejeap/advances/vol5/iss1/art4

CHAPTER 4

COSTS OF THE PROTOCOL

The overall costs of the protocol can be split by:

- **Protocol component** - e.g. licensing, tracking and tracing, enforcement; and

- **Incidence** - i.e. who will incur these costs (manufacturers, wholesalers, retailers, government).

When evaluating the impacts of the protocol, we need to distinguish between (i) those elements that have already been implemented in the UK (e.g. licensing of tobacco manufacturers) and (ii) those elements that are new or 'additional' (e.g. tracking and tracing). In our evaluation we only take into account 'additional' elements of the protocol (and costs associated with them) as they are expected to result in additional benefits (over and above those achieved in the past).

4.1 SUPPLY CHAIN CONTROL

4.1.1 Licence costs

The protocol requires licensing of the supply chain, including manufacturers of tobacco products, manufacturers of equipment, wholesalers and exporters/ importers. We understand that this would entail minimal additional costs for the UK because:

- ➢ tobacco manufacturers are already licensed;
- ➢ there are no manufacturers of equipment in the UK;
- ➢ there are no primary processors in the UK;
- ➢ wholesalers are vertically integrated with the tobacco manufacturers (the latter are licensed);
- ➢ exports and imports are mainly undertaken by the tobacco manufacturers (and a small number of importers of niche products – cigars, chewing tobacco, etc.) - therefore, the cost of licensing those is expected to be minimal.

According to the current version of the protocol licensing of retailers is not mandatory, but recommended "where practicable". Therefore, in this report, we estimate the cost of licensing retailers, but treat it as an additional cost, i.e. we do not add it to the total cost of the protocol.

If licensing of retailers is introduced, the only categories that would be affected are:
- ➢ retailers who will incur compliance costs (i.e. they will need to spend time filling in licence application forms); and
- ➢ government who will need to process these licence applications.

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Retailers

We expect that in the first year, the compliance costs are likely to be higher than in subsequent years. More specifically, we assume that every retailer selling tobacco products (i.e. supermarkets, convenience stores, pubs and newsagents) would need to spend some time (4-8 hours) to deal with the relevant paper work. In subsequent years, this application process will be more familiar and will take less time (2-4 hours)[29].

We estimate the retailers' compliance costs as:

Time x Number of affected retailers x Average hourly wage

The cost is estimated to be £6.1 - £12.3 million in the first year, followed by £3.1 - £6.1 million in subsequent years (Table 4).

Table 4. Compliance cost of licensing retailers

	Estimates
Number of affected UK retailers[30]	161,450
Admin time 1st year 2+ years	 4-8 hours 2-4 hours
Average wage in retail (per hour)[31]	£9.5
Total annual cost 1st year 2+ years	 £6.1 million - £12.3 million £3.1 million - £6.1 million

Source: our estimates based on the above mentioned data sources

In these calculations of costs we do not take into account the licence fee itself. This is because the licence fee, although a cost from retailers perspective, represents a transfer from retailers to government in the overall cost benefit framework. Although these fees do not affect the overall cost-benefit result, they may affect the distribution of 'gainers and losers', with retailers being disproportionately affected if the licence fees are set at a high level.

Government

The UK government is also expected to incur some costs associated with licensing of the supply chain. In order to process 161,430 licence applications per year, it will need to hire 75 -100 employees. Given that an average annual salary in public administration is c. £23,800[32], total wage bill associated with licensing will be between £1.8 million and £2.4 million. If other expenses are taken into account (office space, IT systems, etc.), the total cost is likely to increase by 50%. Therefore, we estimate that licensing of retailers would cost government between £2.7 million and £3.6 million per year.

Therefore, the total annual cost of licensing retailers is £9 million - £16 million in the first year and £6 million - £10 million in subsequent years.

29. These assumptions are consistent with those used in other Regulatory Impact Assessments (RIA) which incorporate compliance costs. See, for example, RIA of proposed changes to UK copyright law (http://www.ipo.gov.uk/londoneconomicsreport.pdf), page 29
30. This figure is based on information provided in the Regulatory Impact Assessment for the Health Bill 2009 (http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsLegislation/DH_093305)
31. Annual Survey of Hours and Earnings (ASHE) 2008, http://www.statistics.gov.uk/downloads/theme_labour/ASHE_2008/sic2007_tab4.5a.xls
32. Annual Survey of Hours and Earnings (ASHE) 2008

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4.1.2 Cost of tracking and tracing

The protocol requires each Party to establish a tracking and tracing system for all tobacco products and manufacturing equipment. This involves affixing "unique machine-scannable and human readable markings" to all master cases and cartons of cigarettes (manufactured or imported) and to pouches of HRT. These markings should contain information on date and place of manufacturing, information on first and subsequent purchasers and the intended market of retail sale. All this information is recorded, using scanning technology, at the time of first shipment and stored in a tracking and tracing database.

The system would allow authorities to track the movement of the product along the supply chain. During inspections or seizures, inspectors are able to scan the markings and to establish the origin of the product and to determine the last point at which the product was scanned. This provides investigators with a clear view on where the product was destined to go and at what point it was diverted from its intended route.

Tracking and tracing systems (or high-tech tax stamp systems with a potential for tracking and tracing) have been implemented in a number of jurisdictions, e.g. in California, Brazil, Turkey and by some manufacturers in the EU (PMI and JTI).

We rely on publicly available information on costs of tracking and tracing technologies to estimate the cost of implementing such a system in the UK. For that, we multiply the unit cost of tracking and tracing in California and Brazil by the number of cigarette packs and HRT pouches sold in the UK. These costs take into account:

➢ The cost of equipment needed for affixing tracking and tracing markings and for scanning these marking by manufacturers and wholesalers; and

➢ The cost of setting up and running a database which will store information required by the protocol and allow interrogation by relevant enforcement authorities.

The difference between the lower and the upper bounds arises from £/$ exchange rate volatility[33] (Table 5)

Table 5. Expected cost of tracking and tracing for the UK (based on SICPA technology)

	Cost per pack	**Expected UK cost (lower bound)** £ Million	**Expected UK cost (upper bound)** £ Million
California	$0.01[35]	£14.8	£16.9
Brazil	$0.017[36]	£27.8	£31.5

Source: our estimates based on "Technology and the fight against illicit tobacco trade", Framework Convention Alliance

33.   The lower bound is based on £/$=1.7 and the upper bound on £/$=1.5
34.   We recognise that other technologies (e.g. the one implemented by PMI) may have different unit costs, but we were unable to obtain information on costs of these alternative technologies.
35.   This is estimated as the annual cost of tracking and tracing ($9 million) divided by annual consumption of 1.2 billion packs (The use of technology to combat the illicit tobacco trade. Framework Convention Alliance. http://www.fctc.org/dmdocuments/INB-2_Factsheet_Use_of_ Technology2.pdf)
36.   The use of technology to combat the illicit tobacco trade. Framework Convention Alliance. http://www.fctc.org/dmdocuments/INB-2_Factsheet_Use_of_Technology2.pdf

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Other tracking and tracing technologies may potentially be cheaper. For example, PMI states that "the application of the codes to products packaging has a minimal impact on the manufacturing process … PMI estimates that the application of these product codes costs as little as US$0.0001 per mark."[37]

This is significantly lower than the SICPA cost; however, it is not clear whether this cost per mark takes into account the cost of maintaining the database. Given this uncertainty, we make a conservative assumption and rely on SICPA costs in our calculations.

From our discussions with SICPA technology experts, we understand that California has no domestic production. All tobacco products are imported, with markings being affixed in eight warehouses on the border. Therefore, the overall cost per pack is relatively low. Brazil, on the other hand, does not import tobacco products, but has multiple domestic producers and needs more equipment to implement tracking and tracing on the manufacturers' premises. Hence, the cost per pack is higher in Brazil. These two polar cases provide us with a lower and an upper bound for the cost of implementing the tracking and tracing **by all manufacturers** in the UK (£14.8 million and £31.5 million respectively).

However, when assessing the costs of the protocol, we need to take into account the fact that the UK has recently joined the EU Agreements with PMI and JTI. These two manufacturers will have to implement the tracking and tracing as part of these agreements, irrespective of the protocol. Hence, the cost of tracking and tracing *attributable to the protocol* should be reduced by 43% (the combined share of PMI and JTI in the UK) and is equal to £8.5 - £17.8 million per year.

4.1.3 Customer identification and verification

The protocol requires all participants of the supply chain (excluding final retailers) to conduct due diligence with respect to their purchasers. That should include customer identification (names, registration, bank account details), establishing whether the purchaser has a licence, and a description of the intended use and intended market of retail sale. They should also terminate business relations with blocked customers.

It appears that these requirements have already been implemented in the UK as part of the MoU and the EU agreements. The cigarettes are usually transported under recognised shipping terms directly to the intended retail market to prevent diversion en route.

Other measures implemented by the tobacco manufacturers in the UK include:

- "Know your customer" checks designed to ensure that the manufacturers only do business with legitimate entities which are compliant with all relevant laws.

- "Know your payment" policies designed to ensure that all payments are made from legitimate sources.

- Volume controls and monitoring designed to ensure that the supply of tobacco products to various markets around the world is consistent with legitimate consumer demand at the retail level.

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37.   Comments by Philip Morris International on the Public consultation paper in preparation of a legal proposal to combat counterfeit medicines for human use (2008) http://ec.europa.eu/enterprise/pharmaceuticals/counterf_par_trade/doc_publ_consult_200803/88_philip_morris_intl.pdf

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Given that these measures closely resemble the protocol requirements, we do not consider 'customer identification and verification' to be additional for the UK and, therefore, do not attempt to estimate its cost. We would like to emphasise, however, that if a similar analysis is done for a different market with no customer identification and verification in place, this element of the protocol should be considered as additional and its cost added to the overall cost of the protocol.

4.1.4 Record-keeping

All participants in the supply chain are required by the protocol to maintain complete and accurate records of all relevant transactions. If requested, they should supply the competent authorities with information on market volumes, trends, forecasts, details of shipments, intended shipping destinations, identity of purchasers, intended retail markets, etc.

