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Assessment of HMRC's Tax Gap Analysis

August 2013

Juan Toro, Kentaro Ogata, Eric Hutton, Selcuk Caner

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Fiscal Affairs Department

UNITED KINGDOM

ASSESSMENT OF HMRC'S TAX GAP ANALYSIS

Juan Toro, Kentaro Ogata, Eric Hutton, Selcuk Caner

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Contents **Page**

ABBREVIATIONS AND ACRONYMS

EOI	Exchange of information
FAD	Fiscal Affairs Department
HMRC	Her Majesty's Revenue and Customs
KAI	Knowledge, Analysis and Intelligence Department
KPI	Key Performance Indicator
LBS	Large Business Services
NIC	National Insurance Contributions
NR	Net tax base
PAYE	Pay-as-you-earn
RA-GAP	Revenue Administration—Gap Analysis Program
SME	Small-medium enterprises
SR	Spending Review
TA	Technical Assistance
TuC	Tax under consideration
U.K.	United Kingdom
VAT	Value-added tax
VTTL	VAT Theoretical Total Liability

PREFACE

In response to a request from Mr. Jonathan Athow (Director, Knowledge, Analysis and Intelligence Department (KAI)) from Her Majesty's Revenue and Customs, (HMRC), the Fiscal Affairs Department (FAD) conducted an assessment of the HMRC's tax gap analysis. The assessment team was led by Mr. Juan Toro (Assistant Director, FAD) and comprised Messrs. Kentaro Ogata (Advisor, FAD), Selcuk Caner, (Senior Economist, FAD), and Eric Hutton (Technical Assistance Advisor, FAD).

The main purpose of the assessment is to provide a thorough review of the HMRC's tax gap analysis program, including its models and methodologies, its use in supporting HMRC operations, and the approach to disseminate its results.

As part of this assessment an initial fact-finding visit was made in April 23–25, 2013, focused on technical discussions with KAI and Central Customer and Strategy staff on the HMRC's tax gap models and methodologies. After this first visit, the mission team continued working at IMF headquarters, in close coordination with HMRC staff, to undertake the assessment and prepare a set of preliminary findings. A follow-up visit was held on July 1, 2012 to discuss and review the preliminary findings. This final Technical Assistance (TA) report incorporates comments from HMRC received during the second visit and from the FAD advisory committee appointed to support this evaluation work.

This report sets out the assessment and recommendations of the team. It consists of an Executive Summary and the following sections: (I) Defining the Tax Gap; (II) Measuring the Direct Taxes Gaps—Framework and Methodologies; (III) Measuring the Indirect Taxes Gaps—Framework and Methodologies; (IV) Reporting the Tax Gap; (V) Using the Tax Gap; and (VI) Possible Future Research on Tax Gap Analysis.

The assessment team would like to express its gratitude for the outstanding support and cooperation received from HMRC management and staff during its stays in London and during the follow-up work.

EXECUTIVE SUMMARY

This report assesses HMRC's tax gap analysis program and provides advice and guidance on further improving it. The report addresses three aspects of the program: (1) the models and methodologies employed; (2) the approach to disseminating the results; and (3) the use of the results in supporting compliance activities, evaluating tax revenue performance across taxes and the effectiveness of HMRC. The report also raises some areas of possible further research.

The reduction of the tax gap is a public commitment of HMRC. The Vision Statement in the HMRC's Strategic Plan 2012–2015 reads:

> "*We will close the tax gap, our customers will feel that the tax system is simple for them and even-handed, and we will be seen as a highly professional and efficient organization.*"

This commitment implies that the tax gap analysis program will have multiple goals. The following three are critical:

- **Measuring tax revenue losses to be closed**: By stating that the goal is *closing the tax gap*, HMRC aims to generate as much revenue as possible in the current policy framework. Therefore, the main objectives of the tax gap analysis program are to assess the tax revenue losses, and HMRC's performance in closing this gap.

- **Supporting efficiency**: HMRC also aims to be recognized as *a highly professional and efficient organization.* This would require that the tax gap be closed in an efficient manner. Therefore, the tax gap program also aims to support HMRC management in the allocation of resources to achieve high impact in reducing noncompliance.

- **Supporting perception of fairness**: The vision states that customers (particularly taxpayers) perceive the tax system as "*even-handed.*" In addition to the way HMRC conducts its operation, its effectiveness in closing the tax gap and the manner in which this is achieved are critical in impacting the taxpayers' perception of the tax system's fairness. Transparent and sufficiently detailed reporting of tax gap estimates allows for public scrutiny of the HMRC's efforts in closing the gap.

Accordingly, the tax gap analysis program in HMRC aims to not only measure the tax gaps but also be part of a broader management framework. The program is an ongoing process of ascertaining how well HMRC is doing in achieving its vision and strategic objectives. In doing so, the program is helping HMRC management assess the institution's performance and guide operational actions with the aim of improving the HMRC's effectiveness in achieving its overarching vision.

Main findings

The HMRC's tax gap analysis program is comprehensive in tax coverage, effectively addresses its multiple dimensions, and work is ongoing to enhance its support to HMRC management. Tax gaps are estimated for most of the taxes administered by HMRC. In this regard, HMRC produces one of the most comprehensive studies of tax gap estimates internationally. Table 1 provides a summary of estimates across taxes.

- *In general, the models and methodologies used by HMRC to estimate the tax gap across taxes are sound and consistent with the general approaches used by other countries*. The HMRC program follows a pattern of employing "bottom-up" based estimates for the direct tax gaps, and "top-down" estimates for the indirect tax gaps. Both approaches are applied consistently with good international practices—in fact, HMRC has been leading the application of some of these methodologies. Notwithstanding these good practices, there are areas of improvement that would enhance the robustness of the analyses. Sections II and III provide in-depth analyses of the models and methodologies used in measuring the tax gap, and provide some recommendations for improvement.

- *Official publications are issued regularly, disseminating widely the results of the tax gap analysis program.* Details as to how the tax gaps are being measured are reported in a comprehensive and transparent manner—tax gaps estimates have become official statistics. However, given the multi-objectives of measuring the tax gaps, their presentation, organization, and communication—according to how they are to be used and interpreted—could be enhanced. Section IV provides a brief review of the reporting and recommendations for improvement.

- *The tax gap estimate and related analyses obtained in the process are providing useful information for compliance management.* Given the complexity of estimating tax gaps across taxes and taxpayer segments, as well as caveats from data limitations, HMRC's approach to avoid creating any mechanical link between marginal changes in the estimates and administrative actions is sensible. At the same time, wide ranging analyses being made in the process of estimating tax gaps, and not just the resulting figures, provide invaluable information for HMRC management. While the use of tax gap estimates and analyses in compliance management is a relatively new field and the process is continuously evolving, HMRC management appears to be making sound decisions in managing the process. Section V discusses briefly the use of tax gap estimates in supporting taxpayers' compliance management.

In the medium term, some areas of research could be explored to further improve the HMRC's tax gap analysis program. Section VI discusses the possibility of assessing top-down models for the income tax gaps, extending the HMRC's models to assess the size of

the policy gap by tax type, and comparing and contrasting the consumption based HMRC's value-added tax (VAT) gap model with a value-added based VAT gap model.

Recommendations

Areas of improvement to further enhance the robustness of the HMRC's tax gap analysis program were identified. Box 1 provides a summary of the main recommendations.

Box 1. Summary of Key Recommendations

Defining the tax gap

- Distinguish between compliance and policy components of tax avoidance schemes in reporting the tax gap.

Measuring the tax gap—direct taxes

- Segmentation of taxpayers in random enquiry programs, and projection of results, should be based on risk profiles.
- The practice of excluding outliers from random audit samples should be reviewed.
- Wage-levels assumed for ghosts and moonlighters estimates need a stronger basis.
- Targeted audit results should be used for checking tax gap estimates and assumptions.
- Domestically determined uplift factors should be estimated.

Measuring the tax gap—indirect taxes

- Better data are needed for the amount of VAT collected on inputs into exempt supplies.
- Volume survey data should be used for excise tax gap estimates.

Reporting the tax gap—presentation of the tax gap

- The aggregation of tax gap estimates—both in their calculation and reporting—should be reviewed for a better representation by tax type.
- The tax gap estimates should also be segmented by estimation method.

Reporting the tax gap—values for the tax gap

- The gross gap and the net gap should be reported in addition to the anticipated net gap to enhance reporting.
- A proper accruals report for VAT revenues should be created.

Using the tax gap—performance measurement

- Reporting both gross gap and net gap estimates would improve performance measurement.

Using the tax gap—resource allocation

- HMRC should continue pursuing the use of tax gap to support resource allocation to tackle noncompliance.

Table 1. Summary of Tax Gap Estimates and Methodologies—2011

Tax	Component	Main Components of Methodology 1/	Proportion of the 2011 Gap 2/
Income Tax, National Insurance Contributions (NIC), Capital Gains Tax	Pay-as-you-earn (PAYE): small-medium enterprises (SMEs)	Bottom-up estimate based on random audit results.	2%
	PAYE: large taxpayers	Constructed estimate based on the results for the SMEs.	7%
	Self-assessment: individuals and businesses	Bottom-up estimate based on random audit results.	14%
	Self-assessment: large partnerships	Constructed estimate bases on error levels comparable to results for the SMEs.	2%
	Nondeclaration of income by individuals not in self-assessment	Bottom-up estimate based on cross-matching PAYE data with third party information.	3%
	"Moonlighters"	Estimate based on study results.	6%
	"Ghosts"	Estimate based on labor force survey and immigration data.	4%
	Avoidance	Estimate constructed using avoidance schemes being tracked in the "risk register."	7%
Corporation Tax	Large business services (LBS) clients	Constructed estimate based on data on Tax under Consideration (TuC) data from the LBS case management system.	4%
	Large and complex businesses	Constructed estimate based on the results for the LBS clients.	4%
	Small-medium enterprises	Bottom-up estimate based on random-audit results.	4%
VAT		Top down estimate based on consumption statistics. (A bottom-up estimate is also performed in order to determine the composition of the gap).	30%
Excises	Alcoholic beverages, Tobacco	Top-down estimate based on consumption statistics.	7%
	Petroleum fuels	Top-down estimate based on travel distance statistics and fleet characteristics, and "cross-border shopping."	1%

Source: Prepared by the IMF team based on HMRC publications.

1/ There are other components to the total estimate for some of these items, such as the addition of the value of nonpayment; this table only summarizes the main estimation methodology component.

2/ Total adds to only 95 percent; the minor indirect and direct tax gaps estimates are left out.

I. DEFINING TAX GAPS

1. **This section clarifies concepts and terminology in the analysis of 'tax gaps.'** A distinction between compliance and policy 'gaps' is discussed as part of a broader concept of tax gap. The HMRC's approach in defining the compliance component of the gap, and the treatment of tax avoidance, are analyzed in the context of this wider gap concept.

A broad definition of the tax gap

2. **A comprehensive understanding of revenue performance accounts for the impact of both taxpayer compliance issues and policy choices**. A commonly used definition of the tax gap is the difference between current and potential collections. Under this definition, the term "tax gap" tends to describe the difference between the actual tax collections and the tax collections a revenue administration should collect given the current policy framework (potential collections). This is what HMRC means by 'tax gap' in its Vision Statement, and is an appropriate focus for any revenue administration. For wider purposes, however, it is important to recognize that it provides only a partial account of the factors that affect revenue performance. A more holistic approach would include the two major factors: (i) the effects of compliance (or noncompliance); and (ii) the effects of policy choices that lead to reduced revenues. The IMF refers to the impact of compliance issues on revenue as "the compliance gap" and the revenue loss attributable to provisions in tax laws that allow an exemption, a special credit, a preferential rate of tax, or a deferral of tax liability as the "policy gap."[1] The relationship between compliance issues and policy choices on tax revenues is analyzed further in Appendix 1, where it is shown how it allows policy makers and administrators to assess potential avenues of action for improving revenue.

3. **From the perspective of compliance management, it is recommendable to measure the impact of both compliance issues and policy choices**. More comprehensive analysis of the policy gap could provide useful insights for revenue administration, and for policy discussions on tax regime designs. The HMRC prepares a tax expenditure report that identifies the value of revenue foregone for select policy measures, but it does not, as is standard for a tax expenditure report, provide a value of the joint impact on potential revenue from the full set of tax expenditures working concurrently—this is what a policy gap measure would accommodate.[2] To provide a comprehensive picture of revenue performance the HMRC's work on estimating the value of individual tax expenditures and the estimates of the

[1] In order to identify the size of the "policy gap" the current policy structure must be measured against some normative policy structure, similar to the process needed to estimate the value of tax expenditures.

