



DENMARK

TECHNICAL ASSISTANCE REPORT— REVENUE ADMINISTRATION GAP ANALYSIS PROGRAM—THE VALUE-ADDED TAX GAP

February 2016

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DENMARK

REVENUE ADMINISTRATION GAP ANALYSIS PROGRAM— THE VALUE-ADDED TAX GAP

Mick Thackray, Eric Hutton, and Kartik Kapoor

March 2015

Mr. Hutton of the Fiscal Affairs Department (FAD) Revenue Administration Gap Program (RA-GAP) visited Denmark in June 2013, to deliver a Technical Assistance mission. During this mission, he presented the RA-GAP value-added tax (VAT) gap model to the Danish Customs and Tax Administration (SKAT), and worked with SKAT analysts, including Mr. Søren Pedersen, to identify the data required for the RA-GAP model and to conduct some preliminary analysis.

Mr. Hutton returned to SKAT in Copenhagen, with Mr. Thackray also of the RA-GAP Program, in April 2014. The purpose of the visit was to further develop the framework for the RA-GAP model.



DENMARK

REVENUE ADMINISTRATION GAP ANALYSIS PROGRAM— THE VALUE-ADDED TAX GAP

EXECUTIVE SUMMARY

This report presents estimates of the tax gap for Denmark for the period 2008–12.

There are two main components to the RA-GAP methodology for estimating the VAT gap: 1) estimate the potential VAT collections for a given period; and 2) determine the accrued VAT collections for that period. The difference between the two values is the VAT gap. The methodology employs a top-down approach for estimating the potential VAT base, using statistical data on value-added generated in each sector and constructs the accrued VAT collections value from tax record data.

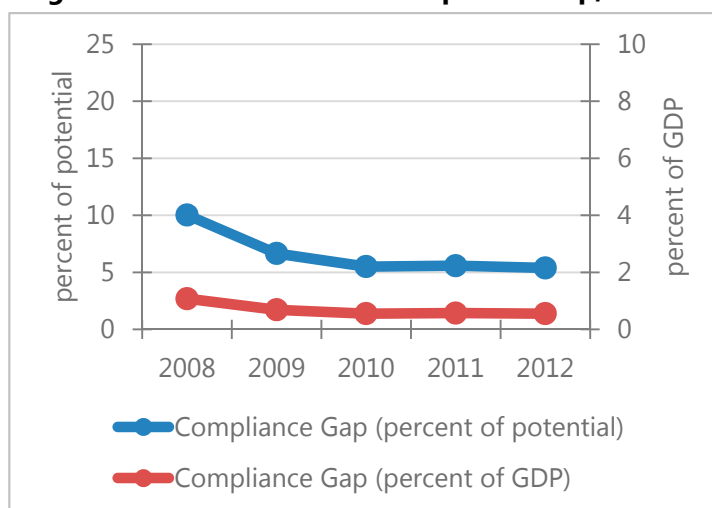
One of the main purposes of this report is to estimate the compliance gap. The compliance gap is the difference between the potential VAT that could have been collected given the current policy framework and actual accrued VAT collections. Other tax gap measures can be determined using different methods for determining potential VAT, and these other measures are important in understanding all the factors which are affecting current collections. This report will provide estimates for these other gap measures as well, and compare and contrast them with the compliance gap.

Main Findings

The compliance gap in Denmark for 2008 through 2012 has been low, below ten percent of the estimated potential, or less than one percent of GDP (Figure 1).

These values indicate high levels of compliance. Furthermore, as the results show that the gap fell from around one percent of GDP in 2008 down to half a percent in 2010, they indicate that compliance has been improving over this period.

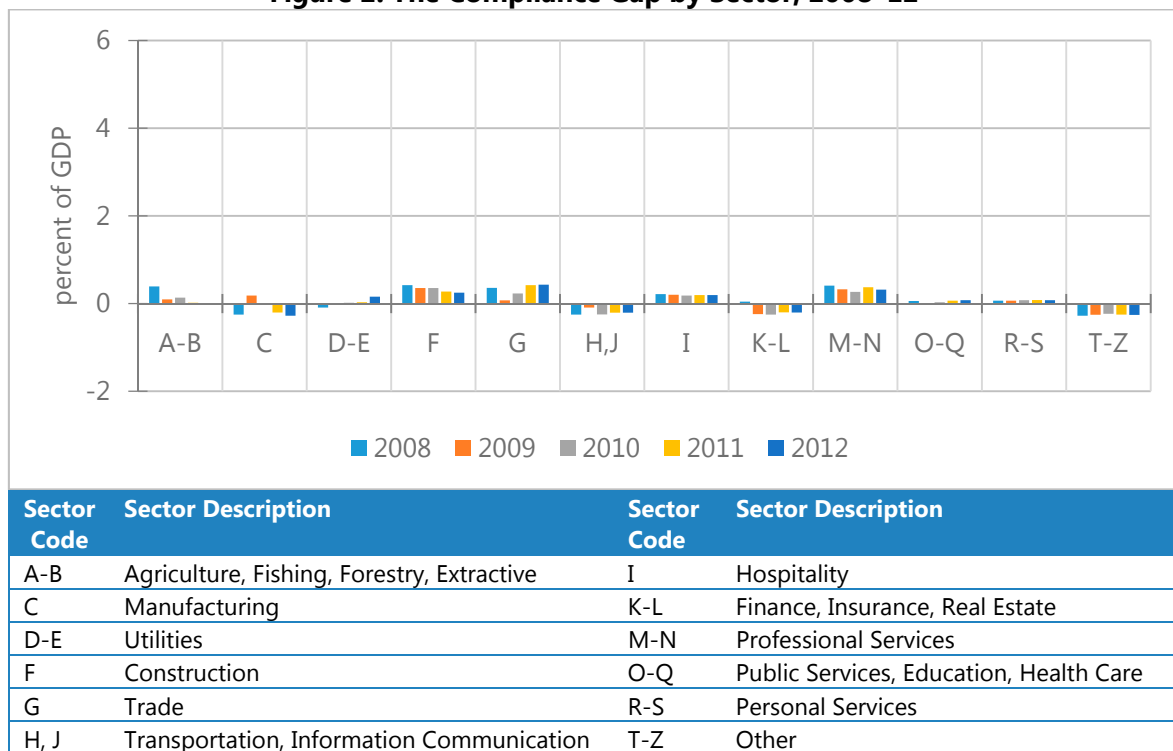
Figure 1. Value-Added Tax Compliance Gap, 2008–12



Sources: Denmark Statistics, SKAT, and staff calculations.