When analysing these requirements, we note that they appear to be closely linked to the requirement of tracking and tracing. Indeed, if the tracking and tracing system is implemented, all records will be generated automatically and stored on the central database. Given that the costs of tracking and tracing are already taken into account, it does not seem appropriate at this stage to include additional costs for the record-keeping. If, however, the requirement of record keeping evolves so that it requires additional information, which is not part of the tracking and tracing database, one would need to assess the cost of supplying this information and add it to the total cost of the protocol.

4.2 ENFORCEMENT AND INTERNATIONAL COOPERATION

With the launch of *Tackling Tobacco Smuggling* strategy in 2000, the HMRC put considerable effort into tackling tobacco smuggling. It invested an additional £209 million over a three year period[38] to fund 1,000 additional front line and investigative staff. This was further enhanced by the deployment of a national network of scanners to detect high volume smuggling in freight containers.

It is not clear at this stage whether the HMRC/ UKBA would need to incur any additional costs if the UK ratifies the protocol and, if so, how much. Given that the HMRC already put significant effort and resources into tackling tobacco smuggling, including search of premises, confiscation and seizures, information sharing, assistance and cooperation, and other measures listed in the protocol under 'International cooperation and information sharing', one could argue that the protocol would not entail any additional spending for the UK government. Hence, our low bound estimate of the HMRC additional spending is zero.

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38.   This is equivalent to £70 million per annum

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On the other hand, some additional spending may be needed to assist low income countries in their effort to curb tobacco smuggling and to ensure global effectiveness of the protocol. A number of experts suggested to us that the success of the protocol is likely to depend on its geographic scope. The more countries ratify the protocol, the more likely it is to achieve its objectives. However, low income countries might struggle financially to implement the protocol without financial assistance from high income countries.

Given multiple uncertainties involved, we do not attempt to estimate precisely additional costs of international cooperation and enforcement the HMRC might incur if the protocol is ratified, but assume that up to £35 million may be spent per annum on additional enforcement and cooperation. This is equivalent to 50% of additional HMRC spending between 2000/01 and 2003/04, when the *Tackling Tobacco Smuggling* strategy was just launched. This may be invested in international technical, legal and administrative assistance, as well as spent on additional enforcement measures within the UK.

To summarise, we estimate the total cost of the protocol for the UK to be in the range between £9 million and £53 million annually (Table 6). This is equivalent to £0.2 billion - £1.1 billion in NPV terms over a 50 year period[39].

Table 6. Estimated annual costs of the protocol (in £ and $US)

	Manufacturers	Wholesalers	Retailers	Government
Tracking and tracing	£9 million - £18 million ($14 million - $28 million)			£0 - £35 m ($0 - $55 m)
Customer verification	Customer verification is already in place		Not applicable	
Record keeping	If tracking and tracing is implemented, record keeping should not require additional expenses		Not applicable	
Enforcement and international cooperation	Not applicable	Not applicable	Not applicable	
Total	£9 million - £53 million ($14 million - $83 million)			

Source: our estimates

In addition, if licensing of retailers is introduced in the UK, it would lead to an additional cost of £9 million - £16 million in the first year and £6 million - £10 million in subsequent years.

39. Assuming 3.5% discounting rate

CHAPTER 5

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BENEFITS OF THE PROTOCOL

In this chapter, we identify and quantify the following potential benefits of the protocol for the UK:

- savings to the national healthcare system;

- output gains due to longer productive life;

- output gains due to reductions in absenteeism; and

- years of life gained (or premature deaths averted).

Our estimated benefit ranges are wide because of many uncertainties involved, mainly relating to geographic scope of the protocol and its effectiveness. In this chapter, we explain where these benefits would come from and quantify them.

5.1 WHERE DO THE BENEFITS COME FROM?

If the protocol is implemented, it is expected that illicit tobacco products will be less available in the UK. Those who currently buy illicit tobacco products would need to pay significantly more to maintain their consumption at the current level.

Typically, when faced with higher prices, consumers tend to reduce their consumption. For tobacco products, the effect is expected to be threefold:

- some smokers will smoke less;

- others will stop smoking altogether; and

- smoking take up may also decline, increasing the number of non smokers.

There are clear health benefits for the second and third groups (i.e. former smokers and non-smokers) as their risks of developing smoking-related diseases, such as lung cancer and stroke, are significantly lower compared to smokers.

The benefits for the first group are less clear-cut. While some studies find a small positive impact on mortality risks[40], other studies find that those who reduce their consumption "smoke each cigarette more intensively and end up with the same amount of smoke exposure"[41]. Given that the evidence on changes in risks for this group is inconclusive, we make a conservative assumption that these risks do not change and that this group does not experience any significant health benefits.

40.　Godtfredsen, NS et al.(2002) "Smoking reduction, smoking cessation, and mortality: a 16-year Follow-up of 19,732 men and women from the Copenhagen Centre for prospective population studies" American Journal of Epidemiology 156: 994-1001
41.　West R. (2006) "Tobacco control: present and future." British Medical Bulletin 1-14

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5 BENEFITS OF THE PROTOCOL

In our analysis of benefits, we firstly estimate how many people would stop smoking and never start smoking due to the protocol. We then assess the implications for the national healthcare system and output produced (as people would have longer and healthier productive lives). Finally, we estimate how many premature deaths will be averted (or years of life gained).

Figure 8 summarises our approach to measuring the impact of the protocol.

Figure 8. Measuring the impact of the protocol

Source: our diagram

COST BENEFIT ANALYSIS OF THE FCTC PROTOCOL ON ILLICIT TRADE IN TOBACCO PRODUCTS

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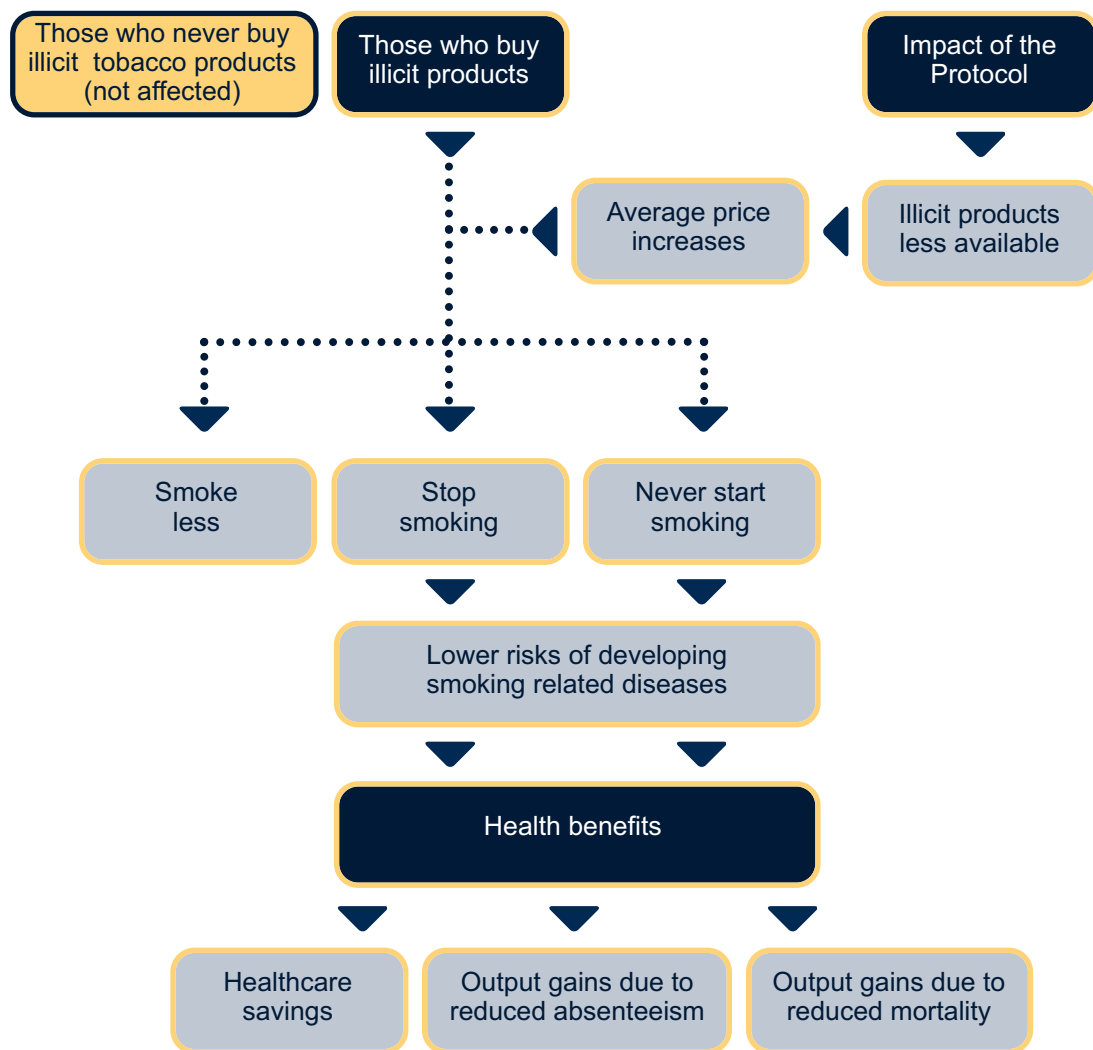
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5.1.1 Impact on price and consumption

For any reduction in the size of the illicit market (in volume terms), we can calculate the impact on (i) the average price paid by consumers and (ii) their consumption of tobacco products.

Impact on price

We estimate that those who currently buy illicit tobacco products pay, on average, £3.50 per pack of manufactured cigarettes or HRT equivalent[42]. These estimates take into account:

➤ Cigarettes represent 82% of smokers' consumption, and HRT represents 18%;

➤ the size of the combined illicit market: 20.2% (estimated in Chapter 2.1.1);

➤ the current share of illicit products in individual consumption: 61% (estimated in Chapter 2.2.2); and

➤ differences in prices of licit and illicit cigarettes and HRT.

If, as a result of the protocol, illicit tobacco products become less available, their share in smokers' consumption will decline and the average price paid by smokers will increase, approaching the price of legal tobacco products when the illicit market completely disappears (Figure 9).

