HM Revenue & Customs

Measuring tax gaps 2016 edition

Methodological annex

An Official Statistics release 20 October 2016

Contents

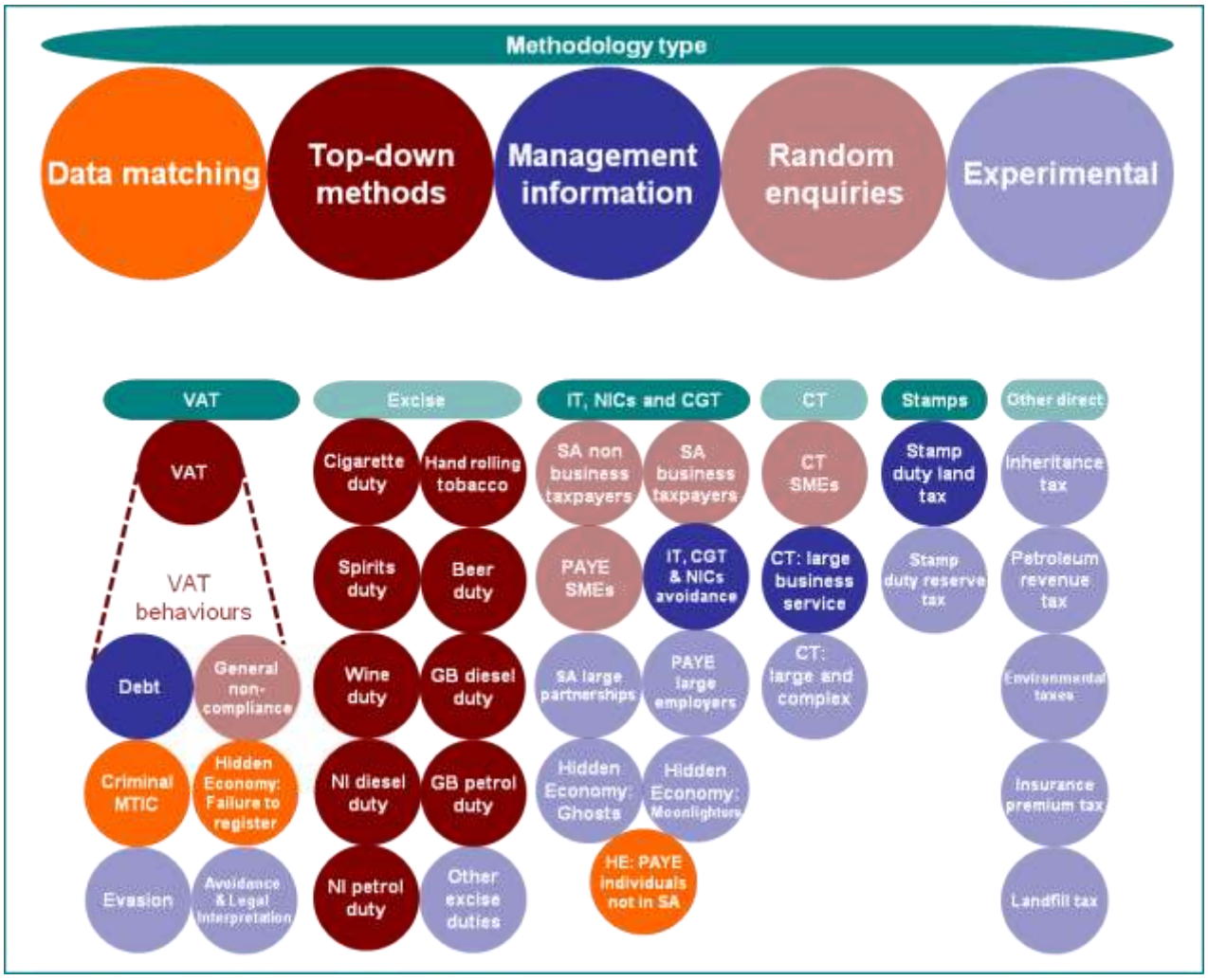
Chapter A: Introduction

A.1 This document provides further details of the data and methodology used to produce estimates of the tax gap published in 'Measuring tax gaps'. There are numerous approaches to measuring tax gaps. These can be categorised as;

- **Data matching** – comparisons between related datasets.
- **Top-down methods** – these methods use external data sources to estimate total consumption of taxable products. This is used to calculate the theoretical tax due. The tax gap is the difference between the theoretical tax due and the tax received.
- **Management Information** - this includes risk registers (a list of identified tax risks, together with information such as estimated value, nature and status), data extracted from accounting systems and other databases/systems used to manage HMRC's business.
- **Random enquiries** – these are full enquiries opened by HMRC officers into a randomly selected sample of taxpayers.
- **Experimental** – where limited data is available, illustrative estimates are produced using assumptions made in collaboration with HMRC's operational experts.

A.2 The figure below shows the general approach used to calculate each tax gap component.

Approaches used to calculate the tax gap



Chapter B: Margins of error

B.1 The figures presented here are subject to statistical uncertainty caused by two factors:

- Sampling error: Errors that arise because the estimates rely on information collected from a sample, rather than from the whole population. Sampling error can lead to chance fluctuations from year-on-year in the tax gap estimates that do not reflect true changes in the size of the tax gap.

- Bias or non-sampling error: Systematic errors where the modelling assumptions or errors in the data lead to estimates that are consistently either too low or too high (e.g. assumptions made to adjust for under-reporting of tobacco and alcohol consumption may under- or over-estimate the true level).

B.2 Where possible Her Majesty's Revenue and Customs (HMRC) has estimated the likely impact of sampling errors by calculating statistical confidence intervals. These give margins of error within which the true value would be expected to lie 95 per cent of the time if there were no systematic errors. They provide an indication of the extent to which changes in the estimates between years can be confidently interpreted as true changes. They do not take account of systematic errors that might lead the central estimate to be too low or too high over the whole series.

B.3 Systematic error is less straightforward to deal with, as it is not defined by statistical assessments that allow for easy interpretation. In order to give an indication of the effect of these biases HMRC presents the tax gaps for alcohol and tobacco as ranges. For spirits and tobacco these are constructed as the range between upper and lower bounds, representing the degree of uncertainty associated with those systematic biases for which upper and lower bounds can be derived.

Value Added Tax

B.4 The VAT Total Theoretical Liability (VTTL) model and the top-down VAT gap derived from it are broad measures, subject to a degree of uncertainty. They are based on an analysis of survey and other data, and include a number of assumptions and adjustments which add both random and systematic variation to the estimates. For the final year's estimate, there is a small element of forecasting in some of the spending data, which introduces further random variation.

B.5 It is not possible to produce a precise confidence interval for the VAT revenue loss estimates. The VTTL estimate is constructed largely from Office for National Statistics (ONS) National Accounts data which are derived, in the main, from sample surveys and are thus subject to both sampling and non-sampling errors. The ONS does not publish error margins for the relevant input series and so it is not possible to construct an estimate of the impact of these errors on the VTTL.

B.6 The VAT gap is updated and revised as and when new data becomes available and new methodologies are developed.

Excise duties

Systematic biases

B.7 Systematic biases are explicitly considered for beer and tobacco products, with results presented as a range. The definitions of the ranges are shown in section E for beer and section F for tobacco products.

B.8 No account is presently made for systematic biases in the wine, spirits and oils estimates.

Random variation

B.9 While the upper and lower estimates for beer and tobacco will contain random variation, the resultant confidence intervals are not shown in this document.

B.10 For spirits, wine and oils, an assessment of the effect of random variation is included using error margins. These are estimated by combining the random errors (where available) from all data sources used to calculate total consumption. For oils, the combined random errors are estimated by simulation techniques and the results presented as combined margins of error. These approximate to 95 per cent confidence intervals, standard across statistical analyses.

B.11 The central estimates for spirits, wine and oils may not necessarily be half way between the upper and lower bounds as these bounds are confidence intervals which may not be symmetric about the central estimate. As we do not have appropriate confidence intervals for the beer or tobacco tax gaps, the central estimate is calculated as the mid-point between the upper and lower estimates.

Direct taxes

Systematic biases

B.12 For direct tax estimates based on random enquiries, an adjustment is made to account for under-declarations that are not detected. HMRC continues to undertake analyses to define suitable ranges for other systematic biases in the direct tax estimates.

B.13 Direct tax gaps rely on bottom-up methods, which measure known components separately. There are also unknown factors that are not fully identified, leading to additional unmeasured losses. These unmeasured losses cause the overall estimate for each direct tax gap, and consequently the overall direct tax gap, to be an under-estimate.

Random variation

B.14 Direct tax estimates derived from random enquiries will be subject to random sampling errors. 95 per cent confidence intervals have been calculated for these estimates using standard statistical techniques.

Chapter C: Tax Gap and Compliance Yield

C.1 Tax gap estimates are calculated net of compliance yield; i.e. they reflect the gap remaining after HMRC compliance efforts. This will differ across components.

C.2 In some cases we specifically use the cash collected measure of compliance yield in the tax gap calculation:

Tax Gap Component	**Compliance Yield**
Self Assessment (excluding large partnerships)	Deducted from gross tax gap; actual compliance yield series shown in table 4.1
Self assessment (large partnerships)	Deducted from gross tax gap; actual compliance yield series shown in table 4.6
PAYE	Deducted from gross tax gap; actual compliance yield series shown in tables 4.7 and 4.9.
Corporation Tax – SME	Deducted from gross tax gap; actual compliance yield series shown in table 5.4
Corporation Tax - Large	Deducted from gross tax gap; compliance yield series shown in tables 5.1 and 5.3. This will represent both actual compliance yield (for closed cases) and estimates of compliance yield (for tax cases which are still under enquiry).
Other Direct Taxes	Deducted from inheritance tax gross tax gap but not used in other tax gap calculations

*References to Tables in Measuring Tax Gaps 2016

C.3 In the following components of the tax gap we use an estimate of compliance success as part of the calculation:

Tax Gap Component	**Compliance Yield**
Avoidance (IT, NICs and CGT)	Compliance yield is estimated by looking at the success of avoidance cases in a related area (large business) over time. Actual compliance yield is lumpy, doesn't relate to tax gap years and is therefore annualised.
Hidden Economy	Based on experimental methodology which estimates the tax gap directly and does not currently take account of compliance yield.

C.4 In the remaining components of the tax gap we use a top down method of calculation looking at the difference between theoretical liability and tax receipts. Although compliance yield is not explicitly included in these calculations it is reflected as part of tax receipts:

Tax Gap Component	**Compliance Yield**
VAT	Not explicitly used, but is reflected in receipts
Tobacco	Not explicitly used, but is reflected in receipts
Alcohol	Not explicitly used, but is reflected in receipts
Oils	Not explicitly used, but is reflected in receipts
Stamp Duties	Not used in the tax gap calculation

C.5 HMRC publishes a detailed breakdown of compliance revenues within our Annual Report and Accounts. This differs in coverage and timing from the compliance information presented in the tax gap estimate.

C.6 The amount of compliance revenue we secure and the size of the tax gap are related, but the links between them are not straightforward. Compliance revenue records many aspects of compliance work, including tax recovered directly from our work, future revenue benefits and losses prevented. It can also cover more than one tax year. Different factors, such as the number of new businesses, new customers, changes in levels of voluntary compliance, economic factors, tax policy and rate changes all affect the tax gap.

VAT gap

General methodology

D.1 The aim is to measure the total VAT gap by comparing the net VAT total theoretical liability (what HMRC expect to receive) with actual VAT receipts. The difference between these amounts is known as the VAT gap.

D.2 This top-down approach involves:

- Gathering data detailing the total amount of expenditure in the economy that is subject to VAT, primarily from the Office for National Statistics (ONS);
- Estimating the rate of VAT on the ONS expenditure data based on commodity breakdowns to derive the gross VAT total theoretical liability (VTTL);
- Subtracting any legitimate refunds occurring through schemes and reliefs, to arrive at the net VTTL.
- Subtracting actual VAT receipts from the net VTTL; and
- Assuming that the residual element is the total VAT gap, which includes error, evasion, debt etc.

D.3 The VTTL is the theoretical amount of VAT that would be collected in an ideal world. This means that all expenditure subject to tax yielding the full and correct amount of VAT, without fraud, avoidance, and losses due to error or non-compliance.

D.4 The VTTL includes 'stuck VAT', which is the VAT paid on 'finally taxed expenditure' which cannot be reclaimed, for example by those not registered for VAT.

D.5 The expenditure data series used in the calculation are mainly constituents of National Accounts macroeconomic aggregates. All National Accounts data used to construct VTTL estimates are consistent with the ONS Blue Book.

Calculation of gross VTTL

D.6 The VTTL is calculated by multiplying the total amount of VAT-able expenditure in the economy by appropriate VAT rates.

D.7 For each of the expenditure sectors, the total expenditure is split according to the different VAT treatments; zero rated, standard rated, reduced rated and exempt. For the purposes of calculating the gross VTTL, only the standard and reduced rated expenditure are used.

D.8 The total VAT-able expenditure for each sector is combined together to represent an overall annual figure for the economy.

D.9 In order to derive the amount of VAT within the VAT-able expenditure, it is necessary to multiply the expenditure by the VAT fraction. The annual gross VTTL is thus calculated by multiplying the annual expenditure figure for the economy by the respective VAT fraction.

D.10 A number of streams of expenditure contribute to the tax base, with most VAT deriving from consumers' expenditure (i.e. household consumption). The main expenditure categories that comprehensively cover VAT liabilities are:

- Household consumption;
- Non-profit institutions serving households;
- Government capital and current expenditure;
- VAT exempt sector capital and current expenditure; and
- Housing capital expenditure.

Input tax adjustments

D.11 Net VAT liability is the difference between VAT due on taxable supplies made by registered traders ('output tax'), and VAT recoverable by traders on supplies made to them ('input tax').

D.12 VAT liability for the relevant categories can be estimated directly from National Accounts data, with one exception - the VAT exempt sector. Businesses making outputs that are exempt from VAT are generally not permitted to reclaim the VAT on inputs associated with their exempt outputs. In order to make an adjustment for this irrecoverable input tax (or 'stuck VAT'), a separate HMRC survey is used to ascertain the proportion of purchases on which VAT cannot be reclaimed.

D.13 A further adjustment is made for expenditure by businesses which are legitimately not registered for VAT and, as such, cannot recover their input tax. This adjustment uses a combination of data from the Department for Business, Innovation and Skills (BIS) and HMRC information on the distribution of business turnover below the VAT threshold to estimate relevant expenditure.

D.14 Finally, third party data sources are used in conjunction with National Accounts data to inform estimates of business expenditure on cars and entertainment, on which VAT is due.

D.15 Because the calculation of irrecoverable input tax is complex, the level of uncertainty around input tax adjustments is larger than for the other elements.

Deductions

D.16 The sum of the VAT liability arising from each of the expenditure categories listed in paragraph D.10 gives an estimate of the gross VTTL in each year. However there are a number of legitimate reasons why part of this theoretical VAT is not actually collected. These can be grouped into two broad categories:

- VAT refunds;
- Expenditure of traders legitimately not registered for VAT.

D.17 VAT refunds are made primarily to government departments, NHS Trusts and regional health authorities for specified contracted out services acquired for non-business purposes. A number of other categories of expenditure cannot be separately identified in the overall VTTL calculation, for which VAT can be refunded. The value of these refunds is taken directly from audited HMRC accounts data.

D.18 Traders who trade below the VAT threshold can legitimately exclude VAT on their sales. Expenditure on the output of these businesses will have been picked up in the theoretical liability. To adjust for this, an estimate of relevant expenditure is made using a combination of BIS data and HMRC information on the distribution of business turnover below the VAT threshold.

Net VAT receipts

D.19 Figures for actual receipts of VAT are taken from HMRC's published Consolidated Fund figures. The receipts are adjusted to reflect timing effects within each financial year, before being used in the model.

VAT gap

D.20 Finally, subtracting the Net VAT Receipts from the Net VTTL derives the VAT gap. The percentage gap is further calculated by dividing the VAT gap by the Net VTTL. Receipts for the financial year (April to March) are compared with theoretical liability for the calendar year, assuming an average three month lag between an economic activity and the payment of the corresponding VAT to HMRC.

D.21 The detailed calculations used to construct the estimated VTTL are continuously reviewed to identify improvements to the methodology. Also the National Accounts data used to construct the VTTL are subject to updates and revision by ONS throughout the year. This is part of the routine revisions to the ONS National Accounts data as final data become available.

Chapter E: Alcohol

General methodology

E.1 The estimates of the illicit market for spirits and wine plus the beer upper bound are produced using a top-down methodology. That is, the estimate is produced by first estimating total consumption, and then subtracting legitimate consumption, the residual being the illicit market:

Illicit Market	=	Total Consumption	-	Legitimate Consumption

E.2 The above equation provides an estimate of the volume of goods supplied through the illicit market. This is then turned into an estimate of the proportion of the total market that is supplied through the illicit market - the illicit market share:

$$\text{Illicit Market Share} = \frac{\text{Illicit Market}}{\text{Total Consumption}} * 100$$

E.3 Revenue losses associated with the illicit market are then estimated by combining the illicit market share information with price data, excise duty and VAT rate information.

E.4 Details of the methodology for estimation of spirits, beer and wine tax gap are provided in the following sections.

Spirits central estimate

Estimating total consumption

E.5 Total consumption can be summarised as:

Total Consumption	=	Total Consumption of UK Purchases	+	Cross-Border Shopping

E.6 The consumption of spirits bought in the United Kingdom (UK) is estimated using the Family Spending Surveys (FSS) from the ONS. This comprises of the Family Expenditure Survey for the period prior to 2001, the Expenditure and Food Survey (EFS) from 2001 to 2008 and the Living Costs and Food Survey (LCF) from 2008 to the present time. EFS and LCF estimates are weighted by the ONS to adjust for survey non-response.

E.7 The FSS only covers purchases within the UK. Because of this, total consumption is made up of the consumption of spirits bought in the UK plus the cross-border shopping.

Total consumption of UK purchases

E.8 The consumption of UK purchased goods in any given year is calculated using:

- Estimates of household on-licence (consumed at the point of sale e.g. in a pub or restaurant) and off-licence (consumed off the premises e.g. from a supermarket) expenditure on spirits from the FSS. Per person expenditure is calculated using the average number of people in a household, also from FSS;
- Data on average prices provided by the ONS;
- Estimates of the UK adult population (18+) from the ONS; and
- Uplift factors covering under-reporting. Uplift factors are calculated independently for on-licence and off-licence sectors as on-licence expenditure is more prone to under-reporting.

E.9 Total UK consumption is defined using this formula:

$$\text{Total UK Consumption} = \frac{\text{Average Household Consumption}}{\text{Average Number of Adults per H'hold}} * \text{UK Adult Population} * \text{Uplift Factor}$$

Family spending survey

E.10 The average weekly expenditure on spirits for an average UK household is estimated using the FSS. Households participating in the surveys are asked to record their expenditure on alcohol under the relevant specific category of drink i.e. wine, spirits, beer, etc. There is an additional category for recording drinks purchased as part of a 'round' of drinks, which will be referred to as 'other' drinks.

E.11 Some of the 'other' drinks consumed will be spirits; this means that the calculation for spirits consumption should include a proportion of 'other' drinks consumption.

E.12 What people record in the 'other' drinks category changes over time. In some time periods we see a larger proportion of spirits recorded in the 'other' drinks category. The strength of the relationship between 'other' drinks and spirits is used to determine the proportion of 'other' drinks consumption to reassign to spirits consumption.

