Cost benefit and public finances analysis of the FCTC Protocol on Illicit Trade in Tobacco Products

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Synopsis

This paper presents the results of new analysis estimating the impact of the Illicit Trade Protocol (part of the World Health Organisation's Framework Convention on Tobacco Control) in terms of: (a) the economic costs and benefits which the Protocol gives rise to; and (b) its impact on the UK public finances. Additional costs arising from measures outlined in the protocol include the additional cost to manufacturers and wholesalers of tracking and tracing, and additional costs to government of introducing a licensing scheme for tobacco retailers, and increased international cooperation. Overall economic benefits of the protocol arise from a projected reduction in the size of the UK illicit tobacco market, which leads to an increase in the average prices paid by smokers who switch from illicit tobacco to legitimately purchased tobacco products. These average price increases are likely to lead to a reduction in smoking prevalence which has economic benefits in terms of reduced NHS costs, increased output from longer healthy working lives and reduced workplace absenteeism, and the value of extra lives saved. Although the protocol imposes additional licensing and enforcement costs on the government, the public finances also benefit from a reduction in the 'tax gap' (losses in tobacco duty and VAT resulting from the illicit market), increased income tax receipts from longer working lives and reduced absenteeism, and reduced spending on sickness and disability benefits.

The cost benefit analysis undertaken here suggests that under reasonable assumptions about the sensitivity of smokers to price increases and the effectiveness of the protocol in reducing the size of the UK illicit tobacco market, net economic benefits (expressed in Net Present Value terms over a 50-year timescale) range from around £1 billion to just over £9 billion (depending on the number of countries who ratify the Protocol). Meanwhile, the UK Exchequer should see net extra receipts of between £200 million and £1.4 billion per year, largely because of the reduction in the size of the tobacco 'tax gap'. The paper concludes that, as with other elements of anti-smuggling strategy introduced in the UK since the year 2000, the Illicit Trade Protocol is likely to be a highly effective – and cost-effective – measure.

Introduction

The illicit trade in tobacco is harmful to public health and to the public finances. It is harmful to public health because by giving smokers access to cheaper tobacco illicit tobacco increases the affordability of smoking and reduces the incentive to smokers to quit. It is harmful to the public finances because taxes are not paid on illicit tobacco. The UK anti-

smuggling strategy first introduced in 2000 has been highly cost-effective, as can be seen by the analysis set out below, and has contributed to the significant reductions in smoking prevalence that have occurred in the UK over the last decade.

At the fifth Conference of the Parties to the World Health Organisation Framework Convention on Tobacco Control in November 2012 the Parties adopted the Illicit Trade Protocol, a subsidiary treaty to the FCTC ("the protocol") and recommendations on Article 6 (taxation).

A report for ASH by the economist Paul Johnson (now director of the Institute for Fiscal Studies) made a detailed cost-benefit analysis (CBA) of the costs and benefits of a draft version of the protocol in 2009[1]. Further analysis was carried out which illustrated that in addition substantial benefits would accrue from increased excise tax revenues. This chapter revisits and updates these analyses in the light of more recent data on tobacco prices and consumption and the size of the illicit market in the UK, and the changes to the final version of the protocol compared with the 2009 draft version.

Cost-effectiveness of the current UK strategy to tackle illicit trade

An analysis of the current UK strategy to tackle the illicit trade in tobacco shows that it has been both effective and cost-effective. In 2000 when the Government launched its first comprehensive strategy to tackle the illicit trade one in five cigarettes smoked were illicit and the size of the illicit market was projected to rise to one in three within a few years without government action. [2] Since then the anti-smuggling strategy has been updated and improved a number of times, most recently in a refreshed UKBA and HMRC strategy in 2011. [3] [4] [5]In 2006 the strategy was reinforced by supply chain legislation making it a legal duty for manufacturers not to facilitate smuggling with fines up to £5 million if they fail to comply.[6]

The Government now spends around £94 million a year tackling smuggling including employing around 2,000 full-time equivalent staff working on detection, investigation and intelligence, and the deployment of 19 x-ray scanners at ports to identify illicit tobacco in shipments. [7]