Figure 9. Impact on average price for those who buy illicit products as illicit market shrinks
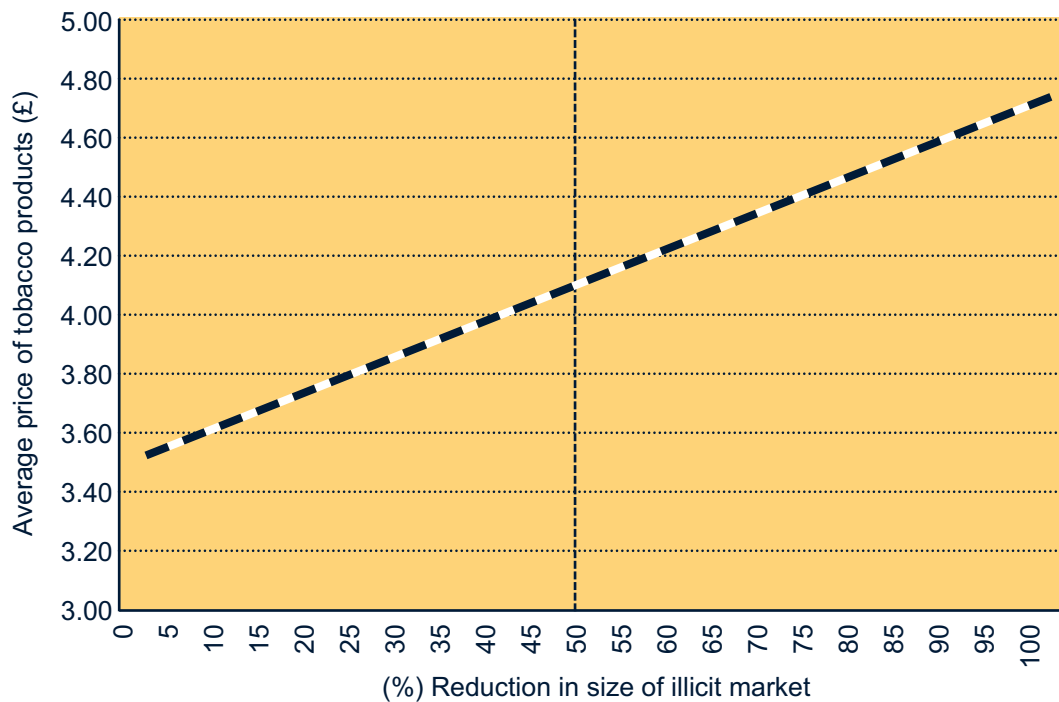
Source: our calculations

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42.   The average price takes into account both consumption of cigarettes and consumption of HRT and is calculated according to the following formula:
      Average price = (Share of illicit Products x Price of illicit products) + (Share of legal products x Price of legal products)

If, for example, the illicit market is reduced by 50% the average price paid by those who currently buy smuggled tobacco would increase from £3.50 to £4.11.

Price elasticity of demand

When faced with a higher price, consumers tend to reduce their consumption. The magnitude of this reduction depends on price elasticity of demand. For example, an elasticity of -0.3 implies that a 10% increase in price would lead to a 3% reduction in consumption.

There is a considerable body of literature estimating price elasticity of demand for tobacco products. Townsend (1996) summarises this literature for the UK and finds the average elasticity to be -0.5[43]. There is also evidence that price elasticity varies by gender, socio-economic class and age. For example, smokers from SEC 4 and 5 (semi-skilled and unskilled manual workers) have higher price elasticity of -0.6 and -0.9 respectively[44].

One should note that the overall price elasticity consists in this case of two elements:

- the smoking prevalence elasticity - i.e. how many people would stop smoking when price increases; and

- the per-smoker consumption elasticity - how many people would reduce their consumption.

Given that the link between reduced consumption of tobacco products and improvements in health is not well documented, we mainly focus on the prevalence elasticity, i.e. on how many people would stop smoking as a result of the protocol. Most studies find that the prevalence elasticity contributes 50% - 75% to the total price elasticity[45].

Moreover, in our analysis, we focus on *long-run* elasticities, which incorporate two effects: (i) a reduction in smoking prevalence due to current smokers' quitting and (ii) a reduction in prevalence due to lower take up of smoking. This means that, apart from affecting the current smokers, a price rise also affects potential future smokers, who are now less likely to take up smoking.

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43.   Townsend J. (1996) "Price and consumption of tobacco" British Medical Bulletin
44.   Townsend J, Roderick P, Cooper J. (1994)"Cigarette smoking by socioeconomic group, sex and age: effects of price, income and health publicity."
      BMJ 309: 923-927
45.   See the World Bank study, Grossman et al. (1993) and the US Surgeon General report (2004)

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Taking this information into account as well as our earlier finding that consumers of illicit tobacco products are more likely to belong to SEC 4 and 5 (see Chapter 2.2.2), we model two options:

- **Scenario 1**:

  Prevalence elasticity of -0.25 (lower bound) - this estimate is based on the total price elasticity of -0.5 and equal split between prevalence elasticity and per-smoker consumption elasticity.

- **Scenario 2**:

  Prevalence elasticity of -0.56 (upper bound) - this estimate is based on the average price elasticity for lower socio-economic groups (-0.75) and a 75%:25% split between prevalence and per-smoker consumption elasticity.

It is worth noting that Scenario 1 would provide us with conservative estimates of the protocol's benefits, because it applies average population elasticities to the consumer groups who are known to be more price sensitive[46].

5.1.2 Impact on smoking prevalence

By combining information on increases in average price with prevalence elasticities, we can calculate the impact of a reduction in the size of the illicit market on smoking prevalence in the UK (Figure 10).

Figure 10. Impact on smoking prevalence as illicit market shrinks
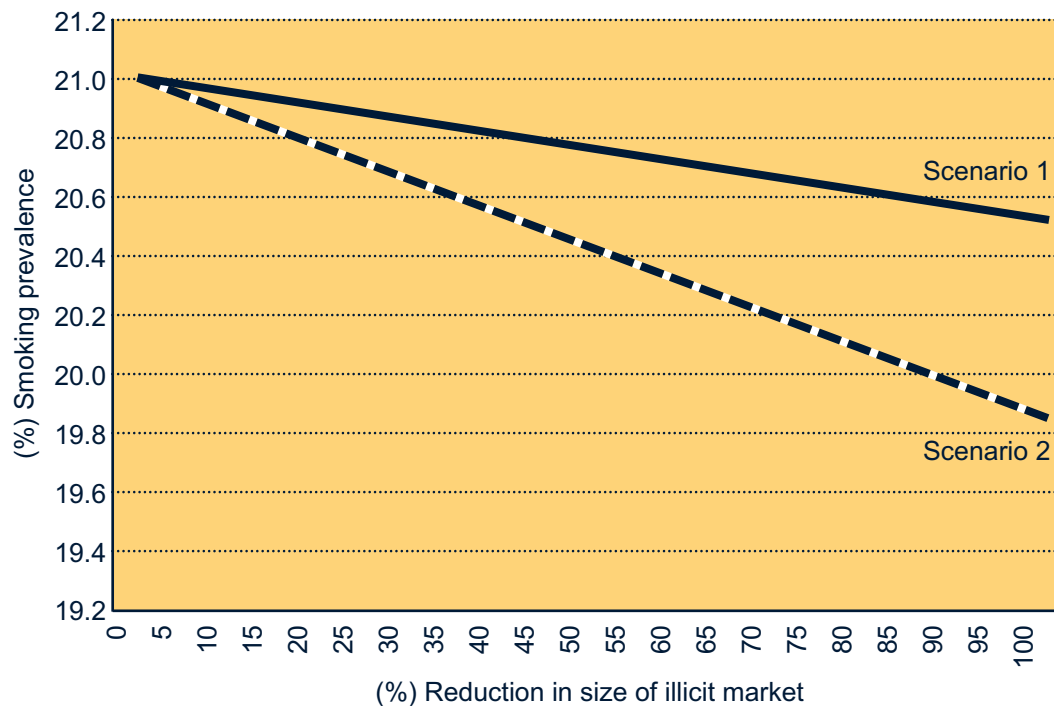
Source: our calculations

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46.   Smokers may potentially substitute illegal cigarettes with duty-paid HRT as it tends to be cheaper than duty-paid cigarettes. Therefore, ideally we would want to take into account relevant cross-price elasticity. Cullum and Pisarrides (2004 "The demand for tobacco products in the UK" HMRC) attempted to estimate it, but obtained "an unsatisfactory result" with the lower bound cross-price elasticity being negative.

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We find that:

- if the illicit market is reduced by 50%, smoking prevalence would decrease from 21.0%[47] to 20.4% - 20.8%; and
- if the illicit market is completely eliminated, smoking prevalence would decrease from 21.0% to 19.9% - 20.5%.

Although these changes in smoking prevalence may appear to be modest, one should bear in mind that two thirds of smokers in the UK do not buy illicit tobacco products and, therefore, will not be affected by the protocol. Moreover, some of those who buy illicit products may respond by reducing consumption, but not quitting. This, however, will not affect smoking prevalence (as these people are still smokers).

5.1.3 Impact on health

A reduction in smoking prevalence is associated with:
- a decrease in the number of people developing smoking-related diseases; and
- a decrease in mortality.

This is because ex-smokers and non smokers have lower risks of developing smoking-related diseases. As more people stop smoking (or do not start smoking) due to the protocol, fewer will develop smoking-related diseases and/or die prematurely.

Below, we review existing evidence on (i) relative risks of developing smoking-related diseases for ex-smokers by time since smoking cessation and (ii) on mortality rates for smokers and ex-smokers by age.

Evolution of relative risks for ex-smokers over time

When people stop smoking, their relative risk of developing smoking-related diseases (compared to smokers) does not fall instantaneously, but declines gradually. Some risks fall faster, others - slower[48]. For example, the risks of stroke and coronary heart disease fall to the same level as for non-smokers within 5 and 15 years[49] (respectively). The risk of developing lung cancer falls dramatically, but remains positive even 25 years after the last cigarette[50].

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47. This estimate is based on the General Household Survey (GHS) 2007
48. "The health consequences of smoking: A report of the surgeon general" (2004), the US Department of Health and Human Services
49. See for example Hurley S. (2005) "Short-term impact of smoking cessation on myocardial infarction and stroke hospitalizations and costs in Australia" MJA 183 (1): 13-17
50. Peto R., Darby S., Deo H., Silcocks P, Whiteley E and Doll R. (2000) "Smoking, smoking cessation, and lung cancer in the UK since 1950: combination of national statistics with two case-control studies", BMJ: 321: 323-329

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There is a huge and complex literature that analyses relative risks by disease. However, it is also possible to analyse the problem at a more aggregated level. We follow the approach adopted in Rasmussen at al. (2005)[51] and assume that the aggregated risk declines linearly for 15 years and stabilises afterwards.