E.13 The average weekly expenditure per household is converted to the volume consumed by that household using the average price of spirits. This is then scaled up to an annual figure.

E.14 The average consumption of spirits per household is then converted to the average per person, by dividing by the average number of adults in a household. This is scaled up to the UK adult population.

E.15 The spirits model assumes that most under-age drinking is taken into account given that, legally, the adults will have often had to have bought the alcohol, which will be included within the expenditure figures from the survey.

Under-reporting uplift factor

E.16 The FSS data for alcohol are subject to under-reporting so an uplift factor is necessary to correct for the bias. This uplift factor is calculated by taking estimates of consumption from the FSS in the base year, and comparing these with independent estimates of total consumption.

E.17 To do this we take a year in which there is believed to be little or no illicit market, and use HMRC clearance data as a true indication of total consumption. In order to reduce sampling error, the uplift factor is derived by taking the average of three year's data: 1990-91; 1991-92; and 1992-93.

E.18 Separate uplift factors are calculated for on- and off-licence markets, however the formula remains the same. To calculate the uplift factors for the on- and off-licence markets, historical clearance data are split between on- and off-licence markets. This uses market shares estimated from commercial sales data.

E.19 The uplift factors are defined as:

$$\text{Uplift Factor} = \frac{\text{Legitimate Consumption in 1990-91 to 1992-93}}{\text{Estimated Total Consumption in 1990-91 to 1992-93}}$$

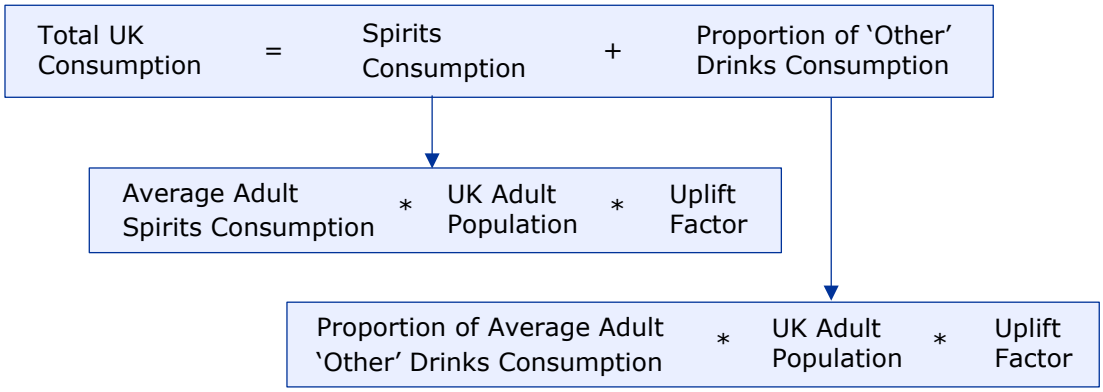
with the appropriate legitimate and total consumption figures used.

Upper and lower confidence intervals

E.20 The confidence intervals indicate the potential size of chance fluctuations in the estimates due to sampling error. The estimates rely on a number of assumptions to combine the various data sources and produce an overall tax gap estimate. The confidence intervals do not take account of any systematic tendency to over or under-estimate the size of the tax gap that might arise from these assumptions. So the central estimate is best interpreted as an indicator of long-term trends in the illicit market rather than a precise estimate of the level or year-on-year changes.

E.21 The variation in the FSS is used to construct 95 per cent confidence intervals around the central estimate. These are regarded as the upper and lower estimates, however they do not account for systematic errors in the model assumptions.

E.22 This leads to a central estimate defined by:



Cross-border shopping and duty free

E.23 Duty free is included in the cross-border shopping calculation. Estimates of consumption of goods purchased as cross-border shopping are based on figures produced from the International Passenger Survey (IPS). This provides estimates of the volume of spirits an average adult traveller brings into the country, separately for air and sea passengers. The IPS figures are weighted by the ONS, scaling up the survey data to represent the total cross-border shopping entering the UK.

E.24 An estimate of the volume of duty free spirits brought into the country is calculated in the same way, using passengers coming from outside the European Union (EU).

E.25 This estimate, however, does not cover sales made on-board ferries, so commercially provided data about deliveries of spirits to ferries are used to supplement the cross-border shopping estimate, and provide a complete figure.

E.26 Cross-border shopping is estimated as:

Cross-Border Shopping	=	Goods Bought Overseas	+	Goods Bought On-board Ferries	+	Duty Free

Estimating legitimate consumption

E.27 Estimates of legitimate consumption have two elements; UK duty paid consumption and cross-border shopping:

Legitimate Consumption	=	UK Duty Paid Consumption	+	Cross-Border Shopping

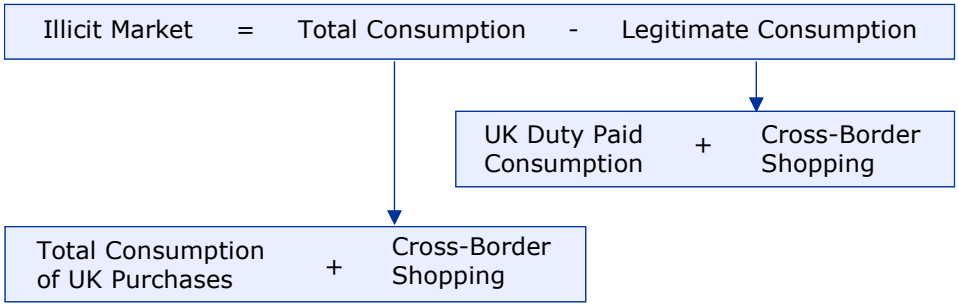
E.28 Estimates of UK duty paid consumption are taken directly from returns to HMRC of the volumes of spirits on which duty has been paid. The volumes of ready-to-drink products have been removed from spirits clearances in order to obtain figures for spirits only.

E.29 Cross-Border Shopping is calculated in the same way as for total consumption:

Cross-Border Shopping	=	Goods Bought Overseas	+	Goods Bought On-board Ferries	+	Duty Free

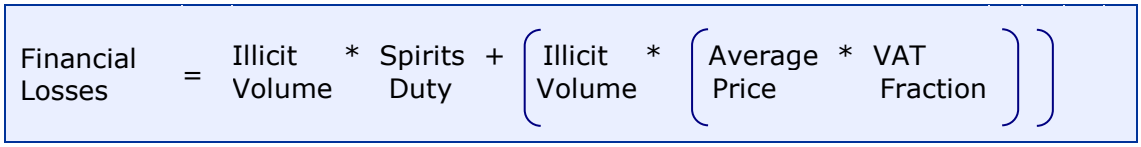
Estimating the illicit market

E.30 Combining the two formulae for total consumption and legitimate consumption gives the formula for the illicit market:



Conversion to monetary losses

E.31 Revenue losses associated with the illicit market are then estimated by combining the illicit market share information with price data and duty and VAT rate information, using this formula:



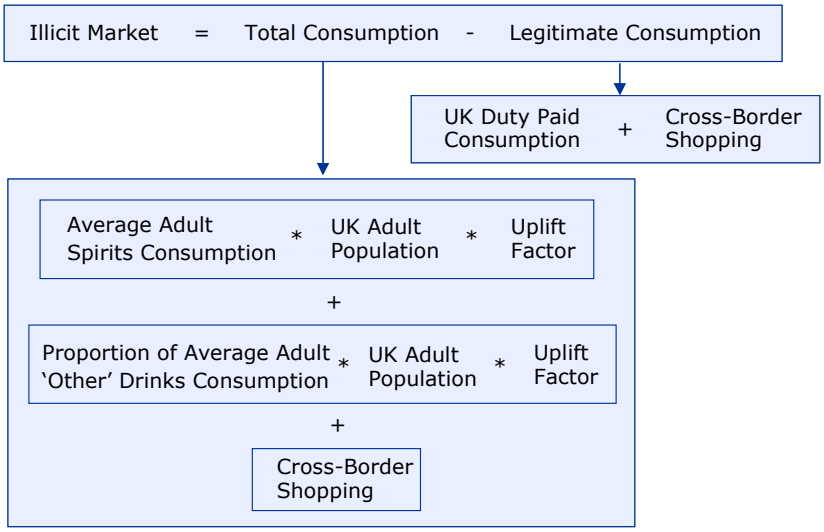
E.32 Data on average spirits prices are derived from data provided by the ONS. The prices used in the model are weighted across on and off trade and for different types of spirits.

E.33 The VAT fraction is the portion of the retail price that is VAT – for example, a 20 per cent VAT rate is equivalent to a 1/6 VAT fraction. VAT fractions are calculated annually to capture changes in the VAT rate. This method assumes that VAT is also lost on all purchases. As, in some cases, the final illicit product is sold in legitimate outlets this may not always be the case, and this will be an over-estimate of losses.

E.34 Spirits Duty is converted into bulk duty liabilities based on the assumption that spirits strength is constant at 38 per cent.

Summary of methodology

E.35 A summary of the calculation of the illicit market central estimate is:



Beer upper estimate

Methodology

E.36 The estimate of the illicit market for beer is produced using a top-down methodology as described in paragraphs E.1 to E.4.

E.37 Details of the estimation of total consumption and of legitimate consumption are provided in the subsequent sections.

Total consumption

E.38 The consumption of beer bought in the UK for each year is estimated using the FSS. FSS estimates are weighted by the ONS to adjust for the survey non-response.

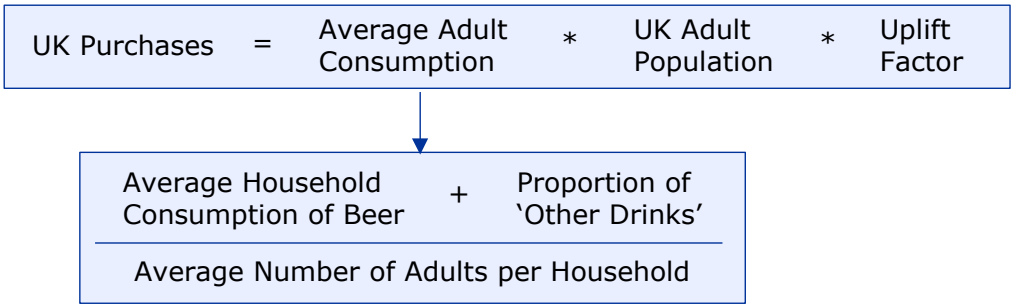
E.39 The FSS only covers purchases within the UK. Because of this, total consumption is made up of consumption of beer bought in the UK (from FSS) plus the cross-border shopping of beer.

UK purchases

E.40 The consumption of UK purchased goods in any given year is calculated using:

- Estimates of household's on-licence (consumed at the point of sale e.g. in a pub or restaurant) and off-licence (consumed off the premises e.g. from a supermarket) expenditure on beer from FSS. HMRC converts these into volumes consumed using data on average prices provided by ONS;
- A proportion of 'other' drinks consumption, which is added to beer consumption;
- Estimates of draught and packaged beer consumption from on-licence and off-licence consumption using data published in the British Beer and Pub Association (BBPA) handbook;
- Estimates of the UK adult population (18+) from the ONS;
- Estimates of the number of adults per household in the UK, from FSS; and
- An uplift factor covering under-reporting. Uplift factors for both draught and packaged beer are calculated.

E.41 UK purchases are defined as:



Other drinks

E.42 Some of the 'other' drinks consumed will be beer, so the calculation for beer consumption should include a proportion of 'other' drinks consumption. Details of the 'other' drinks methodology are in paragraphs E.10 to E.12.

Uplift factor

E.43 The FSS data are subject to under-reporting so an uplift factor is necessary to correct for this bias. The base year uplift factor is calculated by taking estimates of consumption from the FSS in a base year, and comparing these with independent estimates of total consumption. To do this we take a year in which there is believed to be little or no illicit market, and use HMRC clearance data as a true indication of total consumption. In order to reduce sampling error, the uplift factor is calculated by taking an average of three year's data: 1990-91, 1991-92 and 1992-93.

E.44 To calculate uplift factors for draught and packaged beer, FSS data are split between on-licence and off-licence markets and then into draught and packaged beer. This uses market shares estimated from ONS and BBPA data.

E.45 The base year uplift factors are defined as:

$$\text{Base Year Uplift Factor} = \frac{\text{Legitimate Consumption in 1990-91 to 1992-93}}{\text{Estimated Total Consumption in 1990-91 to 1992-93}}$$

E.46 An additional uplift for packaged beer is calculated, which varies from year-on-year. This is based on the assumption that there is no or negligible illicit market in draught beer, so draught beer consumption should be equal to draught clearances in every year. This assumption gives an uplift for draught beer in each year. The draught beer uplift and base year uplifts are combined to compute the packaged beer uplift, using this formula:

$$\text{Packaged Uplift} = \text{Draught uplift} * \frac{\text{Base Year Packaged Uplift}}{\text{Base Year Draught Uplift}}$$

Cross-border shopping and duty free

E.47 Estimates of consumption of goods purchased as cross-border shopping are based on figures produced from IPS. This provides estimates of the volume of beer brought back by UK travellers. The IPS figures are weighted by the ONS to represent the total cross-border shopping entering the UK.

E.48 This estimate does not cover sales made on-board ferries, so commercially provided data for deliveries of beer to ferries are used to supplement the cross-border shopping estimate, and provide a complete figure.

E.49 An estimate of the volume of duty free beer brought into the country is calculated in the same way, using passengers coming from outside the EU.

E.50 Cross-border shopping is estimated as:

$$\text{Cross-Border Shopping} = \text{Goods Bought Overseas} + \text{Goods Bought On-board Ferries} + \text{Duty Free}$$

E.51 Total consumption can be summarised as:

$$\text{Total Consumption} = \text{Total Consumption of UK Purchases} + \text{Cross-Border Shopping}$$

Legitimate consumption

E.52 Estimates of legitimate consumption have two elements:

- UK duty paid consumption; and
- Cross-border shopping.

UK duty paid consumption

E.53 Estimates of UK duty paid consumption are taken directly from returns to HMRC (clearances data) of the volumes of beer on which duty has been paid, along with the actual amounts of money.

Cross-border shopping

E.54 This is calculated in the same way as for total consumption:

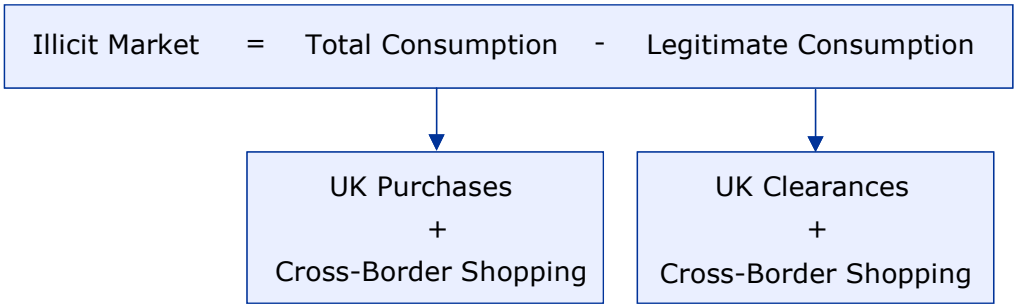
Cross-Border Shopping	=	Goods Bought Overseas	+	Goods Bought On-board Ferries	+	Duty Free

E.55 Legitimate consumption can be summarised as:

Legitimate Consumption	=	UK Duty Paid Consumption	+	Cross-Border Shopping

Illicit market

E.56 Subtracting legitimate consumption from total consumption will give an estimate of the illicit market. This can be written as:



Conversion to monetary losses

E.57 Revenue losses associated with the illicit market are then estimated by combining the illicit market share information with price data, duty and VAT rate information, using the following formula:

Financial Losses	=	Illicit Volume	*	Beer Duty	+	(	Illicit Volume	*	(	Average Price	*	VAT Fraction	)	)

E.58 Where:

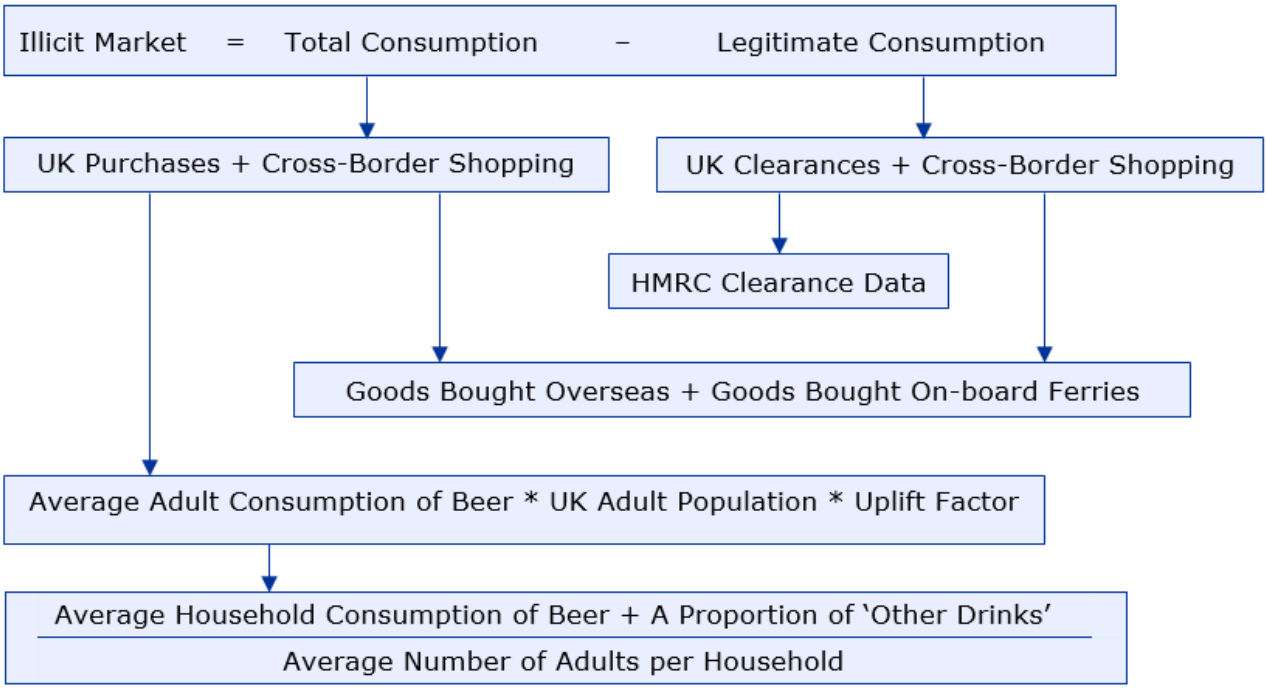
- Average beer prices are derived from the data provided by the ONS; and

- The VAT fraction is the portion of the retail price which is VAT – for example, a 20 per cent VAT rate is equivalent to a 1/6 VAT fraction. VAT fractions are calculated annually to capture changes in the VAT rate.

E.59 This method of converting volume into monetary losses assumes that VAT is also lost on all illicit beer. As, in some cases, the final illicit product is sold in legitimate outlets this may not always be the case, and this will be an over-estimate of losses.

Summary of methodology

E.60 A summary of the calculation of the illicit market upper estimate is:



Beer lower estimate

Overview

E.61 The beer tax gap lower estimates are produced using a bottom-up methodology. This means estimates of the illicit market are made directly, by estimating the fraud components that make up the illicit market. The following types of illicit beer are included in the lower estimate:

- Diversion of UK produced beer; and
- Drawback fraud.