This strategy has been highly effective and the illicit market for cigarettes, which was on a steep upward trajectory, has steadily fallen from a 21% market share in 2000-01[4] to 9% in 2010-11. The illicit market for hand-rolled tobacco has fallen from over 60% to around 38% (all figures mid-range estimates)[8]. I calculate that the decline in the illicit market share has resulted in additional revenue to the Exchequer (VAT plus excise tax) of approximately £1 billion a year compared to a situation in which the illicit market shares for tobacco products remained at their 2000-01 levels. This is a conservative assessment given that in 2000 the illicit market was on a steep upward trajectory. At an annual cost of under £100 million this is a gross return on investment of 10 to 1.

More still needs to be done. The VAT and excise tax losses associated with illicit tobacco are still significant at £1.86 billion compared to only £0.78 billion for beer and spirits and £0.15 billion for diesel.[8] The FCTC Illicit Trade Protocol has a major role to play in further reducing the global market for illicit tobacco. The current UK strategy to tackle the illicit trade

already includes many elements of the Protocol so the costs of implementation are relatively small. The greatest benefit to the UK will come from the implementation of the Protocol by other countries, in particular those which provide significant sources of illicit tobacco reaching the UK, for example, the former Soviet Union and China.

Methodology for the CBA

A cost benefit analysis (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*[9] and methods used across government in Regulatory Impact Assessments (RIAs). The CBA conducted here accounts for the *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 part of the protocol.

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 this evaluation I 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).

Supply chain control measures

Licensing costs

The protocol states that licenses must apply to enterprises involved in manufacturing or import/export of tobacco products and manufacturing equipment, and parties should "endeavour" to license enterprises involved in transport, retail of tobacco products and tobacco growing. Most aspects of licensing 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.

The only significant additional cost entailed by the licensing elements of the protocol is licensing of retailers, which is not currently implemented in the UK. The Scottish Government carried out an impact assessment of various options before introducing a tobacco retailer licensing scheme which was introduced in October 2011.[10] This is a low-cost licensing scheme which operates in conjunction with fixed penalty notices and the ability for the courts to impose banning orders. This scheme requires all tobacco retailers to be registered on one national register in order to sell tobacco. The costs to the industry of this scheme are minimal – limited to a one-off labour cost needed to fill in a form. Costs to the government include initial set-up costs of advertising and marketing to give retailers information about the necessity to comply with the scheme and the process to be undertaken, and also the cost of a database to hold national level information on retailers. Based on applying the estimates from the Scottish Government in a UK-wide context, total costs to the government are estimated at around £5m in the first year and no more than £1m per year on an ongoing basis[11].

Tracking and tracing and record-keeping

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.

An updated version of Paul Johnson's original 2009 estimate suggests that the cost of tracking and tracing measures attributable to the protocol should equal around £10 to £20 million per year in the UK. These costs would be borne by manufacturers and wholesalers.

The establishment of tracking and tracing systems also leads to automatic generation of records of all relevant transactions which will be stored on a central database – which is another requirement of the protocol. Hence the record-keeping requirement imposes no additional costs above and beyond those required for tracking and tracing.

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 market of retail sale. They should also terminate business relations with blocked customers.

Extensive customer identification and verification measures have already been implemented in the UK as a result of EU agreements and memoranda of understanding with the tobacco manufacturers, and so the protocol does not involve additional costs in this area.

Enforcement and international cooperation

Current spending by HMRC on anti-smuggling measures already includes considerable sums for detection, investigation and intelligence, which includes some information sharing and international cooperation. However, such international cooperation is made more difficult

by the lack of widespread international agreements for mutual legal assistance and administrative assistance.

The Illicit Trade Protocol would require negotiation of international agreements and support to assist other countries in implementing the protocol. However, on this work the UK would be operating as part of the EU so would not incur all these costs alone. The current amount the UK has to provide to the FCTC as its contribution to the running costs of the Treaty is $767,000 per year. It would not be unreasonable to assume a contribution of the same order once the protocol is ratified.