There seems to be a consensus that "after 10 to 15 years of abstinence, risk of all-cause **mortality** returns nearly to that of persons who never smoked."[52] The relative risk of **morbidity** (ill health), however, may remain positive even 15 years since cessation.

We consider two possibilities for the aggregate risk evolution (Figure 11).

➢ **Low risk** - the risk declines linearly over 15 years to that of non-smokers, i.e. no additional risk after 15 years; and

➢ **High risk** - the risk declines linearly over 15 years, but remains 25% higher than for non-smokers.

The latter is a conservative assumption as it implies that the relative risk for ex-smokers never falls below 25%.

In each case, the risks for smokers are normalised to be 100% and for non-smokers - 0.

Figure 11. Scenarios of risk evolution for ex-smokers

Source: our assumption

Legend:
— Smoker
—·— Ex-smoker high scenario
······ Ex-smoker low scenario
– – – Never-smoker

X-axis: Years after cessation
Y-axis: (%) Risk of developing a smoking related-disease compared to risk of a smoker
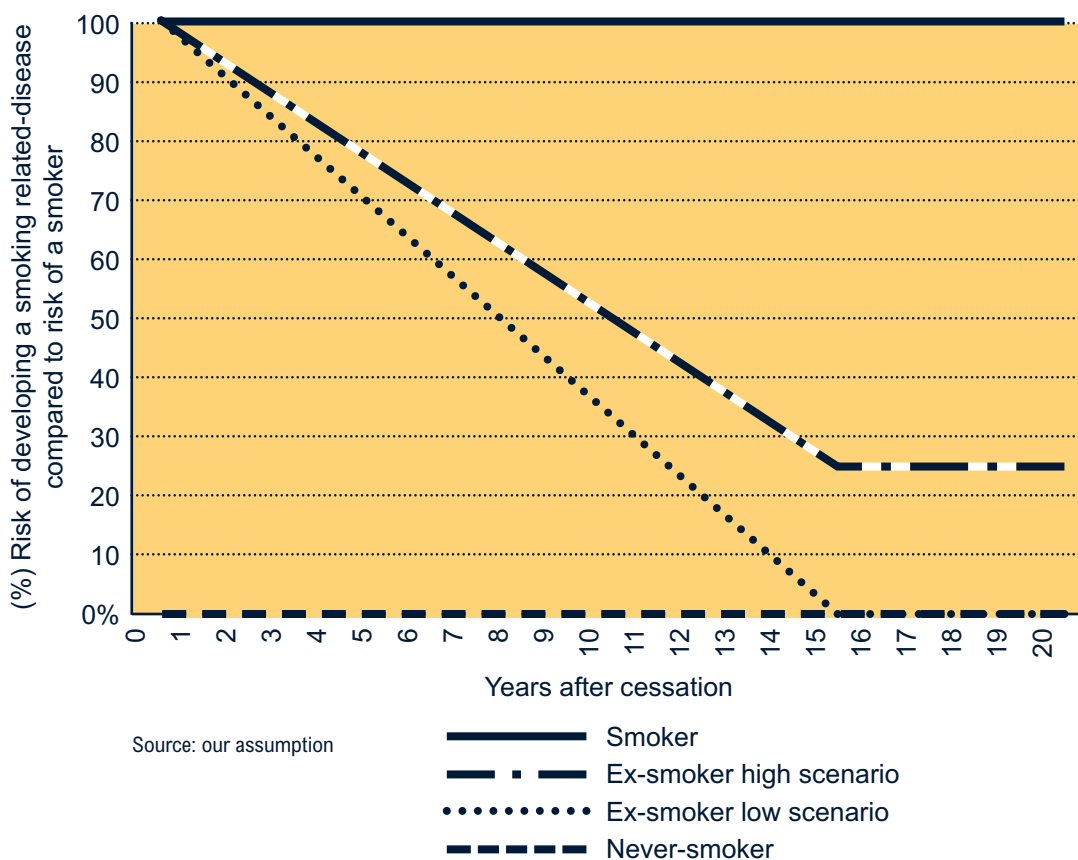
51. Rasmussen S, Prescott E, Sorensen T and Sogaard J. (2005) "The total lifetime health cost savings of smoking cessation to society". European Journal of Public Health 15(6): 601-606

52. "The Health benefits of smoking cessation: A report of the surgeon general" (1990), the US Department of Health and Human Services

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These risk profiles suggest that the benefits of the protocol (e.g. NHS savings) are likely to increase gradually. In the first few years, the relative risks for ex-smokers are still high and the corresponding health benefits are low. However, as the risks fall, we would expect the benefits to increase.

Mortality by age and smoking status

In order to estimate the number of deaths averted as a result of the protocol and corresponding increase in output (if these people are younger than 60 and are still working), we rely on age-adjusted mortality figures for smokers and ex-smokers estimated by Doll et al. (1994) (presented in Table 7). These figures are used by the National Institute for Health and Clinical Excellence (NICE) and in other smoking related research[53].

These mortality figures allow us to estimate the number of annual smoking-related deaths which will occur as a result of smoking prevalence rates in 2007 (for both smokers and former smokers[54]). This is lower than the current annual UK mortality rates from smoking as there is a lag of 15-20 years between tobacco consumption and mortality, and mortality is currently declining because of falling tobacco consumption over the past 20 years.

Table 7. Mortality by age and smoking status per 1,000

Age	Current smoker	Former smoker	Non smoker
35-44	2.8	2	1.6
45-54	8.1	4.9	4
55-64	20.3	13.4	9.5
65-74	47	31.6	23.7
75-84	106	77.3	67.4
85+	218.7	179.7	168.6

Source: NICE, from Doll et al. (1994)

Given that the protocol is expected to reduce the number of smokers and increase the number of ex-smokers and non-smokers, the number of smoking-related deaths is expected to decline.

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53. See for example Raikou M, McGuire A. (2008) "Cost-effectiveness of a mass media campaign and a point of sale intervention to prevent the uptake of smoking in children and young people: Economic modelling report." LSE Health, London School of Economics and Political Science.

54. We adjust the numbers of dead to account for the fact that some deaths among smokers and former smokers may be caused by non-smoking related reasons. This is done by applying relevant non-smoker mortality rates.

5.2 IMPLICATIONS OF BETTER HEALTH

The benefits of a reduction in smoking prevalence are wide-ranging. They include:

- **Reduced healthcare costs** - In 2007, £2.7 billion was spent by the NHS on treatment of smoking-related diseases in England and Wales[55]. As the risk of developing smoking-related diseases falls (due to lower smoking prevalence and decreasing risks for ex-smokers), so would the cost of treatment.

- **Output gains due to reduced mortality** - The fact that people live longer implies that they will have a higher probability of surviving and being in work until the average age of retirement. Therefore, a reduction in smoking prevalence would result in output gains due to reduced mortality.

- **Reduced absenteeism** - Smokers are found to be more prone to absenteeism compared to non-smokers[56]. As more people stop smoking, the output would increase due to reduced absenteeism.

- **Years of life gained** - the fact that people live longer (healthier) lives is in itself a benefit for these individuals and society as a whole.

There may be other benefits, which we do not take into account in this study (e.g. reduced passive smoking).

We express the first three categories of benefits in monetary terms. The fourth category, years of life gained, can also be monetised. This, however, requires placing a monetary value on human life.

Although a number of academic studies have attempted to estimate the value of a statistical life[57], and some of these estimates have been used by government departments in the UK for policy evaluations (e.g. Department for Transport), placing a monetary value on human life may present some problems in an international context. Existing estimates vary greatly, with values ranging between £0.7 million and $20.8 million[58]. Given this uncertainty, we choose not to express the years of life gained in monetary terms. In consequence the calculation of benefits is conservative and it should be noted that the overall benefits would be significantly higher under all the scenarios if a monetary value for life years gained were included.

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55. See "Beyond smoking kills: Protecting children, reducing inequalities". This figure includes hospital admissions, outpatient attendance, GP consultations, practice nurse consultations and prescriptions. Note that Allender et al ("The burden of smoking-related ill health in the United Kingdom" Tobacco Control online, 2009) states a higher figure (£4.4 billion). We consider the BSK data to be more accurate as it uses more recent data sources.
56. According to the NICE statistics, smokers spend more time off sick compared to non-smokers (33 extra hours per year). http://www.nice.org.uk/nicemedia/pdf/PHI5SimplifiedBusinessCase.htm Note that McGuire et al (2009) "An economic analysis of the costs of employee smoking borne by employers", LSE, uses a lower figure (1.77 days), which represents an average across a number of estimates (some of those are not UK specific). We consider the NICE estimates to be more reliable as they are UK-specific.
57. See for example Viscusi K. and Aldy J. (2003) "The value of a statistical life: a critical review of market estimates throughout the world", The Journal of Risk and Uncertainty, 27:1, 5-76 for a comprehensive review of this literature.
58. Ibid, p. 21

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5.3 ESTIMATING THE BENEFITS

Our central estimates of economic benefits resulting from reduced tobacco smuggling are presented in Figure 12 below (while the modelling details are presented in Annexe 1). For any reduction in the size of the illicit market, we estimate (i) healthcare savings, (ii) output gains due to reduced mortality and (iii) output gains due to reduced absenteeism.