E.62 Some of this illicit beer is recovered through HMRC compliance activity, so this is subtracted to give the net tax gap. The tax gap estimate is defined by:

Beer Illicit Market Lower Estimate	=	Diversion of UK Produced Beer	+	Drawback Fraud	-	Seizures of Illicit Beer

E.63 A number of beer frauds are not included in this methodology as we are currently unable to estimate them. This is one of the reasons it is a lower bounding estimate. These include:

- Smuggled beer;
- Diversion of foreign produced beer; and
- Counterfeit beer.

E.64 There may also be other types of fraud which we do not know about; again, these are not covered by the estimate.

Diversion of UK produced beer

E.65 Diversion fraud occurs when beer is moved in duty suspense to the EU and is subsequently diverted back into the UK under the cover of false documentation. The taxes are not declared on the beer and the illicit product enters the UK market.

E.66 We estimate that diversion fraud is equal to the amount of beer moved in duty suspense from the UK to certain EU member states, minus legitimate demand for UK branded beer in those countries. That is, we assume that any UK beer which is not feeding demand abroad will be diverted back to the UK illicit market:

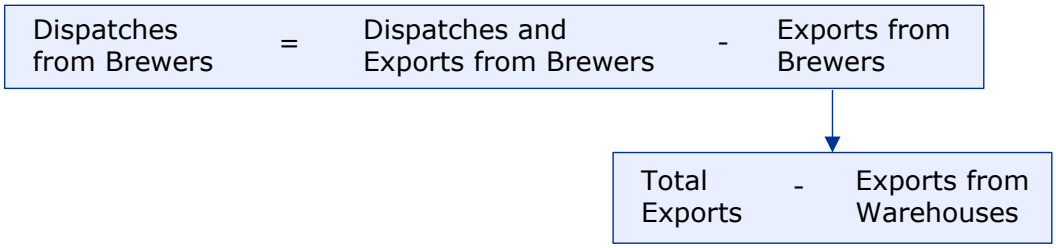
Diversion of UK Produced Beer	=	Duty Suspended Beer Moved to Selected EU Countries	-	Legitimate Demand in Selected EU Countries

E.67 The total amount of beer moved in duty suspense from the UK to the EU includes dispatches from both excise warehouses and brewers. Dispatches from excise warehouses are taken directly off the warehouse return (W1 form). Dispatches from brewers are estimated from data on the brewers return (EX46 form):

Total Beer Dispatches	=	Dispatches from Warehouses	+	Dispatches from Brewers

E.68 Brewers return data is used for dispatches (movements to EU countries) and exports (movements to non-EU countries) and it cannot be disaggregated. So, to estimate dispatches from brewers, we subtract an estimate of exports from brewers.

E.69 Exports from brewers are estimated as total exports, from Customs Handling of Import and Export Freight (CHIEF), minus exports from excise warehouses (W1 form):

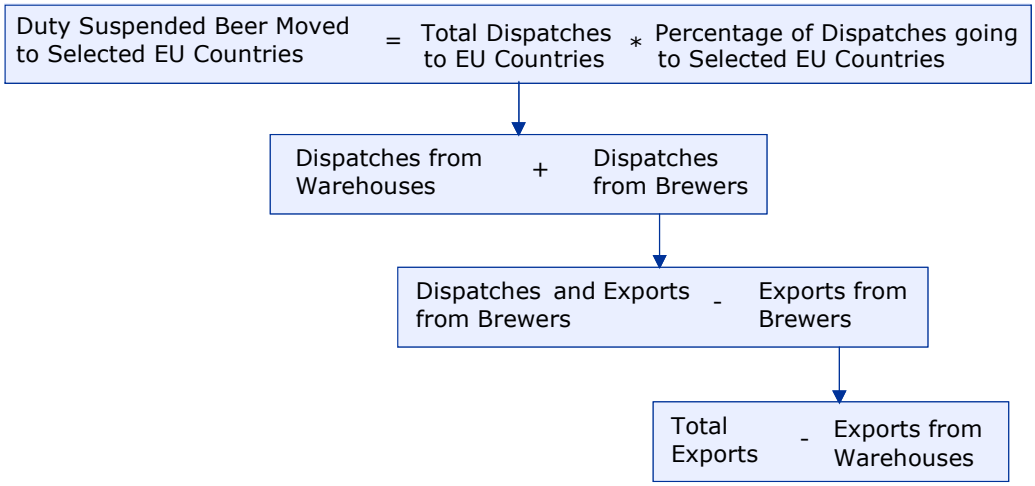


E.70 To preserve the lower bounding nature of this estimate, we only include dispatches to certain EU countries. These countries have been selected based on a number of factors, including: proximity to the UK; the differential in price; operational indications of risk and patterns of supply.

E.71 The estimate of beer dispatches, described in E.67 and E.69, cannot be broken down to the recipient country. So we use an alternative data source, UK trade data, which does include a breakdown by country. The proportion of beer dispatched to the selected EU countries is taken from UK trade data and applied to the estimated total dispatches to produce an estimate for dispatches to these selected EU countries.

E.72 UK trade data is not used to directly estimate dispatches to these countries as it does not include certain types of movements. More detail is provided on this later.

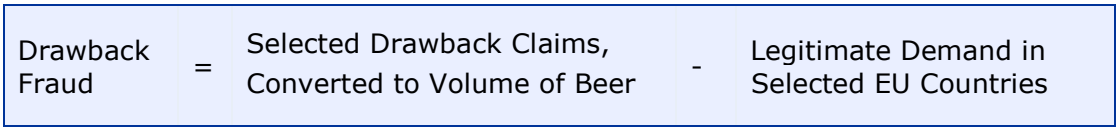
E.73 To summarise:



Drawback fraud

E.74 Drawback fraud occurs when goods are moved to the EU and the duty is reclaimed via drawback. Duty is then paid at the lower rate in the destination country and the goods are illicitly returned to the UK.

E.75 To estimate drawback fraud, we estimate the volume of beer corresponding to certain drawback claims, then subtract the legitimate demand for beer in the selected destination countries:



E.76 To preserve the lower bounding nature of this estimate, we only include drawback if it is claimed for dispatch by a business not part of the Large Business Service (LBS). The value of these drawback claims are converted to volumes of beer by dividing by the average duty rate for beer.

E.77 The volume is then adjusted using the proportion of dispatches going to the selected EU countries. This gives an estimate of the amount of beer going to the selected countries with drawback claimed by small and medium sized enterprises:

$$\text{Selected Drawback} = \frac{\text{Value of Drawback Claims (non LBS, for Dispatch)}}{\text{Average Beer Duty Rate}} * \text{Percentage of Dispatches going to Selected EU Countries}$$

Legitimate demand in selected EU countries

E.78 Some of the beer moved to the selected EU countries will be supplying legitimate demand within those countries, rather than being diverted to the UK illicit market. We make one overall estimate of legitimate demand in the selected EU countries, and subtract it from the sum of selected beer dispatches and selected beer for drawback.

E.79 We have purposely over-estimated legitimate demand as this produces an under-estimate of the illicit market, in order to maintain the lower bounding nature of the tax gap estimate.

E.80 The estimate of legitimate demand in other countries includes:

- cross-border shopping bought by UK residents; and
- legitimate consumption abroad, which may include: consumption by UK expatriates; consumption by UK residents on vacation or while working abroad; consumption by foreign nationals; beer in transit to other countries.

$$\text{Legitimate Demand in Selected EU Countries} = \text{Cross-Border Shopping by UK Residents} + \text{Legitimate Consumption Abroad}$$

E.81 Cross-border shopping is estimated using data from the IPS. More detail is provided in paragraph E.96. Only passengers from the selected EU countries are included.

Legitimate consumption of UK produced beer abroad

E.82 We could not find reliable data regarding legitimate consumption of UK produced beer abroad. So, we estimate it based on the assumption that in a certain year when the illicit market upper estimate was low, there was negligible illicit activity so all dispatches to the selected EU countries were consumed legitimately. This is likely to provide an over-estimate of legitimate consumption abroad, as there would likely be some level of fraud in these years. This supports the methodology being a lower estimate of the tax gap.

E.83 For stability, an average of two years is used: 2000-01 and 2001-02. For simplicity, we will refer to these two years as the 'base year'.

E.84 Brewers return data is not available for years prior to 2007. Consequently we use an alternative data source, UK trade data, to estimate dispatches in the base year.

E.85 In the base year we assume that all dispatches supply either cross-border shopping by UK residents or legitimate consumption abroad. We subtract an estimate of cross-

border shopping in the base year from dispatches in the base year; the remainder is assumed to be legitimate consumption abroad:

Legitimate Consumption Abroad	=	Dispatches to Selected EU Countries in Base Year	-	Cross-Border Shopping from Selected EU Countries in Base Year

E.86 We believe that UK trade data may under-estimate beer dispatches in the base year as it does not record certain types of beer movement. These include:

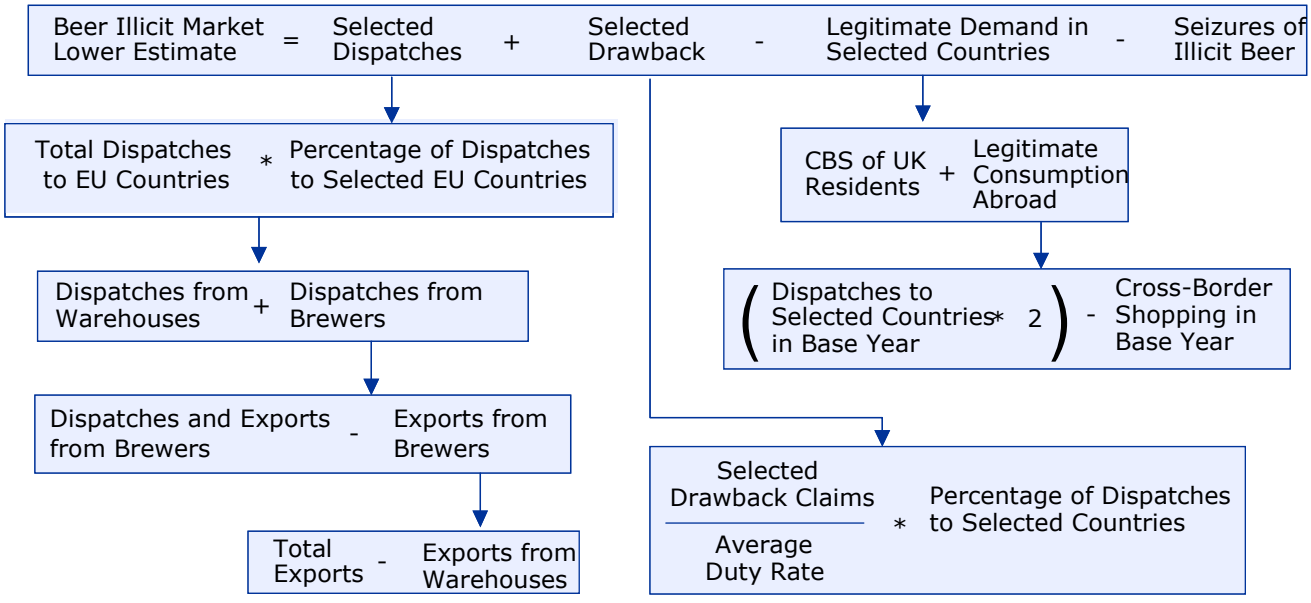
- goods in transit;
- deliveries to embassies; and
- deliveries to Navy, Army and Air Force Institutes (NAAFI).

E.87 Additionally, as the threshold for recording goods on UK trade data is relatively high in beer terms, beer may have a higher proportion of small traders than other commodities. This may mean the standard adjustment applied to UK trade data to account for small traders may be too low for beer.

E.88 To account for these concerns we uplift the UK trade data. There is very little evidence to indicate the actual level of under-reporting. Comparison with our calculated dispatches in later years led us to apply a factor of two. Again, the high level of this adjustment may result in this being an over-estimate, but this is in keeping with the lower bounding methodology for the tax gap.

Illicit market lower estimate

E.89 In summary, the illicit market is estimated as:



Implied mid-point estimate

E.90 The implied mid-point estimate is calculated as the average of the upper and lower estimates. It is only intended as an indicator of long-term trend – the true tax gap could lie anywhere within the bounds.

E.91 The upper and lower estimates should be interpreted as indicators of long-term trend, rather than precise estimates of the level or of year-on-year changes. The bounds do

not take account of any systematic tendency to over- or under-estimate the size of the tax gap that might arise from the modelling assumptions.

Illicit market share

E.92 The direct estimate of the volume of illicit beer is converted into an estimate of the proportion of the total market that is supplied through the illicit market – the illicit market share:

$$\text{Illicit Market Share} = \frac{\text{Illicit Market}}{\text{Total UK Consumption}} * 100$$

Total UK consumption

E.93 Total UK consumption is calculated as the sum of legitimate UK consumption and the illicit market:

$$\text{Total UK Consumption} = \text{Legitimate UK Consumption} + \text{Illicit Market}$$

Legitimate UK consumption

E.94 Estimates of legitimate consumption have two elements:

- UK duty paid consumption; and
- Cross-border shopping and duty free.

UK duty paid consumption

E.95 Estimates of UK duty paid consumption are taken directly from returns to HMRC (clearances data) of the volumes of beer on which duty has been paid, along with the actual amounts of money.

Cross-border shopping and duty free

E.96 Estimates of the consumption of goods purchased as cross-border shopping are based on figures produced from the IPS. This provides estimates of the volume of beer brought back by UK travellers. The IPS figures are weighted by the ONS to represent the total cross-border shopping entering the UK.

E.97 This estimate does not cover sales made on-board ferries, so commercially provided data for deliveries of beer to ferries are used to supplement the cross-border shopping estimate, and provide a complete figure.

E.98 An estimate of the volume of duty free beer brought into the country is calculated in the same way, using passengers coming from outside the EU.

E.99 Cross-border shopping and duty free are estimated as:

$$\text{Cross-Border Shopping and Duty Free} = \text{Goods Bought Overseas} + \text{Goods Bought On-board Ferries} + \text{Duty Free}$$

Wine central estimate

E.100 The wine tax gap is an experimental top-down methodology that estimates the tax gap for wine, sparkling wines and made wines. For 2013-14 and 2014-15 an estimate using this methodology was not possible due to changes in data sources. An illustrative result, based on the average of the two previous years' estimates, is given and the methodology below relates to estimates prior to 2013-14.

E.101 The wine tax gap is the same as the spirits tax gap with the only differences listed below:

- Wine prices are taken as per litre weighted average of wine, sparkling wine and made wine;
- Wine clearances are the sum of wine, sparkling wine and made wine;
- Off-licence wine expenditure is the sum of wine, sparkling wine and made wine as recorded in the FSS;
- Off-licence wine consumption is calculated as for the spirits tax gap.

On-licence Consumption = Off-licence Consumption * Commercial Data Weighting

E.102 On-licence consumption is estimated from off-licence consumption. We know from commercially available data what the proportion each year of on-licence trade is relative to off-licence trade. We use this factor to estimate the on-licence volume:

E.103 The commercial data weighting is calculated as:

$$\text{Commercial Data Weighting} = \frac{\text{On-licence Proportion}}{\text{Off-licence Proportion}}$$

E.104 We calculate total consumption as:

$$\text{Total Consumption} = (\text{Off-licence Consumption} * \text{Commercial Data Weighting}) + \text{Off-licence Consumption}$$

E.105 The uplift for wine is estimated using data from the year 2000.

E.106 Using a random Her Majesty's Customs and Excise passenger and freight survey in the year 2000, we are able to estimate the illicit market for the year 2000. This, in addition to cross-border shopping and clearances, allows us to estimate the total wine consumption for 2000 as:

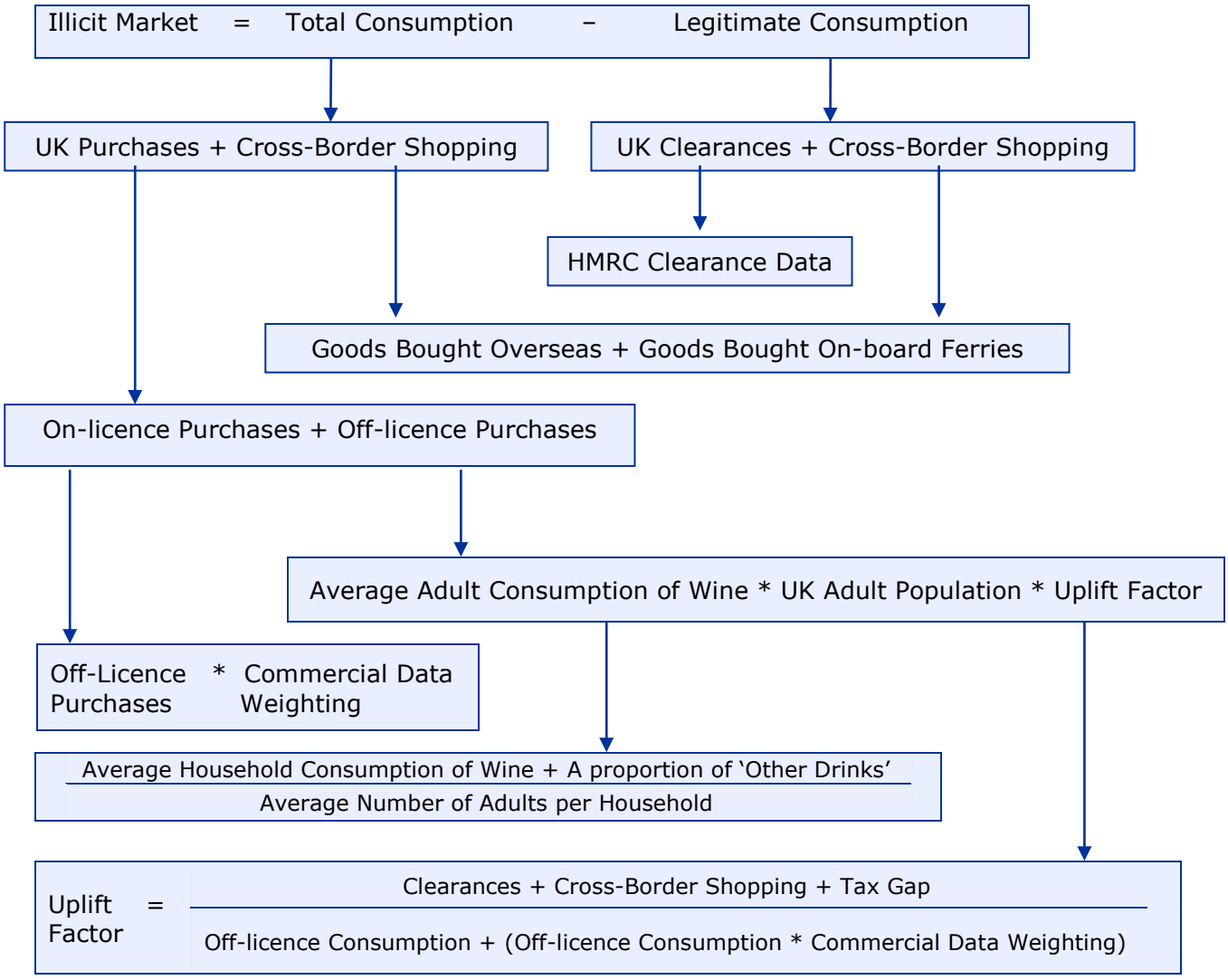
$$\text{Total Consumption}_{00} = \text{Clearances}_{00} + \text{Cross-Border Shopping}_{00} + \text{Illicit Market}_{00}$$

E.107 Knowing the total consumption for 2000 and the FSS driven estimates of total consumption allows us to infer an under reporting uplift as follows:

$$\text{Uplift Factor} = \frac{\text{Clearances} + \text{Cross-Border Shopping} + \text{Tax Gap}}{\text{Off-licence Consumption} + (\text{Off-licence Consumption} * \text{Commercial Data Weighting})}$$

Summary of methodology

E.108 A summary of the calculation for the illicit market is shown below:



Chapter F: Tobacco

General methodology

F.1 The estimate of the illicit market for tobacco is produced using a top-down methodology. That is, first we estimate total consumption, and then we subtract legitimate consumption. The residual is estimated to be the illicit market.

$$\text{Illicit Market} = \text{Total Consumption} - \text{Legitimate Consumption}$$

F.2 The above equation provides an estimate of the volume of goods supplied through the illicit market. This is then turned into an estimate of the proportion of the total market that is supplied through the illicit market.

$$\text{Illicit Market Share} = \frac{\text{Illicit Market}}{\text{Total Consumption}} * 100$$

F.3 Revenue losses associated with the illicit market are then estimated by combining the illicit market share information with price data, excise duty and VAT rate information.