The compliance gap is distributed across a number of sectors, with no particular point of strong concentration (Figure 2). The sectors which consistently show the highest levels of noncompliance, in relative terms, are the construction sector and the professional services sector. While the trade sector also has some values of the same magnitude, this is likely an allocation issue and is likely offset by the negative gap appearing for the manufacturing sector (which displays an almost perfect negative correlation). The results also suggest that the improvements in compliance between 2008 and 2010 came in the agriculture, forestry, fishing, extractive sector and the finance, insurance, real estate sector.

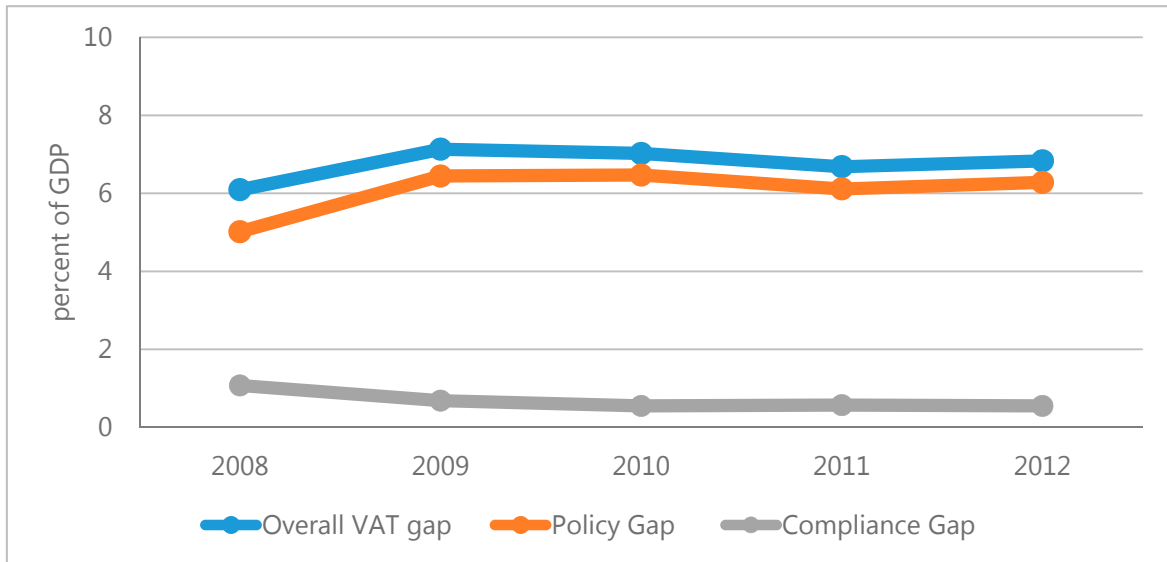
Figure 2. The Compliance Gap by Sector, 2008–12



Sources: Denmark Statistics; SKAT; and staff calculations.

Note: The whitespace in this chart is intentional—the scale is selected to show the level of the gap per sector in sizes relative in scale to the actual collections per sector.

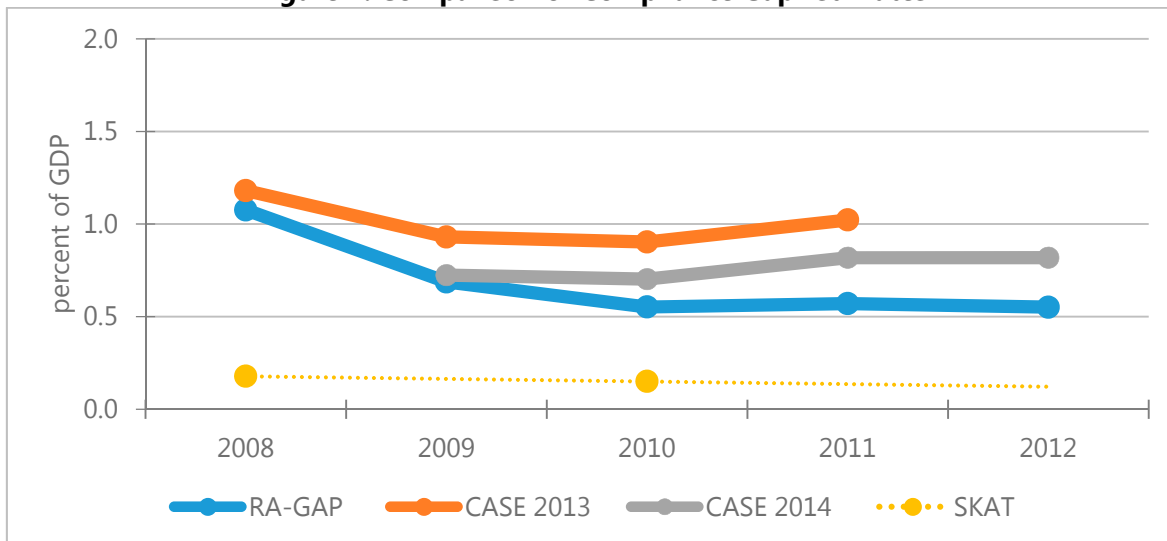
While the compliance gap was decreasing from 2008–10, the policy gap was increasing at a faster rate (Figure 3). The change in the policy gap reflects a change in consumer behavior, rather than any explicit policy change—the proportion of exempt supplies in total final consumption increased. The decrease in the compliance gap is likely not correlated with this changing consumption pattern—that is it is not likely that consumers shifted their purchases out of taxable sectors with relatively high noncompliance into exempt sectors. It is likely that data issues may be contributing to the apparent change in the compliance gap; some imports by exempt sectors in 2008 may have been misassociated with taxable sectors.