[2] The policy gap is not simply the sum total of all tax expenditures, as there may be overlap between two individual tax expenditures. For example the value of the expenditure for zero-rating children's clothing likely overlaps with the value of the expenditure of zero-rating supplies to charities, as some of the supplies to charities would include children's clothing.

compliance gap should be linked.[3] The provision of exemptions, special credits, preferential rates of tax, or deferral of tax liabilities can present avenues for some taxpayers to engage in noncompliant activity, and as such it is important for a tax administration to monitor the levels of revenue foregone through these policy choices, comparing and contrasting them with trends in the estimated revenue losses due to compliance issues. Monitoring the revenue foregone due to policy choices also helps determine if revenue performance is being impacted by unanticipated taxpayer take-up of these tax instruments; otherwise any associated changes in revenue performance could be interpreted as being the result of changes in taxpayer compliance. In addition, the administration should undertake special compliance programs to control the use of these special treatments to deter and uncover potential abuses. These control activities give the administration a strong basis for estimating the associated revenue cost and promote changes when abuses are detected.

The HMRC approach

4. **Tax gap analysis in HMRC is focused on the compliance gap, but is arguably a wider measure as it has some degree of the policy gap by including tax avoidance and legal interpretation of the tax laws**. HMRC defines the tax gap as "*…the difference between tax collected and the tax that should be collected (the theoretical liability*)."[4] While this looks identical to the compliance gap described above, HMRC defines the theoretical liability to be: "*…the tax that would be paid if all individuals and companies complied with both the letter of the law and HMRC's interpretation of the intention of Parliament in setting law (referred as the spirit of the law)*."[5] The latter part of this definition implies that HMRC explicitly includes in its tax gap measures revenue at risk associated with identified tax avoidance schemes; crucially, the definition includes such schemes whether or not they have ultimately been determined to be legal through litigation. Where the courts do decide that a scheme is legal HMRC does not count future uses within the tax gap measure. This is partly pragmatic as case workers would no longer record the usage of the scheme on the systems used to measure direct tax avoidance. But HMRC also considers that this is right conceptually—if the law is not amended then there is recognition of a change in the spirit of the law. And for VAT the calculation of the theoretical liability is amended following court decisions.

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[3] This would be consistent with the approach taken by Her Majesty's Treasury in preparing the annual budget, where estimates of both the impact on revenues of anticipated changes in compliance and the anticipated take-up of policy measures are provided. For example, Budget 2013 included measures to tackle avoidance by partnerships. The corresponding estimates of the impact on revenue included both policy and operational compliance responses. Section VI explores the issue of reporting on the policy gap in greater detail.

[4] See "*Measuring tax gaps 2012, Tax gap estimates for 2010-11*," October 18, 2012, HMRC.

[5] Ibid.

5. **Given the broad remit of HMRC, inclusion of the tax avoidance in the coverage of the tax gap analysis is appropriate.** HMRC is clearly tasked to design and deliver tax policy changes to "improve fairness and reduce the scope for evasion or avoidance."[6] This remit is naturally consistent with the vision of HMRC. Therefore, to help properly measure and monitor HMRC performance, tax gap analysis should cover tax avoidance in addition to tax evasion and other noncompliances.

Accounting for tax avoidance

6. **Until a legal ruling is available, it is theoretically and practically appropriate to include tax avoidance schemes in the compliance gap**. From a theoretical standpoint the argument can be made that an administration's interpretation of the tax law should be the basis for determining what is taxable or not, or what is compliant activity or not, until this interpretation is overruled through appropriate litigation process (statutory appeal to an independent body, including the tribunals and the courts, a common law claim to the courts or an application for judicial review).[7] From a practical standpoint, the statistical data used in any top-down tax gap estimate would not capture activities that have been recharacterized for purposes of tax avoidance, and so top-down tax gap estimates may de facto include tax avoidance.[8] Explicitly including tax avoidance schemes in any bottom-up gap estimates would provide consistency in the breadth of coverage of the two classes of estimates.

7. **Tax avoidance schemes deemed legal through litigation should be considered part of the policy gap, not the compliance gap, and this distinction should be made clear**. If a tax avoidance scheme is deemed to be a legal application of the tax law, then the only way to recover the loss in collectable revenue is through a change in the legislation—this would make it a result of policy choice and not a compliance issue. Conversely avoidance schemes deemed illegal would fall under the compliance gap.

8. **Distinguishing this policy component from the rest of the HMRC's tax gap estimate would improve the clarity of the exercise, and provide for clearer direction as to the allocation of resources needed to close the gap**. Actions necessary to reduce revenue

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[6] Remit for HMRC 2012–13, letter from the Chancellor of Exchequer, available at http://www.hmrc.gov.uk/news/cx-remit-letter.pdf.

[7] Tax disputes could be settled also through administrative dispute resolution procedure. Whenever the HMRC agrees to treat certain tax avoidance behavior as legal in a dispute resolution process, such behavior should be considered legal for all other cases under the comparable circumstances, just like a resolution through litigation.

[8] Consider, for example, a financial institution that created a separate corporate entity for their in-house print-shop, in order to obtain input tax credits for the capital equipment of the shop. The statistical data would likely still capture the activities of the full institution under financial services, and so estimating the potential tax base using the statistical data would be implicitly identifying a tax gap created due to avoidance activity.

leakage due to legal tax avoidance schemes are quite different from those needed to address noncompliance; dealing with legal tax avoidance schemes requires proposing changes to the legislation, while undetermined or illegal schemes require compliance management efforts. Breaking the gap down along these lines would assist HMRC in the resource allocation process.

Recommendation

- Tax avoidance schemes ruled legal through litigation should be identified as being part of the policy gap and not reported as part of the compliance gap.

II. Measuring the Direct Tax Gaps—Framework and Methodologies

9. **This section discusses the estimation frameworks and methodologies for direct taxes—Section III analyzes the tax gap estimates for indirect taxes**. In a number of cases, multiple models or methodologies are combined under a more general estimation framework to arrive at the full estimate of the gap for a particular tax type.[9] In the case of direct taxes the tax gap estimates are constructed by compiling the results from a number of models and methodologies focused on distinct components of the gap.[10] This assessment reviews both: (a) the design of the overall estimation framework; and (b) the individual model and methodologies of the framework.

10. **Tax gaps in direct taxation are estimated using mainly bottom-up techniques in several categories of incomes.** The tax gap estimates can be broken down into three major groups: (i) the gap for income tax, National Insurance Contributions (NIC), and capital gains tax (this group of taxes will be collectively referred to herein as the noncorporation taxes);[11] (ii) the gap for corporation tax; and (iii) the gap for other direct taxes. This report focuses on the first two categories, which comprise 96 percent of the direct tax gap.

[9] A summary of individual models and methodologies employed for direct taxation is provided in Appendix 2.

[10] In general, it would be preferable to use top-down methods for all tax types, as they generally use independently derived statistics on the size of the tax base, and so are more likely to provide an estimate of potential tax revenues including from activities unknown to the tax authorities. However, given that effective tax rate of direct tax varies substantially across the population of potential taxpayers—depending on wide-ranging factors for which independent data often does not exist—a top-down estimate for direct taxes has proved to be difficult, which is why bottom-up estimates are the most prevalent methodology employed—see Section VI for further discussion and possible research work on this topic.

[11] Hereafter the report refers to these categories of incomes as "noncorporation taxes."

A. Estimation Framework and Models for Noncorporation Taxes

11. **The tax gap estimation framework for the first grouping relies on three basic types of estimation models or methodologies**: (1) a random-audit based estimation methodology—the random-enquiry program; (2) a data-matching estimation methodology—through cross-check of information; and (3) ad-hoc specific taxpayer segment models—primarily to measure tax gap from "hidden" economy. The results from these models and methodologies are then supplemented with direct operational data to complete the coverage of potential sources of noncompliance.[12]

12. **Each of these models is used to estimate tax gaps for several types and segments of taxpayers.** These models break down the estimation of the "general noncompliance" gap by the potential sources of revenue leakage: employers, self-assessors, and nondeclarants.[13]

13. **A mapping of the models and methodologies across the general tax base and tax population illustrates a complex estimation framework for under-declaration/ nondeclaration categories of noncompliance**. This mapping is represented in Figure 2, prepared by the IMF team to illustrate the different models in relationship to the tax bases. This mapping comprises the following components:

- The tax base has been segmented into three dimensions or type of incomes: wages and salaries (red segment), business income (blue segment), or other income (green segment: capital gains, interest, lettings, etc). These components are represented in the bottom three-piece pie chart.

- Layered on top of tax base dimensions are the possible taxpayers for each type of income. Generally the scope of potential taxpayers is captured between those registered or not, then, if registered whether they filed or not, then if they filed, whether they declared any income for that income segment. This is simplified in the case of wages and salaries somewhat, as it can be assumed that registered employers who file a return for "PAYE" income tax withholdings have done so to declare PAYE. These segments are represented in the upper pie chart divided into eleven pieces.

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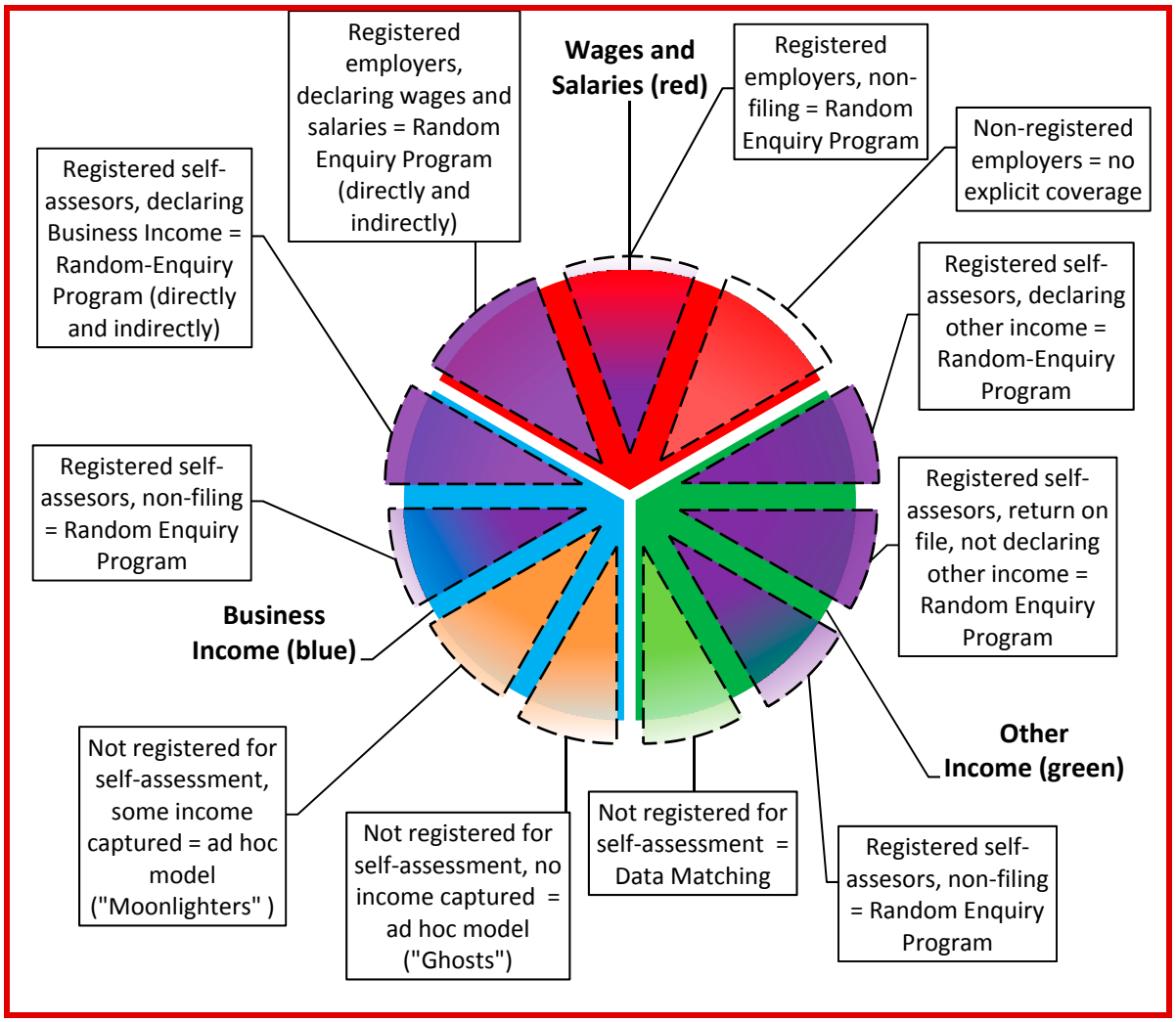
[12] Specifically data on nonpayment of liabilities is added to the total, covering payment noncompliance, along with operational data on the values associated with tax avoidance schemes in place.