F.4 Details of the methodology for both cigarettes and hand-rolling tobacco are provided in the following sections.

Cigarette estimates

Methodology

F.5 The estimate of the illicit market for cigarettes is produced using a top-down methodology as described in paragraphs F.1 to F.4.

F.6 Details of the estimation of total consumption and of legitimate consumption are provided in the subsequent sections.

Total consumption

F.7 The total consumption in any given year is calculated using:

- estimates of prevalence (proportion of the population that smokes cigarettes) from the General Lifestyle Survey (GLF), the Opinions and Lifestyle Survey (OPN) and Health Survey for England (HSE);
- estimates of cigarette consumption per smoker from GLF, OPN and HSE;
- estimates of the adult population (16+) from the ONS; and
- an uplift factor covering under-reporting.

F.8 The estimate of total UK consumption of cigarettes for each year is based on the estimates of cigarette smoking prevalence and consumption per smoker for Declared and Undeclared Smokers.

F.9 In general, most smokers admit that they smoke. Up to the end of 2011, the prevalence and consumption per smoker of these Declared Smokers was obtained from the GLF, formerly known as the General Household Survey (GHS). The GLF ceased at the end of 2011, so from 2012 onwards this was estimated using the OPN. This is a similar and well established survey, and has been used in calculations of the tax gap for hand-rolling tobacco in previous years.

F.10 The GLF and OPN are both administered by the ONS, but the main difference is the presence of dual smokers. These are respondents in the OPN survey that said they smoked both cigarettes and hand-rolling tobacco. This was not an option for respondents in the GLF.

F.11 There are some smokers who, for whatever reason, do not admit that they smoke. The prevalence and consumption of Undeclared Smokers in the non-smoking population can be obtained from the HSE.

F.12 From 2013, the methodology for calculating the upper and lower bounds for cigarette consumption has been improved. Previously the upper bound was based on consumption in the base year, with the lower bound based on the consumption in the reference year. As time passed, and as smoking habits changed, this assumption gave increasingly extreme and unrealistic bounds.

F.13 The new method for calculating the bounds is described below and is based on the same assumptions used for producing the hand-rolling tobacco estimates. The methodology and assumptions for the cigarette model has been retrospectively applied to all years back to 2000-01. As a result, the figures are produced on a consistent basis and trends in the illicit market can be directly compared.

Uplift factor

F.14 The survey data for tobacco consumption are subject to under-reporting due to the self-reporting nature of the surveys. An uplift factor is necessary to correct for the bias. This uplift factor is calculated by taking estimates of total consumption from the GLF in a base year, and comparing with consumption based on actual clearances to HMRC and an estimate of legitimately purchased cigarettes from abroad. We take a base year in which the illicit market can be measured using another source of data, and is believed to be small. For cigarettes, the year 1996-97 was used as this is the earliest year where we have results from the cross-Channel Smuggling Survey, and hence an estimate of the tax gap.

F.15 The uplift factor is defined as:

$$\text{Uplift Factor} = \frac{\text{Legitimate Consumption in 1996-97 (based on HMRC clearances and estimate of duty free/cross-border shopping)}}{\text{Total Consumption in 1996-97 (based on self-reported consumption from GLF survey)}}$$

F.16 Uncertainties in the data sets used to create the estimates mean that it cannot be ascertained with sufficient accuracy to produce a single point estimate of total consumption. So, the exercise is undertaken twice – once to produce an upper bound for total consumption, and once to produce a lower bound. This allows us to produce a range for total consumption that takes account of the uncertainty in the underlying data.

Upper and lower bounds for total consumption

F.17 The one difference between the upper and lower bound calculations is the treatment of dual smokers. In the upper bound calculation the majority of the dual smokers are considered to be cigarette smokers. In the lower bound estimate, we assume the majority of them smoke hand-rolling tobacco. This is explained further in the table below and the following section.

F.18 Upper and lower bound assumptions:

	Allocation of total tobacco consumption to cigarette consumption	
OPN Survey Options	**Upper bound assumption**	**Lower bound assumption**
Cigarettes Only	100%	100%
Dual Smokers: Cigarettes and hand-rolling tobacco, but mainly cigarettes	99%	51%
Dual Smokers: Cigarettes and hand-rolling tobacco, but mainly hand-rolling tobacco	49%	1%
Hand-rolling tobacco only	0%	0%

F.19 The **upper bound** of total cigarette consumption is calculated firstly by estimating consumption levels from smokers who only smoked cigarettes. This is added together with a maximum consumption of cigarettes that could be smoked by dual smokers. This will result in a highest possible estimate and can be treated as an upper bound of total cigarette consumption.

F.20 The **lower bound** of total cigarette consumption is calculated firstly by estimating consumption levels from smokers who only smoked cigarettes. This is added together with a minimum consumption of cigarettes that could be smoked by dual smokers. This will result in a lowest possible estimate and can be treated as a lower bound of total cigarette consumption.

F.21 Prior to 2012, the GLF was used as the base estimate for cigarette consumption. This was supplemented with OPN data on dual smokers where this was added/subtracted to obtain the upper and lower bounds.

Legitimate consumption

F.22 Estimates of legitimate consumption have two elements:

- UK duty paid consumption; and
- Cross-border and duty free shopping.

UK duty paid consumption

F.23 Estimates of UK duty paid consumption are taken directly from returns to HMRC (clearance data) on the volumes of cigarettes on which duty has been paid, along with the actual amounts of money. In general these can be used directly; however there is a complication around the duty and VAT changes associated with the Budget that usually happens at the end of each financial year. Not all cigarettes cleared in the months immediately before a Budget will be consumed before the duty increase, meaning that the figures do not match the consumption estimates. To correct for this, a monthly average is taken to cover the period before and after the Budget.

Cross-border shopping and duty free

F.24 Estimates of consumption of goods purchased as cross-border shopping are based on figures produced by the IPS. This provides estimates of the number of cigarettes an average adult traveller brings into the country, separately for air and sea passengers. The IPS figures are weighted by the ONS, scaling up the survey data to represent the total cross-border shopping entering the UK.

F.25 This estimate, however, does not cover sales made on-board ferries, so commercially provided data about deliveries of cigarettes to ferries are used to supplement the cross-border shopping estimate.

F.26 Duty Free cigarettes brought into the UK are also estimated from the IPS, using passengers coming back from outside the EU.

F.27 Legitimate consumption can be summarised as:

Legitimate Consumption	=	UK Duty Paid Consumption	+	Cross-Border Shopping	+	Duty Free

Conversion to monetary losses

F.28 Revenue losses associated with the illicit market are then estimated by combining the illicit market share information with price data and duty and VAT rate information.

F.29 All calculations to this point have been made on volumes of cigarettes. Volumes are converted to estimates of revenue using:

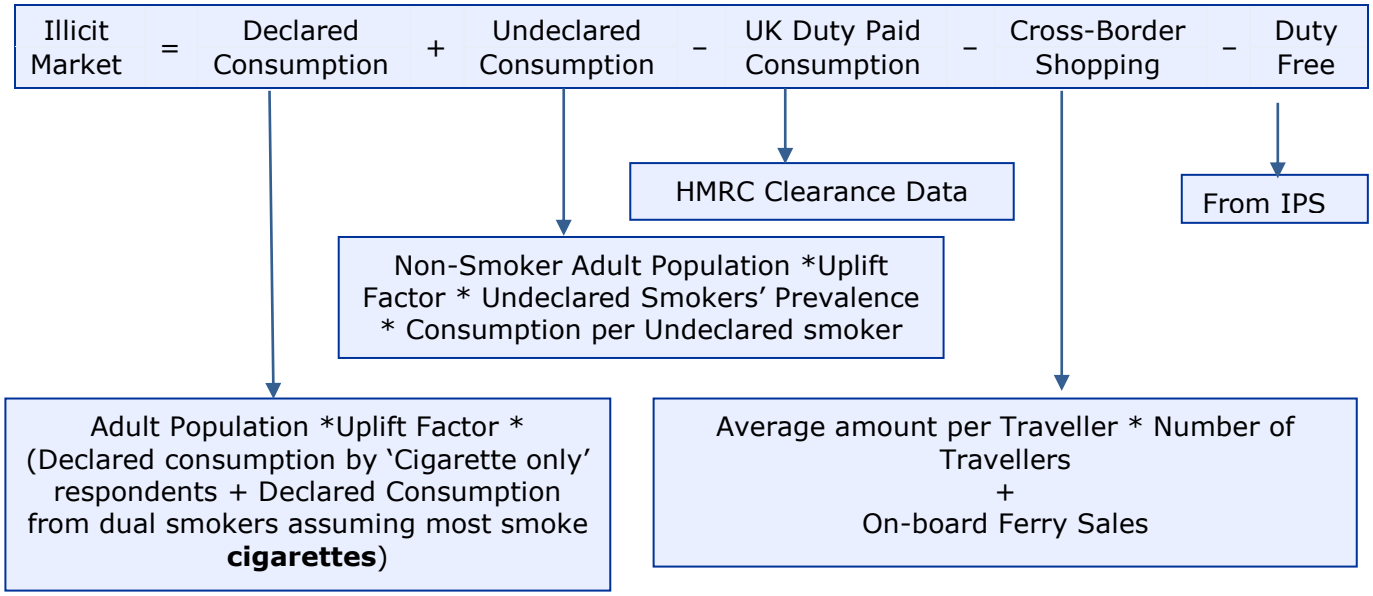
Losses = (Specific Duty + (AD Valorem Duty + VAT Fraction) * Average Price) * Illicit Volume

F.30 The average price is taken as the weighted average price (WAP) of all cigarettes that were UK duty paid. The WAP is calculated by weighting the retail price of each product by the share of clearances in the cigarette market.

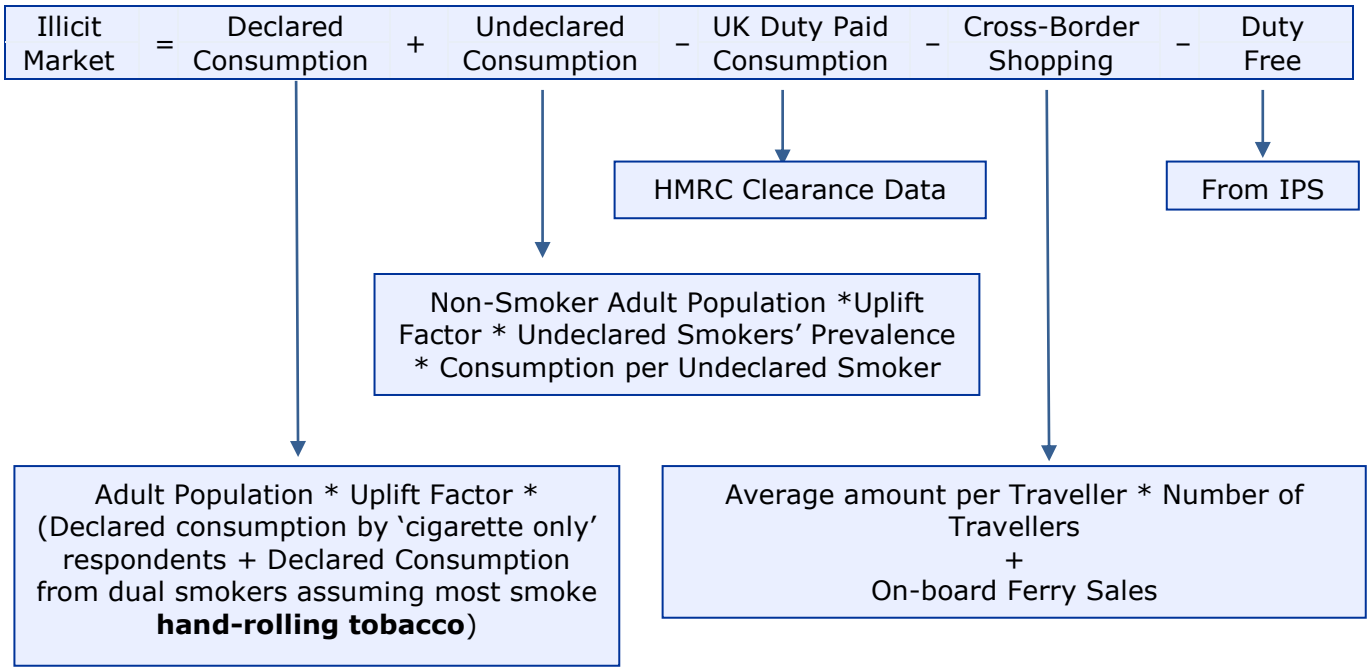
F.31 The VAT fraction is the portion of the retail price that is VAT – for example, a 20 per cent VAT rate is equivalent to a 1/6 VAT fraction. VAT fractions are calculated annually to capture changes in the VAT rate. This method assumes that VAT is also lost on all purchases. As, in some cases, the final illicit product is sold in legitimate outlets this may not always be the case, and this will be an over-estimate of losses.

Summary of methodology

F.32 A summary of the calculation of the illicit market **Upper Bound** is:



F.33 A summary of the calculation of the illicit market **Lower Bound** is:



Hand-rolling tobacco estimates

Methodology

F.34 The estimate of the illicit market for hand-rolling tobacco is produced using a top-down methodology as described in paragraphs F.1 to F.4.

F.35 Details of the estimation of total consumption and of legitimate consumption are provided in the subsequent sections.

Total consumption

F.36 The total consumption in any given year is calculated using:

- estimates of prevalence (proportion of the population that smokes hand-rolling tobacco) from the GLF, OPN and HSE;
- estimates of hand-rolling tobacco consumption per smoker from GLF, OPN and HSE;
- estimates of the adult population (16+) from the ONS; and
- an uplift factor covering under-reporting.

F.37 The estimate of total UK consumption of hand-rolling tobacco for each year is based on the estimates of hand-rolling tobacco smoking prevalence and consumption per smoker for Declared and Undeclared Smokers.

F.38 In general, most smokers admit that they smoke. The prevalence and consumption per smoker of these Declared Smokers was obtained from the GLF until 2011. As with the cigarette tax gap, from 2012 the OPN was used.

F.39 There are some smokers who, for whatever reason, do not admit that they smoke. The prevalence and consumption of Undeclared Smokers in the non-smoking population can be obtained from the HSE.

Uplift factor

F.40 The survey data for tobacco consumption are subject to under-reporting due to the self-reporting nature of the surveys. An uplift factor is necessary to correct for the bias. This uplift factor is calculated by taking estimates of consumption in a base year, and comparing these with independent estimates of total consumption. To do this we take a year in which there is believed to be little or no illicit market and use HMRC clearance data, duty free and cross-border shopping estimates as a true indication of total consumption – for hand-rolling tobacco, 1984-85 is used.

F.41 Ideally, in order to reduce the impact of sampling error from the GLF, we would derive the uplift factor using the average of three years' data. However the GLF in the 1980s only collected data on smoking prevalence in alternate years. This means that we do not have data for 1983-84 and 1985-86, and we have to rely on data from the single year 1984-85. This will increase random variation, and hence the resultant confidence intervals. However, figures for legitimate consumption do exist for the three years, so an average for legitimate consumption is calculated for 1983-84, 1984-85 and 1985-86. The uplift factor is defined as:

$$\text{Uplift Factor} = \frac{\text{Average Consumption in 1983-84 to 1985-86 (based on HMRC clearances and duty free/cross-border shopping)}}{\text{Total Consumption in 1984-85 (based on self-reported consumption from GLF survey)}}$$

F.42 Uncertainties in the data sets used to create these estimates mean that it is only possible to provide estimates in the form of a range within which the level of the illicit market is likely to fall. So, the exercise is undertaken twice – once to produce an upper bound for total consumption, and once to produce a lower bound. This allows us to produce a range for total consumption that takes account of the uncertainty in the underlying data.

Upper and lower bounds for total consumption

F.43 The only difference between the upper and lower bound consumption calculations is the treatment of dual smokers. In the upper bound calculation the majority of the dual smokers are considered to be cigarette smokers. In the lower bound estimate, we assume the majority of them smoke hand-rolling tobacco. This is explained further in the table below and the following section. Upper and lower bound assumptions:

	Allocation of total tobacco consumption to hand-rolling tobacco consumption	
OPN Survey Options	**Upper bound assumption**	**Lower bound assumption**
Cigarettes Only	0%	0%
Dual Smokers: Cigarettes and hand-rolling tobacco, but mainly cigarettes	49%	1%
Dual Smokers: Cigarettes and hand-rolling tobacco, but mainly hand-rolling tobacco	99%	51%
Hand-rolling tobacco only	100%	100%

F.44 The **upper bound** of total hand-rolling tobacco consumption is calculated firstly by estimating consumption levels from smokers who only smoked hand-rolling tobacco. This is added together with a maximum consumption of hand-rolling tobacco that could be smoked by dual smokers. This will result in a highest possible estimate and can be treated as an upper bound of total hand-rolling tobacco consumption.

F.45 The **lower bound** of total hand-rolling tobacco consumption is calculated firstly by estimating consumption levels from smokers who only smoked hand-rolling tobacco. This is added together with a minimum consumption of hand-rolling tobacco that could be smoked by dual smokers. This will result in a lowest possible estimate and can be treated as a lower bound of total hand-rolling tobacco consumption.

F.46 Prior to 2012, the GLF was used as the base estimate for hand-rolling tobacco consumption. This was supplemented with OPN data on dual smokers where this was added/subtracted to obtain the upper and lower bounds.

Legitimate consumption

F.47 Estimates of legitimate consumption have two elements:

- UK duty paid consumption; and
- Cross-border and duty free shopping.

UK duty paid consumption

F.48 Estimates of UK duty paid consumption are taken directly from returns to HMRC (clearances data) on the volumes of hand-rolling tobacco on which duty has been paid, along with the actual amounts of money. In general these can be used directly; however, as with cigarettes, there is a complication around the duty and VAT changes associated with the Budget that usually happens at the end of each financial year. Not all hand-rolling tobacco cleared in the months immediately before a Budget will be consumed before the duty increase, meaning that the figures do not match the consumption estimates. To correct for this, a monthly average is taken to cover the period before and after the Budget.

Cross-border shopping and duty free

F.49 Estimates of the consumption of goods purchased as cross-border shopping are based on figures produced by the IPS. This provides estimates of the amount of hand-rolling tobacco an average adult traveller brings into the country, separately for air and sea passengers. The IPS figures are weighted by the ONS, scaling up the survey data to represent the total cross-border shopping entering the UK.