Figure 12. Benefits of the protocol in NPV terms (central estimate)
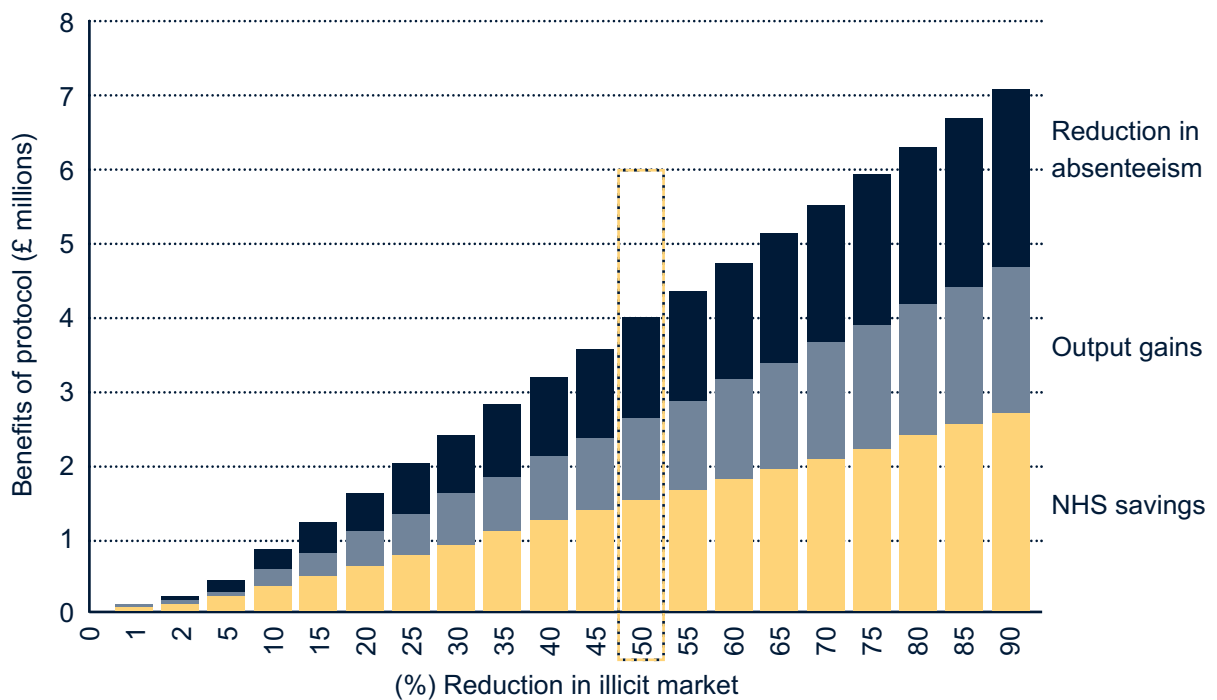
Source: our calculations. See Annex 2 tables 13, 14, 15 and 16 for details.

For example, if the illicit market is reduced by 50%:

● Healthcare savings are estimated to range between £0.7 billion and £2.2 billion, with a central estimate of £1.5 billion;

● Output gains due to reduced mortality - £0.7 billion - £1.6 billion (central estimate - £1.1 billion); and

● Output gains due to reduced absenteeism - £0.8 billion - £1.9 billion (central estimate - £1.3 billion[59]).

59.   See Annexe 2 for more details

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These figures provide the low and upper bound for the estimated benefits. The lower bound is based on the most conservative assumptions, i.e. demand elasticity of -0.25 and high relative risk for ex-smokers. The upper bound is based on more 'optimistic' assumptions of higher demand elasticity (-0.56) and lower relative risks for ex-smokers.

We also estimate the number of deaths averted as a result of the protocol. Only c. 71,000 people a year (both smokers and ex-smokers) are likely to die in the future from smoking-related diseases in the UK as a result of current smoking prevalence. Current annual death rates are higher, but this is due to higher past smoking prevalence rates[60]. We combine the reductions in smoking prevalence (because some people would stop smoking and others would not take up smoking) with mortality rates by smoking status (see Table 7) and estimate the number of deaths averted by the protocol. For example, we find that:

➣ If the illicit market is reduced by 60%, between 350 and 788 deaths will be averted annually, with the central estimate of 569.

➣ If the illicit market is reduced by 80%, the average number of deaths averted is between 467 and 1051 annually (central estimate - 759)[61].

We note that these estimates are lower than in West et al. (2008), where the number of averted deaths is calculated as a 5% reduction in the total number of smoking-related deaths[62]. We believe that this difference in estimates arises for three main reasons:

● Our starting point - the number of smoking-related deaths as a result of 2007 prevalence rates is lower (71,000 vs. 80,000)

● We make a conservative assumption that the number of smoking-related deaths is affected by changes in smoking prevalence (i.e. by quitting and not taking up), but not by changes in consumption.

● In West et al. (2008), no adjustment is made for the fact that mortality rates for ex-smokers are higher than those for non-smokers. Therefore, the number of deaths averted may not be linearly related to a reduction in consumption, but is likely to depend on whether this reduction arises from smokers reducing the amount they smoke, giving up altogether, or from young people not taking up smoking in the first place (or from a combination of all three factors).

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60. This figure is based on the number of deaths by age (http://www.statistics.gov.uk/STATBASE/Expodata/Spreadsheets/D9543.xls) and mortality
       rates by smoking status (http://www.nice.org.uk/nicemedia/pdf/PH14economicmodellingreport.pdf)
61. See Annexe 2 for more details
62. This is because consumption is expected to fall by 5% change if the illicit market is completely eliminated

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Figure 13. Number of deaths averted as a result of the Protocol (annually)
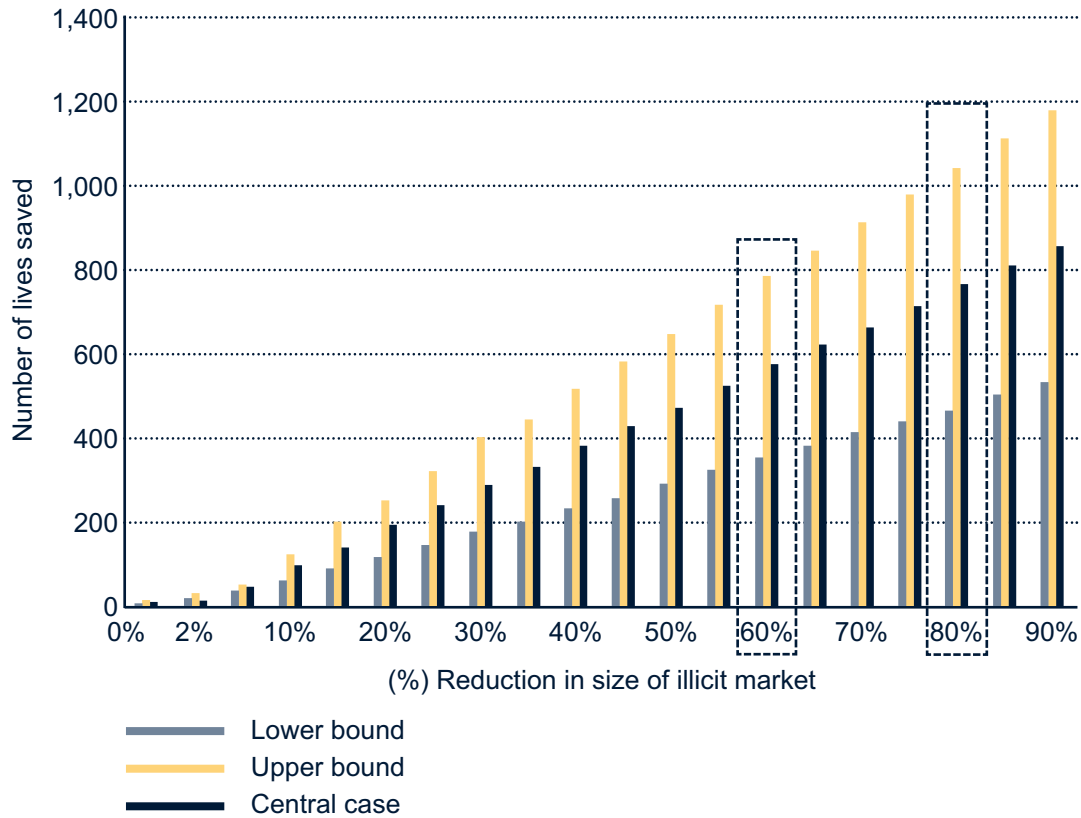
Source: our calculations

Apart from being sensitive to the assumptions made (on demand elasticity, and relative risks), our estimates of benefits are obviously sensitive to the protocol's effectiveness, i.e. to a specific reduction in illicit trade achieved as a result of the protocol. Below, we discuss what might affect the protocol's effectiveness.

CHAPTER 6

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EFFECTIVENESS OF THE PROTOCOL

It is difficult at this stage to predict the impact of the protocol on the size of the illicit tobacco market in the UK. This is because the protocol has not yet been implemented and, therefore, we are unable to measure its impact directly. But, more importantly, there are uncertainties involved in its geographic scope, i.e. how many Parties would ratify it. It appears that geographic scope is likely to be one of the most critical factors influencing the protocol's effectiveness. Given that most illicit cigarettes currently sold in the UK are produced in Eastern Europe, Russia and China, the effectiveness of the protocol will largely depend on whether these countries would sign up to it.

In this chapter, we review available evidence on effectiveness of various anti-smuggling measures implemented in different countries. Most of these measures (i.e. tracking and tracing, supply chain controls, enforcement and international cooperation) are part of the protocol. Therefore, this evidence is directly relevant.

At this stage we do not know how many Parties would ratify the protocol. Therefore, we consider three scenarios, which capture the essence of the problem, i.e. that the protocol is likely to be more effective if it is ratified by the countries of origin of counterfeit and 'cheap whites'.

6.1.1 Review of existing evidence

In this chapter we review the evidence on anti-smuggling measures implemented in the UK, Spain, Italy and California. These measures include:

- the tracking and tracing in California and more recently in continental Europe;

- tighter supply chain controls - in the UK, Italy and Spain;

- stronger enforcement and international cooperation - in the UK and Spain.

All these measures proved to be highly effective, reducing the size of illicit markets by 35% - 87%.

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UK

Anti-smuggling measures implemented in the UK have been discussed earlier (in Chapter 2.1.1). To summarise, these included:

- The HMRC 'Tackling tobacco smuggling' strategy, including investing additional £209 million to fund extra 1,000 front line and investigative staff (2000),

- The House of Commons Health Select Committee report (2000) and the Committee of Public Accounts "Tobacco smuggling" report (2002/03), which were effective at influencing the tobacco companies' behaviour and tackling tobacco smuggling.

- Memoranda of Understanding - agreements with the tobacco manufacturers to control the supply chain (2002 - 2003);

- Changes to the legislation to ensure that it is tobacco manufacturers' legal duty not to facilitate smuggling. Those who do not take sufficient steps to control the supply chain are subject to fines up to £5 million (2006).