Figure 3. Value-Added Tax Gap, Compliance Gap and Policy Gap, 2008–12

Sources: Denmark Statistics; SKAT; and staff calculations.

Comparison to Other Estimates

The compliance gap results show consistent trends, if not levels, with other estimates (Figure 4). There are two main other sources for compliance gap estimates for Denmark; SKAT's own estimates, and the EU-wide estimates commissioned by the European Commission (EC). The RA-GAP results lie between the SKAT's own estimates and the EC results (Center for Social and Economic Research "CASE" results in the figure)—see Section 3 below for more details on these results.

Figure 4. Comparison of Compliance Gap Estimates

Sources: Denmark Statistics; SKAT; and staff calculations.

Other Observations

The use of a tax gap target for SKAT, as stipulated in the Finance Act should be reviewed. As currently operationalized, the tax gap measure that is used as a strategic target for SKAT is flawed. While it is sufficient to monitor important aspects of SKAT's performance, it is not internally consistent as a tax gap measure and has only partial coverage of the total tax gap.

- The tax gap metric currently being used should compare tax gap losses identified by the random audit programs to the total net, not gross, amounts of tax due.
- The use of a numerical tax gap target is typically not recommended, because of the uncertainty in such measures.

SKAT should reduce the lag between random audit program fieldwork and publication of their tax gap estimates, so as to maximize the relevance of published estimates. Reducing the time taken to review the handling of tax gap estimates would also improve the transparency in reporting.

SKAT's use of detailed tax gap analysis to inform both strategic and tactical decisions represents good practice, but could be developed further. The existing analysis is suited for operational purposes, however, there are ways by which they could improve and extend their analysis. These are addressed in detail in Section IV below.

ABBREVIATIONS AND ACRONYMS

CASE	Center for Social and Economic Research (Poland)
CIT	Corporate income tax
EC	European Commission
Eurostat	Statistical Office of the European Communities
Kr	Danish krone
PIT	Personal income tax
RA-GAP	Revenue Administration GAP Analysis Program
SKAT	Danish Customs and Tax Administration
TAXUD	Taxation Customs Union
VAT	Value-added tax
WAR	Weighted Average Rate (of VAT)

GLOSSARY

Assessment Gap	The difference between the between potential collections given the current policy framework and the VAT declared or assessed (a component of the compliance gap).
C-efficiency	The ratio of actual VAT to potential VAT if all final consumption were taxed at the current standard rate.
Collections Gap	The difference between VAT declared or assessed and the actual VAT revenue collected (a component of the compliance gap).
Compliance Gap	The difference between the potential VAT given the current policy framework and actual VAT revenue.
Efficiency Gap	The difference between the potential VAT if all final consumption were taxed at the current standard rate and the potential VAT where most of final consumption is taxed at the standard rate, but where a set of minimal standard exemptions are maintained (a component of the policy gap).
Expenditure Gap	The difference between the potential VAT where most of final consumption is taxed at the standard rate, but where a set of minimal standard exemptions are maintained, and the potential VAT given the current policy framework (a component of the policy gap).
Overall VAT Gap	The difference between the potential VAT if all final consumption were taxed at the current standard rate and actual VAT revenue.
Policy Gap	The difference between the potential VAT if all final consumption were taxed at the current standard rate and the potential VAT given the current policy framework.

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1. BACKGROUND

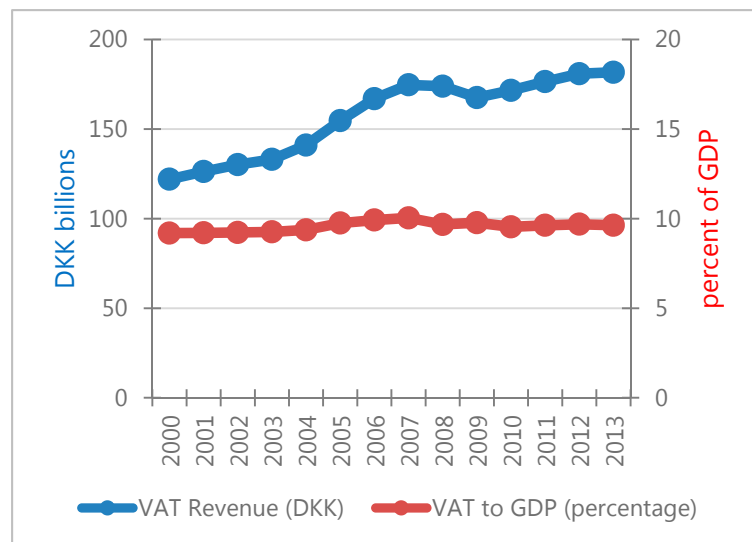
1. **This report provides estimates of the VAT gap in Denmark, produced under the IMF's RA-GAP program.** The RA-GAP Program, conducted by the Fiscal Affairs Department's Revenue Administration Divisions, provides revenue administrations with an estimate and quantitative analysis of the gap between potential and actual collections, referred to as the tax gap.¹ The RA-GAP program aims to provide an evaluation of the tax gap for a specific tax, and a breakdown by contributing factors, along with the distribution across economic sectors, to help revenue administrations monitor and identify what is contributing to the gap.

2. **The main purpose of this report is to provide the revenue administration with analysis regarding compliance performance.** This section provides an overview of the VAT revenue performance, using standard metrics such as revenue to GDP and c-efficiency. Section 2 then provides the estimate of the compliance gap, plus other associated tax gap measures. Section 3 breaks the estimated levels of noncompliance down by economic sector in an attempt to identify the key sources of the compliance gap. Finally a review of the SKAT's own tax gap program is provided in Section 4.