Based on this information I have estimated a lower bound of zero for additional spending on enforcement and international cooperation once the protocol is ratified, and an upper bound of £2 million per year. This would include the UK's contribution to the Meeting of the Parties once the protocol is ratified and staffing for international support. The amount of additional spending on enforcement and international cooperation should also reduce over time as part of it will account for legal work on international agreements (which would not be long-term but time-limited).

Overall costs

Table 1 below summarises my estimates of additional expenditure on the various components of the protocol.

Table 1. Estimated annual costs of the protocol (£)

<table>
<tr><th></th><th colspan="4">Costs to be incurred by:</th></tr>
<tr><th></th><th>Manufacturers</th><th>Wholesalers</th><th>Retailers</th><th>Government</th></tr>
<tr><td>Licensing</td><td colspan="2">Licensing already in place</td><td>Negligible additional costs</td><td>£5m (year 1), £1m (subsequent)</td></tr>
<tr><td>Tracking and tracing</td><td colspan="2">£10m - £20m</td><td>Not applicable</td><td>None</td></tr>
<tr><td>Customer verification</td><td colspan="2">Customer verification is already in place</td><td>Not applicable</td><td>None</td></tr>
<tr><td>Record keeping</td><td colspan="2">If tracking and tracing is implemented, record keeping should not require additional expenses</td><td>Not applicable</td><td>None</td></tr>
<tr><td>Enforcement and international cooperation</td><td>Not applicable</td><td>Not applicable</td><td>Not applicable</td><td>£0-£2m</td></tr>
<tr><td>TOTAL</td><td colspan="4">£15m-£27m (year 1)
£11m-£23m (subsequent years)</td></tr>
</table>

Source: author's estimates.

Benefits of the protocol

If the protocol is implemented it is expected that illicit 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.

The benefits of the protocol derive from the following:

- **Reduced healthcare costs** – in 2007, £2.7 billion was spent by the NHS on treatment of smoking-related diseases in England and Wales[12]. As the risk of developing smoking-related diseases falls (due to lower smoking prevalence and decreasing risks for ex-smokers), so does 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[13]. As more people stop smoking, output should increase due to reduced absenteeism.
- **Years of life gained** (or premature deaths averted). The UK Government uses a monetary equivalent value of around £1.1 million per life saved[14] and I use this estimate in the calculations here.

Each of these four aspects of the benefits of the protocol is estimated using a model of the relationship between smoking prevalence and the costs of smoking developed by Johnson (2009) and updated by myself for ASH more recently[15].

Price and consumption effects

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.

In this analysis we measure benefits for former smokers and non-smokers but not people who carry on smoking at a lower rate of consumption as the evidence on benefits for this group is inconclusive.

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

Currently, HMRC estimates that the illicit market comprises around 9 percent of total cigarette sales and 38 percent of hand-rolling tobacco (HRT) sales. Data from the Smoking Toolkit study suggests that the proportion of smokers using illicit tobacco products decreased from around 19% in 2007-08 to 4% in 2010-11[16,17]. 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[18]. The Smoking Toolkit study suggests that in 2010-11, cigarette smokers paid an average of £6.49 for 20 cigarettes purchased legitimately compared with £5.05 for 20 cigarettes purchased from illicit sources. For hand-rolling tobacco the corresponding figures were £3.14 for 20 legitimately purchased roll-ups and £1.81 for 20 illegally purchased roll-ups.

The increase in tobacco prices resulting from the reduction in the size of the illicit market should lead to a reduction in tobacco consumption. The magnitude of this reduction depends on the *price elasticity of demand* for tobacco products. For example, an elasticity of -0.7 implies that a 10% increase in price would lead to a 7% reduction in consumption.