[13] While HMRC appears to be managing tax gap estimates by collection processes in direct taxation (self-assessment, withholding at source, etc.), it would be also useful to assess the gap measurements by distinct tax heads (as it is the case in indirect taxation) to see if they have the complete coverage; this issue is covered in more depth in Section IV.

- Finally the upper pie chart has been color-coded to represent which model or methodology has been applied to cover that segment of taxpayer and income; purple represents a random-enquiry program was used, light green that data-matching is used, and orange for ad-hoc modeling. Segments of the upper-pie fading coloration indicate a possible gap (lack of) in the coverage, while transparent slices represent gaps in the coverage.

Figure 1. Tax Gap Estimation Framework for Noncorporation Taxes 1/



1/ There are other components to the total estimate for some of these items, such as the addition of the value of nonpayment and avoidance.

14. **Data on the costs of tax avoidance and nonpayment complete the estimation framework for noncompliance.** The models and methodologies covered in Figure 2 pertain to noncompliance through under-declaration/nondeclaration. The other two primary forms of noncompliance that impact on revenues are tax avoidance and nonpayment; in both cases the source for the estimates across all taxpayers is direct program data.

B. Issues in the Estimation Framework for Noncorporation Taxes

Estimation framework for noncorporation taxes

15. **An estimation framework that constructs an overall tax gap estimate by combining the results from a set of independent models and methodologies has to be comprehensive in its coverage**. Assessment of such a framework needs to ensure that individual components neither overlap nor have gaps in their coverage (or, at the very least, that the risk of either is minimized). There are four general features of a comprehensive framework; these are outlined in Box 2.

Box 2. Design Criteria for an Effective Tax Gap Estimation Framework

1. **Captures the appropriate tax base:** The various models and methodologies should cover all potentially taxable activity as defined for the particular tax type concerned.
2. **Covers all potential taxpayers:** The various models and methodologies should cover all potential taxpayers as defined for the particular tax type.
3. **Accounts for all potential forms of noncompliance:** All manners of potential noncompliance that can impact the potential revenue have to be accounted for.
4. **No overlap between any two components of the framework:** In order to avoid potential over-estimation of the gap, either overlapping coverage of the base, taxpayers, or types of noncompliance must be avoided, or the overlap itself needs to be estimated and subtracted from the composite result.

16. **While HMRC's estimation framework for direct taxes is generally sound, as compared to the design criteria for an effective framework, there are issues with the scope of coverage of the tax base and potential taxpayers**. Table 2 summarizes the team's findings on how the overall framework for estimating tax gaps in direct taxes meets the criteria outlined in Box 2.

Table 2. Evaluation of Gap Estimation Framework for Noncorporation Taxes[1]

Criteria	Evaluation of the Estimation framework for Noncorporation Taxes Tax Gap [2]	Comments
1. Captures the appropriate tax base.	Good	Missing foreign sources of other income.
2. Covers all potential taxpayers.	Fair	Missing nonregistered employers.
3. Accounts for all potential forms of noncompliance.	Excellent	
4. No overlap between any two components of the framework.	Excellent	
Overall assessment	**Good**	

[1] In conducting the review, the criteria for evaluation was the team's assessment of the potential scope for improvement: "excellent" denotes that the team could not identify room for improvement; "good" that some minor improvements could be made but that they would not likely affect the results significantly; "fair" that improvements could be made that might significantly affect the results; and "poor" that the methodology may need to be redesigned as it is likely that the associated errors with the estimate exceed the value of the estimate.
[2] Evaluation levels = excellent, good, fair, poor, missing; n/a = not available.

17. **The estimation framework appears to lack coverage for withholdings of salaries and wages not being declared by nonregistered employers—Criterion 2**. This particular gap may be implicitly included in the estimates generated by the models for the "Moonlighters" (undeclared self-assessment earnings by taxpayers in the PAYE system) and "Ghosts" (undeclared self-assessment earnings by taxpayers not registered for self-assessment and not in the PAYE system); however this is not certain. The explicit model design for these two groups is oriented around own earnings. The mapping applied in Figure 2 also suggests (through the faded coloration in some of the segments) that there may be gaps in the coverage for undeclared liabilities resulting from nonfiling. Undeclared liability from nonfiling registered taxpayers can be estimated through the use of a random-enquiry estimation methodology, but only if the random audits capture a sufficient sample of registrants who ought to file but who have not (see Box 3 for more discussion on features of effective random-enquiry programs).

18. **For nonfilers, it is not certain whether the random-enquiry program will capture any potential undeclared liability—Criterion 2**. This is discussed in more detail in the section related to the assessment of random-enquiry based estimates. In general, this is a difficult segment of the population to capture through random-enquiry as it will typically contain extremely noncompliant taxpayers who are trying to avoid detection by HMRC, and so can be difficult to locate and audit. It could be that the data-matching exercise could prove to be a more effective tool for detecting noncompliance by nonfilers. The data-matching

exercise should be extended to cover this taxpayer segment and the results from both estimation methodologies should be compared and reported on.[14]

Random-enquiry based tax gap estimates for noncorporation inome taxes

19. **Random-enquiry programs for estimating tax gaps must be characterized by several features to be effective**. The criteria for a robust random-enquiry program are described in Box 3.

Box 3.Criteria for an Effective Random-Audit Based Gap Estimation Methodology

1. **Proper definition of the population:** The definition of the population from which the sample is to be drawn can impact on the inferences that can be made from the results. It should include current filers and taxpayers who should be filing. Using a population based only on current filers will mean the estimate for the gap will exclude undeclared liabilities from nonfilers.
2. **Risk-based taxpayer segments for sample selection:** Before commencing sample selection, the population should first be segmented to produce groups of taxpayers with similar risk profiles. This will provide for the most "efficient" use of the random audit data, as the sample results for a given segment will be more closely matched to that segment's population. Two key taxpayer characteristics that can be identified in the taxpayer data that should allow for easy segmentation into groups correlated with risk profiles are taxpayer size and main sector of activity.
3. **Proper sample selection:** Adequate sample sizes should be selected for each of the taxpayer segments. There is a trade-off between having more accurate sampling through selecting a higher sample size, and the cost of sampling (both for the tax authority and taxpayers). By having risk-based taxpayer segments, this balance can be better managed by having higher sample sizes, and greater accuracy, in the higher risk taxpayer segments.
4. **Comprehensive audit:** The scope of the audit conducted should be comprehensive, covering all audit aspects that a taxpayer might be subject to under any and all other audit selection processes.
5. **Projection to the population:** The share of the undeclared liability obtained from the random audit data to the declared liability for a taxpayer segment can be applied to the total declared liability for all taxpayers in that segment to estimate their total detected undeclared liability. In cases where there may be un-sampled segments of the taxpayer population taxpayers should be grouped by risk profiles for projecting the results from the sampled population to the un-sampled population.
6. **Projection to other populations:** In projecting the results from one taxpayer segment to another, the results should only be used to make inferences in regard to the forms of noncompliance that the random-audit program is designed to capture: i.e., under-declaration of liabilities.
7. **Accounting for undetected undeclared liability: To arrive at the total gap estimates for a taxpayer segment, the results from the random-audit program should be adjusted to account for undeclared liability not-detected by audits.** This "uplift" factor for the level of nondetection of undeclared liability is best done at the taxpayer segment level, given that the taxpayer segments are risk-based, and the level of nondetection is likely correlated to the level of noncompliance risk.

[14] Such a report may exist; the request for this information was pending at the time of the preparation of this draft report.

20. **The HMRC's random-enquiry programs to assess undeclared liabilities from employers and self-assessors are generally good, but also present some shortcomings** Table 3 shows an assessment of how the HMRC's program matches the key features list in Box 3; some shortcomings are identified in several criteria.

Table 3. Evaluation of Random-Enquiry Based Estimates for Noncorporation Taxes

Criteria	Evaluation of the Random Audit Program for Employers[1]	Evaluation of the Random Audit Program for Self-Assessment[1]	Comments
1. Proper definition of the population.	Excellent	Excellent	
2. Risk-based taxpayer segments for sample selection.	Fair	Fair	Business taxpayers' stratification can be enhanced to improve accuracy of estimates.
3. Proper sample selection.	Good	Good	
4. Comprehensive audit.	Good	Good	
5. Projection to the population.	Fair	Fair	Better segmentation of the population could enhance the projection.
6. Projection to other populations.	Fair	Fair	Better segmentation of the population could enhance the projection.
7. Accounting for undetected undeclared liability.	Fair	Fair	Not being accounted for in all cases, values being used could be improved.
Overall assessment	**Good**	**Good**	

[1] Evaluation levels = excellent, good, fair, poor, missing; n/a = not available.

21. **Improvements can be made to increase the robustness of the random-enquiry program.** In particular, improvements could be made in the segments of the population that the samples are being drawn from, how outliers are identified and treated in the sample, and how inferences from the sample are used to estimate undeclared liability by other taxpayer segments. The estimated impact of undeclared liability not detected by the random audit program could also be improved.

- ***Criterion 2: Population segmentation*—business taxpayers should be stratified along risk categories.** The key assumption in the random enquiry program is that the results from the sample are indicative for the population as a whole. For this assumption to hold true the selection criteria and the sample size are crucial. It has been indicated that changes to the sampling selection program are being introduced that would segment the population, with businesses being selected from four strata based on turnover, and individuals being selected from seven income classes of income. As results to date suggest that 80 percent of the gap is from business taxpayers, improvements to the design of the stratification of these taxpayers are

essential to improving the accuracy of this estimate. Analysis of all the random enquiry data should be conducted to identify groups of taxpayers with similar revealed risk profiles, and use this information to stratify the taxpayers. A better stratification program would likely require segmenting the taxpayers based on a combination of size and type of activity.

- ***Criterion 3: Sample selection*—the treatment of outliers requires more review, and the values for identified outliers needs to be added directly to the gap estimates.** The documentation for self-assessment random enquiry program states: "enquiries with exceptionally high yield or tax at risk (outliers) are not representative of the population and distort the results and so have been excluded from all analysis in this report."[15] Data on the number and values associated with excluded outliers reported on suggest that in many cases improper identification of outliers may be occurring as the impact of excluding the "outlier" for many of the periods is well within the expected error margin of such an exercise.[16] For any legitimate outliers, it is proper to exclude their value in estimating the grossing up factor for the population of taxpayers, instead the value of their undeclared liability should be included directly in the value of the gap. It should be noted that risk-based segmentation of the population should make it easier to identify true outliers.

- ***Criterion 5: projection to the population*—risk-profiles should be the basis for projecting results to the un-sampled taxpayer segments.** The key assumption in employing the results from the random enquiry program to other taxpayer segments is that the two populations have similar compliance behavior. This is a rather strong assumption, given that this technique is for the most part being used to take results from small-medium taxpayers and applying them to large taxpayers; it would typically be expected that these taxpayers would not have similar compliance profiles (it is for this very reason that the HMRC has segmented these populations in the first place). Stratifying the results from the random enquiry program based on risk profiles would allow for better application of the results across populations.

- ***Criterion 6: Projection to other populations*—the random enquiry results from the small-medium employers should be projected properly.** Currently these results are being improperly extended to the large employers. The total gap from the small is being used as an estimate for the total gap for the large employers, this effectively discounts (or adds an error component to) the known information on the large

[15] "Analysis of the 2002–03 to 2008–09 Self-Assessment Random Enquiry Programmes," HMRC, February 2013.

[16] Footnotes to table 3.2, ibid. Footnotes to table 2.1, "Analysis of the 2003–04 to 2008–09 Employer Compliance Random Enquiry Programmes," HMRC, November 2011.

employers' payment noncompliance. The results from the random enquiry program estimated undeclared liability for the small-medium employers could be used to produce an estimate the undeclared liability for the large employers. In addition, in applying the results to the large employers the results for the large employer are being affected by the assumption of a biased error estimate.[17] In regards to the projection of the results from the large employers to the self-assessment of income for large partnerships, it is not clear whether the net results or gross results for the undeclared liabilities for large employers is being applied; the gross results, as above, would be the preferred methodology.

- ***Criterion 7: Accounting for undetected undeclared liability*—a more consistent and coherent approach to estimating and applying uplifts is needed.** For the random enquiry estimates, most of the uplift factors being used are cited as being from "U.S. Research." Uplift factors are not being used in all cases, however. As uplifts can form a significant portion of the gap estimates, a more consistent, coherent approach should be used. If U.S. based estimates are to be the primary source for these uplifts, then the U.S. based values should be applied across all taxpayers as they are employed in the United States. In the longer term, estimates of domestically determined values need to be determined.

The data-matching based tax gap estimates for noncorporation taxes

22. **Data-matching programs for estimating tax gaps must be characterized by several key features to be effective**. The criteria for an effective data-matching program are compiled in Box 4.

[17] The estimate of the gap value for the small-medium employers is 1 percent, but in applying the value to the large employers this 1 percent figure is being interpreted as being a gap value of 1 to 2 percent, and so a mid-range value of 1.5 percent being applied, which implies a 50 percent increase over the base value.