A. Value-Added Tax Revenue Performance

3. **VAT revenues measured as a percent of GDP in Denmark have been between relatively stable at around 10 percent of GDP (Figure 5).** There appears to have been an increase of maybe half a percent of GDP taking place around 2005, and some slight fluctuations following that period, but no dramatic changes are observed. The nominal values show a more dramatic fluctuation for the period 2005 to 2009, but this seems to be reflective of changes in overall economic activity during the period. The policy structure during this period has also been fairly stable, with no changes to the standard rate (25 percent) and no significant changes to the tax base.

Figure 5. Value-Added Tax Revenues, 2000–13



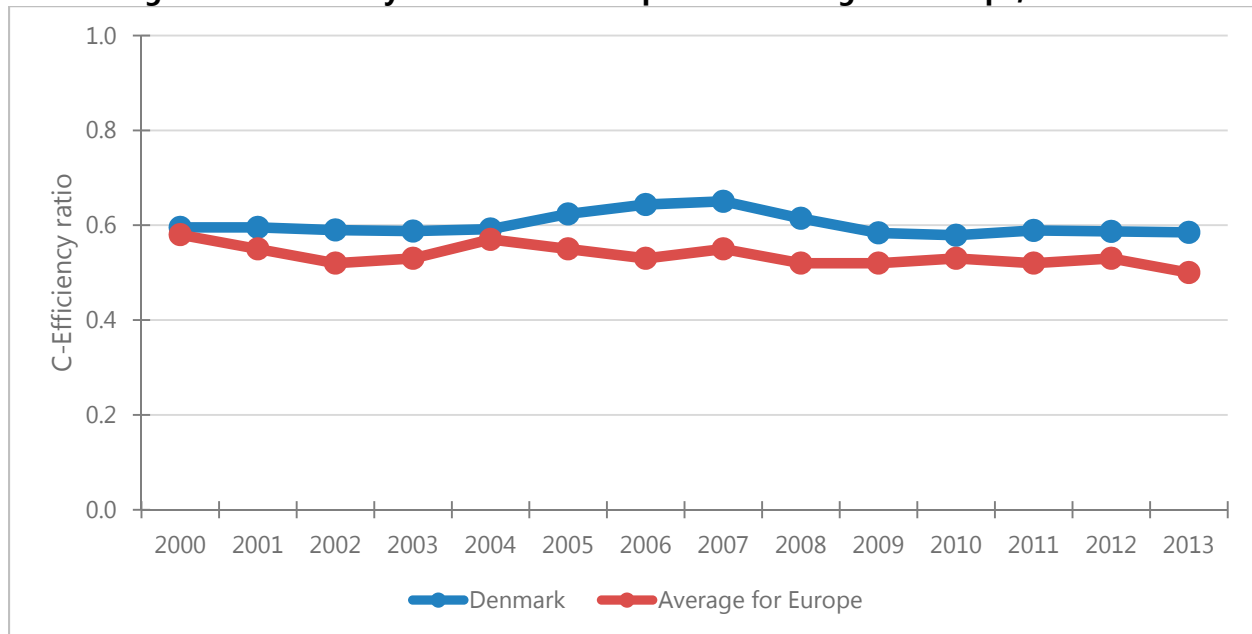
Sources: Statistical Office of the EC (Eurostat); and staff calculations.

¹ The model and methodology used in assessing the VAT gap are detailed in Appendix I.

4. **The c-efficiency ratio provides a more indicative measure of the relative performance of the VAT in relation to economic aggregates than the simple ratio of collections to GDP.**² VAT is a tax on final consumption, and final consumption by households is generally the largest part of the tax base for VAT; so, in principle, a movement in VAT collections as a share of GDP could be explained by a change in the standard VAT rates and the relative share of final consumption to GDP. The c-efficiency measure is used to control for such effects.

5. **C-efficiency in Denmark has consistently been a little higher than the average for Europe (Figure 6).** While both Denmark's c-efficiency ratio and the average ratio for Europe have shown some minor fluctuations over the period 2000–13, for most of that time Denmark has been above the average. There are two exceptions, in 2000 and in 2004 when the average for Europe shows a brief spike, rising up to meet Denmark's value. Also, as with nominal revenues and the VAT to GDP ratio, Denmark's c-efficiency ratio shows a distinct hump for the period 2004–09.

² Commonly used as a measure of the degree of VAT revenue mobilization for a given country's economic level and composition, c-efficiency is defined as the ratio of VAT collections to final consumption, divided by the main VAT rate. It provides a more relevant measure of the generation of VAT in relation to economic aggregates than the simple ratio of collections to GDP, because it controls for VAT standard rates and (partially) the composition of GDP. However, other components of expenditure, such as intermediate consumption by government and exempt industries also contribute to net VAT collections and consequently to observed c-efficiency values. It has limitations, however, in that final consumption as measured for national accounts purposes is not exactly the same as the final consumption targeted by a VAT; for example in the national accounts treatment hotel services provided to nonresidents are not included in final consumption but treated as an export.