In this study I focus on the *prevalence* elasticity – the reduction in the number of smokers as a result of a price increase. Most studies find that the prevalence elasticity is around 50% - 75% of the total price elasticity.[19]

In this paper I assume a price elasticity of -1.05 in line with the most recent calculations by HMRC[20]. I model two scenarios for the prevalence elasticity:

- **Scenario 1:** prevalence elasticity of -0.525 (lower bound) – assuming that the prevalence elasticity is 50% of the total price elasticity.
- **Scenario 2:** prevalence elasticity of -0.7875 (upper bound) – assuming that the prevalence elasticity is 75% of the total price elasticity.

It should be noted that there is evidence that consumers of illicit tobacco are more price-sensitive than the average consumer and so scenario 1 is likely to be an underestimate of the prevalence elasticity for the group who will be most affected by reduced availability of illicit tobacco products.

By combining information on increases in average price paid for tobacco products with prevalence elasticities, it is possible to calculate the impact of a reduction in the size of the illicit market on smoking prevalence in the UK. Estimates using the two scenarios above suggest that:

- If the size of the illicit market were reduced by 50%, UK smoking prevalence would decrease from 20%[21] to between 19.5% and 19.7%.
- If the illicit market were completely eliminated, UK smoking prevalence would decrease from 20% to between 19% and 19.3%

Public finance impacts of the protocol

Reduction in the size of the illicit market has the following impacts on the public finances:

- **Closing the tobacco 'tax gap'.** In the 2010/11 tax year, HMRC estimates that approximately £1.9 billion of tax was lost to the exchequer due to illicit sales of tobacco. This figure comprises £1.2 billion of lost revenue from taxes on cigarettes and just under £700 million of lost revenue from taxes on HRT[22].

- **Reduced healthcare costs** – as explained in the CBA section above.

- **Increased tax receipts from additional working life** – people of working age whose deaths are averted through giving up smoking (or not starting smoking) due to the tobacco tax increase will have longer working lives and hence pay more in income tax and National Insurance contributions (NICs) to the Exchequer. They will also spend at least some of their additional disposable income and hence pay more VAT.

- **Increased tax receipts from reduced absenteeism** – the extra output from reduced absenteeism among people who stop smoking (or never take up smoking) following the tax increase leads to increased income tax, NICs and VAT receipts.

- **Reduced spending on benefits related to sickness and disability** – smoking is associated with increased ill-health in the population as well as increased mortality. The ASH model estimates the reduction in expenditure on benefits for people of working age with long-standing health conditions (such as Employment and Support Allowance and Disability Living Allowance) which would result from a reduction in smoking caused by the tax increase.

- **Increased spending on benefits for retired people** – increased longevity as a result of reductions in smoking leads to some increased spending on state benefits for people over 65 – the State Retirement Pension and Pension Credit – because of reduced working-age mortality.

Note that increased tax receipts are *not* included as an economic benefit arising from the protocol in the CBA, because they are essentially a transfer from one section of the economy (smokers paying tobacco taxes, or workers paying income taxes) to the Exchequer. However, the additional income from people who have longer working lives and/or reduced workplace absenteeism because of giving up (or not starting) smoking is included in the CBA as an economic benefit.

Geographic scope of the protocol

The net benefits of the protocol are likely to depend on its geographic scope. Johnson (2009) modelled three scenarios for ratification of the treaty:

- **EU plus a limited number of other jurisdictions.** This is the most pessimistic scenario because the illicit market in the UK is currently dominated by counterfeit and non-UK brands ("cheap whites"), most of which are produced outside the EU. The protocol comes into force on the 90th day after it has been ratified by 40 Parties. This scenario envisages ratification by the majority of the EU Member States and a limited number of other Parties which do not currently contribute significantly to the problem in the UK. In this scenario, the reduction in the size of the illicit market in the UK would most likely be modest – between 5% and 15%.

- **EU plus major countries of origin of illicit.** If the protocol is ratified by 40 Parties including 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 United Arab Emirates, former Soviet Union countries and China (countries of origin of cheap whites and counterfeit) implement the supply chain control and enforcement measures specified in the protocol, availability of illicit tobacco will be reduced. Overall, this scenario is likely to have a greater impact on the size of the illicit market in the UK – a reduction of between 25% and 50%.