Box 4. Criteria for an Effective Data-Matching Based Gap Estimation Methodology

1. **Availability of unique taxpayer identifiers:** The success of a data matching program is entirely dependent on having the ability to uniquely identify all taxpayers, or potential taxpayers.
2. **Availability of unique identifiers in third party data:** The third party information should not only have some means of uniquely identifying potential taxpayers, but there must be a way to map those identifiers to the tax authority's taxpayer identification system (if they are not the same identifier).
3. **Accounting for unmatched data:** Unmatched data poses a challenge because even though the identifiers cannot be matched doesn't necessarily mean that the underlying data do not represent the same individuals or households. There are a number of possible ways in which data in the third party system that pertains to a known taxpayer cannot be matched to that taxpayer. As such, if it is assumed that all unmatched data represents undeclared tax by nonregistrants the gap calculation could be overstated (if some of it reflects data that a taxpayer declared). Alternatively if all unmatched data is ignored, the gap could be underestimated to the extent that some of the unmatched data will represent undeclared tax by nonregistrants, and some alternative means of estimating this gap would be necessary. The most appropriate technique would depend on the proportion of unmatched data—the smaller the proportion the smaller the consequences of potentially including unmatched data already declared by taxpayers.
4. **Comprehensive coverage:** Ideally the third party information should be universal, i.e., all potential providers of such information are required to provide it. If the scope is limited, then either information as to the relative coverage of the provided information is necessary, or the data-matching exercise needs to be accompanied by a complementary method for estimating the size of the gap from other sources.
5. **Proper estimation of the associated tax gap:** To properly estimate the tax gap associated with matched data, micro-simulation of the impact on the taxpayer's liability is necessary (except in cases where a specific tax rate applies regardless of other income, credits, etc.). In the case of unmatched data, if micro-simulation is not available, an average effective rate could be used. The rate used should be the average effective rate for other taxpayers who also have income of the same type in the same income range.
6. **Accounting for undetected undeclared liability:** An estimate of the proportion of undetected undeclared liability should be applied to the total detected undeclared liability to arrive at the total estimated undeclared liability.

23. **While the overall principles through which HMRC applies the data-matching programs seem sound, some shortcomings were detected**. Table 4 shows an assessment on how the HMRC's program matches the key features list in Box 4.

Table 4. Evaluation of the Data-matching Based Estimates for NonCorporation Taxes

Criteria	Evaluation of Data-Matching Program[1]	Comments
1. Availability of unique taxpayer identifiers.	Excellent	
2. Availability of unique identifiers in third party data.	Excellent	
3. Accounting for unmatched data.	Fair	Unmatched data is being ignored, possibly skewing the results
4. Comprehensive scope of coverage.	Fair	The data matching program has to be supplemented to address the lack of coverage.
5. Proper estimation of the associated tax gap.	Good	
6. Accounting for undetected undeclared liability.	Fair	Further information on this component is necessary to complete the evaluation.
Overall assessment	Fair	

[1] Evaluation levels = excellent, good, fair, poor, missing; n/a = not available.

24. **A key area for improvement in the data matching program is to address the issues of the scope of coverage of the estimation methodology**.

- ***Criterion 4: Scope of coverage*—the data-matching program need to be supplemented in order to capture undeclared other income from nondomestic sources, including through effective exchange of information (EOI)**. A data-matching program can only serve as the sole basis for a gap estimate in areas where the third-party sources are the only potential sources for the data being sought. In the case of the broad category of "other income," while HMRC has access to data from domestic sources of a broad range of other income types, they do not have access to foreign sources. As such, the data-matching program has to be complemented with an estimate of the gap associated with undeclared foreign sourced other income. The recent initiatives to strengthen EOI are encouraging, but much needs to be done to be able to obtain sufficiently complete data on foreign sourced income for data-matching.

Ad-hoc model-based tax gap estimates for noncorporation taxes

25. **Although it is not possible to define a comprehensive set of criteria to assess different ad-hoc models, some areas of potential improvement were identified**. Nonetheless the models—for ghosts and moonlighters—can still be evaluated against the general criterion of ensuring that (1) their coverage is appropriate, given the segment of the estimation framework that they are being designed to cover; and (2) ensuring that the general estimation methodology is sound.

- ***Criterion 1: Scope of coverage*—these models could be extended to capture the unregistered employers.** It is likely that the population that these two models attempt to capture includes, or significantly overlaps with, the population of nonregistered employers that are not submitting income tax withholdings. In fact, these models may already be capturing a portion of this segment of the gap, and overestimating the amount of undeclared self-employment earnings—some of the undeclared wages and salaries being estimated and included as a tax gap for self-assessment of income tax might actually relate to the wages and salaries of employed individuals whose undeclared income should be included in the PAYE tax gap. To the extent that this overlap might already be occurring, it may mean that the overall gap value would not be impacted significantly by making this distinction, but the distinction may nevertheless be important if it informs resource allocation decisions (i.e., focusing on identifying more self-employed taxpayers, or focusing on identifying more taxpayers who are employers).

- ***Criterion 2: Improvements to the general methodology*—a better foundation for the assumptions on the wage-levels for the ghosts and moonlighters is needed.** For the ghosts and moonlighters, the estimates rely on some strong assumptions as to the number of participants, and their general levels of compensation. While there is some foundation to the estimates in regards to the number of participants, there is no evidence or analysis supporting the assumed wage levels. As these estimates form a very significant portion of the income tax gap, and the tax gap as a whole, more research on the design of these models in general is warranted.

C. Estimation Framework and Models for Corporation Tax

26. **The tax gap estimation framework for the second income tax grouping (corporation tax) relies on three basic models**: (1) a random-audit based estimation methodology—the random-enquiry program; (2) direct program data; and (3) ad-hoc estimates. Similar to the estimation framework for income tax, the results from these models and methodologies are supplemented with direct operational data to complete the coverage of potential sources of noncompliance.

27. **A mapping of the models and methodologies across the general tax base and tax population was also prepared for the corporation tax**. This mapping, represented in Figure 3, illustrates the coverage of the models and methodologies used in estimating the corporation tax gap, segmented on the basis of the portions of the gap they are primarily designed to estimate. The representation comprises the following components:

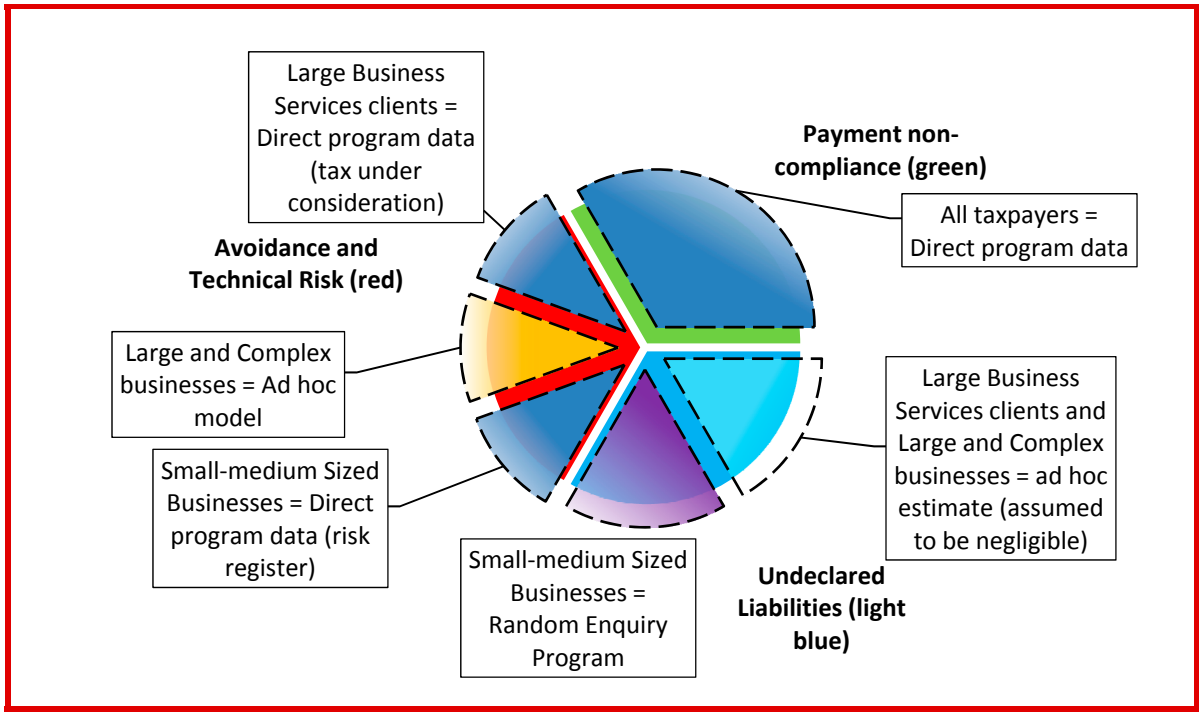
- The primary segmentation in the figure, represented in the bottom pie chart, is by the form of noncompliance targeted by particular models and methodologies. These

include undeclared liabilities (light blue segment), avoidance and "technical risk" (red segment), and other noncompliance (green segment).[18]

- The segments of the upper pie chart again represent the segment of taxpayer targeted, with the color of the segment identifying the model or methodology. Here purple shading indicates a random enquiry based estimate, orange shading an ad hoc model, dark blue indicates direct program data, and a transparent segment indicates no estimate is being made.

28. **There are two important differences between the estimation framework for the corporation tax (Figure 3) and the noncorporation taxes (Figure 2)**. The corporation tax estimation framework includes a component for supplementing direct program data on tax avoidance and technical risk, for all taxpayers, while this only pertains to certain taxpayer and income type segments in the income tax, NIC, and capital gains tax estimation framework. For this reason the representation of the framework for the corporation tax includes the additional element of segmentation by portion of the tax gap. Also the corporation tax gap estimation framework covers only one form of income, so an income type dimension is not needed as it was with the income tax, NIC, and capital gains tax estimation framework.

Figure 2. The Tax Gap Estimation Framework for Corporation Tax



[18] "Technical risk" is a term used by HMRC to describe issues related to the interpretation of the law.

D. Issues in the Estimation Framework and Models for Corporation Tax

Estimation framework for corporation tax

29. **While the estimation framework for the tax gap for corporation tax is generally good, there are issues with regard to the coverage**. Table 5 provides a summary assessment of how well the estimation framework for the corporation tax meets the criteria for a good estimation framework as described in Box 2. While most of the components meet the criteria, there is a notable gap in the coverage that is in regards to undetected undeclared liabilities by large corporations.

Table 5. Evaluation of the Tax Gap Estimation Framework for Corporation Tax

Criteria	Evaluation of the Estimation framework for the Income Tax, NIC, and Capital Gains Tax Gap[1]	Comments
1. Captures the appropriate tax base	Excellent	
2. Coverage of all potential taxpayers	Excellent	
3. Accounts for all potential forms of noncompliance	Fair	Undetected undeclared liabilities are not being accounted for all taxpayers.
4. No overlap between any two components of the framework	Excellent	
Overall assessment	**Good**	

[1] Evaluation levels = excellent, good, fair, poor, missing; n/a = not available.

30. **The assumption that tax gaps in corporation taxation for large taxpayers comes exclusively from tax avoidance and risk should be tested—Criterion 3**. A proper tax gap estimation exercise should avoid assuming the size of any particular components of the tax gap; as it undermines the whole purpose of the exercise. Data from targeted audits (data from audits that have been performed during the regular course of operations) could be used to check the validity of the current assumption (that there is negligible undeclared liability in large businesses) or to establish an estimate as to the possible size.[19]

31. **While the overall tax gap estimation framework for the corporation tax is generally good, some improvements could be made to the models and methodologies**. These improvements are discussed below in the assessment of the models.

[19] Targeted audit data, while drawn from a skewed sample, can be used as the basis for a tax gap estimate; the U.S. income tax gap estimates documentation provides details on such methodologies.

The random-enquiry based tax gap estimates for corporation tax

32. **The HMRC's random-enquiry based estimates also presented some shortcomings.** The set of criteria outlined in Box 3 was used to assess the random-enquiry program for corporation tax. Table 6 summarizes the assessment.

Table 6. Evaluation of the Corporation Tax Random Enquiry Based Estimate

Criteria	Evaluation of the Random Audit Program for Small-Medium Corporation Taxpayers[1]	Comments
1. Proper definition of the population	Excellent	
2. Risk-based taxpayer segments for sample selection	Fair	Segmentation is not based on risk profiles
3. Proper sample selection	Fair	There may be issues with the treatment of outliers and the sample size
4. Comprehensive audit	Good	
5. Appropriate projection of the random audit data to the taxpayer population	Good	
6. Appropriate scope of projection of results	n/a	
7. Accounting for undetected undeclared liability	Fair	Values could be improved
Overall assessment	**Fair/Good**	

[1] Evaluation levels = excellent, good, fair, poor, missing; n/a = not available.