F.50 This estimate, however, does not cover sales made on board ferries, so commercially provided data about deliveries of hand-rolling tobacco to ferries are used to supplement the cross-border shopping estimate.

F.51 Figures from the IPS are not used directly to assess the level of cross-border shopping. Cross-border shopping is legitimate only if it is for personal consumption and only legitimate cross-border shopping is included in these estimates. There is no clear level above which the goods are regarded as smuggled instead of for personal consumption. It is by varying the assumptions that produces the higher and lower bounds for cross-border shopping.

F.52 The two differences between the upper and lower bound calculations for cross-border shopping are by changing:

- the definition of a smuggler for upper and lower bound; and
- whether or not to include non-respondents in the estimates.

Upper bound for cross-border shopping

F.53 These factors lead to a higher estimate for cross-border shopping by assuming:

- that anyone who is coming back from EU Countries and agrees to answer the IPS questions is in fact shopping and not smuggling; and
- that all non-respondents will on average be carrying the same amount as those who complete the survey.

F.54 This leads to an estimate defined by:

Upper Cross-Border Shopping	=	High Average Hand-Rolling Tobacco per Traveller from IPS	*	Number of Travellers

Lower bound for cross-border shopping

F.55 It is known that some smugglers repeatedly carry the exact amount of hand-rolling tobacco[1] that HMRC publishes in its guidelines over which it might be interpreted as for commercial use. So by considering a lower cut-off point in the analysis of cross-border shopping, we exclude this type of smuggling from our estimates of cross-border shopping.

F.56 The lower estimate for cross-border shopping has been created by assuming that:

- anyone who is carrying over 2.75 kg of hand-rolling tobacco is smuggling; and
- all non-respondents are not carrying hand-rolling tobacco.

F.57 This leads to an estimate defined by:

Lower Cross-Border Shopping	=	Low Average Hand-Rolling Tobacco per Traveller from IPS	*	Number of Travellers

F.58 Duty free hand-rolling tobacco brought into the UK is also estimated from the IPS, using passengers coming back from outside the EU.

F.59 Legitimate consumption can be summarised as:

Legitimate Consumption	=	UK Duty Paid Consumption	+	Cross-Border Shopping	+	Duty Free

Conversion to monetary losses

F.60 All calculations to this point have been made on volumes of hand-rolling tobacco. Volumes are converted to estimates of revenue losses using:

Losses = (Specific Duty + VAT Fraction * Average Price) * Illicit Volume

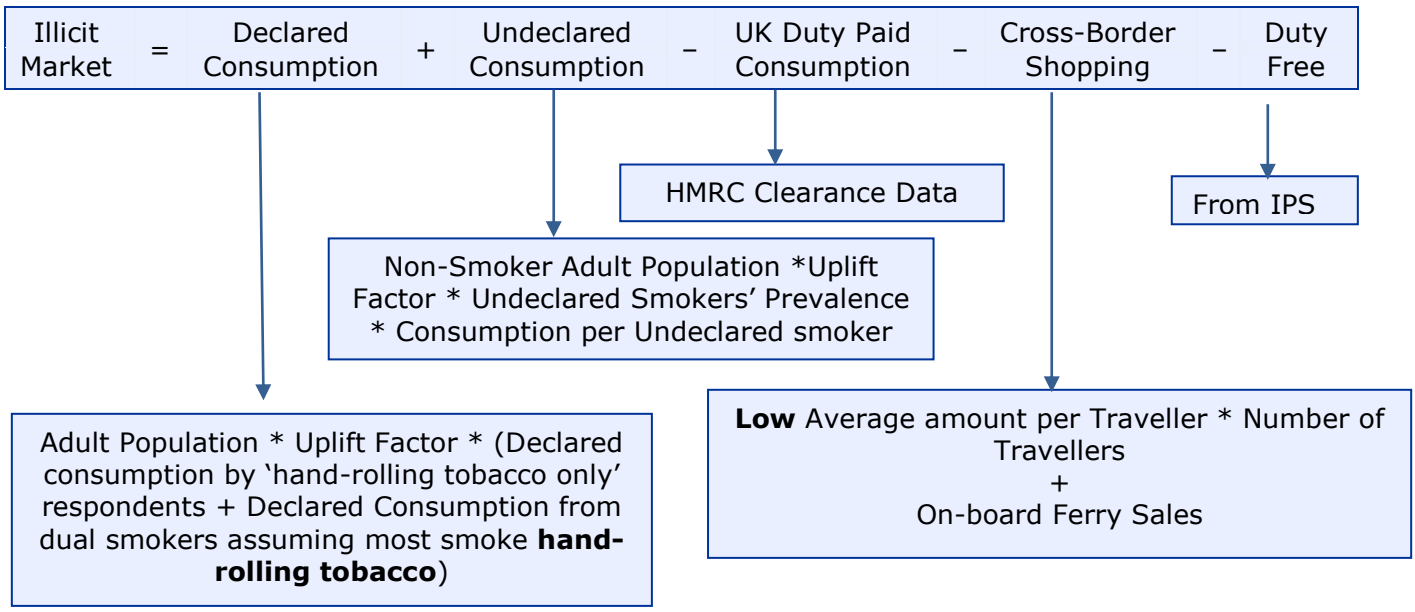
F.61 From 2012-13, the average price is taken as the WAP of all hand-rolling tobacco that was UK duty paid. The WAP is calculated by weighting the retail price of each product by the share of clearances in the hand-rolling tobacco market. WAP data for hand-rolling tobacco is not available prior to 2012-13 so the price of the most popular brand of hand-rolling tobacco was used.

F.62 The VAT fraction is the portion of the retail price that is VAT – for example, a 20 per cent VAT rate is equivalent to a 1/6 VAT fraction. VAT fractions are calculated annually to capture changes in the VAT rate. This method assumes that VAT is also lost on all purchases. As, in some cases, the final illicit product is sold in legitimate outlets this may not always be the case, and this will be an over-estimate of losses.

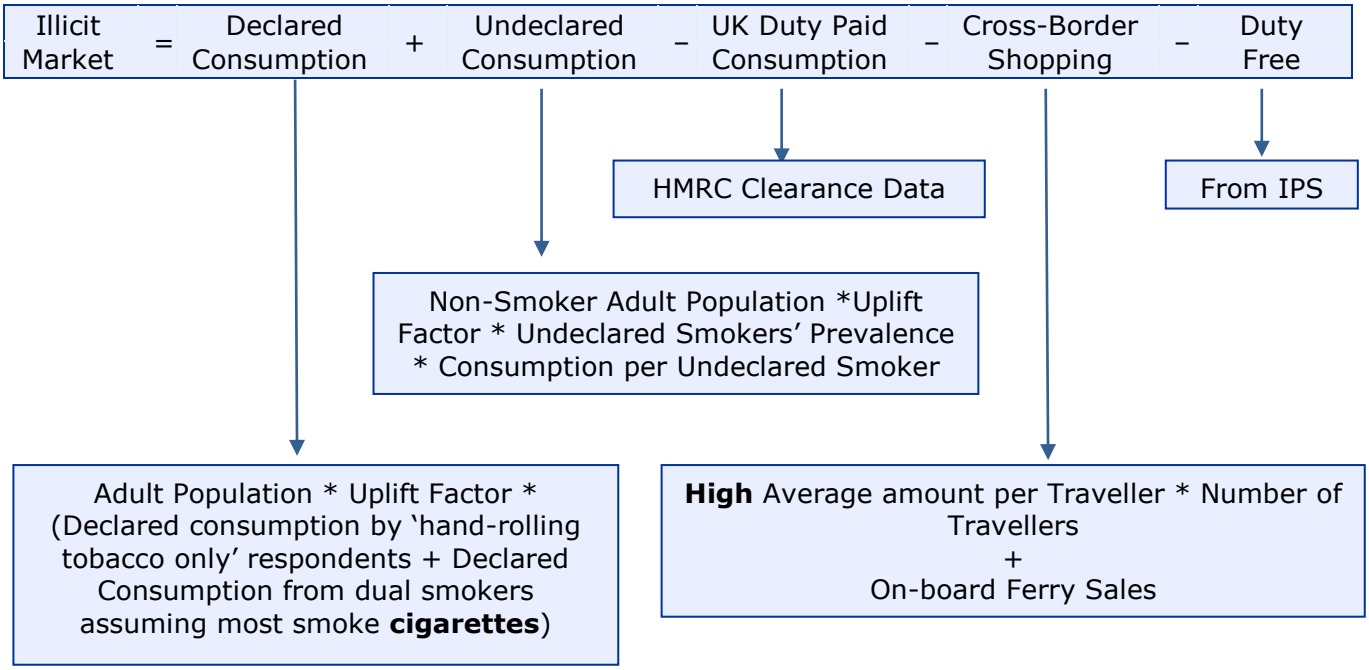
[1] Until 2011, the amount that could be brought in from other EU member states was 3 kg. This level has also been used for calculating upper and lower bounds in following years.

Summary of methodology

F.63 A summary of the calculation of the illicit market **Upper Bound** is:



F.64 A summary of the calculation of the illicit market **Lower Bound** is:



Chapter G: Oils

G.1 2013-14 GB diesel estimates have been carried forward for 2014-15. HMRC is exploring alternative data sources in order to develop a new method to estimate the GB diesel tax gap.

G.2 2013-14 Northern Ireland diesel estimates have been carried forward for 2014-15. HMRC is exploring alternative data sources in order to develop a new method to estimate the Northern Ireland diesel tax gap.

General methodology

The oils markets in Great Britain

Methodology

G.3 The estimate of the illicit market for oils is produced using a top-down methodology. That is, the estimate is produced by first estimating total consumption, and then subtracting legitimate consumption, the residual being the illicit market:

$$\text{Illicit Market} = \text{Total Consumption} - \text{Legitimate Consumption}$$

G.4 The above equation provides an estimate of the volume of goods supplied through the illicit market. This is then turned into an estimate of the proportion of the total market that is supplied through the illicit market – the illicit market share:

$$\text{Illicit Market Share} = \frac{\text{Illicit Market}}{\text{Total Consumption}} * 100$$

G.5 Revenue losses associated with the illicit market are then estimated by combining the illicit market share information with price data, excise duty and VAT rate information.

G.6 Details of the estimation of total consumption and of legitimate consumption are provided in the following sections.

Total consumption

G.7 The total consumption in any given year is calculated using:

- estimates of car and van stocks from Vehicle Licensing Statistics, published by the Department for Transport (DfT);
- estimates of the relative distances travelled by petrol and diesel cars and vans based on Road Track data;
- estimates of the total distances travelled by cars, vans and other non-heavy goods vehicles from Road Traffic and Congestion in GB, published by the DfT;
- estimates of the total distances travelled by buses and motorcycles from Road Statistics: Traffic, Speeds and Congestion (formerly Road Traffic Statistics), published by the DfT;

- estimates of the fuel efficiency of petrol and diesel cars, vans, buses and motorcycles, calculated using the National Travel Survey (NTS), published by the DfT, and data provided by Atmospheric Emissions Agency Technology (AEAT[2]); and

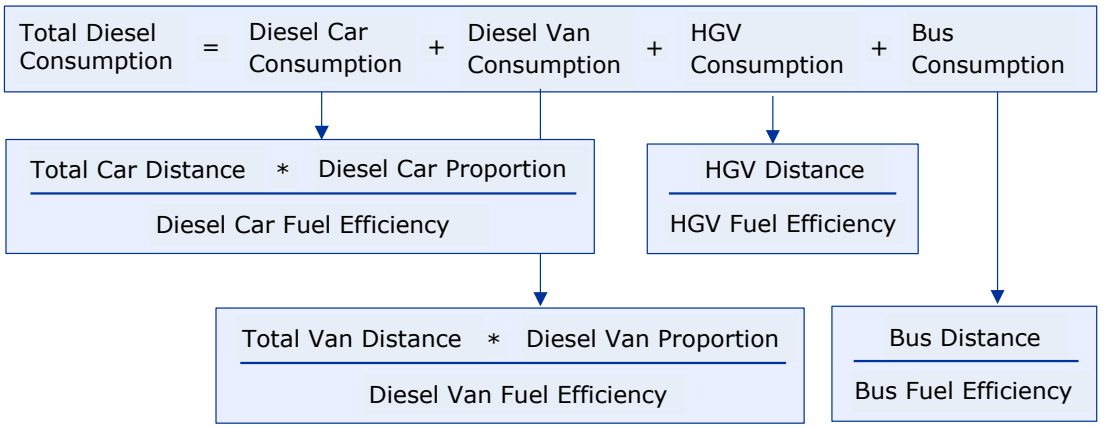
- estimates of Heavy Goods Vehicles (HGV) stocks, total distances travelled and fuel efficiency from the Road Freight Statistics, published by the DfT.

G.8 The total consumption of oil is calculated by dividing the total distance travelled by each vehicle type by the fuel efficiency of that vehicle type, and combining the fuel consumption of all vehicle types for each year. The only difference between the methodologies for the diesel and petrol markets is the vehicle types that are included in each market.

G.9 Cars and vans contribute to both the diesel and petrol markets. The proportion that they contribute to each market is calculated from the relative distances travelled by those vehicles. The relative distances are calculated in such a way as to make the GB petrol illicit market negligible. This gives a varying ratio over time, which is then used in the calculation of the GB diesel total consumption.

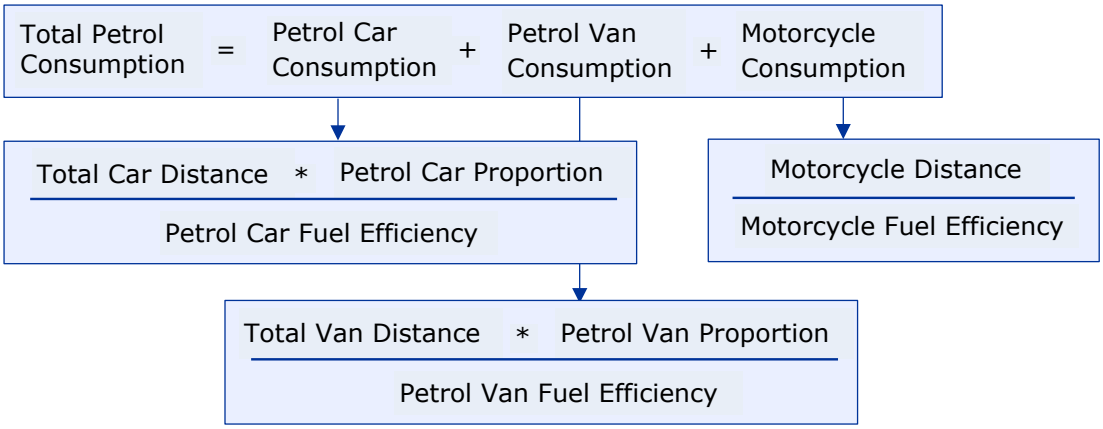
G.10 The fuel efficiency data provided by AEAT is laboratory test data, which means the fuel efficiencies are higher than expected from road travel. This data is revised downwards using historical road travel data from NTS.

G.11 It is assumed that HGVs and buses only have diesel engines. This leads to an estimate of diesel consumption defined by:



[2] http://www.aeat.co.uk/cms/

G.12 It is assumed that motorcycles only have petrol engines. This leads to an estimate of petrol consumption defined by:



Legitimate consumption

G.13 There are two elements of legitimate consumption:

- UK duty paid; and
- Cross-Border Shopping.

UK duty paid consumption

G.14 Estimates of UK duty paid consumption are taken directly from returns to HMRC (clearances data) on the volume of petrol and diesel released for consumption in the UK. This is split between consumption in GB and Northern Ireland (NI) using data on deliveries to fuel stations obtained from the Department of Energy and Climate Change (DECC), and the Department for Regional Development (DRDNI).

G.15 The HMRC clearance data includes the UK duty paid consumption of bio-fuels. The petrol data includes bio-ethanol and the diesel data includes bio-diesel.

G.16 For 2012-13 there was an improvement in the methodology used to estimate the GB diesel tax gap as a result of additional data obtained on diesel consumption. An element of uncertainty in diesel consumed in road transportation has now been introduced to reflect diesel that is wasted or unused, and diesel that is used for domestic purposes (e.g. grass cutting) and in non-agricultural machinery (e.g. in waterways). Data on the level of uncertainty was obtained from the AEA.

G.17 The introduction of uncertainty in diesel consumption has led to a revision in the central and lower and upper bound estimates of the GB diesel tax gap over the past years.

Cross-border shopping

G.18 The total cross-border shopping in any year is calculated using:

- estimates of the number of HGVs leaving GB for mainland Europe from Goods Vehicle Traffic to Mainland Europe, published by the DfT;
- estimates of the number of HGVs leaving GB for the Republic of Ireland (RoI) from Maritime Statistics, published by the DfT;
- estimates of the number of buses travelling on international routes from Maritime Statistics, published by the DfT; and

- estimates of the net amount of fuel brought into GB per vehicle, based on the 2009 Survey of UK Registered Heavy Goods Vehicles in GB, conducted by AECOM.

G.19 It is assumed that only HGV and bus traffic contribute significantly to cross-border shopping and so cross-border shopping only contributes to the diesel estimate.

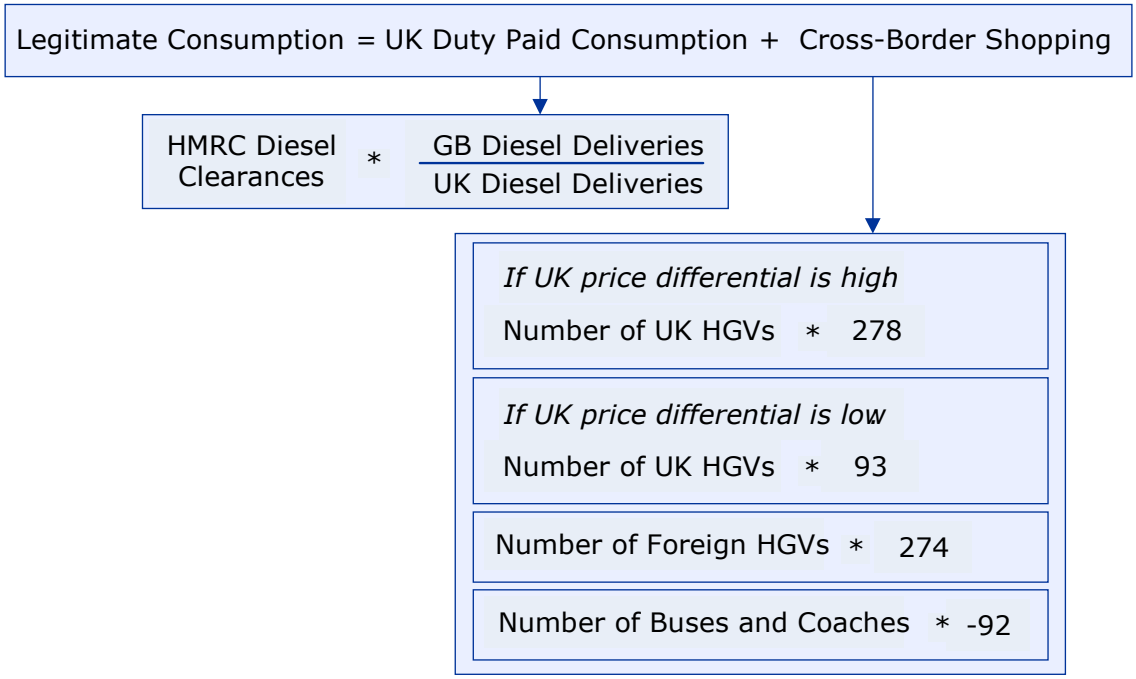
G.20 Whilst the HGV numbers published by the DfT indicate the traffic leaving GB, it is a good proxy of the traffic entering GB. The bus numbers cover both inward and outward travel, so these figures are divided by two to produce the inward travel figures.