- **Worldwide.** This scenario assumes that the protocol is ratified and implemented by most countries in the world. This 'optimistic' scenario provides an upper bound estimate of the protocol's effectiveness. Johnson (2009) assumes that this scenario would produce a 60% to 80% reduction in the size of the illicit market in the UK, based on evidence from other countries which implemented the most successful anti-smuggling measures in recent years[23].

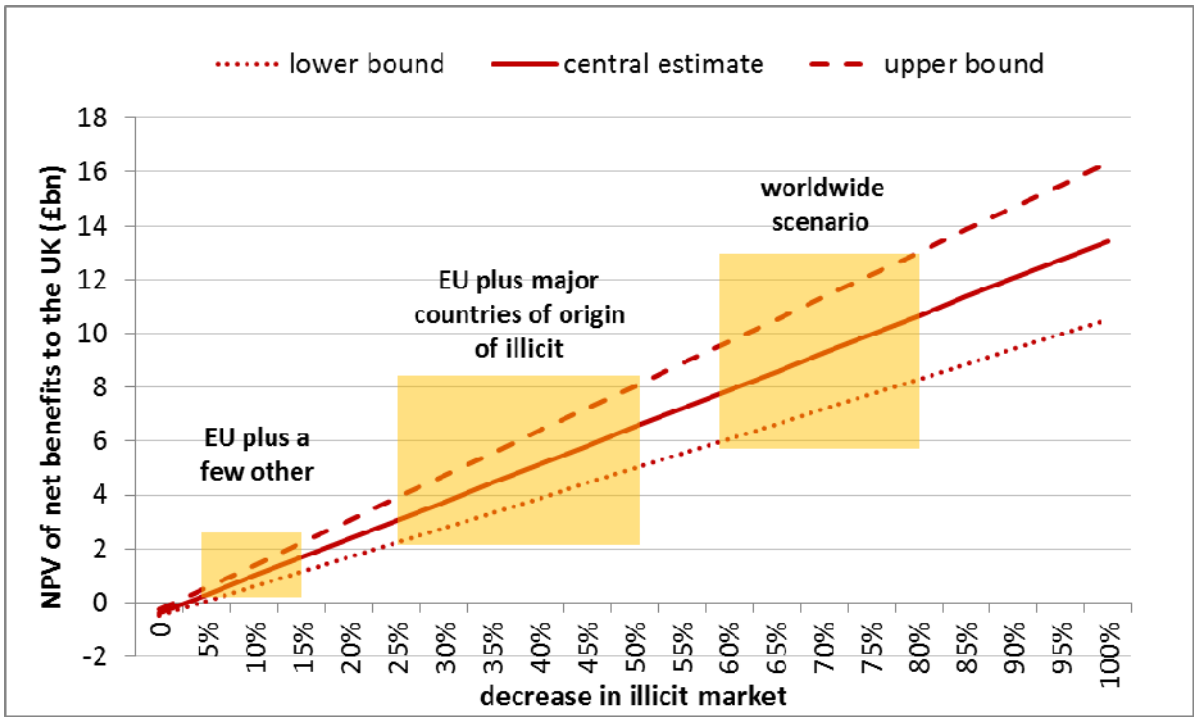
Results of the cost benefit analysis

Over the range of likely reductions in the size of the illicit market corresponding to the three geographical scenarios above, our estimates of the net benefits of the protocol (in net present value terms) range between approximately £100 million and £13.0 billion. These are calculated by combining the benefits and the costs under different assumptions about the geographic scope of the protocol, demand elasticity and relative risks (see Figure 1 below.)

The horizontal axis on Figure 1 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 plus limited others, (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* (NPV) of benefits (annual benefits summed over a 50-year period using an annual discount rate of 3.5 percent). 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 1. Net benefits of the protocol in NPV terms



Source: author's estimates

Table 2 below shows the breakdown of the central estimate of net benefit for the midpoint of each scenario:

- 10% reduction if the treaty is ratified by the EU plus a limited number of other jurisdictions only;
- 37.5% reduction if the treaty is ratified by the EU plus the major countries of origin of illicit;
- 70% reduction if the treaty is ratified worldwide.