33. **Improvements are needed in the areas of the segmentation of the population, the sample selection, and accounting for undetected undeclared liability**. Below a description of possible improvements in relation to specific criteria.

- ***Criterion 2: Population segmentation*—as with the unincorporated business taxpayers, the segmentation of the corporate taxpayer population should be based on risk profiles.** Again, segmenting taxpayers on a combination of size and type of activity, as informed by risk-based profiles, would allow for a more efficient sampling exercise, and likely improve the accuracy of the results of the program.

- ***Criterion 3: Sample selection*—the treatment of outliers needs to be reviewed, as does sample size.** The documentation for this program notes that outliers are being excluded from the analysis, but goes on to state that "high tax at risk combined with small sample sizes for the program can result in one large settlement substantially

inflating that overall population for that year."[20] For small sample sizes, however, it is more difficult to ascertain whether an anomalous value is truly an outlier or a representative result; as the sample size gets smaller, the distribution in that sample will deviate more and more from the distribution in the population. In order to properly be able to identify and address outliers, it must first be determined that the sample size is sufficient. A review of the impact of including all the excluded outliers for this series indicates that a fairly stable trend seems to emerge, more stable than the results excluding the outliers.[21]

- ***Criterion 7: Accounting for undetected undeclared liability*—as with the income tax program, a more consistent and coherent approach to estimating and applying uplifts is needed.** As the uplift factors can have a significant impact on the final estimates for the tax gap, some additional research into the general range of domestic values should be conducted. Preferably uplifts should be determined for the individual taxpayer segments (given that the size of the uplift is likely correlated to risk factors).

The ad-hoc model based tax gap estimates for corporation tax

34. **The ad-hoc model in use in the tax gap estimation framework is designed to ensure scope of coverage, but the methodology could be improved**. The ad-hoc model used to extend the data on technical risk and tax avoidance from the LBS segment[22] to the large and complex business[23] helps extend the coverage of the overall estimation framework. However, the projection method used could be improved, following the guidelines for projecting data from one taxpayer segment to another as outlined for random audit programs.[24]

35. **Segmentation of the LBS businesses and the large and complex businesses based on risk profiles should be conducted in order to improve projection of results from one population to the other**. Instead of employing the general level of technical risk and tax avoidance to total liability for the LBS businesses to the large and complex businesses, a more targeted segmentation of source LBS businesses and target large and complex

[20] "Analysis of the 2004 to 2009 Corporation Tax Self-Assessment Random Enquiry Programmes," HMRC, December 2012.

[21] Footnotes to Table 2.1, ibid.

[22] The largest corporations (about 800) being monitored and audited by the LBS group of HMRC.

[23] Large corporations excluding LBS segment (around 9,000).

[24] See the discussion under paragraph 23, fourth bullet, regarding Criterion 6.

businesses could be identified. The current approach yields a very stark contrast in ratios for the avoidance to technical risk, with a ratio of roughly four to one for the LBS businesses and one to four for the large and complex businesses.[25] While it is likely that there would be a higher proportion of avoidance schemes to technical risks for larger and more sophisticated businesses, this difference is quite stark.

E. Recommendations

- An estimate of the gap from undeclared withholdings on employment income from nonregistered employers is needed.

- Segmentation of businesses in the random enquiry program should be based on risk profiles.

- The practice of excluding outliers from the random audit samples should be reviewed, and outlier results should be incorporated into the gap directly.

- Establish "peer" segments between businesses covered under the random enquiry program and those to which the results are being extended.

- The manner in which the results from the small-medium employers are being projected to the large employers should be changed so that the projection makes no additional assumption as to error bias, and so that the results are used only to project undeclared liabilities.

- The data-matching exercise should be used across a broader segment of the taxpayer population, not just for taxpayers not registered for self-assessment.

- Research should be conducted to better establish a basis for wage-level assumptions being used in the estimates for the ghosts and moonlighters.

- Risk profile based segments of LBS businesses should be constructed; this would allow for better establishment of "peer" groups between the LBS businesses and the large and complex businesses.

- Statistics on the results of targeted audit results should be compiled to use as a basis for comparison with the tax gap estimates (targeted audit data should establish a floor level for any estimate).

[25] In Measuring the Tax Gap 2012, the average values for the LBS for 2006–07 to 2008–09 is GBP 1.4 billion in avoidance to an average of GBP 0.3 billion for technical risks subject to litigation. For the large and complex businesses, the average value for avoidance for 2009–10 to 2010–11 is GBP 0.25 billion, while the average derived value for technical risks is GBP 1.0 billion.

- Targeted audit results could be used where random enquiry results are not available, once adjusting for the selection bias associated with the targeted audit results.

- The assumption that there is no tax gap other than tax avoidance or technical risk for LBS taxpayers should be tested and proved.

- Determine domestic uplift factors to be used in tax gap estimates for corporation taxation.

III. Measuring the Indirect Tax Gaps—Framework and Methodologies

36. **This section discusses the estimation frameworks and methodologies for the indirect tax gaps.** In this case the framework and model is essentially one piece, with the model being designed to capture all possible sources of the tax gap—hereafter the report refers interchangeably to 'framework' or 'model.' Therefore, there is no need to differentiate among them, as it was the case in the estimation of tax gaps in direct taxation.

A. Estimation Framework for Indirect Taxation

37. **Tax gaps in indirect taxation are estimated using mainly top-down techniques.** The indirect tax gap estimates are broken down into three major groupings: (1) the gap for VAT; (2) the gap for excise taxes; and (3) the gap for other indirect taxes. This review focuses on the first two of these categories, which comprise 92 percent of the indirect tax gap—Table 7 summarizes the methodologies used.

Table 7. Methodologies for Estimating Tax Gaps in VAT and Excise Taxes

Tax Type	Methodology
VAT	A top-down approach based on consumption statistics is used to estimate the overall potential collections for the VAT, referred to by HMRC as the VAT Theoretical Total Liability (VTTL). The tax gap is then derived by subtracting actual collections from the VTTL. The top-down approach used estimates the VTTL by adding: (i) an estimate of the amount of final VAT payable by households on their final consumption, based on consumer expenditure survey data; (ii) the VAT payable by government based on department accounts and supply-use tables; and (iii) expenditures by exempt sectors based on supply-use tables and surveys as to the proportion of input used by businesses that is not recoverable. Some other adjustments are made to account for special treatment for housing and charities, and to adjust for any reimbursements of VAT under special relief programs or schemes. For internal purposes, to supplement the top-down estimate for the VAT and to allow for disaggregating the VAT gap based on the aspects of noncompliance, a bottom-up estimate is also conducted. The bottom-up estimate generally is lower than the top-down estimate, as would be expected.
Excises: Alcoholic beverages, tobacco	Top-down estimates based on surveys or consumption data published by the Office of National Statistics are used to determine the total level of consumption. The difference between total consumption and the tax paid level of consumption provides the base for the estimated tax gaps. Difficulty in converting survey data on the value of wine expenditures into estimates of volumes of consumption has required the development of a new model with a slightly more complex estimation methodology, but it still follows the general top-down approach of calculating the gap based on an estimate of total consumption.
Excises: Petroleum fuels	Top-down estimates are based on travel distance statistics and fleet characteristics, and "cross-border shopping." Thus, two separate methods of estimation are employed based on location; petroleum fuel consumption in Great Britain versus that in Northern Ireland. For consumption in Great Britain, the estimate is a composite of fuel purchased domestically versus that obtained through "cross-border shopping." An estimate of domestic consumption in Great Britain is constructed using data on fleet composition; distance travelled, and fuel efficiency. The level of the tax gap is then determined by the estimated total consumption, plus estimated total cross-border shopping, less duty paid consumption and licit cross-border shopping. The estimate for Northern Ireland is based on the estimates obtained for Great Britain and estimates of the relative market shares.

Source: Prepared by the IMF team based on HMRC publications.

B. Issues in the Estimation Framework for Indirect Taxation

38. **The indirect tax framework in use by the HMRC is consistent with general estimation practices for these tax types; comprehensiveness of its coverage has to be ensured**. Similarly to the assessment of indirect taxation, design criteria were defined to evaluate the robustness of tax gap estimate models in indirect taxation. Box 5 outlines a set of key features required for a robust top-down gap estimation model.

Box 5. Design Criteria for an Effective Top-Down Gap Estimation Methodology

1. **Independent source of statistics for the tax base:** A top-down program relies on having good statistics on the size of the tax base, derived from sources other than taxpayer records; nominally independent data sources should be checked to ensure they do not rely on tax records to impute critical missing values or control totals. For example income surveys are often grossed up to income totals reported by tax authorities, to correct for nonresponse at very low and very high income levels.
2. **Accurate statistical data:** The statistical data needs to be relatively accurate, with detailed documentation on the method of compilation and, ideally, an indication of the estimation error.
3. **Consistency in statistical data:** When statistical data from different sources are combined, it must be ensured that they are consistent—both in terms of definitions, and in scale of the data. For example, when combining national accounts statistics with consumption survey data, it should be verified that the overall level of consumption reflected in the survey data is consistent with that in the national accounts data. It also needs to be verified, when using statistical data that spans a period of time, that changes in definitions have not occurred.
4. **Sufficiently detailed statistical data:** In order to be able to accurately model the policy framework, the statistical data needs to be sufficiently detailed. Commodities and sectors should be disaggregated sufficiently to match the most detailed definitions in the tax rate schedules.
5. **Comprehensive statistical data:** The statistical data used needs to cover the full tax base for the tax type. Because top-down models are usually more accurate in identifying changes to tax gaps than their precise level, the data should be available for more than one period.
6. **Accurate modeling of the tax structure:** The model of the tax structure should adhere as closely as possible to the statutory description of the application of the tax; using statutory rates where possible instead of average effective rates, and capturing all special treatments such as exemptions, thresholds, credits, etc.

39. **While overall the models for the VAT and the excise taxes meet the criteria for effective design, there are areas for improvement.** Table 8 summarizes the appraisal of how the indirect taxation framework meets the criteria outlined in Box 5.

Table 8. Evaluation of the Indirect Tax Top-down Based Estimates

Criteria	Evaluation of the VAT Model[1]	Evaluation of the Excise Tax Models[1]	Comments
1. Independent source of statistics for the tax base.	Good	Excellent	Some HMRC based data is used to supplement third-part data.
2. Accurate statistical data.	Good	Good	
3. Consistency in statistical data.	Good	Good	
4. Sufficiently detailed statistical data.	Good	Excellent	
5. Comprehensive statistical data.	Fair	Fair	The VAT data on consumption by exempt suppliers could be improved; the primary data used for beer, spirits and wine is value based but the tax is volume based.
6. Accurate modeling of the tax structure.	Good	Excellent	The modeling of how tax accrues on inputs to exempt supplies could be improved for the VAT.
Overall assessment	**Good**	**Good**	

[1] Evaluation levels = excellent, good, fair, poor, missing; n/a = not available.

40. **Improvements can be made to enhance the robustness of the indirect taxation tax gap models.** Some suggestions for improvement are provided below.

The VAT gap model

- ***Criterion 5: Comprehensive statistical data*—the VAT gap model could be improved with better information on the proportion of exempt to total supplies.** Currently data on the proportion of exempt to total supplies being used in the VAT gap model is obtained from an HMRC survey. Ideally the proportion of supplies used in making exempt supplies should be calculated based on data from source-use statistical tables. This would improve the degree of independence of the data sources used in estimating the base, and it is also likely that the survey techniques and responses used in constructing the source-use tables are of better quality. If there is a concern that the source/use tables are outdated, an alternative would be to require taxpayers to record the proportion of exempt to total supplies on their VAT return.[26] Data that taxpayers are required to report on a return would probably be more reliable

[26] For this purpose current source-use tables are not required, they only need to be reasonably current such that they reflect current business practices. Tables produced within the last three to four years would likely have proportional values for a sector that are reasonably representative of current business activity (barring any significant price shocks).

than information obtained through HMRC conducted surveys.[27] In fact, data required to be reported on a return might be a better basis for estimation than a model based on source-use tables, as it would more accurately capture the impact of the actual apportioning methodologies in use by taxpayers; a source-use data based model would mostly be restricted to a apportioning potential input tax credits based on the proportion of exempt output.

The excise gap models

- ***Criterion 5: Comprehensive statistical data*—the results from the value data based excise models should be compared to volume-based survey data**. It is understood that the HMRC has had issues with volume reported data in the past, in that there could be under-reporting. This is an obvious question in regards to these estimates and so illustrative calculations using the volume based survey data (such as is provided in the General Lifestyle Survey from the Office of National Statistics) should be produced and compared against the value based calculations.