G.21 The total volume of cross-border shopping is calculated by multiplying the cross-border traffic volumes by the estimated net amount of fuel brought back per vehicle.

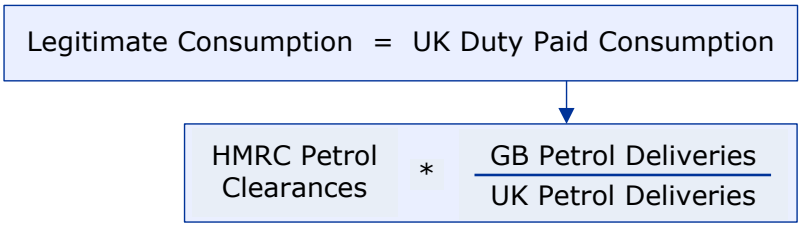
G.22 The 2009 survey shows that the fuel price differential between the UK and Europe also influences the volume of fuel brought back. The cross-border shopping is calculated as follows:

- if the GB price is more than 20 pence higher than France, UK registered HGVs travelling to Europe bring back a high volume of fuel;
- if the GB price is less than 20 pence higher than France, UK registered HGVs travelling to Europe bring back a lower volume of fuel;
- if the GB price is more than 20 pence higher than the RoI UK registered HGVs travelling to the RoI bring back a high volume of fuel;
- if the GB price is less than 20 pence higher than the RoI, UK registered HGVs travelling to the RoI bring back a lower volume of fuel;
- foreign registered HGVs all bring back the same volume of fuel; and
- the net amount of fuel cross-border shopped by buses and coaches was found to be negative i.e. buses and coaches are net exporters.

G.23 The legitimate consumption of diesel can be summarised as:



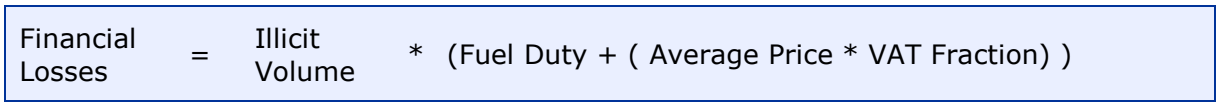
G.24 The legitimate consumption of petrol can be summarised as:



Conversion to monetary losses

G.25 Revenue losses associated with the illicit market are then estimated by combining the illicit market share information with price data and duty and VAT rate information.

G.26 All calculations to this point have been made on volumes of oil. Volumes are converted to estimates of revenue losses using:



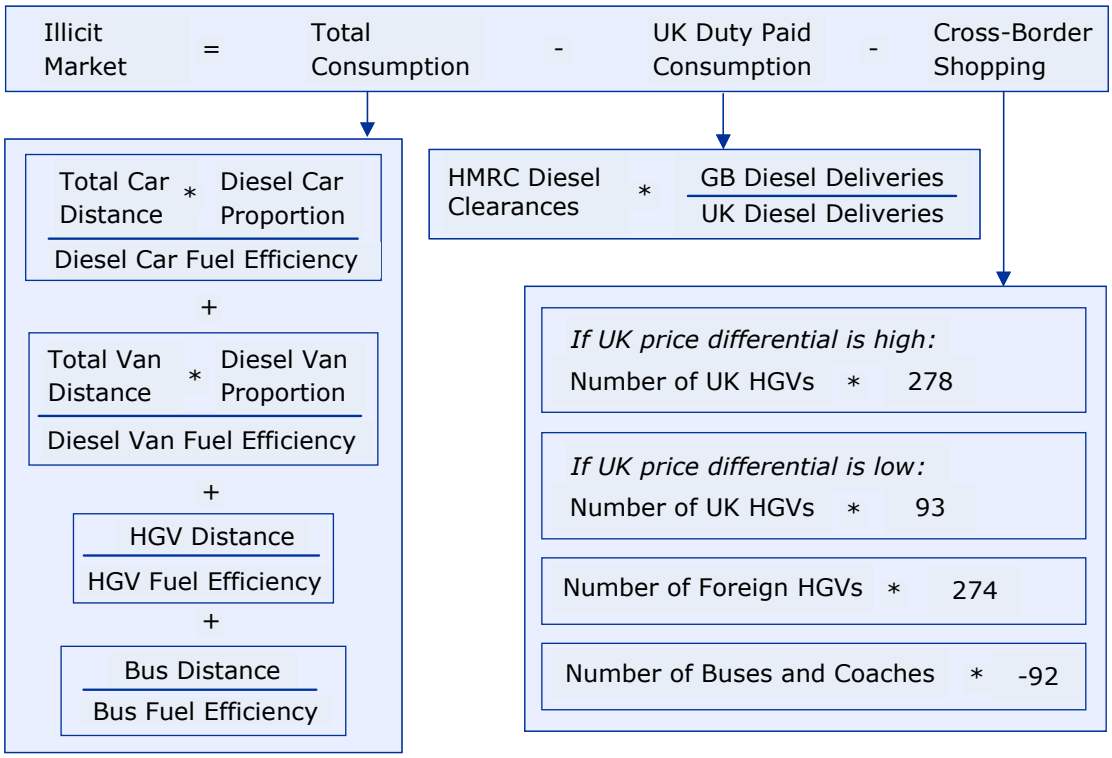
G.27 The typical price of different grades of oil is published on a monthly basis by DECC. An average price for petrol and diesel is then calculated by weighting the DECC prices by the HMRC clearance volumes of the different grades.

G.28 Similarly, the average duty is calculated from the duty rates published by HMRC and weighted by the HMRC clearance volumes.

G.29 The VAT fraction is the portion of the retail price that is VAT – for example, a 20 per cent VAT rate is equivalent to a 1/6 VAT fraction.

Summary of methodology

G.30 A summary of the calculation of the GB diesel illicit market is:



The oils markets in Northern Ireland

Methodology

G.31 Unlike other excise goods, the illicit market for petrol is not directly estimated as it is not currently possible to estimate the level of cross-border shopping though it is assumed to be negligible, as it is in GB. Exploratory modelling has allowed for an estimate of the split between cross-border shopping and the illicit market for NI diesel.

G.32 The estimate of the non-UK duty paid (NUKDP) market for oils is produced using a top-down methodology, as described in paragraphs G.3 to G.6. Revenue losses associated with the illicit market are estimated by combining the illicit market information with price data, excise duty and VAT rate information.

G.33 Details of the estimation of total consumption and of legitimate consumption are provided in the following sections.

Total consumption

G.34 The total consumption in any given year is calculated using:

- Estimates of car and van stocks from Vehicle Licensing Statistics, published by the DfT;
- Estimates of HGV stocks from the Road Freight Statistics, published by the DfT;
- Estimates of the NI vehicle stocks from NI Transport Statistics, published by the DRDNI; and
- Estimates of the average fuel consumption of all vehicle types, taken from the GB oils models.

G.35 The total consumption of oil is calculated by multiplying the total stocks of each vehicle type by the average fuel consumption of that vehicle type and combining the fuel consumption of all vehicle types for each year. The only difference between the methodologies for the diesel and petrol markets is the vehicle types that are included in each market.

G.36 As there are no reliable data sources on distances travelled in NI, total consumption for NI is estimated from GB consumption. It is assumed that fuel consumption per vehicle in NI changes at the same rate as for those in GB, in other words the trend of NI fuel consumption is estimated by multiplying NI vehicle stocks by GB fuel consumption per vehicle for each year.

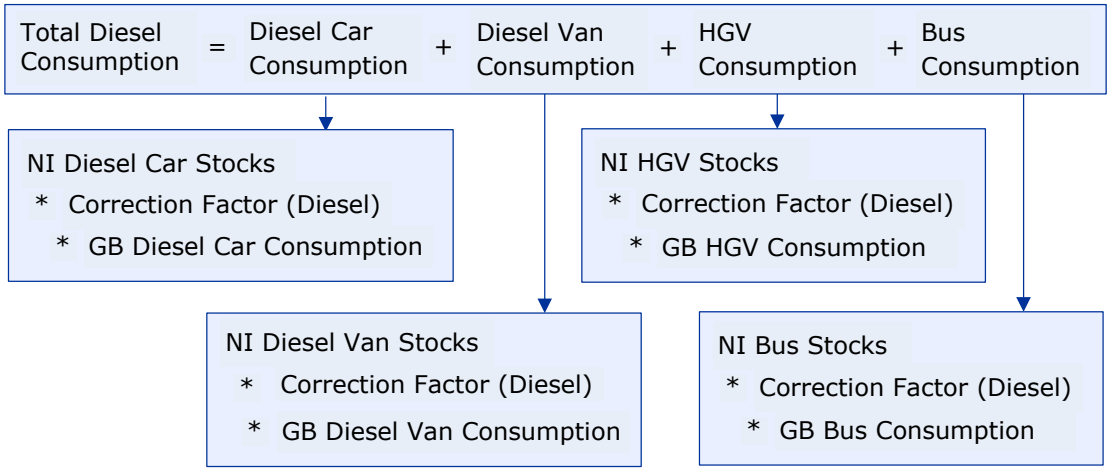
G.37 However, this may lead to an over- or under-estimation of the total distances travelled in NI and of the total consumption of oils in NI. So, a correction factor is necessary to correct for the bias. This correction factor is calculated by taking estimates of consumption in a base year, and comparing these with independent estimates of total consumption. To do this, we take a year in which there is believed to be little or no illicit market, and use HMRC clearance data as a true indication of total consumption.

G.38 In 1996, the duty on oils in NI and RoI was approximately the same. So, it is assumed that there was no significant cross-border shopping, fraud or smuggling in 1996 and so total consumption and legitimate consumption were the same.

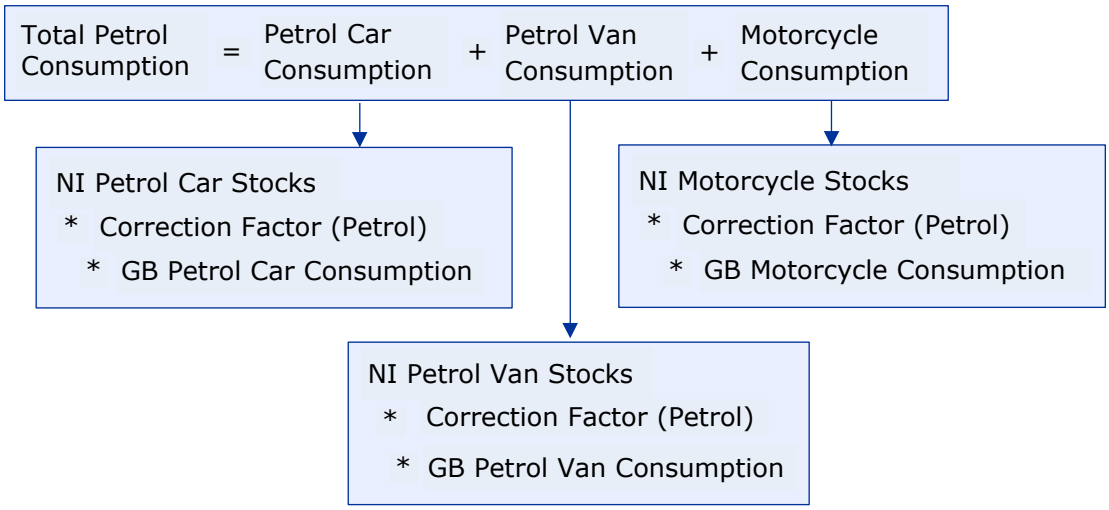
G.39 Correction factors for diesel and petrol are defined as:

$$\text{Correction Factor} = \frac{\text{Legitimate Consumption in NI in 1996}}{\text{Estimated Total Consumption in NI in 1996}}$$

G.40 This leads to an estimate of diesel consumption defined by:



G.41 This leads to an estimate of petrol consumption defined by:



Legitimate consumption

G.42 There are two elements of legitimate consumption:

- UK duty paid; and
- Cross-Border Shopping.

UK duty paid consumption

G.43 Estimates of UK duty paid consumption are taken directly from returns to HMRC (clearances data) on the volume of petrol and diesel released for consumption in the UK. This is split between consumption in GB and NI using data on deliveries to fuel stations obtained from DECC and DRDNI.

G.44 The HMRC clearance data includes the UK duty paid consumption of bio-fuels. The petrol data includes bio-ethanol and the diesel data includes bio-diesel.

G.45 As in the case of GB diesel consumption, for 2013-14 an element of uncertainty has been included in the amount of diesel consumed in NI. Uncertainty reflects unused or wasted diesel and diesel used in domestic and non-agricultural machinery. Data on uncertainty was obtained from a study carried out by the AEA.

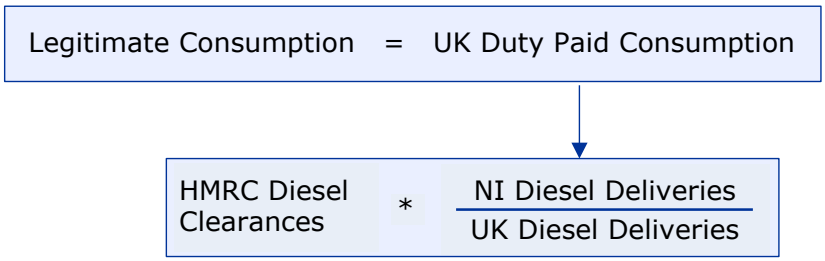
G.46 This change in methodology has resulted in revised central and lower and upper bound estimates of the NI diesel tax gap.

Cross-border shopping

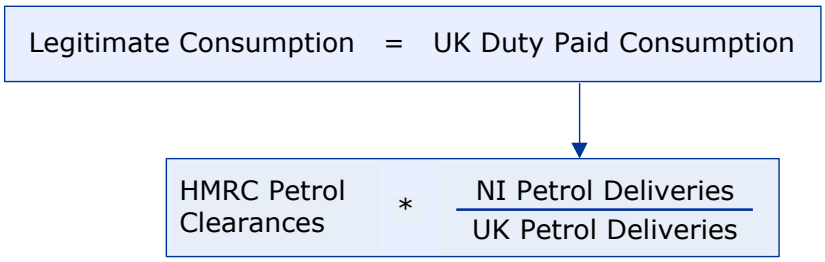
G.47 Previously it has not been possible to estimate the quantity of cross-border shopping for NI. This is because of the difficulties caused by the long land border with the RoI.

G.48 In recent years a new model was developed in the attempt to estimate the level of cross-border shopping. However, although the estimates from this model gave an insight on cross-border shopping, HMRC recognises that these results have to be interpreted with caution at this stage. The model will have to be refined in the future so that more robust estimates are obtained.

G.49 The legitimate consumption of diesel can be summarised as:



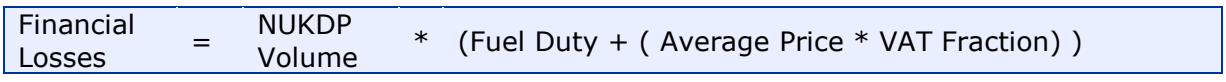
G.50 The legitimate consumption of petrol can be summarised as:



Conversion to monetary losses

G.51 Revenue losses associated with the NUKDP market are then estimated by combining the NUKDP market share information with price data and duty and VAT rate information.

G.52 All calculations to this point have been made on volumes of oil. Volumes are converted to estimates of revenue losses using:



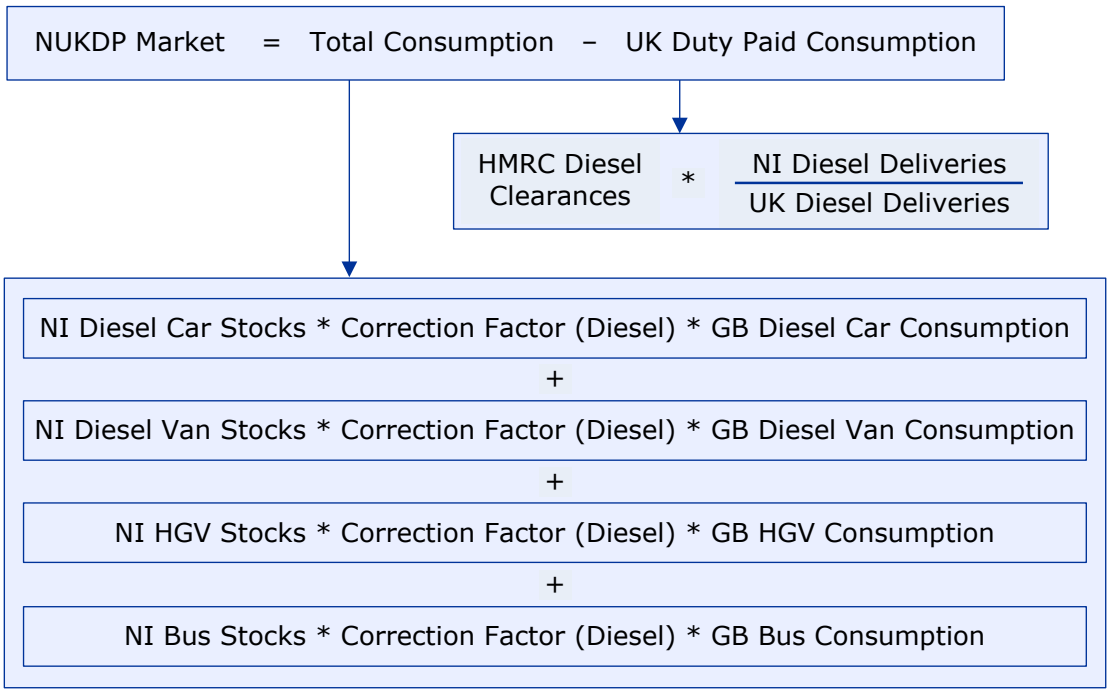
G.53 The typical price of different grades of oil is published on a monthly basis by DECC. An average price for petrol and diesel is then calculated by weighting the DECC prices by the HMRC clearance volumes of the different grades.

G.54 Similarly, the average duty is calculated from the duty rates published by HMRC and weighted by the HMRC clearance volumes.