Table 2. Midpoint estimates of NPV of net benefits corresponding to three scenarios for treaty ratification (£bn)

Extent of treaty ratification	**EU + limited other jurisdictions**	**EU + major countries of origin of illicit**	**Worldwide**
Reduction in illicit market	10%	37.5%	70%
Costs (expressed as negative benefit)	-0.38	-0.41	-0.41
Benefits:			
NHS savings	0.27	1.00	1.88
Output gains due to reduced mortality	0.18	0.68	1.27
Output gains due to reduced absenteeism	0.15	0.54	1.02
Value of lives saved	0.79	2.96	5.53
Total net benefits	**1.00**	**4.78**	**9.28**

Source: author's estimates

Scenario 1: EU plus limited others

As discussed earlier, if the protocol is ratified by the EU member states plus only limited other Parties, its effect on the UK is expected to be relatively small, with a reduction in the size of the illicit market of between 5% and 15%**.** In our central case, a 10% reduction results in a net benefit of around £1 billion.

Scenario 2: EU plus countries of origin of counterfeit

If other Parties ratify the protocol in addition to the EU, its expected effectiveness is likely to be higher than under the EU-only scenario and the illicit market is likely to reduce by between 25% and 50%. In our central case, a 37.5% reduction results in a net benefit of just under £5 billion.

Scenario 3: Worldwide

In this scenario, the net benefits of the protocol are relatively large. The central estimate in this case range is just over £9 billion, corresponding to a 70% reduction in the size of the illicit market.

In all three scenarios, the value of lives saved is the largest single contribution to the net benefit, but NHS savings and the value of output gains due to reduced mortality and reduced absenteeism also make substantial contributions.

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 plus limited others' 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 only the 40 Parties needed to bring it into force initially, with other countries joining a few years later. In this case, limited initial benefits will be followed by higher benefits in later years.

Annual benefits

The net benefits of the protocol expressed in annual terms (rather than Net Present Value terms), averaged over the first five years, range from £7 million to £306 million as shown in Table 3 below:

Table 3. Midpoint estimates of annual net benefits corresponding to three scenarios for treaty ratification (£m): average, first 5 years of protocol operation

Extent of treaty ratification	**EU + limited other jurisdictions**	**EU + major countries of origin of illicit**	**Worldwide**
Reduction in illicit market	10%	37.5%	70%
Costs (expressed as negative benefit)	-22	-24	-24
Benefits:			
NHS savings	6	21	39
Output gains due to reduced mortality	3	26	45
Output gains due to reduced absenteeism	2	22	38
Value of lives saved	15	119	206
Total net benefits	**7**	**165**	**306**