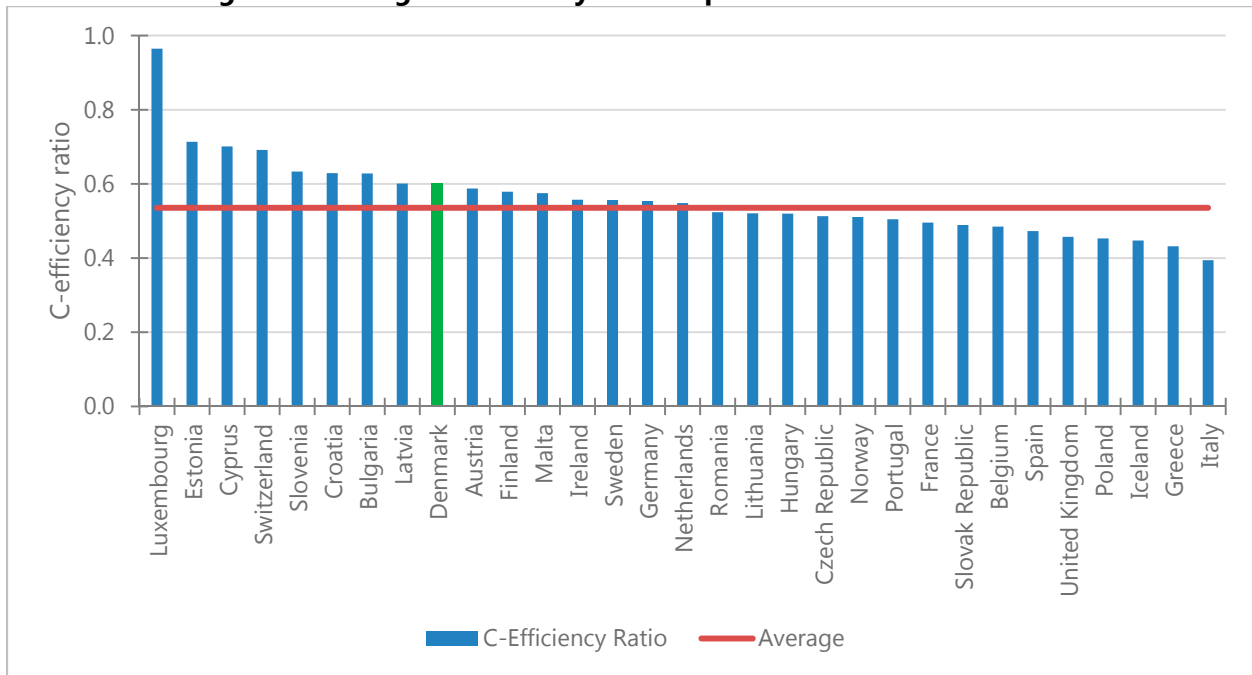
Figure 6. C-Efficiency for Denmark Compared to Average for Europe, 2000–13

Sources: Eurostat; and staff calculations.

6. **Denmark's c-efficiency is amongst the highest values observed for Europe (Figure 7).** While a c-efficiency ratio provides a convenient means of comparing general VAT revenue performance across countries, it is limited in being able to identify why differences might exist. C-efficiency captures the combined impact of changes in compliance gap, policy changes, and changes in the tax base. Two countries can therefore have similar c-efficiency values for completely different reasons; for example a country with high compliance and a lot of exemptions might have the same c-efficiency value as a country with few exemptions and low compliance.³ It is for this reason that it is necessary to understand how all these factors combine to influence c-efficiency, through a detailed analysis of the tax gap and its component parts.

³ See "From Stimulus to Consolidation: Revenue and Expenditure Policies in Advanced and Emerging Economies," by a staff team led by Benedict Clements, Victoria Perry, and Juan Toro (IMF, 2010) for a good discussion on the relationship between the c-efficiency measure and the compliance gap and policy gap.

Figure 7. Average C-Efficiency for Europe over the Period 2000–13



Sources: Eurostat; and staff calculations.

2. ESTIMATES OF THE TAX GAP

7. **The VAT gap for a particular year is the difference between revenues collected for a given year and the potential revenues that could have been collected given the economic activity which took place during that year.** The RA-GAP approach was used to estimate the VAT gap for the years 2008 to 2012 in this report. Potential VAT revenues were estimated using detailed national accounts data published by national statistics agency, Statistics Denmark to determine the potential VAT base (roughly all final consumption), and then the standard rate was applied to this base.⁴ For VAT actual collections SKAT employed the RA-GAP methodology for determining accrued net VAT—accrued VAT payments less accrued excess credit—and supplied the results for each major sector for the same period.⁵

A. The Compliance Gap

8. **The *compliance gap* is the difference between the potential VAT given the current policy framework and actual VAT revenue.** The compliance gap thus directly measures the performance of a revenue administration in collecting the tax due from taxpayers. As estimates for the compliance gap must rely on statistical data to determine the level of Potential VAT, the estimates will have an error margin similar to that for the underlying statistics. It is therefore generally more useful to use estimates of the compliance gap to assess *trends* in compliance, rather than the *level*.

9. **The estimated compliance gap dropped from 2008 to 2009, and has then been relatively stable (Figure 8).** Like the overall VAT gap, the VAT compliance gap for a particular year is the difference between potential revenues and actual revenues, but in this case the potential revenues are determined given the policy framework in place during that year.

10. **It is not clear whether the higher level of noncompliance estimated for 2008 is reflective of an actual higher level of noncompliance, or whether there is an issue with the data.** Two factors bring into question whether the results for the compliance gap reflect actual changes in compliance, or whether there might be some other effect at play here. Firstly it is notable that while the estimated compliance gap decreased between 2008 and 2009 the overall gap increased notably for this period; this suggests there were likely some significant changes in the distribution of economic activity during this period.⁶ Secondly, a breakdown of imports by