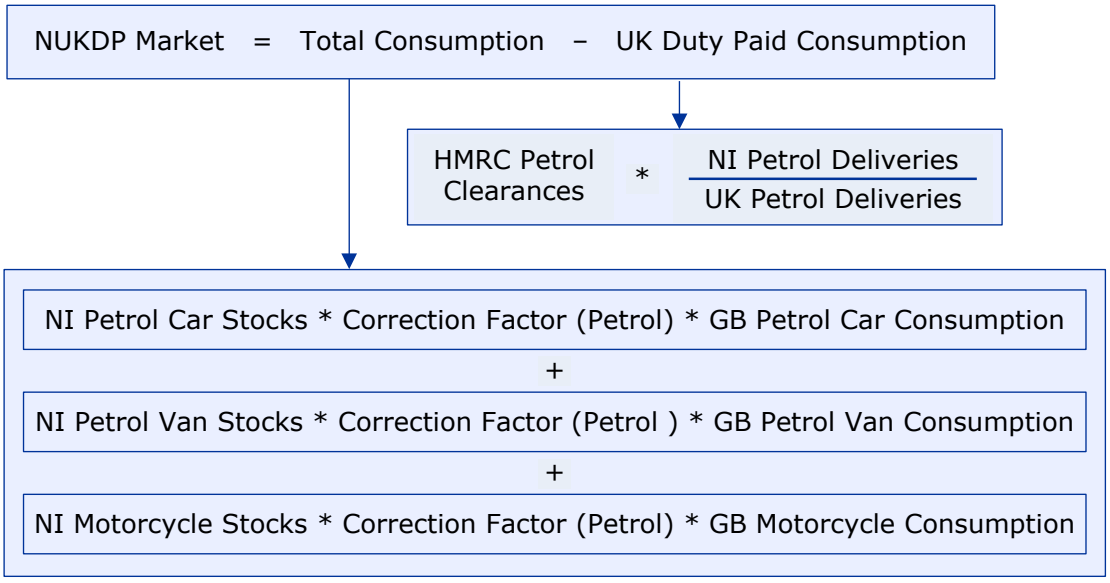
G.55 The VAT fraction is the portion of the retail price that is VAT – for example, a 20 per cent VAT rate is equivalent to a 1/6 VAT fraction.

Summary of methodology

G.56 A summary of the calculation of the NI diesel NUKDP market is:



G.57 A summary of the calculation of the NI petrol NUKDP market is:



Chapter H: Estimates from random enquiry programmes, avoidance and hidden economy

H.1 This chapter provides detail on HMRC's random enquiry programmes and the methodology used to produce the avoidance and hidden economy tax gaps. This chapter covers all the approaches taken to produce income tax (IT), National Insurance Contributions (NICs) and Capital Gain Tax (CGT) tax gaps as well as the Corporation Tax (CT) gap from small and medium sized enterprises. The CT gap estimates for large businesses are described in Chapter I.

Random enquiry programme estimates

H.2 There are three direct tax random enquiry programmes which are used to produce tax gap estimates. They cover:

- Self Assessment individuals and small partnerships;
- Small and medium-sized enterprises;
- Corporation Tax for small and medium-sized enterprises.

H.3 Random enquiry programmes allow HMRC to estimate the extent of under-declaration of liabilities arising from the submission of incorrect returns. Each return selected is subject to a full enquiry involving a complete examination of records. Under certain circumstances, a full enquiry may not take place if the return can be verified through third party information.

Populations and sampling

H.4 The sizes of the samples for the three programmes are shown in Table H.1 below.

Table H.1: Sample sizes for the Self Assessment, employer compliance and Corporation Tax random enquiry programmes

Self Assessment		Employer Compliance		Corporation Tax	
Tax return year	Sample size	Tax return year	Sample size	Accounting period ending in year	Sample size
2004-05	6,482	2004-05	1,649	2004-05	408
2005-06	5,834	2005-06	1,649	2005-06	419
2006-07	3,217	2006-07	1,649	2006-07	460
2007-08	3,219	2007-08	1,649	2007-08	492
2008-09	3,221	2008-09	1,649	2008-09	491
2009-10	2,599	2009-10	1,649	2009-10	480
2010-11	2,450	2010-11	825	2010-11	490
2011-12	2,599	2011-12	825	2011-12	567
2012-13	2,601	2012-13	925	2012-13	671
2013-14	2,451	2013-14	925	2013-14	587
2014-15		2014-15	925	2014-15	

H.5 To produce population estimates for total tax gaps from the samples in Table H.1, the average tax gap estimates from random enquiries are multiplied by the number of taxpayers in the population.

H.6 Adjustments are made for cases selected but 'dropped' – that is, no enquiry is made because the return satisfies the criteria for not taking up an enquiry.

Self Assessment

H.7 The Self Assessment (SA) random enquiry programme allows us to estimate the tax gap arising from under-declaration of tax liabilities of individuals in SA. Results from the SA random enquiry programme are scaled up to the total number of individuals sent a notice to file.

H.8 In this context, 'individuals' means individuals who are self-employed, pensioners, and partnerships (with up to 4 partners), as well as those who are employees or may only have investment income. So the taxes directly included are:

- IT;
- NICs; and
- CGT.

H.9 The random sample used for the programme is selected from SA taxpayers issued with a notice to file a return. The sample is drawn by a systematic process that selects every "n^{th}" notice. The sampling interval, n, is determined by dividing the total number of returns issued by the required sample size (rounded down to the nearest whole number). When the return includes a partnership income schedule, the next return on the list is selected. This is because the returns of individuals who are partners will automatically be included in any enquiry resulting from the selection of a partnership return.

H.10 2009-10 is the last year which uses a simple random sample, as random samples for subsequent years have been stratified to improve the accuracy of the results. Samples drawn from business taxpayers are stratified by turnover from 2010-11 onwards, with samples drawn from non-business taxpayers stratified by level of income from 2011-12 onwards.

H.11 Due to a relatively small sample size and large natural variance in the levels of under-declared liabilities from year to year, a smoothing approach has been used for small partnerships from 2010-11, when the stratification of business taxpayers was introduced. A three-year moving average with a double weighting given to the current year is used to smooth the data. This ensures that the resulting estimates are less susceptible to sampling variability and more indicative of longer-term trends.

Employer compliance

H.12 The employer compliance (EC) random enquiry programme allows us to estimate the tax gap arising from Pay As You Earn (PAYE) failures and other irregularities. Results from the EC random enquiry programme are scaled up to the total number of PAYE schemes.

H.13 The employer may be a self-employed individual, partnership, or a company and will be required to make returns under the PAYE regulations to account for IT and NICs.

H.14 The figures relate solely to IT and NICs collected through PAYE due on earnings and other income from employment. The scope of these figures also includes tax due on occupational pensions taxed through PAYE.

H.15 The taxes directly included are:

- IT;
- NICs; and
- Tax on occupational pensions.

H.16 The random sample is selected from small and medium-sized enterprises (SMEs) and stratified on the basis of employer segments (defined in terms of the number of employees and the employer's legal status).

Corporation Tax

H.17 The CT random enquiry programme allows us to estimate the tax gap arising from incorrect CT returns of SMEs. Results from the CT random enquiry programme are scaled up to the total number of live SME trader cases. In this context, 'live' excludes cases which are, for instance, dormant or dissolved/struck off.

H.18 For CT, the random sample is selected from SMEs issued a notice to deliver a return each month. From January 2012, the sampling process selects every 3,000th return, whereas previously it selected every 4,000th return. From April 2013, the sampling process has changed to a stratified random sample, based on the size of annual trading turnover. This change in the selection process has involved selecting fewer smaller traders, which in turn is expected to increase both the accuracy and the yield (under-declared tax liability) resulting from the random enquiry programme.

H.19 Due to a relatively small sample size and large natural variance in the levels of under-declared liabilities from year to year a smoothing approach is used. A three-year moving average with a double weighting given to the current year is used to smooth the data. This ensures that the resulting estimates are less susceptible to sampling variability and more indicative of longer-term trends.

Timing

H.20 There are two factors which influence the timing of the latest available tax gap estimate for a particular type of tax return:

- Delays inherent in the returns process; this varies according to the head of duty and is shown in Table H.2; and
- Delays due to the complexity or size of some random enquiries; it can take several years before sufficient random enquiries relating to a particular tax year are settled to robustly report the results.

Table H.2: Comparison of delays due to returns process

Random enquiry programme	Delays due to returns process
Self Assessment	Individuals generally have until 31 January following the year of assessment to which the return relates to submit their return. HMRC then has a further year in which to open an enquiry.
Employer compliance	None. EC reviews initially look at the records of the previous 12 months.
Corporation Tax	Companies have until a year after the end of their accounting period to submit their return. HMRC then has a further year in which to open an enquiry.

H.21 There are three consequences of the timing issues described above:

- Estimates of tax gaps for CT and SA are not available for the latest years due to a lag in data available. In order to present a more consistent picture of the scale of tax losses, projection factors have been applied to the estimates for CT and SA. These projection factors are shown in Table H.3;
- Estimates for earlier years have been revised since previously published, as a result of the inclusion of additional data from reviews that have since been

completed. In addition, revisions have been made to the figures for earlier years due to improvements in the method used to extrapolate the results of the random enquiry programme to the population; and

- At the time of estimation, some enquiries were not closed for each year of each random enquiry programme. In order to estimate tax gaps for each year, it is necessary to make assumptions about the cases that were yet to be settled at the date the enquiry results are analysed. Forecasts for such enquiries are made based on the results of recently settled enquiries with similar durations.

Table H.3: Comparison of projection factors

Random enquiry programme	Projection factors
Self Assessment	Based on the year on year change in SA liabilities from 2012-13, using separate projection factors for business and non-business taxpayers.
Corporation Tax	Based on the year on year change in estimated total SME Corporation Tax liabilities from 2013-14.

Sources of error

H.22 There are two main sources of error associated with the results of random enquiries which could result in the true values of the tax gaps differing from the estimates produced. These are:

- sampling variation in the data: the whole population is not subject to enquiry, so even though the sample is designed to be representative, its characteristics may differ from the population purely by chance; and

- systematic uncertainty where the sample results consistently tend to under report the true values for the population, or where the sample does not include the full population, for example those participating in avoidance. We are able to make an adjustment for one source of systematic uncertainty, which is non-detection of non-compliance; details are discussed below.

H.23 The random enquiry programmes will not identify all incorrect returns or the full scale of under-declaration of liabilities, and so estimates produced from the unadjusted results of the programmes would underestimate the full extent of the tax gap. The Internal Revenue Service (IRS) in the US has previously tackled this problem by using a range of 'multipliers' to adjust for non-detection[3]. The principles behind the IRS methodology have been applied to HMRC's data to produce approximate multipliers for the UK.

H.24 The IRS was able to undertake this analysis of non-detection because their random enquiry samples covered upward of 50,000 cases – much higher than is feasible in the UK. In the absence of this data for the UK, the US multipliers are used to account for non-detection. The size of the multipliers varies by the type of non-compliance found; Table H.4 shows how these multipliers differ by each random enquiry programme. The multipliers used are consistent year on year and are due for review in 2017.

[3] James Andreoni, Brian Erard and Jonathan Feinstein (1998) 'Tax Compliance', Journal of Economic Literature, Vol. 36, No. 2. (June, 1998), pp. 818-860

Table H.4: Comparison of adjustments for non-detection

Random enquiry programme	Adjustment to central estimate	Adjustment to lower estimate	Adjustment to upper estimate
Self Assessment (business)	1.908	1.000	3.075
Self Assessment (non-business)	1.260	1.000	1.928
Employer compliance	n/a	n/a	n/a
Corporation Tax	1.376	1.000	1.859

Modelling adjustments

H.25 From April 2013 the additional rate of income tax, charged on income above £150,000, was reduced from 50 per cent to 45 per cent. This policy change was thought to result in some taxpayers delaying income from 2012-13 to 2013-14 to take advantage of the lower rate (sometimes referred to as reverse forestalling).

H.26 As a consequence of this change in additional rate, taxpayers' behaviour liabilities were reduced in 2012-13 and increased in 2013-14. The SA liabilities series used in this tax gap analysis have been adjusted to compensate for this change to obtain a more accurate view of underlying liabilities in 2012-13. The projection factors used to forecast liabilities to 2013-14 and 2014-15 have also been adjusted to allow for this effect.

Validation

H.27 As part of each year's programme, HMRC conducts a validation exercise for a sample of cases, focusing on those cases which have the greatest influence on the results. These cases are checked to confirm that the enquiry outcomes (e.g. the amount of yield) have been recorded accurately. Any inaccuracies are corrected prior to calculation of the tax gap for that year.

Outliers

H.28 Outliers are individual cases with large yields which are far removed from those yields from the other sample cases. To reduce the influence of outliers in the tax gap calculation, the yields from the outliers were capped to a value of the mean yield of all settled enquiries for each of the random enquiry programmes, plus 3 standard deviations.

Tax gap calculation

H.29 The methodology used combines the estimate of under-declared liabilities with the amount of non-payment. As some of the tax gap is recovered through HMRC compliance activity, this is subtracted to give the net tax gap. The tax gap estimate is defined as:

- Net tax gap = (under-declared liabilities from incorrect returns * US multipliers to account for non-detection) + non-payment – yield from compliance activity.

H.30 The ranges which define the upper and lower estimates of the tax gap are based on the 95 per cent confidence intervals of the estimate for under-declared liabilities from incorrect returns. These ranges are adjusted for non-detection as described in Table H.4 above.

Non-payment

H.31 The figures used to estimate levels of non-payment come from analysis of write-offs of tax on a financial year basis.

H.32 As separate figures of non-payment are not available for just the taxpayers within the scope of the random enquiry programmes, the amounts are split in proportion to the tax gap resulting from the relevant section of the populations. These non-payment figures will tend to relate to tax liabilities for years before the random enquiry period. This approach has been taken because figures are not readily available by reference to the liability period.

Compliance yield

H.33 The random enquiries provide an estimate of the tax gap due to incorrect returns. However, HMRC carries out a wider programme of compliance activity to identify and correct erroneous returns. To calculate the net tax gap it is necessary to subtract the yield from this activity. The figures for yield are taken from HMRC's systems for recording the outcomes of enquiries, and relate to cases settled during each year rather than enquiries into returns relating to a specific tax year. See Chapter C.

Estimates for taxpayers not covered by the random enquiry programmes

Large employers operating a PAYE scheme

H.34 Larger employers with 250 or more employees, including those dealt with by our Large Business Directorate and employers which are part of a complex group, are not covered by the EC random enquiry programme. This means an alternative methodology is required to produce an indicator of the associated tax gap.

H.35 An illustrative estimate can be produced by assuming that the tax at risk will represent, over the long term, the same proportion of liabilities to SME employers, as shown by the results of the random programme. The estimated tax at risk is then adjusted to reflect compliance yield and non-payment.

H.36 The estimated tax gap for small and medium-sized enterprises usually represents between one and two per cent of liabilities for this group on average (see Table 4.7 in 'Measuring tax gaps 2016 edition').

Large partnerships in Self Assessment

H.37 An illustrative estimate has been produced by assuming that the tax at risk will represent a similar proportion of liabilities to all other SA taxpayers, as shown by the results of the SA random enquiry programme. Projections for 2013-14 and 2014-15 are based liabilities for SA businesses.

Large businesses paying Corporation Tax

H.38 Tax gap estimates for large businesses, which are not covered by the CT random enquiry programme, are covered in Chapter I.

Avoidance

Data sources

H.39 This section describes estimates of the avoidance tax gap for IT, NICs and CGT. The same data sources are used to estimate the tax gaps for CT (SME and L&C), VAT and Stamp Duty Land Tax. Estimates for Petroleum Revenue Tax, Stamp Duty Reserve Tax and Inheritance Tax are illustrative, and are produced using management assumptions.

H.40 The avoidance tax gap is estimated using information that HMRC collects on tax avoidance schemes and records on 'risk registers'. This includes avoidance schemes for individuals, trusts, partnerships and employers. The information that HMRC collects relates to disclosed and undisclosed schemes;

- For schemes disclosed under DOTAS (Disclosure of tax avoidance schemes), information is captured during the following process: Promoters of avoidance schemes that are covered by the avoidance disclosure rules[4] must disclose any new schemes to HMRC when they are made available to potential users. Disclosures must contain sufficient detail for HMRC tax specialists to understand how the scheme works. For each disclosure, HMRC issues a scheme reference number to the promoter, and taxpayers who participate in the scheme are required to notify HMRC of the reference number on their tax return (described here as a 'notification').

- Undisclosed schemes are identified by HMRC tax specialists through their compliance work.

H.41 When reviewing avoidance schemes, tax specialists record an estimate of the 'tax under consideration' relating to these ongoing enquiries. Any additional tax ('compliance yield') that is collected following completed enquiries is also recorded.

H.42 In order to tackle avoidance schemes, HMRC organises the schemes into groups of similar schemes ('projects'). The tax under consideration estimates are recorded at the project level and relate to all avoidance schemes assigned to the project and all tax years that the scheme affects. When an enquiry is completed, the related tax under consideration is deducted from the total tax under consideration for the project and the compliance yield is recorded.

H.43 Detailed taxpayer-level data on avoidance schemes is available for large businesses and high net worth individuals. This enables comparison of the tax under consideration and compliance yield for an individual scheme user. On aggregate, data on completed enquiries provides a basis to estimate expected compliance yield from ongoing enquiries.

Methodology

H.44 The tax gap is calculated by subtracting estimated compliance yield from tax under consideration;

Estimated tax gap = tax under consideration – estimated compliance yield

H.45 The **tax under consideration** estimate relates to ongoing and completed enquiries. For completed enquiries, an estimate of tax under consideration is calculated from the

[4] http://www.hmrc.gov.uk/aiu/summary-disclosure-rules.htm

compliance yield figures (because tax under consideration is deducted from the total project-level estimate once the intervention has been completed). This is calculated by applying the ratio of the compliance yield to tax under consideration from the taxpayer-level data to the actual compliance yield data.

H.46 The **compliance yield** that is likely to be recovered is estimated using the ratio of the compliance yield to tax under consideration. This ratio is derived from the taxpayer-level data on completed avoidance enquiries.

- This year improved data has been used to assign the total tax under consideration to tax years to produce an improved annualised tax gap estimate.

Data quality

H.47 The main source of error in these estimates is that HMRC may not identify all risks – which will lead to an under-estimation of the tax gap. It is difficult to quantify the extent to which this source of error impacts upon the estimates.

H.48 There are a number of issues with the methodology to estimate the avoidance tax gap. These include:

- Estimates of tax under consideration are made by tax specialists using all the information available at the time. As this information improves, the view of tax under consideration may change;

- The ratio of compliance yield to tax under consideration will change over time as more enquiries are completed. Any difference between estimated compliance yield from ongoing enquiries and actual compliance yield will lead to revisions in the estimates;

- CT avoidance schemes used by LBS groups are excluded from the calculations to avoid double-counting with the separate avoidance estimate for these businesses. Any re-classification of users following better information on the users of specific schemes would lead to revisions of the CT avoidance estimate.

H.49 As a result of these factors, the figures presented in the document are likely to be revised as more information becomes available.

H.50 The data on avoidance schemes are reviewed by HMRC analysts for consistency and accuracy. Over time, as the scope, quality and quantity of the data improves, HMRC will seek to improve the avoidance tax gap estimates.

Hidden economy

PAYE individuals not in Self Assessment

H.51 The estimate of the tax gap for PAYE individuals not in Self Assessment relates to employees and pensioners who are taxed through PAYE, but do not receive or submit SA returns for additional tax due outside of their employed earnings, e.g. taxes due on bank interest or lettings income. The taxes covered are IT and CGT.

H.52 It is not necessary to issue most taxpayers with a Self Assessment return where all tax liabilities are withheld at source. For example, employment income where tax is deducted under PAYE, or basic rate tax withheld from bank interest. However, there are risks within this population, for example due to taxpayers not informing HMRC about sources of income, such as rental income, capital gains or income from a secondary employment or self employment.

H.53 HMRC cannot conduct random enquiries into the tax affairs of individuals who are not issued a return because the legal position requires a return to be issued for an enquiry to take place. An alternative method is required for measurement of risks and estimating the associated tax gap.

H.54 The introduction of data matching tools created opportunities for HMRC to measure the extent to which taxpayers do not declare sources of income. Income reported by third party data sources can be compared with HMRC's internal data to identify undeclared income, from which it is possible to estimate the tax due.