- **As is done with the VAT, bottom-up estimates for the excise tax gap should be constructed to compare against the top-down estimates**. One interesting feature of the estimation framework for the VAT that HMRC employs is that it supplements the main result from the top-down model with a bottom-up based estimate. The main purpose of this is to segment the tax gap into different forms of noncompliance, but it also provides a good quality check for the top-down based estimate. This approach should be extended to the excise taxes. A bottom-up estimate for excise taxes should be compiled based on audit data for domestic producers on their under-declaration or nondeclaration, and audit and policing data from customs on under-declaration, mis-declaration, or nondeclaration.

C. Recommendations

- Bottom-up estimates of the excise taxes should be constructed in order to compare and contrast with the results from the top-down estimates.

[27] The VAT return in use by the HMRC has been over-simplified. In most countries with a VAT taxpayers are required to provide information on the level of their taxable output for the period by tax rate, and their level of exempt output, detail on input tax credit claims is also generally required to be reported such as the amount of input tax credit being claimed that was paid on imports versus that paid to domestic suppliers. As this is all data that a taxpayer would need to have compiled in order to compute their liability, having the taxpayer report it on the tax form would have a negligible impact on the taxpayer's compliance costs while providing substantial benefit to the HMRC. This would also provide for better data than a survey, as the reporting requirements for tax return data are typically more stringent than for a survey, and the sample size would be larger (all filing taxpayers).

- The method for determining the proportion of VAT collected on inputs into the production of exempt supplies should be based on better statistical data.

- Results for the excise tax based on consumption volume survey data should be produced for comparison and contrast to the expenditure value based survey data.

IV. Reporting the Tax Gap

41. **Reporting on performance measurement indicators is one of the key components of a good management framework.** Reporting is important for the users, in particular the management that makes operational decisions based on the performance measurements, as well as to ensure the transparency of the institution's operation.

42. **HMRC identifies several purposes served by publicizing tax gap estimates and analyses**:

- **Transparency**: Transparency is high priority agenda of the government and HMRC. As the information is used in high level operational decision making, HMRC believes that it should be transparent about the figures it is using.

- **Public interest**: The Information Commissioner has ruled that the tax gap estimates are a matter of public interest and thus should be published because disclosure will facilitate public debate and enable the public to assess HMRC's performance. In addition, as the estimates are published as Official Statistics, HMRC has to abide by the Code of Practice for Official Statistics—the result of which is that if HMRC were to stop publication, the code of practice stipulates HMRC should consult with all of the users and get confirmations that they no longer use the estimates.

- **Taxpayer behavioral response**: HMRC expects that by assuring the public that most tax liabilities are being collected and that the great majority of peer taxpayers pay the tax that is due, it could positively affect taxpayers' compliance behavior.

- **Internal use for operational decisions**: As discussed above, the key benefit of the tax gap analyses is to provide information to help make operational decisions. It is important to properly document the analyses and share them transparently with those who could be affected by the operational decisions.

43. **Given that both analyses and publication of tax gaps have multiple purposes, it is important to have a clear communication strategy**. For example, gap analyses for operational management purposes would not always be relevant in affecting taxpayers' compliance behavior or in affecting taxpayer's perceptions of the fairness of the tax system. Conversely, considerations of how to best affect taxpayer behavior and perceptions should not discourage candid assessments of tax gaps—although it may be true that publishing

results showing peer taxpayers are mostly paying taxes could enhance compliance that should not provide an incentive to publish artificially low gap estimates.[28]

A. Presentation of the Tax Gap Results

HMRC approach to reporting on the tax gap

44. **A performance measurement indicator should be verifiable.** Reporting on performance measurement indicators should provide not only the values, but also the methodology and source data. HMRC reports the results of their gap estimation annually in the "Measuring Tax Gaps" publication. It reports the tax gap estimates in several different ways, including: in nominal terms and in percent share of theoretical liabilities, broken down by tax heads and taxpayer behaviors, error margins and known biases, historical series together with notes on methodological changes. In addition the publication includes a methodological annex that is sufficiently detailed and provides enough information to assess the validity of estimations; it describes the definition, the methodology to derive and data sources of each estimate—on-line information is also available.

45. **HMRC does not publish how tax gap estimates are to be used in making operational decisions.** This is reasonable as operational changes should not be mechanically linked to changes in the gap. The link between resource allocation and the gap estimates are sufficiently explained separately in the U.K. administration's 2010 Spending Review.

46. **The method by which the tax gap estimates are being aggregated should be reviewed.** There are some general inconsistencies in the manner in which the individual components of the tax gap are being aggregated throughout the report—Table 9 represents the current aggregation methods being used. Using a consistent manner to report the tax gap would improve the transparency of the estimates, and could also provide for a better breakdown of the results in informing resource allocations.

[28] It could be argued that showing low gap estimates may have an adverse impact on compliance as noncompliant taxpayers might feel relieved to see HMRC is not detecting their wrong-doing.

Table 9. Current Levels of Aggregation for the Gap Estimates

Current Apparent Aggregation Hierarchy				
Level One	Level Two	Level Three	Level Four	Level Five
Total Gap	Direct Taxes	Income, NIC, and capital gains tax	Income, NIC, and capital gains tax	*Breakdown by the individual estimation components*
		Corporation tax	Corporation tax	
		Other direct taxes	Other direct taxes	
	Indirect Taxes	VAT	VAT	
		Excises and other indirect Taxes	Beer duty	
			Spirits duty	
			Cigarette duty	
			Hand-rolled tobacco duty	
			Great Britain diesel duty	
			…	
			Other indirect taxes	

Source: Prepared by the IMF team.

47. **Specifically the tax gaps values should be aggregated in a manner that is more consistent with how revenues are generally reported**. This would influence not only the higher level of aggregation being used in the tax gaps, such as keeping other indirect taxes separate from excise taxes in all presentations, but also how the tax gaps are being measured and aggregated at the micro level, as the NIC gap should be reported separately from income tax. Using this basic rule, there should be four basic levels of aggregation for the tax gap applied consistently throughout the report, as shown in Table 10. Transparency and resource allocation would benefit from these levels of aggregation, as these should provide a better indication as to the location of the gap, by avoiding issues of averaging out gaps across major tax types (such as across the NIC and income tax, and excise taxes and other indirect taxes).

Table 10. Suggested Levels of Aggregation for the Gap Estimates

Suggested Aggregation Hierarchy			
Level One	Level Two	Level Three	Level Four
Total Gap	Direct Taxes	Income and capital gains tax	*Breakdown by the individual estimation components*
		NIC	
		Corporation tax	
		Other direct taxes	
	Indirect Taxes	VAT	
		Excises	
		Other indirect taxes	

Source: Prepared by the IMF team.

48. **No single indicator will provide sufficient information to assess the extent to which the organization has been successful.** A set of complementary indicators is necessary. The gap estimates of individual tax heads and related analyses in themselves are important outcomes of the exercise. In this respect, the benefits and risks in producing a

single aggregated tax gap estimate should be reviewed. Given the varying degree of robustness of estimation model, and considering that the least complete model tends to produce the largest estimate (e.g., ghosts and moonlighters), presenting certain segments of the tax gap estimate separately from others could be usefully considered.

Recommendations

- The method by which the gap estimates are being aggregated, both in their calculation and reporting, should be reviewed to have isolated estimates and reported aggregates by major tax type.

- The tax gap estimates should be segmented by the level of robustness and completeness (e.g., grouping gap estimates with similar level of margins of error).

B. Values for the Tax Gap

49. **The value of the gap, measured properly, can change over time.** In addition to the usual challenge of working with nominal values (the value of which inflation will erode over time) the gap value is itself a dynamic value and can be expected to change for any given period over time. For a bottom-up estimate, the value of the gap for a given period will tend to go down on subsequent measurements, as the stock of debts are reduced, or new information on unidentified risks are obtained. For top-down estimates, which compare accrued collections for a period to the potential tax from all taxable activity that occurred in that period, the gap will change over time as revenue accrues through the collection of arrears or from the collections of additional assessments. This dynamic nature of the absolute value of the gap means that even relative measures for the gap, as a percent of total potential revenue or as a percent of GDP, will also be dynamic.

50. **Dynamic values can present challenges in attempting to make assessments of performance levels across periods.** It can be expected that using accrued collections to measure the tax gap, the gap estimate for recent years would have a tendency to be higher than for more distant periods, as there will have been less opportunity for the administration to collect upon unremitted amounts owing. For this reason, HMRC uses a hybrid approach to developing the tax gap, using differing values for the amounts collected, in an attempt to build a stable value for the net gap.

51. **For direct taxes, the HMRC's hybrid approach uses differing values for collections depending on the tax period.** For older periods, the actual compliance yield—the value of actual collections against identified liabilities—are subtracted from the estimated tax gap. For more recent periods gap projections are used, with estimated compliance yield being subtracted from the estimated tax gap.

52. **For the indirect taxes, an adjusted cash basis for the collections is used.** The adjusted cash collection—shifting the value by three months—is used as an approximation of

accrual collections. This can be a good proxy under certain conditions. Most significantly it requires that new un-paid obligations balance with arrears collections in a year.

Issues

53. **Assumptions of future collections performance undermine the use of the gap as a means of assessing performance changes over time**. They also reduce the ability of the gap estimates to provide information on how revenue performance has changed over time for a particular period. While the current practice may be pragmatic to deal with data issues (the lack of accruals data for the VAT) and to generate a measure for the gap that can produce results that are comparable over a number of periods (the inclusion of estimated collections for the most current periods), the costs of undermining the gap estimates seem to outweigh the benefit of such pragmatism. While the netting of anticipated compliance yields might well have positive impacts on taxpayer compliance behavior—by assuring that most tax liabilities will be eventually collected—it does not necessarily support the current practice of only reporting the anticipated gap.

54. **Reporting the tax gap in three manners, the "gross gap," the "net gap," and then the net gap with anticipated collections, would provide a more nuanced breakdown of revenue collections performance over time and for a particular period**. We define the gross gap as being the gap as measured at the due date for payment of tax liabilities, and the net gap is the gap at the time of measurement; the net gap with anticipated collections is how we would define what the HMRC is currently reporting.[29] The HMRC has argued that presentation of a gross gap and net gap number can be misleading in that it could be interpreted that the gross gap is what is collected without any intervention, and the net gap is the sole indicator of administrative action. While it is agreed that a gross gap figure is not a measure of voluntary compliance, it does provide information on the general nature of taxpayer compliance—if two tax periods had the same net gap number, but one had a lower gross gap number, it could be concluded that taxpayers were more compliant in the period with the lower gross gap period.

55. **Comparisons of the relative sizes of the values of the net gap and the gross gap can yield insight into the type of administrative activity that may be needed to yield further revenue collection improvements**. Furthermore, by explicitly identifying that portion of the gap figure being presented that is attributable to assumptions regarding future potential collections would make the gap measure more transparent, i.e., the difference between the net gap and the anticipated net gap currently being reported. This would also allow for tracking current and projected performance in these active collection activities.

[29] While this definition for the gross gap is somewhat narrow in definition—a broader definition would be the gap in the absence of any active or passive intervention by the administration—it has the advantage of being practical; measuring this gap is a relatively simple matter of identifying those payments made on-time.

56. **The estimates for the VAT gap could be improved, and made more consistent with the gap estimates for the other major tax types, by using a true accrual value**. While the current system does not provide a report on how VAT payments are accruing, it should be capable of producing such a report—the system has to be able to track how payments are being allocated against liabilities in order to do proper interest calculations for payments in arrears.

Recommendations

- Values for the gross gap and the current net gap should be reported, in addition to the anticipated net gap figure currently used.
- Methods for generating a proper accruals report for VAT revenues should be investigated.

V. USING THE TAX GAP

A. Tax Gap as Performance Indicator for Revenue Collection

57. **A tax gap estimate has several characteristics suitable for a performance indicator that is linked to pre-determined consequences.** Any performance indicator with direct consequences (e.g., on performance assessments of managers, resource allocation) needs to be measurable, verifiable and free from bias. It also has to be tied to the institution's efforts in meeting its objectives and goals. These features require a clear and transparent methodology for quantification that is acceptable by those who need to monitor the performance (e.g., the government or the parliament). A tax gap is directly linked to the most important objective of any tax administration—to collect taxes—and it is a quantified figure (be it an absolute amount or a figure scaled to the size of relevant tax base or the overall economic size).

58. **There are, however, several challenges in using a tax gap estimate as a performance indicator**. These include:

- **Data limitations**: The benefit of measuring a tax gap is to provide a context for actual tax collection by comparing it with an objective estimate of relevant tax potential, using data sources (preferably) independent of the tax administration. This benefit, however, could also be the weakness of the gap estimate. While the worth of any gap estimate depends on the quality of the data, to the extent it relies on third-party data, it inherits the problems and limitations of the data source that the tax administration itself cannot control. A change in the third-party data would lead to a change in gap estimate, which of course has nothing to do with the institutional performance it aims to measure. It is generally recommendable, wherever feasible, to cross-check the gap estimate against alternative estimates, which in theory should produce the same gap number.