These measures proved to be effective, reducing illicit cigarette trade from 20% in 2001/02 to 13% in 2006/07 - a reduction of 35%.

Spain

Spain provides another good example of effective measures against tobacco smuggling. The Spanish government increased its investment tenfold - from €4 million in 1993-96 to almost €40 million in 1996-2000[63]. These resources were spent on a range of measures, including intelligence, customs activity in border areas and international cooperation, both within Europe and with US authorities (as American brands were a key source of contraband in Spain). Spain also collaborated with OLAF to prevent cigarettes illegally entering the country from Gibraltar and Andorra.

As a result of all these measures, the market share of smuggled cigarettes fell from 16% to 2% (a 87.5% reduction in the size of illicit market). Tax revenues rose from €2,300 million to €5,200 million, which is equivalent to €68 in tax revenues for every € spent on anti-smuggling activities.

Italy

As in Spain, American brands (particularly, Marlboro) dominated illicit tobacco trade in Italy and tobacco manufacturers were believed to be complicit in smuggling. In 2000, the European Community (EC) started a lawsuit against Phillip Morris International(PMI), R.J. Reynolds and Japan Tobacco, accusing the companies of cigarette smuggling, laundering the proceeds of narcotics trafficking and price fixing[64]. In 2001, ten EU countries led by Italy joined the lawsuit.

63.   Joossens L. and Raw M. (2008) "Progress in combating cigarette smuggling: controlling the supply chain." Tobacco Control 2008 17: 399-404
64.   United States District Court "European Community complaint against Philip Morris, R.J. Reynolds and Japan Tobacco", Eastern District of New York, New York, 3 November 2000

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In 2004, this lawsuit against PMI was dropped in exchange for a legally binding Agreement, under which PMI agreed:

- to pay the EC $1 billion over 12 years; and

- to implement a range of measures to control its supply chain, including tracking and tracing initially at a master case level and later at a carton and pack level[65].

PMI has developed a bespoke tracking and tracing system and marked 200 million master cases with unique codes[66]. Since 2008, PMI has been introducing the tracking and tracing at a carton level in its most sensitive markets in Eastern Europe.

All these measures had a positive impact on the size of illicit trade in Italy, with cigarette smuggling falling from 15% in the 1990s to 1-2% in 2006[67].

California

In 2005 California introduced a high-tech tax stamp system with a potential for tracking and tracing (based on SICPA technology) that allowed enforcement officials to scan packs of cigarettes, to distinguish real tax stamps from fakes, to identify the company that applied the stamp and sold the cigarettes, and to get other information for tracking, tracing and enforcement[68]. In June 2007, the California tax collection agency estimated that annual cigarette tax evasion had declined by 37% (from $292 million to $182 million) due to increased enforcement and the new tax stamps[69]. It appears that the system was also effective against counterfeit products. Seizures of counterfeit products at retail locations declined, as did the percentage of retailers selling counterfeit products[70].

6.1.2 Geographic scope of the protocol and its effectiveness

The benefits of the protocol are likely to depend on its geographic scope. We consider three highly stylised scenarios which capture potential variation in the protocol's geographic scope and its expected effectiveness.

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65. A master case contains 10,000 cigarettes
66. Joossens L. and Raw M. (2008) "Progress in combating cigarette smuggling: controlling the supply chain." Tobacco Control 17: 399-404
67. Ibid
68. Joossens L. The use of technology to combat the illicit tobacco trade: coding, verification, tracking and tracing of tobacco products and tax stamps. Fact sheet INB-2 Geneva FCA 2008
69. California State Board of Equalization (27/06/2007) available from: http://www.boe.ca.gov/news/newsroom07.htm
70. Bureau of State Audits, California State Auditor, Board of Equalization, Report no 2005-034, 29 June 2006

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Scenario 1: EU only

In this scenario we assume that the protocol is ratified by the European Union only. We understand that this scenario is highly unlikely, indeed while a number has not yet been set for the protocol, for the WHO FCTC ratification by 40 Parties was required before the Treaty could enter into force. However, we still model this scenario in order to have the lower bound of the protocol's impact. This scenario is most 'pessimistic' because:

- The EU member states have already put significant efforts into tackling tobacco smuggling and made considerable progress. All EU member states have signed the Agreements with PMI and JTI, requiring these manufacturers to implement a range of supply control measures, including the tracking and tracing of their products. The HMRC cooperates with OLAF and enforcement agencies in member states to ensure that joint efforts are effective.

- The illicit market in the UK is currently dominated by counterfeit and non-UK brands ('cheap whites'), most of which are produced outside of the EU. While the EU efforts are now more focused on these segments of the illicit market, their effectiveness may be somewhat limited if the countries where counterfeit is produced do not cooperate.

Overall, if the protocol is ratified by the EU member states only, we expect the impact on the size of the illicit market in the UK to be relatively modest - between 5% and 15%. Most of this effect will come from a reduction in smuggling of genuine brands, with limited effect on counterfeit and 'cheap whites'.

We also assume that under this scenario no additional spending on international cooperation is required given that the level of cooperation within the EU is already high.

Scenario 2: EU + Countries - origin of counterfeit

If, on the other hand, the protocol is ratified by the EU and several other countries, where counterfeit and 'cheap whites' are currently being produced, the impact is likely to be more significant. Indeed, if UAE, Russia and China (countries-origin of cheap whites) implement the supply chain control and enforcement measures specified in the protocol, availability of counterfeit will be greatly reduced.

Over time, however, producers of counterfeit may adapt to these changes and relocate elsewhere (to countries that have not yet ratified the protocol), with a predictable adverse impact on the size of illicit trade. This scenario is in some ways analogous to recent developments in the UK, where smuggling of genuine UK brands have been greatly reduced, but partly replaced by counterfeit and cheap whites.

Overall, we expect this scenario to have a greater impact on the size of the illicit market in the UK - a reduction between 25% and 50%. In order to achieve these reductions the HMRC would need to work more closely with Parties outside the EU, increasing its spending on international cooperation (between zero and £35 million *additional* spending per annum). We also assume that higher spending would entail larger reductions in the size of the illicit market.

Scenario 3: Worldwide

This scenario assumes that the protocol is ratified and implemented by most countries in the world. This 'optimistic' scenario provides us with an upper bound estimate of the protocol's effectiveness. We assume that this scenario would produce a 60-80% reduction in the size of the illicit market in the UK. This is consistent with experiences of the countries which implemented the most successful anti-smuggling measures (e.g. Spain and Italy).

We summarised these three scenarios in Table 8.

Table 8. Geographic scope of the protocol - three scenarios

	Geographic scope	**Expected reduction in the size of illicit market**
Scenario 1	EU only	5% - 15%
Scenario 2	EU + countries-origin of counterfeit	25% - 50%
Scenario 3	Worldwide	60% - 80%

Source: our assumption

In Chapter 7, overleaf, we combine the costs and benefits and calculate the net benefits for the three scenarios of the protocol's effectiveness.

CHAPTER 7

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ESTIMATING THE NET BENEFITS

Our estimates of the net benefits of the protocol (in NPV terms) range between minus £0.1bn and plus £8.8bn. These are calculated by combining the benefits and the costs under different assumptions about geographic scope of the protocol, demand elasticity and relative risks (Figure 14).

The horizontal axis measures percentage reductions in the illicit market. The yellow boxes encompass the range of reductions which might follow from the protocol being enforced in (1) the EU only, (2) the EU and the main countries of origin of counterfeit and cheap white cigarettes, and (3) most of the world.

The vertical axis measures the *net present value* of benefits. The lines relate benefits to reductions in the illicit market on our most optimistic assumptions (top, dashed, line), most pessimistic (bottom, dotted, line) and central assumptions (the central, solid, line).

Figure 14. Net benefits of the protocol in NPV terms
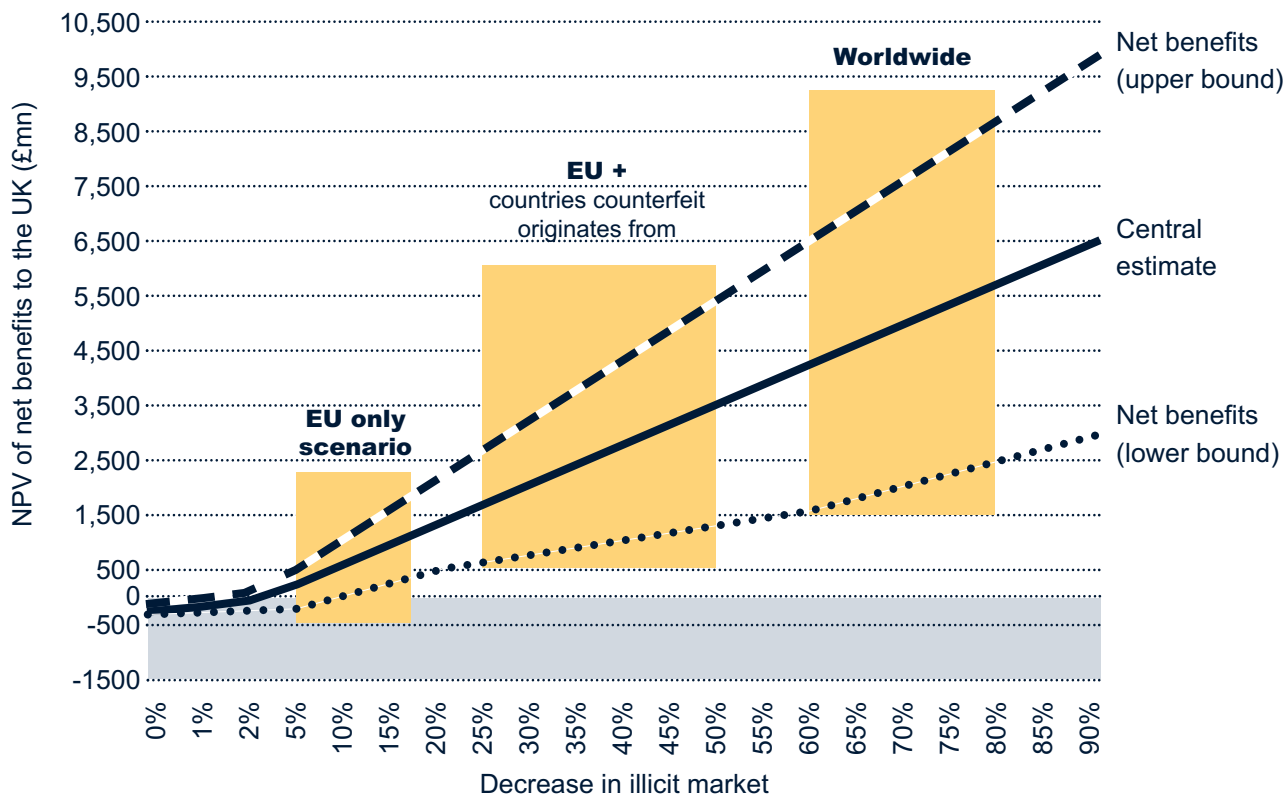
Source: our estimates. See Annex 2 table 17 for details.