H.55 Data matching cannot however be completely accurate, and there will be instances where non-declaration of income is incorrectly inferred from a mismatch (and vice versa). Inference about the amount of non-compliance associated with a particular mismatch can be difficult.

H.56 The estimate was produced by matching data supplied by third parties with a sample of tax records for these taxpayers. Income recorded in the third party data was compared against income shown on HMRC records as being taxed through PAYE. Several sources of income were investigated, such as income from lettings, bank and building society interest and capital gains. Where a difference was found between income in the third party data and the tax records, the tax that should have been paid on this income, if any, was then calculated and identified as the tax gap. The results from the sample were then grossed to produce an estimate of the overall tax gap for all employees and pensioners taxed through PAYE who are outside SA.

H.57 The limitations associated with the results of this exercise relate to the coverage of the third party data used to establish evidence of additional undeclared income. Not all potential sources of income could be investigated due to availability of data and the investigation of some sources was limited by the completeness of the information. The resulting estimate should be interpreted broadly as a lower limit for the true scale of the tax gap relating to this group of taxpayers.

H.58 The latest available estimate of the tax gap relating to PAYE individuals not in Self Assessment is for the 2009-10 tax year. In order to present a more consistent picture of the scale of direct tax losses, projection factors have been applied to the estimates for PAYE individuals not in Self Assessment. Estimates from 2010-11 to 2014-15 are projected from 2009-10 data in line with growth in GDP.

H.59 Table H.5 shows the sources of income and gains contributing to the estimated tax gap relating to income and capital gains of individuals taxed through PAYE but who do not receive SA returns.

Table H.5: Estimated tax gap for employees and pensioners taxed through PAYE but outside Self Assessment, by income source, 2009-10 (£ million)

Source of income	Estimated tax gap
Lettings	550
Interest	190
Capital gains	130
Irregular ISAs[1]	50
Chargeable events[2]	10
Secondary income[3]	2
Total[4]	**940**

1 Irregular ISAs: Individuals are allowed to open or subscribe to just one ISA of any particular type within a given tax year. If another ISA of the same type is opened or subscribed to, then it is not entitled to tax-free status.
2 Chargeable events: chargeable events are most commonly payment of money from a life insurance policy, though other types of event such as the sale of an investment bond can also give rise to chargeable event gain that should then be treated as income for income tax purposes.
3 Secondary income from employment is included in the estimate for 'moonlighters' and excluded from the estimate for 'non-declaration of income and capital gains from individuals who do not receive returns' in Table 1.1.
4 Figures rounded to the nearest £10 million (except secondary income). As a result components may not appear to sum.

Ghosts

H.60 An estimate for the tax gap for ghosts has been produced by applying a set of assumptions to information on Jobseeker's Allowance claimants, the reported income from individuals who are known to HMRC, and estimates of the stock of illegal immigrants.

Moonlighters

H.61 UK survey data reported in The Shadow Economy in Germany, Great Britain and Scandinavia: A measurement based on questionnaire surveys[5], has been used to estimate the proportion of employees who moonlight, the average number of hours spent moonlighting and the income generated through this. It is possible to then calculate a ratio of informal to formal income which can then be applied to employment income data. Applying marginal tax rates to these figures then produces an estimate of the tax due.

[5] Soren Pedersen (2003) The Shadow Economy in Germany, Great Britain and Scandinavia: A measurement based on questionnaire surveys, Statistics Denmark.

Chapter I: Corporation Tax for large businesses

I.1 This chapter provides details on the methodology used to produce the Corporation Tax (CT) gap estimates for large businesses as reported in 'Measuring tax gaps'. The SME CT tax gap estimates are described in Chapter H.

Businesses managed by the Large Business Service

Overview

I.2 This section describes analysis of the CT tax gap for businesses managed by the LBS reflecting the organisational structure of HMRC until April 2014 when HMRC's Large Business directorate was formed to manage tax compliance of the UK's 2,100 largest businesses.

I.3 For the period up to 2013-14 the tax affairs of large businesses were managed by two directorates: the Large Business Service (LBS) and Local Compliance Large and Complex (L&C). In April 2014 a Large Business Directorate was formed to manage the tax compliance of the UK's 2,100 largest businesses.

I.4 For each LBS business, HMRC tax specialists identify possible issues for further consideration with the business through a variety of approaches. The approach taken will depend on the relationship with the business, but where appropriate will include a detailed review of its accounts and CT return. The initial estimate of the amount of tax associated with these issues is recorded on the LBS case management system as the tax under consideration.

I.5 This initial estimate of tax under consideration forms the basis for engagement with the business and further clarification of the issues. The initial estimate may be revised up or down when further information becomes available - these will lead to revisions to the tax gap estimates.

I.6 The tax gap is calculated as the difference between tax under consideration and the compliance yield for avoidance risks and technical risks subject to litigation plus an uplift factor (see I.21).

Estimated tax gap =	**tax under consideration minus estimated compliance yield for avoidance risks and technical risks subject to litigation plus an uplift factor**

Quality assurance

I.7 To complement the quality assurance practices in the LBS, the accuracy of tax under consideration was reviewed for a sample of large risks. The exercise showed that a small proportion of estimates required adjustment to reflect the latest known information. In addition, long-running cases tend to be more accurate.

Recording risk

I.8 The estimates are derived using information held on the LBS case management system. Its primary purpose is to support effective management of risk and resource in the LBS. However, because it allows managers and staff to record and monitor the tax under consideration for businesses managed by the LBS, the information it contains can be used to inform estimates of potential CT tax gap.

I.9 HMRC's case management systems are regularly reviewed to ensure that the most useful information is being collected. A significant change was made during 2011 and 2012 to transfer management information about compliance risks onto a new system. This resulted in tax under consideration being captured earlier in the risk assessment process than before.

I.10 The tax under consideration is an estimate of the maximum potential additional tax liability in each case before we have carried out a full investigation of the specific facts or analysis of relevant law. It is not actual tax either owed or unpaid, it is a tool to guide our enquiries to focus on the most significant risks that exist at any particular time with the largest businesses. In many cases, when we have looked at the full facts it becomes clear that there is some lesser liability or even no further liability at all. Tax under consideration will naturally vary from time to time as outstanding issues are settled and new risks are identified. The total is just a snapshot of work in progress and will naturally fluctuate as risks are settled and new ones taken up.

I.11 An adjustment factor of 0.9, based on a quality assurance exercise of a sample of risks, was applied to the tax under consideration of any risks open at July 2014 in order to reflect likely future revisions. This also increases comparability with estimates prior to 2007-08.

I.12 The tax specialists will engage with the business to gain a full understanding of the issue and to discuss the analysis of the tax position. The outcomes of the engagement with the business which might include formal review or alternative dispute resolution could be:

- HMRC agrees no additional tax is due; or
- agreement is reached between HMRC and the business that additional tax is due; or
- HMRC and the business are unable to reach agreement in which case the issue will be resolved by litigation.

I.13 The main cause of the net tax gap is where HMRC unsuccessfully challenges avoidance or loses in litigation cases. There will also be situations where issues are not identified and so HMRC does not clarify the situation with businesses. This second cause of the tax gap will not be captured on the case management system.

Classifying risks

I.14 For analysis of the tax gap, the recorded risks presented in 'Measuring tax gaps' are summarised into avoidance risks and technical risks subject to litigation where the enquiry has been closed or is currently being worked. The avoidance category relates to the use of disclosed avoidance schemes or other suspected avoidance identified by HMRC tax specialists. The avoidance disclosure regime was first introduced in 2004 and initially covered only specific aspects of CT. In August 2006 the regime was extended to the rest of CT. As part of the regime, promoters of schemes have to disclose to HMRC the details of the schemes developed and users should notify HMRC of the use of a scheme in their tax return. This provides an enhanced view of the use of marketed avoidance schemes and the potential associated tax at stake.

I.15 It should be noted that avoidance covers a wide range of activities. Some of these will be addressed with existing legislation and some will need to be resolved by legislation preventing future losses. There will also be cases where issues have been identified but not recorded because it would not be practical to challenge within existing legislation. Again, such issues can be prevented in the future through legislative changes.

I.16 Technical covers a wide range of issues, from cases where there is genuine uncertainty about the correct tax treatment, through mistakes to culpable errors in,

or omissions from, the company tax return. As with avoidance, the tax gap estimate relates to those cases where it was not possible to reach agreement on the amount of tax to be paid.

Open risks

I.17 It may take many years for enquiry work on issues to be completed and for the yield from this work to be recovered. So the likely compliance yield has to be partly forecast to derive figures for the tax gap. While all these issues will be closed over time, in the interim it is necessary to estimate the yield that will result from open enquiries.

I.18 The forecast of expected yield for such open cases is based on the results of closed cases from previous accounting periods. The amount of yield as a proportion of tax under consideration that has resulted in yield in these cases is used to calculate the expected yield from the open cases. Once the actual results are known the estimates will be revised.

Risk working

I.19 The estimates for tax under consideration are split into four main categories according to how the risks are worked by HMRC:

No net tax gap

a) Tax under consideration for technical risks where agreement has been reached

b) Tax under consideration for technical risks where agreement is expected

Tax gap = tax under consideration - actual compliance yield (closed cases) – expected compliance yield (open cases)

c) Tax under consideration for avoidance risks where the enquiry is closed or the risk is being worked

d) Tax under consideration for technical risks that have been litigated or are leading to litigation.

Allocating risks to accounting periods

I.20 It is assumed that risks should relate to a maximum of five accounting periods. This is based on analysis of previous risks showing that around 90 per cent of the risks relate to five or fewer accounting periods. This approach applies for the tax gap estimates from 2008-09 and onwards. As a result, the total number of risks from 2008-09 onwards are not directly comparable to the number of risks before 2008-09.

I.21 The estimates increase the understanding of the potential tax gap in businesses managed by the LBS. As more data becomes available for analysis over time, improvements to the methodology can be made based on trends not apparent before. For example, last year we had evidence from the Large Business Task Force to derive an uplift factor for unidentified risks. The uplift is phased in to reflect the creation of Large Business Risk Task Force.

I.22 This year we have reviewed and improved the categorisation of international risks challengeable under the UK law. The inclusion of these risks has minimal impact on the tax gap because the compliance yield associated with these risks largely offsets the tax under consideration.

I.23 The 2012-13 estimate is projected to 2013-14 and 2014-15 based on the trend in CT receipts for groups formerly in the LBS.

I.24 HMRC will be reviewing the methodology it uses to estimate the LBS CT tax gap to ensure the best available data and assumptions are used. Therefore the estimates are subject to further revisions next year.

Large and complex businesses

I.25 An illustrative estimate of the L&C CT gap is produced by assuming that the tax at risk will represent a similar proportion of liabilities to LBS businesses. Applying this assumption to the L&C liabilities data produces an estimate of the tax at risk for L&C businesses for each year.

I.26 The 2012-13 estimate is projected to 2013-14 and 2014-15 based on the trend in L&C CT liabilities. This produces estimates of tax at risk for 2013-14 and 2014-15, from which compliance yield is subtracted and an estimate of losses from non-payment is added.

Chapter J: Other Taxes

J.1 With the exception of Stamp Duty Land Tax and Landfill Tax, tax gap estimates for all other taxes are illustrative and produced using management assumptions. Other taxes include;

- Other direct taxes
    a. Stamp Duty Land Tax
    b. Stamp Duty Reserve Tax
    c. Inheritance Tax
    d. Petroleum Revenue Tax
- Other indirect taxes
    a. Custom duties and levies
    b. Air Passenger Duty
    c. Insurance Premium Tax
    d. Climate Change Levy
    e. Aggregates Levy
    f. Landfill tax

Stamp Duty Land Tax

General methodology

J.2 The Stamp Duty Land Tax (SDLT) tax gap is estimated using a combination of management information and management assumptions.

Tax under consideration

J.3 The SDLT tax gap is calculated from the amount of SDLT outstanding, referred to here as tax under consideration or tax at risk (TAR). There are five identified components to the amount of SDLT tax at risk (why SDLT tax gap exists):

- TAR from cases being investigated by the SDLT Anti-Avoidance team.
- SDLT avoided unknown to the department. This is uplifted by 20% of all cases.
- Reliefs that are improperly claimed being "Non-Compliant".
- SDLT potentially evaded by deliberate manipulation of the final consideration in property transactions.
- SDLT not paid due to evasion, goodwill, agent behaviour and linked transactions.

SDLT avoidance unknown to the department

J.4 It would be impossible for HMRC to know about every case of SDLT avoidance, because either the associated paperwork has not been completed, or because it has been deliberately falsified and not yet discovered, or for some other reason. Expert opinion has suggested that HMRC is likely to be aware of approximately 80 per cent of all transactions involving SDLT where tax under consideration has resulted. For this reason, a multiplier of 1.25 (100 / 80) has been used to 'uplift' the amount of tax under consideration which is known about to account for this.

Evasion

General evasion

J.5 This reflects a percentage of the total amount of SDLT receipts (as published by HMRC) not initially paid because of evasion. Internal discussion with subject matter experts suggests that this amounts to one per cent of the published SDLT receipts each year, with around 50 per cent of this recoverable in line with other non-avoidance activity.

Threshold manipulation

J.6 Another form of SDLT evasion is threshold manipulation. This occurs when a sale value of a property is artificially reduced to below a threshold so as to reduce the SDLT liability. SDLT only applies to properties where the economic consideration of the transaction is above £125,000, where the liability is (at least) one per cent, so if a property has a market value of £126,000, but the sale is agreed for £124,950, the purchaser would avoid £1,260 in SDLT. It has been previously estimated that five per cent of all total amounts of SDLT liable from property transactions where the economic consideration is less than £1,001 from the SDLT step thresholds (£125,000, £250,000, £500,000, £1 million and £2 million) are deliberately reduced to evade SDLT in this way. It is also estimated that 50 per cent of the resulting tax under consideration is recoverable, in line with other non-avoidance activity. On 4th Dec 2014 new rules affecting stamp duty thresholds came into operation which are expected to significantly reduce this threshold manipulation.

General non-compliance

Reliefs improperly claimed

J.7 Improperly claimed relief takes different forms and there are more than 30 different reliefs claimed for SDLT. Four of these reliefs alone accounted for over 75% per cent of the value of reliefs claimed and are used in this calculation.

J.8 Analysis of open enquiries and a series of pilot research projects have suggested that up to five per cent of these claims may be falsely claimed. Additionally, there is an assumption that HMRC may only be able to recover 10 per cent of the tax under consideration involved in these cases: this takes into account the large number of reliefs for which compliance work has not yet begun and the small number of cases open into those reliefs that have been targeted.

Goodwill, agent behaviour and linked transactions

J.9 This reflects a percentage of the total amount of SDLT receipts (as published by HMRC) not initially paid because of goodwill, agent behaviour and linked transactions. Internal discussion with subject matter experts suggests that this amounts to 0.5 per cent of the published SDLT receipts each year, with around 50 per cent of this recoverable in line with other non-avoidance activity.

Exclusions from this methodology

J.10 In previous years, a figure had been published which estimated the amount of SDLT which had been avoided by the use of tax avoidance schemes, which were artificial structures solely constructed to avoid SDLT that the department had been made aware of. It was calculated by multiplying together the number of DOTAS schemes, the estimated tax under consideration each year and the estimated number of users of each DOTAS scheme. It is excluded from the methodology from 2011-12 onwards as it is believed that there were no DOTAS schemes revealed to the department during 2011-12.

Landfill Tax

General Methodology

J.11 The Landfill Tax gap is estimated using a combination of modelling, proxy indicators and assumptions made in collaboration with HMRC's operational experts. It uses HMRC and publically available data to estimate each component. This is the first time this methodology has been applied to Landfill Tax and it is likely to evolve as additional data becomes available.

Tax in scope

J.12 Landfill Tax is due on waste disposed of at a permitted landfill site as a disincentive to landfilling and to encourage better waste management. The tax gap measures the difference between the amount of Landfill Tax that should theoretically be collected when waste is disposed of at a landfill site, against what is actually collected.

J.13 The methodology does not include an amount for waste disposed of at illegal waste sites as it is not taxable at this point. This means there is additional tax at risk from illegally disposed waste depending on what proportion, if any, would have been disposed of at landfill if it had not been illegally dumped. Due to the extent of assumptions that would be required to estimate the tax at risk on illegal waste and the inherent uncertainties around whether the waste would be disposed of by way of landfill, we have not included an estimate.

Tax under consideration - Under-declaration

J.14 Under-declared waste is estimated in two ways and averaged to arrive at a central estimate. A trend line is fitted to HMRC data on taxable tonnes over time and expected and actual tonnages of waste compared. The estimate is refined to take account of the increase in diversion of waste away from landfill in recent years to incineration and export of refuse derived fuel. We assumed nearly all of this diverted waste is taxable at the standard rate if sent to landfill.

J.15 After these adjustments, the tax under consideration is estimated by applying the tax rates at the same composition as declared taxable waste (around 60% standard rated and 40% lower rated, depending on the year).

J.16 In a second approach, a proxy indicator is used to estimate under-declaration, assuming that all landfill site operators have under-declared taxable waste by 5% per year and that this under-declared amount should be taxed at the standard rate.

Tax under consideration - Misclassification

J.17 There are two rates of Landfill Tax, standard and lower rate. A trend line is fitted to HMRC published statistics on lower rated tonnes declared over time. Expected tonnages of lower rate waste is then compared with declared lower rate waste that shows a trend towards increasingly larger amounts of lower rated waste to landfill in recent years. Some of this is expected due to changes in how waste is diverted away from landfill towards other forms of waste management.

J.18 We assumed 25% of the difference between expected and declared lower rated waste constitutes tax base under consideration, and the tax under consideration is the difference between the standard and lower rates of waste on this tonnage.

Tax gap calculation

J.19 As some of the tax gap is recovered through HMRC compliance activity, this is subtracted to give the net tax gap. The tax gap estimate is defined as:

Net tax gap = (under-declaration of waste) + (misclassification of waste as either standard or lower-rated) – (yield from compliance activity).

Chapter K: Abbreviations

AEAT: AEA Technology

BBPA: British Beer and Pub Association

CGT: Capital Gains Tax

CHIEF: Customs Handling of Import and Export Freight

CT: Corporation Tax

DECC: Department of Energy and Climate Change

DfT: Department for Transport

DOTAS: Disclosure of Tax Avoidance Schemes

DRDNI: Department for Regional Development

EC: Employer Compliance

EFS: Expenditure and Food Survey

EU: European Union

EX 46: Beer Duty Return

FSS: Family Spending Survey

GB: Great Britain

GDP: Gross Domestic Product

GHS: General Household Survey

GLF: General Lifestyle Survey

HGV: Heavy Goods Vehicles (bigger than 3.5 tonnes)

HMRC: Her Majesty's Revenue and Customs

HSE: Health Survey for England

IPS: International Passenger Survey

IRS: Internal Revenue Service (United States)

IT: Income tax

LBS: Large Business Service

LCF: Living Costs and Food Survey

NAAFI: Navy, Army and Air Force Institutes

NI: Northern Ireland

NICs: National Insurance Contributions

NTS: National Travel Survey

NUKDP: Non-UK-Duty Paid

ONS: Office for National Statistics

OPN: Opinions and Lifestyle Survey

PAYE: Pay As You Earn

RoI: Republic of Ireland

SA: Self Assessment

SDLT: Stamp Duty Land Tax

SME: Small or medium-sized enterprise

UK: United Kingdom

VAT: Value Added Tax

VTTL: VAT Total Theoretical Liability

W1: Warehouse Return

WAP: Weighted Average Price

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