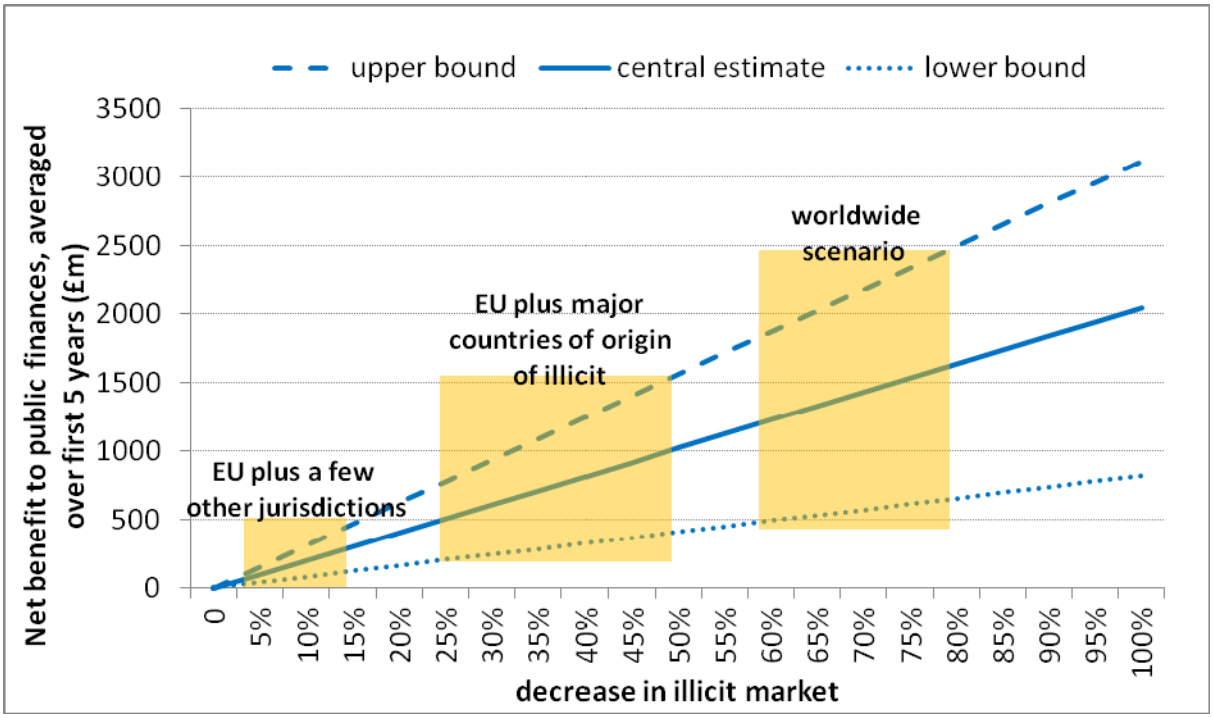
Source: author's estimates

Impact of the protocol on the public finances

Over the range of likely reductions in the size of the illicit market corresponding to the three geographical scenarios above, our estimates of the impact of the protocol on the public finances range between an improvement of around £50 million per year to £2.5 billion per year. These figures are produced by averaging the gains produced by the ASH model over the first five years after the protocol comes into operation.

The vertical axis on Figure 2 measures the net public finance benefits. As with Figure 1 above, the yellow boxes encompass the range of reductions which might follow from the protocol being enforced in (1) the EU plus limited others, (2) the EU and the main countries of origin of counterfeit and cheap white cigarettes, and (3) most of the world. The lines relate improvements in the public finances 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 2. Net annual public finance benefits of the protocol



Source: author's estimates

Table 4 shows the central estimates of net impact of the protocol on the public finances corresponding to the three ratification scenarios set out earlier.

Table 4. Midpoint estimates of net annual impact on the public finances of three scenarios for treaty ratification (£m)

Extent of treaty ratification	EU + limited other jurisdictions	EU + major countries of origin of illicit	Worldwide
Reduction in illicit market	10%	37.5%	70%
Costs (to government):			
Licensing + enforcement/cooperation	-3	-3	-3
Benefits:			
Reduction in the 'tax gap'	187	699	1,306
NHS savings	6	21	39
Extra taxes due to increased working lives	2	9	17
Extra taxes due to reduced absenteeism	4	14	26
Reduced sickness/disability benefits	7	27	50
Increased pension payments	-1	-3	-5
Total net benefits	**201**	**764**	**1,428**

The net benefits for each midpoint scenario range from around £200 million for a 10% reduction in the size of the illicit market if the EU and limited other jurisdictions ratify the protocol, through to just over £1.4 billion if the protocol is ratified worldwide. The vast majority of the benefit to the public finances comes from the reduction in the 'tax gap' – the tobacco duty and VAT which the Exchequer currently misses out on due to illicit tobacco sales. Increased tax revenue from reducing the 'tax gap' is included in the public finances analysis but not the cost benefit analysis, which explains why the net public finance impacts are always positive even in 'lower bound' scenarios on Figure 2, whereas the economic benefits are negative at the lower bound at the extreme left-hand edge of Figure 1.