For a given reduction in the size of the illicit market (say, 40%), these estimates are constructed as shown in Table 9.

Table 9. Calculating the net benefits in NPV terms for 40% reduction in illicit trade

	Lower bound £ Billion	Central case £ Billion	Upper bound £ Billion
Costs	**£0.2**	**£0.4**	**£0.7**
Benefits, of those	**£1.8**	**£3.1**	**£4.5**
Healthcare savings	£0.6	£1.2	£1.8
Output gains due to reduced mortality	£0.6	£0.9	£1.2
Output gains due to reduced absenteeism	£0.7	£1.1	£1.5
Net benefits[71]	**£1.1**	**£2.7**	**£4.3**

Source: own estimates

As one would expect, the benefits are significantly higher under the scenarios 2 and 3 than under the 'EU only' scenario.

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71.   It is worth noting that in order to calculate the lower bound of net benefits; we subtract the upper bound estimate of costs from the lower bound estimate of benefits. And for the upper bound net benefits, visa versa, we subtract the lower bound of costs from the upper bound of benefits.

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7 ESTIMATING THE NET BENEFITS

Scenario 1: EU only

As discussed in Chapter 6.1.2, if the protocol is ratified by the EU member states only, its effect on the UK is expected to be relatively limited, with a reduction in the size of the illicit market between 5% and 15%. We find that this scenario results in small positive net benefits, with the central estimates varying between £0.1 billion (for 5% reduction) and £0.9 billion (for 15% reduction in the size of the illicit market).

Scenario 2: EU + Countries - origin of counterfeit

If other Parties join the EU and ratify the protocol, its expected effectiveness is likely to be higher than under the previous scenario and that the illicit market will be reduced by 25%-50%. In this case, the central estimates of the net benefits vary between £1.6 billion for 25% reduction in the size of the illicit market and £3.4 billion for a 50% reduction in the size of illicit market.

Overall, this scenario is likely to lead to significant positive net benefits (except under the most conservative assumptions when the net benefits are lower – under £1 billion in NPV terms).

Scenario 3: Worldwide

Under this scenario, the net benefits of the protocol are always positive and large. The central estimates in this case range between £4.1 billion for 60% reduction in the size of the illicit market and £5.7 billion for 80% reduction.

Evolution of the protocol

One should bear in mind that these scenarios are highly stylised and, therefore, should be interpreted with caution. Although our estimates of net benefits for the 'EU only' scenario are relatively small, this scenario does not take into account potential evolution of the protocol over time. Indeed, one can think of a 'hybrid scenario' in which the protocol is initially ratified by the EU member states only, with other countries joining a few years later. In this case, limited initial benefits will be followed by higher benefits in later years, with overall results being NPV positive.

CHAPTER 8

SUMMARY AND CONCLUSIONS

This report has assessed the likely costs and benefits from a UK perspective of implementing the proposed FCTC protocol. We find that under almost all plausible scenarios the benefits of the protocol are likely to exceed the costs even when only considering benefits accruing to the UK. Our central estimate of the monetary net benefits to the UK (assuming very wide international take up of the protocol) is £5.7 billion ($8.9 billion) in Net Present Value terms plus 760 premature deaths averted annually. Even on the most pessimistic assumptions benefits are likely to outweigh costs, if only marginally.

The calculations for other countries will differ. The UK is characterised by quite a significant illicit market, most legal consumption being of domestically produced cigarettes and already significant action by government and manufacturers. Where there is currently less action by government and manufacturers, additional costs may be higher than will be the case in the UK. Conversely benefits are also likely to be higher.

Costs

We estimate that the costs of the protocol for the UK would range between £9 million and £53 million annually ($14 million - $83 million). This is equivalent to £0.2 billion - £1.1 billion ($0.3 billion - $1.7 billion) in NPV terms over a 50 year period. A large proportion of this is down to employment costs, which will vary significantly country by country, so these costs should not be assumed to be directly transferable to other countries.

Effectiveness of the protocol

The effectiveness of the protocol is likely to depend on its geographic scope:

- If the protocol is ratified and implemented by the EU member states which are Parties to the WHO FCTC only, it would help to curb smuggling of genuine UK brands, but might have limited impact on counterfeit and 'cheap whites'. This is the base case because if the UK ratifies the protocol it will be as part of the EU.

- If, on the other hand, most countries in the world which are Parties to the FCTC ratify and implement the protocol, it is expected to be highly effective.

- Finally, if the protocol is ratified and implemented by the EU and a few other Parties to the FCTC, where counterfeit and cheap whites are currently being produced, the impact initially is likely to be significant. However, over time the effectiveness of the protocol may go down because producers of counterfeit may 'relocate' to areas not covered by the protocol.

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8 SUMMARY AND CONCLUSIONS

Benefits

As cheap cigarettes and HRT become less available, those who currently buy illicit tobacco products would face higher prices and, consequently, reduce their consumption or stop smoking altogether.

Lower smoking prevalence would generate a number of benefits, such as:

- Reduced healthcare costs.

- Output gains due to reduced mortality.

- Reduced absenteeism.

- Years of life gained.

We put monetary values on the first three of these. We treat years of life gained separately. Overall, we find that the benefits of the protocol outweigh its costs for all three scenarios of the protocol's effectiveness.

Specifically, we find that:

- The 'EU only' scenario leads to small positive net benefits, with the central estimates varying between £0.1 billion ($0.16 billion) for 5% reduction and £0.9 billion ($1.4 billion) for 15% reduction in the size of the illicit market;

- For the 'EU and other countries' scenario the central estimates of the net benefits vary between £1.6 billion ($2.5 billion) and £3.4 billion ($5.3 billion) for 25% and 50% reduction in the size of illicit market respectively; and

- The 'worldwide' scenario always produces large net benefits - the central estimate is between £4.1 billion and £5.7 billion ($6.4 billion - $8.9 billion).

One should bear in mind that our scenarios of the protocol's effectiveness are highly stylised and, therefore, should be interpreted with caution. Although our estimates of the net benefits for the 'EU only' scenario are relatively small, this scenario does not take into account potential evolution of the protocol over time. Indeed, one can think of a 'hybrid scenario' in which the protocol is initially ratified by the EU member states which are Parties to the FCTC only, with other Parties joining a few years later. In this case, limited initial benefits will be followed by higher benefits in later years, with overall results being positive and significant (welfare improving).

We also estimate the impact of the protocol on the number of deaths because of smoking-related diseases and find that if the illicit market is reduced substantially (by 60% - 80%), between 569 and 759 deaths would be averted annually.

Wider application

Although our estimates are specific to the UK, this analysis could be easily replicated for other countries. Below, we summarise the steps that need to be taken for an assessment of the impact of the protocol on any Party ratifying the protocol.

Table 10. Summary of the analysis (by step)

	Steps

A: Costs	A1. Identify 'additional' elements of the protocol. For example, if all participants in the supply chain are already licensed, there is no need to consider this further.
	A2. For all additional elements, assess costs for:
	   - manufacturers and primary processors,
	   - commercial importers and exporters,
	   - wholesalers,
	   - brokers,
	   - distributors,
	   - manufacturers of equipment,
	   - retailers,
	   - Government

B: Benefits	B1. Collect information on current size of illicit market, the number of people buying illicit products and prices of licit and illicit products. Calculate the average price paid by those who buy illicit products.
	B2. Review assumptions on demand elasticities, relative risks for ex-smokers and mortality rates by age and smoking status as these may vary by country.
	B3. For any reduction in the size of illicit market (from 0% to 100%), assess the impact on:
	   - average price paid; and
	   - smoking prevalence (using smoking prevalence elasticity)
	B4. Using smoking prevalence data over time, split the population into smokers, non-smokers and ex-smokers (the latter groups should be also split by duration of smoking cessation).
	B5. Assess the 'starting point', i.e. current smoking-related healthcare costs, number of smoking-related deaths and absenteeism rates by smoking status.
	B6. For any reduction in the size of illicit market, model population 'movements' from smokers to ex-smokers and non-smokers over time.
	B7. Assess the impact of the population movements on healthcare costs, number of smoking-related deaths (by age) and absenteeism. Express these impacts in monetary terms (by applying relevant wage rates where applicable).

C: Net benefits	C1. Calculate the net benefits as total benefits minus total costs C2. Analyse sensitivity of the results, i.e. assess the differences in net benefits under most conservative and most optimistic assumptions (if applicable). C3. Conclusions and recommendations

Source: own estimates

ANNEXE 1

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MODELLING OF THE PROTOCOL'S BENEFITS

This Annexe provides details on our modelling of the protocol's benefits.

Modelling the impact on healthcare costs

The 2006-07 total costs of smoking to the NHS (in England and Wales) were estimated at £2.7bn (see Chapter 5.2). In the absence of similar information for Scotland and Northern Ireland, we apply 11.3% uplift to the NHS figure to estimate the cost to the UK population as a whole.

We analyse the yearly evolution of this cost with and without the protocol and compute the NPV of the healthcare savings due to the protocol's implementation.

To do so, we first split the population into different categories based on their smoking status. More specifically, we use the GHS data on smoking prevalence over time and split the population of ex-smokers into 15 categories by length of their abstinence (from year 1 to year 15 or more). Table 11 presents this split for 2007.