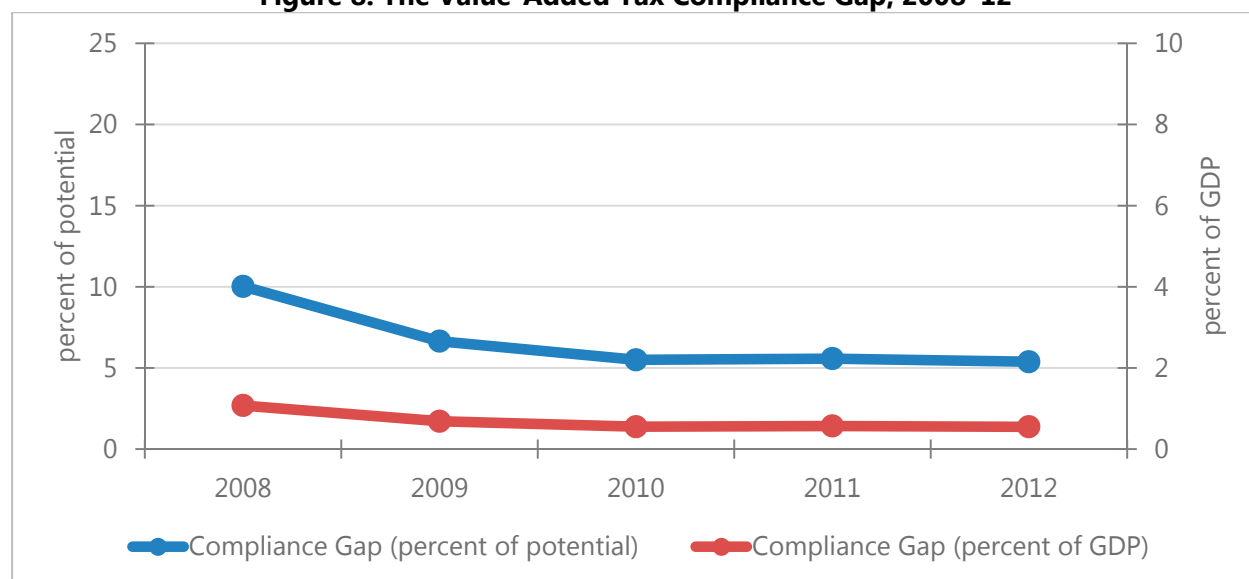
⁴ As discussed in Appendix 1, while the model employs data on output, intermediate demand, imports and exports to determine the tax base, this is identical to final consumption.

⁵ The accruals values used are those as measured as of May 2014, the time at which the data extraction was performed. The time elapsed between the end of 2012 and the date of extraction is sufficiently large that any remaining late collections for tax periods used in this report will likely only have a very marginal impact on the total collections figures used in this report.

⁶ This issue will be examined in more detail in the analysis of the policy gap.

sector was not available for 2008 and so the sector shares of imports for 2009 had to be employed—this could lead to skewed results given that there were apparently a lot of shifts going on in the distribution of economic activity during the financial crisis

Figure 8. The Value-Added Tax Compliance Gap, 2008–12



Sources: Denmark Statistics; SKAT; and staff calculations.

11. **Data limitations prohibited extending the analysis beyond this four year period.** Ideally the analysis should have been conducted for a more extended period, at least 10 years. This would allow for more analysis as to whether the changes observed from 2008 to 2010 are part of a larger trend, or a singular occurrence. Unfortunately the detailed tax record data necessary to go back beyond 2008 has been archived and was not available for extraction.

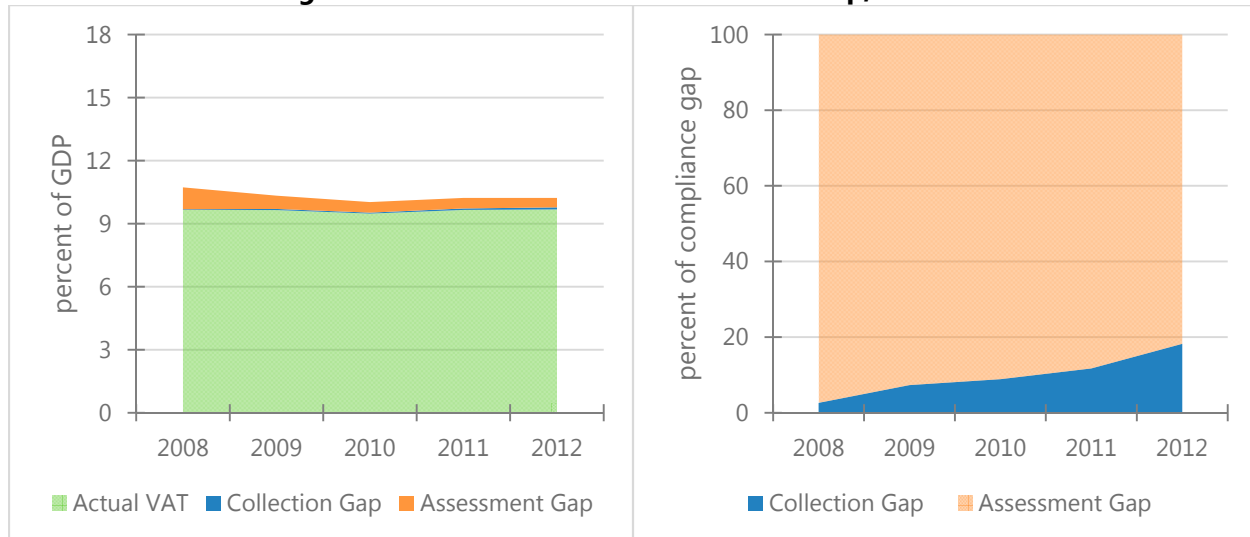
The Assessment and Collection Gaps

12. **The compliance gap can be broken down into an *assessment gap* and a *collections gap*.** The assessment gap is the difference between the estimated VAT that should have been declared and the VAT which has been declared or assessed. The collections gap is the difference between VAT declared or assessed and the VAT actually paid. The collections gap, in other words, represents known outstanding debt by taxpayers, while the assessment gap represents taxable activity that the administration has not assessed. These two gaps are also sometimes referred to as the known portion of the compliance gap (the collections gap) and the unknown portion of the compliance gap (the assessment gap).⁷

⁷ These basic measures, with compliance gaps in general, do not take into account uncollectible arrears. This would include arrears written off for cases of bankrupt businesses for example. As such, the collections gap will tend to overstate the amount of potential gain to be achieved from further closing the identified portion of the tax gap. In other words, there might be some normal, or even optimal, nonzero state for the collections gap.