- **Error margins**: Any tax gap estimate—even the most developed and sophisticated model—has a potentially large margin of error, one which is difficult to precisely quantify, not least because standard statistical methods are generally of limited use. One needs to assess very carefully whether changes (or differences) of the estimate are due to spurious factors or real ones. On the other hand, improving the accuracy through an expansion of the estimation model is very challenging: for example, one should ask if such refinement is likely to make sufficient difference in the gap estimate to be worth considering given the margin of error (e.g., improving the estimate from 20.0 ± 3 to 19.5 ± 3 may not be worth the effort); and if the change in the error margin does not outweigh the apparent improvement in the precision of the estimate (e.g., from 20 ± 2 to 19 ± 4).[30, 31]

- **Timeliness**: A tax gap estimate is generally a backward looking exercise and the results can have a significant time lag. The degree of lag varies based on the source of data, of course. Generally speaking those measures that rely on detailed statistical data will have the greatest lag. However even those based on tax record data can have a significant lag due to the time involved in collecting and processing the data; for example taxpayers might have up to twelve months after the end of a period to file their return, and then that data needs to be captured, processed, and analyzed. While current estimates can be produced, these generally really on some kind of forecasting, and so, being an estimate of an estimate, the error margin increases substantially.

- **Disincentive to identify new noncompliance (bottom-up approach)**: A bottom-up approach could provide a perverse incentive if used as a performance indicator. A bottom-up approach inevitably relies on the current knowledge about noncompliance behaviors. As such, the gap estimate could be a useful performance indicator (if data and error margin issues are properly overcome) to assess the performance in tackling

[30] There is an important distinction to be drawn between the margins of error around the level of the gap estimate and those of trend. Typically, component errors in gap estimates are systematically biased—most obviously, from simplifying assumptions about coverage and effective rates. In such a situation, the estimated level will be systematically biased (though we may not know which way), and the error in year on year changes much less than the error in estimated levels.

[31] One could argue that some indication of margins of error could be usefully provided along with the gap estimates themselves. There is a clear benefit in cautioning the audience about the inherent difficulties in providing precise point estimates, although margins of error themselves are not exact science either. On the other hand, publication of margins of error has a potential risk of undermining gap estimates. In particular, the margins around levels could incorrectly undermine the potentially robust year-on-year changes—when component errors in gap estimates are systematically biased (due to model assumptions, etc.), the error in year on year changes would be much less than the error in estimated levels. On balance, it seems sensible to not publish specific margins of error. However, broad indication of margins of error could still be useful—for example, by grouping gap estimates with similar level of margins of error.

the known noncompliances. However, the major caveat in using a bottom-up tax gap is that the gap would increase if new noncompliance behaviors are identified. More sources of noncompliance authorities know about, the larger the gap becomes. If an increase in the gap is to be interpreted as indicating lower performance of the administration, it would provide a perverse incentive not to identify any new noncompliance behaviors. (It is possible to split the gap into previously known noncompliance and newly identified one, but it would complicate the framework.)

59. **Using a single gap estimate as a sole Key Performance Indicator (KPI) on compliance and/or administration efficiency could be misleading**. Given the potentially large margin of error in the gap estimates, one should not draw strong conclusions from small changes in the number (within a country) and/or small differences in the level (across countries). Assessing compliance and administration efficiency would require a comprehensive analysis of several related indicators (sub-indicators), just like a doctor's diagnosis.

Issues

60. **HMRC has stopped using the aggregate tax gap estimate as a KPI**. It is instead used to help make strategic decisions and business planning, including assessing the scale and direction of new investments (additional allocation of operational resources; see the next section). Considering that even the most developed top-down VAT gap estimate cannot be free of data limitations and margins of error, and that some of the estimates are still illustrative, the aggregate estimate by itself should not be used as the primary KPI for administrative performance; though used properly, when used in combination with other complementary performance measurement indicators, it can still serve as a performance indicator.

61. **The aggregate tax gap, and the various sub-components used to derive it, can be used to assess whether the operational strategies are broadly generating the expected results**. HMRC is utilizing its tax gap analyses for such a 'health check." However, HMRC could perform this health check in a more systemic manner. Most notably, HMRC is not doing health check by just looking at the aggregate tax gap number. Like an actual health check, it is making use of all the intermediate indicators and related gap analyses. Such process of health checks could be more explicitly acknowledged and implemented more systemically.

62. **As two of the fundamental aims of the HMRC are to encourage, facilitate and increase voluntary compliance and to crack down on those who choose to be deliberately noncompliant, these two components of collections should be identified in the tax gap measurement**. While several compliance measures are common to these two areas—voluntary compliance and compliance yield—sometimes they require different compliance measures. As discussed above, while the activities that HMRC undertakes which

result in taxpayers filing and paying on time, as is captured by a "gross gap" measure, the measure itself is still indicative of the degree to which the administration has been able to encourage voluntary compliance. Similarly the additional collection efforts needed by the administration would then be captures by the "net gap" measure.

63. **Changes in tax gap estimates based on bottom-up techniques should not be the sole basis for drawing conclusions as to compliance levels**. Any bottom-up tax gap measurement is inherently limited as a measurement of overall tax administration efficiency, to the extent that they can only explicitly capture risk factors identifiable by the administration. A small gap estimate does not necessarily mean that the real gap is also small. In an extreme case, for example, a tax administration completely incapable of detecting any noncompliance behavior of taxpayers would estimate the tax gap at zero.

Recommendations

- In measuring the HMRCs performance in encouraging voluntary compliance and enforcing collection, both gross gap and net gap estimates should be employed.

- Tax gap estimates, particularly those that are based on bottom-up methods, should not be the sole basis for drawing conclusions on changes in taxpayer compliance.

B. Tax Gap as a Resource Allocation Tool

64. **A performance measurement indicator should be integrated into a broader performance management framework.** The use of any performance indicator would be of limited value unless there are consequences for over- and under-performance. The management could use the information provided through the performance measurement to, for example, reallocate resources, refocus activities and assess personal performance of the staff.

65. **Tax gap measurement—more precisely, the analyses conducted in the tax gap measurement process—can generally inform in the two broad areas of risk analyses and marginal effectiveness of additional investment**.

- **Risk analyses**: One of the key benefits of conducting tax gap analyses—which inevitably include related revenue analyses—is that it can lead to a better understanding of the underlying causes of the gap. Understanding the distribution of the causes of the gap—or revenue risks—would be the basis of performance management actions such as resource reallocation. In addition, information obtained in the process (e.g., random enquiry program) could be useful more generally within the tax administration.

- **Marginal return on resource (marginal effectiveness of additional investment)**: While a tax gap estimate by itself cannot inform the effectiveness of individual

activities, if analyzed combined with operational information (such as resource allocations and operational strategies and focuses) it might be possible to establish the link between operational input and compliance outcome.

66. **HMRC is in an ongoing process of linking tax gap with risk analyses and resource allocation.** This process is under development and has helped operational management such as the preparation of the Spending Review (SR)—tax gap analysis allowed HMRC to "assess whether the overall balance of the SR package was proportionate and whether it was sufficiently ambitious."[32] It has also helped in supporting taxpayers' compliance management. HMRC should continue pursuing this development.

Recommendation

- HMRC should continue pursuing the use of tax gap to support resource allocation to tackle noncompliance. In particular:
    - Further development is needed in the linkages of tax gap estimates and taxpayer risks.
    - In assessing taxpayers' compliance, tax gap estimates should be combined with other compliance indicators.

VI. POSSIBLE FUTURE RESEARCH ON TAX GAP ANALYSIS

67. **Three possible areas of research could help improve in the medium term the HMRC's tax gap analysis program:** (1) assessing possible top-down models for the income tax gaps; (2) extending the HMRC's models to assess the size of the policy gap by tax type; (3) and comparing and contrasting the output of the FAD Revenue Administration Gap

Analysis Program (RA-GAP) value-added based VAT gap model to the results from the HMRC's VAT gap model.[33, 34]

[32] Closing the tax gap: HMRC's record at ensuring tax compliance: Government Response to the Committee's Twenty-ninth Report of Session 2010–12—Treasury Contents—Appendix 2: Additional information about the Tax Gap.

[33] The FAD RA-GAP model for estimating VAT gap was presented to HMRC during the first visit of the assessment team. Along with the presentation, a technical note describing the model was provided to KAI staff.

[34] The assessment team considers that the development of these research areas could be jointly explored by FAD and HMRC.

A. Top Down Direct Tax Gap Models

68. **A top-down model at the very least would provide a useful means to verify the broad validity of bottom-up estimates, and also to estimate the policy gap**. It is acknowledged that there are some serious modeling challenges and significant data issues to be addressed in trying to develop a top-down model for direct taxes, as the HMRC has documented.[35] However, there are also some serious modeling and data issues inherent in any bottom-up estimate as well, so having the results from a top-down model to serve as a *point of comparison*, rather than as the primary means of estimation, could improve the overall analysis of the size and trends in the direct tax gaps. Of course, the cost of doing this exercise will have to be assessed to appraise if these costs would outweigh the benefits.

69. **One possible approach would be to start with the top-down VAT gap analysis, expanding it to provide a proxy for corporate income taxation**. Very broadly speaking, VAT is tax on value added (Y), which comprises labor income (W; wage and salaries, etc.) and gross capital income (R; corporate profit, etc.). Therefore, VAT base less wage (Y – W = R) could be used as a proxy of corporate income tax.[36] More precisely,

$$Y = C + I + (X - M) = W + R,$$
$$\therefore R = C - W + I + (X - M)$$

where: I = Investment, X = Export, and M = Import.

Investment is added back, as the treatment under VAT—fully creditable—is equivalent to full expensing under corporate income taxation. However, adding back full amount of investment would overestimate the tax base, as depreciation expense (D) needs to be taken into account. The net tax base (NR)—i.e., net of deductible depreciation expenses—would be: NR = C – W + (I – D) + (X – M)

[35] Rubin, Marcus, "The Practicality of a Top Down Approach to the Direct Tax Gap," HMRC Working Paper No. 12, August 2011.

[36] More precisely, it would be an estimate of cash flow to all businesses, corporate and unincorporated.

The last term—the net export—is added back, as export is taxable output and import is deductible costs under corporate income tax, whereas export is zero-rated and import is taxable under VAT.[37]

70. **A key challenge, among others, would be to account for allowances specific to individual taxpayer circumstances.** Theoretical tax base can be modeled if reliable third-party data are available for such specific circumstances. However, such data are not available in most cases (even the key aggregates may have been estimated using tax data, and thus not necessarily a third-party data). Therefore, it would be difficult to use a top-down model for a primary gap indicator for direct taxation, as concluded by the HMRC.[38] Nonetheless, this is a route of enquiry meriting closer examination

B. Value-Added Based VAT Gap Model

71. **Using the RA-GAP VAT gap model would allow for a breakdown of the VAT gap by sector of economic activity, which is useful for compliance management**. One of the advantages that this model has over a traditional consumption based VAT gap model is that the results are compiled by sector of economic activity, so comparing revenues aggregated by the sector of the taxpayer to the models outputs allows for a decomposition of the gap by sector.

72. **Theoretically, the value-added based approach used in the RA-GAP model should produce the same results as a model based on consumption statistics used by HMRC**. This should be the case if the general national accounting identity holds true between the level of consumption in the consumption model, and the outputs and inputs in the value-added model. In other words, as long as the following relationship is maintained:

$$C \quad [+G] \;=\; Y - I - X + M \;[- G]$$

[37] This border adjustment indicates that NR only reflects domestic income of residents. For a fuller modeling, foreign income of residents (adjusted by regimes to relieve international double taxation, e.g., foreign dividend exemption) and domestic income by nonresidents (taking into account varying applicable regimes, e.g., withholding tax at a rate stipulated in applicable Double Taxation Agreement) need to be added.

[38] "The Practicality of a Top Down Approach to the Direct Tax Gap," 2011, HMRC Working Paper No. 12.

The main component for the consumption based approach to estimating the base would be represented by the left-hand side of the equation, with the value-added based approach represented on the right hand-side.[39]

73. **Analyzing the differences in results from the two sets of models could be extremely useful for improving the models.** One issue with the RA-GAP model is that the primary data source for the potential collections estimate, the source-use statistical tables, are usually only produced with a few years lag. To overcome this issue, and produce timelier estimates, the RA-GAP methodology employs time series data on GDP by economic activity to inflate the estimated net VAT by sector. And of course the consumption statistics data used by HMRC are not fully current either, so there is some projection required to produce up to date estimate of the potential collections in that model as well. It would be beneficial to compare the time series of net VAT estimated in both ways and compare the impact on the estimated potential collections over time.