Table 11. Split of the population in 2007 by smoking status

Smoking category	Share
Current smoker	21%
ex-smoker year 1	1.50%
ex-smoker year 2	2.50%
ex-smoker year 3	1.50%
ex-smoker year 4	1.50%
ex-smoker year 5	0.50%
ex-smoker year 6	1.50%
ex-smoker year 7	0.50%
ex-smoker year 8	1.00%
ex-smoker year 9	1.00%
ex-smoker year 10	0.25%
ex-smoker year 11	0.25%
ex-smoker year 12	0.25%
ex-smoker year 13	0.25%
ex-smoker year 14	1.25%
ex-smoker year 15 +	11.25%
Non smoker	54%
Total	100.00%

Source: our estimates based on the GHS

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72. In reality, non-smokers' risk may be positive due to passive smoking.

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ANNEXE 1: MODELLING OF THE PROTOCOL'S BENEFITS

Using our two risk scenarios (see Figure 11), we allocate the total healthcare cost to each group. The cost for non-smokers is zero as their *relative* risk of developing smoking-related diseases is assumed to be zero[72].

As a result of the protocol, the average price of tobacco products would increase and the number of smokers would fall. Therefore, over time some people would 'migrate' from the 'current smoker' category to the ex-smoker category Year 1, then Year 2, and so on. The non-smoker group would also evolve (as some future smokers would not take up smoking[73]).

As the population split evolves, so does the corresponding healthcare cost. Given that the ex-smokers and non-smokers are less likely to develop smoking-related diseases, the overall healthcare cost is expected to fall.

Modelling output gains due to reduced mortality

Our starting point is the number of deaths (by age) in England and Wales in 2007[74]. Using the smoking prevalence figures (based on the GHS) and the mortality rates by age for smokers, ex-smokers and non-smokers (as presented in Table 7), we estimate the number of *smoking-related deaths* for smokers and ex-smokers by age[75] (Table 12).

Table 12. Number of smoking-related deaths by age

Age	Number of deaths (smokers)	Number of deaths (ex-smokers)
35-44	1,462	467
45-54	3,785	796
55-64	7,982	4,255
65-74	7,706	8,709
75-84	9,752	8,337
85+	5,865	4,332

Source: own estimates

73. This evolution is based on the underlying prevalence elasticities.
74. "Mortality statistics – deaths registered in 2007", the ONS http://www.statistics.gov.uk/STATBASE/Expodata/Spreadsheets/D9543.xls
75. When doing so, we adjust for the probability of dying from non-smoking related causes

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ANNEXE 1: MODELLING OF THE PROTOCOL'S BENEFITS

We then model the evolution of the population over time due to the protocol, i.e. a decline in the number of smokers and an increase in the number of ex-smokers and non-smokers (as in the previous model). That allows us to estimate the number of averted deaths (for each age group).

Assuming that 60 is the average age of retirement, we calculate the number of 'productive' years gained (for 'survivors' who are younger than 60)[76] and the corresponding increase in output (in NPV terms) using average annual wage (£24,538[77]) as a proxy for output. When doing so, we adjust the number of 'survivors', taking into account the probability of dying from non-smoking related causes.

Modelling output gains due to reduced absenteeism

NICE estimates that "a person who smokes will have 33 hours off sick more per year than a non-smoker"[78]. We assume that for ex-smokers this number does not fall to zero as soon as they stop smoking, but changes gradually according to the relative risks of developing a smoking-related illness[79] (as in Figure 11).

Using the 2007 population split shown in Table 11, we calculate the output lost due to smokers and ex-smokers taking time off sick in 2007. This is done by multiplying 33 hours by average hourly wage and by the number of smokers and ex-smokers (adjusted for the relative risks).

The dynamics of the model is similar to the one that estimates the healthcare savings.

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76. For example, for someone aged 40, who is predicted to survive as a result of the Protocol, there will be 20 years of productive life gained.
77. National statistics - Table 2.1a Weekly pay - Gross (£) - For all employee jobs: United Kingdom, 2008
78. http://www.nice.org.uk/nicemedia/pdf/PHI5SimplifiedBusinessCase.htm
79. This is supported by evidence presented in Sindelar J. et al (2005) "If smoking increases absences, does quitting reduce them?" Tobacco Control 14: 99-105. The paper also reports a short increase in absenteeism in the first three months, which is compensated by some decline in later months, with an overall effect in the first year being almost neutral.

ANNEXE 2

BENEFITS OF THE PROTOCOL

**Table 13.
Savings to the healthcare
system (in £ million)**

Reduction in the size of illicit market	Lower bound £ million	Central case £ million	Upper bound £ million
5%	£70	£146	£223
10%	£140	£293	£446
15%	£210	£440	£669
20%	£281	£586	£892
25%	£351	£733	£1,115
30%	£421	£880	£1,339
35%	£491	£1,027	£1,562
40%	£562	£1,173	£1,785
45%	£632	£1,320	£2,008
50%	£702	£1,467	£2,231
55%	£773	£1,613	£2,454
60%	£843	£1,760	£2,678
65%	£913	£1,907	£2,901
70%	£983	£2,054	£3,124
75%	£1,054	£2,200	£3,347
80%	£1,124	£2,347	£3,570
85%	£1,194	£2,494	£3,793
90%	£1,264	£2,641	£4,017

Source: own estimates.
Net Present Values using 3.5% discount rate.

**Table 14.
Output gains due to improved
longevity (in £ million)**

Reduction in the size of illicit market	Lower bound £ million	Central case £ million	Upper bound £ million
5%	£69	£112	£155
10%	£138	£224	£311
15%	£207	£337	£466
20%	£276	£449	£622
25%	£345	£561	£778
30%	£414	£674	£933
35%	£484	£786	£1,089
40%	£553	£899	£1,244
45%	£622	£1,011	£1,400
50%	£691	£1,123	£1,556
55%	£760	£1,236	£1,711
60%	£829	£1,348	£1,867
65%	£899	£1,461	£2,022
70%	£968	£1,573	£2,178
75%	£1,037	£1,685	£2,334
80%	£1,106	£1,798	£2,489
85%	£1,175	£1,910	£2,645
90%	£1,244	£2,022	£2,800

Source: own estimates.
Net Present Values using 3.5% discount rate.

**Table 15.
Output gains due to reduced
absenteeism (in £ million)**

Reduction in the size of illicit market	Lower bound £ million	Central case £ million	Upper bound £ million
5%	£83	£134	£185
10%	£166	£268	£370
15%	£249	£402	£555
20%	£332	£536	£740
25%	£415	£670	£925
30%	£498	£804	£1,110
35%	£581	£938	£1,296
40%	£664	£1,072	£1,481
45%	£747	£1,207	£1,666
50%	£830	£1,341	£1,851
55%	£914	£1,475	£2,036
60%	£997	£1,609	£2,221
65%	£1,080	£1,743	£2,407
70%	£1,163	£1,877	£2,592
75%	£1,246	£2,011	£2,777
80%	£1,329	£2,145	£2,962
85%	£1,412	£2,280	£3,147
90%	£1,495	£2,414	£3,332

Source: own estimates.
Net Present Values using 3.5% discount rate.

**Table 16.
Total monetary benefits of the
Protocol (in £million)**

Reduction in the size of illicit market	Lower bound £ million	Central case £ million	Upper bound £ million
5%	£222	£393	£563
10%	£445	£786	£1,127
15%	£667	£1,179	£1,691
20%	£890	£1,572	£2,255
25%	£1,112	£1,966	£2,819
30%	£1,335	£2,359	£3,383
35%	£1,557	£2,752	£3,947
40%	£1,780	£3,145	£4,511
45%	£2,002	£3,539	£5,075
50%	£2,225	£3,932	£5,639
55%	£2,447	£4,325	£6,203
60%	£2,670	£4,718	£6,767
65%	£2,892	£5,112	£7,331
70%	£3,115	£5,505	£7,895
75%	£3,337	£5,898	£8,459
80%	£3,560	£6,291	£9,023
85%	£3,783	£6,685	£9,587
90%	£4,005	£7,078	£10,150

Source: own estimates.
Net Present Values using 3.5% discount rate.

Table 17.
Total monetary net benefits of the Protocol (in £million)

Reduction in the size of illicit market	Lower bound £ million	Central case £ million	Upper bound £ million
5%	-£140	£115	£370
10%	£82	£508	£934
15%	£305	£902	£1,498
20%	£527	£1,295	£2,062
25%	£662	£1,644	£2,626
30%	£796	£1,993	£3,190
35%	£931	£2,342	£3,754
40%	£1,065	£2,692	£4,318
45%	£1,200	£3,041	£4,882
50%	£1,334	£3,390	£5,446
55%	£1,469	£3,739	£6,010
60%	£1,603	£4,088	£6,574
65%	£1,826	£4,482	£7,138
70%	£2,048	£4,875	£7,702
75%	£2,271	£5,268	£8,265
80%	£2,493	£5,661	£8,829
85%	£2,716	£6,055	£9,393
90%	£2,939	£6,448	£9,957

Source: own estimates.
Net Present Values using 3.5% discount rate.

Table 18.
Average number of lives saved per year

Reduction in the size of illicit market	Lower bound	Central case	Upper bound
5%	29	47	66
10%	58	95	131
15%	88	142	197
20%	117	190	263
25%	146	237	329
30%	175	285	394
35%	204	332	460
40%	234	380	526
45%	263	427	591
50%	292	475	657
55%	321	522	723
60%	350	569	788
65%	380	617	854
70%	409	664	920
75%	438	712	986
80%	467	759	1051
85%	496	807	1117
90%	526	854	1183

Source: own estimates.
Net Present Values using 3.5% discount rate.

ANNEXE 3

LIST OF THE ABBREVIATIONS USED IN THE REPORT

CBA - cost benefit analysis

FCTC - Framework Convention on Tobacco Control

GHS - General Household Survey

HMCE - HM Customs and Excise was merged with the Inland Revenue to become HM Revenue and Customs in 2005

HMRC - HM Revenue and Customs

HRT - hand rolling tobacco

JTI - Japan Tobacco International

MoU - Memorandum of Understanding

NHS - National Health Service

NICE - National Institute for Health and Clinical Excellence

NPV - Net Present Value

OLAF - the European Anti-Fraud Office

PMI - Philip Morris International

SEC - socio-economic class

TMA - Tobacco Manufacturers' Association

UKBA - UK Border Agency

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