As with the CBA results above, one should bear in mind that these scenarios are highly stylised and therefore should be interpreted with caution.

Conclusion

The cost benefit analysis of the Illicit Trade Protocol undertaken in this paper suggests that under reasonable assumptions about the sensitivity of smokers to price increases and the effectiveness of the protocol in reducing the size of the UK illicit tobacco market, net economic benefits range from £1 billion to over £9 billion (depending on the number of countries who ratify the Protocol). Meanwhile, analysis of the Protocol's impact on the public finances suggests that the UK Exchequer should see net extra receipts of between £200 million and £1.4 billion, largely because of the reduction in the size of the tobacco 'tax gap'. The paper concludes that, as with other elements of anti-smuggling strategy introduced in the UK since the year 2000, the Illicit Trade Protocol is likely to be a highly effective – and cost-effective – measure.

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[10] Scottish Government, "Tobacco provisions to be contained in the Health (Scotland) Bill", February 2009. http://www.scotland.gov.uk/Publications/2009/02/27120518/1 - see Section 9.
[11] A *positive* licensing scheme which would impose additional requirements on tobacco retailers was also costed by the Scottish Government but implementation of such a scheme would go considerably beyond the requirements of the FCTC Protocol.
[12] See *Beyond Smoking Kills: Protecting children, reducing inequalities*. ASH, October 2008. . http://www.ash.org.uk/beyondsmokingkills This figure includes hospital admissions, outpatient attendance, GP consultations, practice nurse consultations and prescriptions.
[13] According to statistics from NICE, smokers spend more time off sick compared to non-smokers (33 extra hours per year). See http://www.nice.org.uk/nicemedia/pdf/PHI5SimplifiedBusinessCase.htm
[14] See for example Department of Transport (2007), Highway Economics Note No. 1, "2005 valuation of the benefits of prevention of road accidents and casualties", http://www.dft.gov.uk/pgr/roadsafety/ea/pdfeconnote105.pdf
[15] See Reed, H (2010), *The Effects of increasing tobacco taxation: a cost benefit and public finances analysis*. London: Action on Smoking and Health. http://www.ash.org.uk/itp/cba
[16] B Iringe-Koko, A McNeill, L Joossens, R West, J Brown, M Dockrell and A McEwen (forthcoming), "Trends in purchase of illicit tobacco and the cost of smoking in England, 2007-11". Department of Epidemiology and Public Health, University College London. Forthcoming, *Addiction*.
[17] Note that this is a very substantial reduction between 2007-08 in the proportion of people in the Smoking Toolkit data saying that they have purchased tobacco from illicit sources. It implies that the number of illicit tobacco purchasers in 2010-11 was only just over one-fifth of the number of purchasers in 2007-08. This is a much greater proportionate reduction in the illicit market than the number suggested by HMRC's tax gap analysis over the same time period. The calculations of the impact of reducing the illicit market on smoking prevalence in this paper use the HMRC information on the size of the tax gap to calibrate the results on the grounds that estimates derived from aggregate data are likely to be more reliable. However, the Smoking Toolkit study is used to provide the data on average street prices for illicit tobacco products compared with legally purchased tobacco products.
[18] See Johnson (2009), Figure 9.
[19] U.S. Department of Health and Human Services. *The Health Consequences of Smoking: A Report of the Surgeon General.* Atlanta, GA. 2004. http://www.cdc.gov/tobacco/data_statistics/sgr/2004/index.htm
[20] M Czubek and S Johal (2010), "Econometric analysis of cigarette consumption in the UK". HMRC Working Paper No 9. http://www.hmrc.gov.uk/research/cig-consumption-uk.pdf
[21] 2010 General Lifestyle Survey, ONS, 2012.
[22] Measuring Tax Gaps 2012. HMRC. http://www.hmrc.gov.uk/stats/mtg-2012.pdf
[23] See for example evidence on Spain and Italy in Joossens, L and Raw, M (2008), "Progress in combating cigarette smuggling: controlling the supply chain". *Tobacco Control* 17: 399-404.