C. Measuring the Policy Gap

74. **Producing estimates of the policy gap, in addition to the compliance gap, would be useful for analyzing revenue performance as a whole, and for providing context to assessing the size of the compliance gap**. As noted in Section I of this report, the tax gap is comprised of both a compliance gap component and a policy gap component, while the HMRC is currently only including a portion of the policy gap in the estimates (tax avoidance) some of the models in use could be extended to estimate the full policy gap.

75. **In general top-down models can be easily extended to estimate the policy gap.** As top down models generally involve creating an estimate of potential revenue by modeling how the current tax applies to the tax base, modeling the policy gap would require replacing the current tax structure in the model with some normative version of the tax structure. As mentioned before, a normative version of a VAT would be a single rate tax structure with exemptions limited to financial services, and zero-rating limited to exports.

76. **For taxes without a top-down model, new models might be required to estimate the policy gap.** For the income taxes, for example, a micro-simulation model would be a suitable tool for estimating the policy gap. It is likely that such models already exist and are being used for the purposes of tax expenditure estimates and policy analysis.

77. **Estimation of the policy gap is a related but separate exercise from the production of tax expenditure estimates.** While the two concepts are related, and the

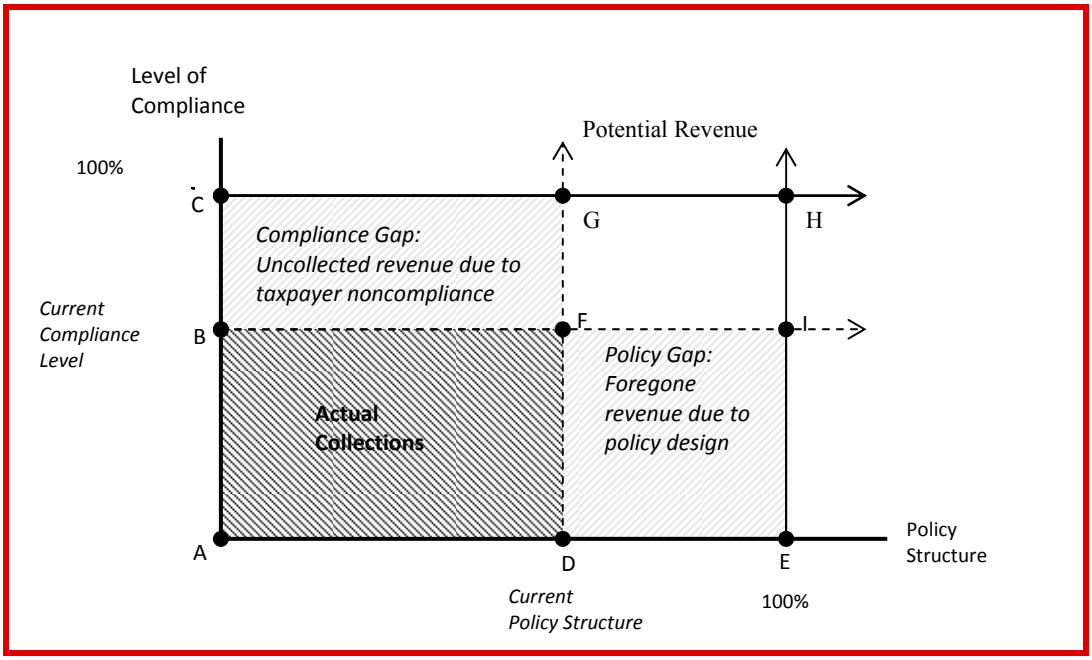
[39] "G" is appearing as potentially being on either side of the equation, as its location, for a VAT gap model, would depend on the precise treatment of government—whether they have to pay tax on their purchases, and so more closely relate to final consumption, or whether they are not subject to the VAT and so are excluded from the potential VAT base.

estimation methodologies are based on the same principle (comparison of the current tax structure to some normative structure), the execution and results will differ. Tax expenditure estimates identify the revenue foregone due to particular elements of the tax system, while the policy gap measures the net effect on potential revenue of the interaction of all the elements in the tax structure.

Appendix I. Compliance Issues, Policy Choices, and the Tax Gap

The relationship between compliance issues and policy choices on tax revenues is illustrated in Figure 1.[40] Analyzing tax revenue performance in this fashion allows for a comparison of the relative extent to which the receipts are being influenced by compliance issues or tax policy choices. Looking at the gap in this wider context makes it possible to relate compliance issues and policy choices to other tax-related indicators, such as tax expenditures or measures of revenue productivity. For the VAT, for example, a common measure of revenue productivity is "C-Efficiency" ratio, which is defined as: *C-Efficiency = VAT Revenue / (Consumption * Standard Rate)*. As consumption in this instance serves as a general proxy for the potential tax base, the term (Consumption * Standard Rate) is an approximation for the value for the full potential revenue for the tax—i.e., covering both policy and compliance—and thus the c-efficiency measure is a general approximation of the impact of both on VAT receipts.[41]

Figure 3. Illustration of the Components of the Tax Gap



[40] In Figure3 the overall tax gap would be the difference between the boxes ACHE and ABFD. ACHE represents the revenue that could be generated from a "normative" version of the tax—for VAT for example this would be based on a VAT with a single positive rate and a broad base.

[41] For a more complete discussion of the relationship between C-Efficiency, the compliance gap, and the policy gap see De Mooij and Keen, 'Fiscal Devaluation' and Fiscal Consolidation: The VAT in Troubled Times," NBER Working Paper No. 1791, March 2012.

Appendix II. Summary of the Estimation Models and Methodologies for Direct Taxes

This appendix describes the estimation models and methodologies for two income tax grouping: income tax, NIC, and capital gains; and corporation tax. These two groups represent 96 percent of the direct tax gap.

Income tax, NIC, capital gains tax

There are nine separate specific techniques in place for estimating the tax gap for this group of direct taxes, but they can be broken down into two major categories (general noncompliance or avoidance) across three major taxpayer types (employers, self-assessors, nondeclarants). This segmentation of the gap estimation methodology is summarized in Table 11.

The various methodologies for estimating the tax gap resulting from general noncompliance can be summarized as being based on the results from direct random audit, based on the results from random audits for another taxpayer segment, data matching, or based on statistical estimates of the size of the potential tax base for the segment.

For the random enquiry programs the general approach is to gross the results for the sample population up to the full population (based on the relative amount of tax liability), then "up-rate" the value to take into account the lapse in time (using trends in the national accounts statistics for Gross Operating Surplus), and then an "uplift" factor to account for undetected noncompliance is applied to arrive at the estimated level of under-declared liabilities. Data on nonpayment by the taxpayer segment for the tax period is then added to arrive at the total amount of general noncompliance.

Larger businesses, and partnerships, are not included in the random enquiry program. The tax gap resulting from under-declared liabilities for these businesses is estimated using the assumption that their level for this noncompliance will be roughly the same as the average results derived for the taxpayers of the same taxpayer type (employers or self-assessors) under the random enquiry program. Nonpayment is then added to this estimate to arrive at the overall level of general noncompliance.

For the nondeclarants, referred to by HMRC as the "Hidden Economy," as the full amount of the contributions to the gap is unobservable by HMRC by its very nature, third party sources of information form the basis of the estimates (statistical data or using data obtained from other parties involved in the transactions).

For the estimate of the amount of the tax gap arising from avoidance, the same data source and method is used for all taxpayers: the stock of tax at risk recorded in the "Risk Register." This register includes data on which taxpayers are involved in known tax avoidance schemes, and the impact on their tax liability. As tax avoidance schemes can cover multiple years of tax liability, it is assumed that only one third of the registered "tax at risk" accrues in any

given tax period (in other words it is assumed the average length of the tax avoidance scheme is three years).

Table 11. Summary of Estimation Methodologies for Noncorporation Taxes

Tax Gap Category	Taxpayer Type	Taxpayer Segment	Tax Covered	Basis of Estimate
General Noncompliance	Employers	Employers with up to 250 employees (except where the employer is part of a complex group).	PAYE, NIC	Random enquiry for undeclared liability, grossed up for the population and inflation, times an "uplift," plus nonpayment.
		Employers that are dealt with by the Large Business Service or are considered "Large and Complex."	PAYE, NIC	Assumption that the risk is the same as the average for employers covered under the random enquiry program, plus nonpayment.
	Self-assessors	'Business taxpayers' consisting of self-employed taxpayers and partnerships with up to 4 partners who receive notices to file a return.	Income Tax, Capital Gains Tax, NIC	Random enquiry for undeclared liability, grossed up for the population and inflation, times an "uplift," plus nonpayment
		'Nonbusiness taxpayers' consisting of individuals without business income and trusts who receive notices to file a return.	Income Tax, Capital Gains Tax	Random enquiry for undeclared liability, grossed up for the population and inflation, times an "uplift," plus nonpayment.
		Partnerships with 5 or more partners who receive notices to file a return.	Income Tax, Capital Gains Tax, NIC	Assumption that the risk is the same as the average for the self-assessors covered under the random enquiry program, plus nonpayment.
	Nondeclarants	Employees and pensioners who are taxed through PAYE but have undeclared nonemployment income.	Income Tax, Capital Gains Tax	Data matching between bank records and income tax returns, statistical data on "lettings."
		Moonlighters: individuals that pay some income taxes but have undeclared income from other sources.	Income Tax	Survey results from other countries.
		Ghosts: untaxed and nonregistered working individuals.	Income Tax	Statistical data on labor force survey and immigration data.
Avoidance	All	All	Income Tax	Data from the risk register on identified avoidance schemes, annualized.

Source: Prepared by the IMF team based on HMRC publications.

Corporation tax

Corporate tax gap is estimated for three sub-groups of corporations. The first group comprises the largest 800 corporations that are monitored and audited by the LBS group. There is another group of smaller businesses (around 9,000) that are classified as large and complex. The third group of corporations is the SMEs covered by the Corporate Tax Self Assessed program. This segmentation of the gap estimation methodology is summarized in Table 12.

Table 12. Summary of Corporation Tax Gap Estimation Methodologies

Tax Gap Category	Taxpayer Segment	Basis of Estimate
General NonCompliance	Large Business Services clients	Assumed to be zero
	Large and complex business	Nonpayment.
	Small-medium sized enterprises	Random enquiry for undeclared liability, grossed up for the population and inflation, times an "uplift," plus nonpayment
Avoidance and "technical risks"	Businesses handed by the Large Business Services group	Data from the LBS case management system on the amount of "Tax under Consideration."
	Large and complex businesses	Assumption that the risk is the same as the average for businesses in the LBS, plus nonpayment.
	Small-medium sized enterprises	Data from the risk register on identified avoidance schemes, annualized.

Source: Prepared by the IMF team based on HMRC publications.

For the general noncompliance portion of the tax gap there are two methodologies used. For the SMEs a random enquiry methodology is employed, which is identical in nature to the random enquiry estimation methodology described above. For the LBS businesses it is assumed that the general noncompliance gap is zero, while for the large and complex businesses it is implicitly assumed to be the level of nonpayment.

For the SMEs the total tax gap also includes the reduced liability associated with tax avoidance schemes, as recorded in the risk register, as is done for the unincorporated SMEs.

For the LBS and large and complex businesses, the total tax gap is assumed to be comprised of two components; tax avoidance and "technical risks subject to litigation." "Technical risks" would be the result in differences in interpretation of the application of the tax law, which is differentiated from avoidance, which involves organizing tax activities in such a way purely to affect your tax liability. Only that portion of the technical risk that is subject to litigation is included as part of the gap, as this represents the portion that the HMRC believes to be clearly noncompliant.

Data on the value of tax associated with tax avoidance and technical risks for LBS businesses is recorded by the LBS case management system, and is referred to as "Tax under Consideration". The tax gap for LBS businesses is therefore derived directly from the value of TuC for a given period, after removing any value of TuC associated with technical risks that will not be subject to litigation.[42]

For the large and complex business, the level of the gap is estimated based on the relative size of the gap (as compared to total tax liability) for the LBS businesses. As there is data in the risk register on the amount of reduced tax liability for these businesses associated with avoidance schemes, the difference is assumed to be tax gap from technical risks. The ratio of avoidance to technical risk for the LBS is roughly five to one, while for the large and complex businesses it ends up being one to four.[43]

[42] Generally this appears to represent about 50 percent of the value of TuC from technical risks.

[43] In Measuring the Tax Gap 2012, the average values for the LBS for 2006–07 to 2008–09 is BRP 1.4 billion in avoidance to an average of BRP 0.3 billion for technical risks subject to litigation. For the large and complex businesses, the average value for avoidance for 2009–10 to 2010–11 is BRP 0.25 billion, while the average derived value for technical risks is BRP 1.0 billion.