13. **The assessment gap makes up the bulk of the compliance gap (Figure 9).** While the collection gap is quite small relative to actual collections, it does increase over time, becoming 20 percent of the total compliance gap by 2012. It is noteworthy that while the collection gap grows over the period, the overall compliance gap is fairly flat for the period 2009–12. This suggests that measured in another year or two, the compliance gap for 2011 and 2012 could decrease, as these old debts are collected upon, resulting in an overall trend of a declining compliance gap.

Figure 9. The Assessment and Collection Gap, 2008–12



Sources: Denmark Statistics; SKAT; and staff calculations.

B. The Compliance Gap and the Policy Gap

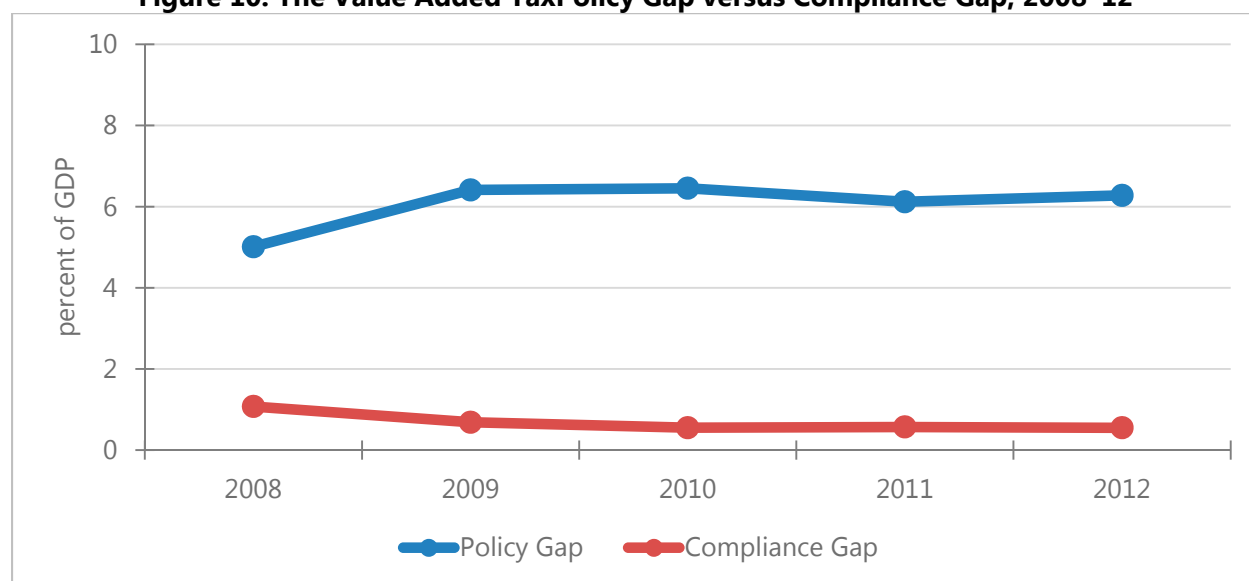
14. **The policy gap is the difference between the potential VAT if all final consumption were taxed at the current standard rate and the potential VAT given the current policy framework.** The size of the policy gap is affected by two factors; changes in the policy structure, or changes in the structure of the tax base. In other words the policy gap may increase or decrease without any explicit changes in policy; if there is a shift in final consumption from taxable items to exempt items the policy gap will increase.

15. **The changes to the compliance gap were more than offset by changes in the policy gap (Figure 10).** The policy gap has shown a lot more volatility than the compliance gap. This is occurring despite the fact that there have been no changes of any significance to the policy structure during the period.⁸ It is important to note that the policy gap is not only influenced by explicit changes in tax policy, but it will also capture the impact of changes in the tax base; if the proportion of final consumption of exempt supplies to taxable supplies increase, the policy gap

⁸ In 2010 there was a minor change affecting some tourism services, duly captured in the model.

will increase. In this case it would appear that, relative to 2008, there has been a shift towards a greater proportion of consumption of exempt supplies.

Figure 10. The Value Added Tax Policy Gap versus Compliance Gap, 2008–12



Sources: Denmark Statistics; SKAT; and staff calculations.

The Expenditure and Efficiency Gap

16. The policy gap can be broken down into an *expenditure gap* and an *efficiency gap*.

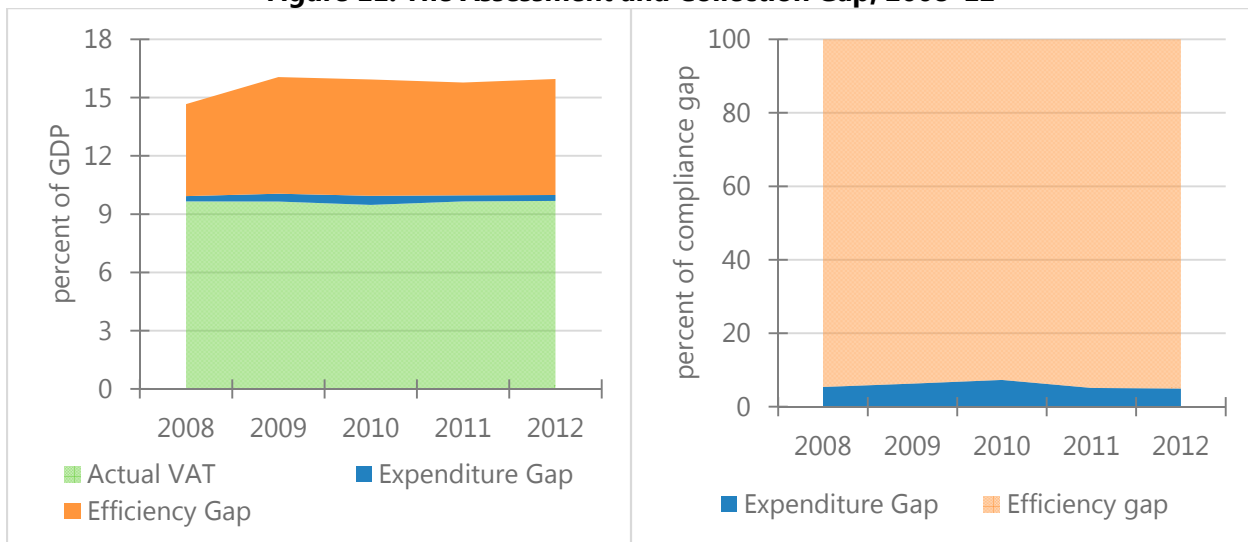
The expenditure gap is the difference between the potential VAT where most of final consumption is taxed at the standard rate, but where a set of minimal standard exemptions are maintained, and the potential VAT given the current policy framework. In other words the expenditure gap is the component of the policy gap due to tax expenditure decisions. The efficiency gap is the difference between the potential VAT if all final consumption were taxed at the current standard rate and the potential VAT where most of final consumption is taxed at the standard rate, but where a set of minimal standard exemptions are maintained.⁹ In other words the efficiency gap is the portion of the policy gap that results from the typical VAT exemptions necessary due to pragmatic considerations in the design of a VAT. Another way to look at these two measures is that these two components divide the policy gap into the portion where

