

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

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## 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.

## 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.

**8 SUMMARY AND CONCLUSIONS**

**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)**

<b>Steps</b>	
<b>A: Costs</b>	<p>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.</p> <p>A2. For all additional elements, assess costs for:</p> <ul style="list-style-type: none"> <li>- manufacturers and primary processors,</li> <li>- commercial importers and exporters,</li> <li>- wholesalers,</li> <li>- brokers,</li> <li>- distributors,</li> <li>- manufacturers of equipment,</li> <li>- retailers,</li> <li>- Government</li> </ul>
<b>B: Benefits</b>	<p>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.</p> <p>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.</p> <p>B3. For any reduction in the size of illicit market (from 0% to 100%), assess the impact on:</p> <ul style="list-style-type: none"> <li>- average price paid; and</li> <li>- smoking prevalence (using smoking prevalence elasticity)</li> </ul> <p>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).</p> <p>B5. Assess the ‘starting point’, i.e. current smoking-related healthcare costs, number of smoking-related deaths and absenteeism rates by smoking status.</p> <p>B6. For any reduction in the size of illicit market, model population ‘movements’ from smokers to ex-smokers and non-smokers over time.</p> <p>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).</p>
<b>C: Net benefits</b>	<p>C1. Calculate the net benefits as total benefits minus total costs</p> <p>C2. Analyse sensitivity of the results, i.e. assess the differences in net benefits under most conservative and most optimistic assumptions (if applicable).</p> <p>C3. Conclusions and recommendations</p>

Source: own estimates

ANNEXE 1

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

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

**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<sup>72</sup>.

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<sup>73</sup>).

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<sup>74</sup>. 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<sup>75</sup> (Table 12).

**Table 12. Number of smoking-related deaths by age**

<b>Age</b>	<b>Number of deaths (smokers)</b>	<b>Number of deaths (ex-smokers)</b>
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

**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)<sup>76</sup> and the corresponding increase in output (in NPV terms) using average annual wage (£24,538<sup>77</sup>) 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"<sup>78</sup>. 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<sup>79</sup> (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.

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.

**ANNEXE 2: BENEFITS OF THE PROTOCOL**

**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

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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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