⁹ The set of minimum exemptions includes: maintaining the exemption for financial services, which is typical of almost all VATs in the world; retaining the current treatment of the public sector, since changes to the treatment of the public sector might yield revenue changes in the VAT model but would actually be netted out by increased public expenditures; and maintaining the exemption for housing, as this is a common characteristic of almost all VATs in the world, and the measurement of housing in national accounts includes imputed rents which are not actual market transactions and so would not be subject to VAT in any case. It should be noted that the EU's sixth directive allows for a broader set of exemptions than the list included here; this normative structure is not meant to be a policy prescription, but is simply an attempt to establish a baseline value in line with international norms.

revenue mobilization opportunities exist (the expenditure gap) and the portion where there is little opportunity for revenue mobilization (the efficiency gap).

17. **The efficiency gap makes up the bulk of the policy gap (Figure 11).** The full policy gap is a theoretical concept; there is no country that has implemented a VAT on all final consumption, as defined in national accounts. This decomposition of the policy gap provides a better sense of the amount of revenue foregone due to policy design—the tax expenditure gap—versus the amount of revenue foregone due to the structure of the economy—the size of the financial sector, the public sector, and imputed rents on home ownership.

Figure 11. The Assessment and Collection Gap, 2008–12



Sources: Denmark Statistics; SKAT; and staff calculations.

18. **The movements in the policy gap have been the result of movements in the efficiency gap, not the expenditure gap.** This indicates that the changes to the overall gap have been driven changes in the economic structure of Denmark, not changes in taxpayer compliance behavior or changes in policy. The results suggest that there has been a shift to a higher proportion of exempt activity; that is an increase in the proportion of final consumption provided through the public sector and/or the financial sector.

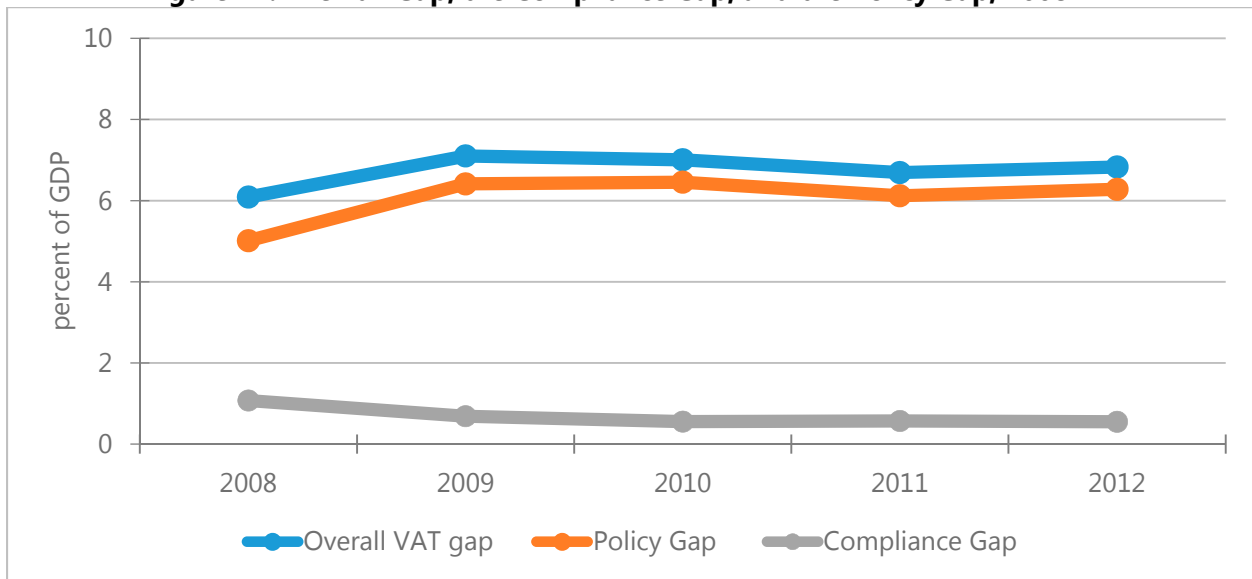
C. The Overall Value-Added Tax Gap

19. **Combining the policy gap and the compliance gap into the overall VAT gap yields an indicator of overall revenue performance.** The overall VAT gap can either be measured directly, as being difference between the potential VAT if all final consumption were taxed at the current standard rate and actual VAT revenue, or by directly combining the policy and compliance gaps.

20. **The estimated overall VAT gap for Denmark increased from 2008–09, but was then relatively stable over the period 2009–12 (Figure 12).** The overall VAT gap appeared to

increase from around six percent of GDP in 2008 to around seven percent in 2009. From 2009 to 2012 the level was fairly stable; there were some minor fluctuations within half a percent of GDP.

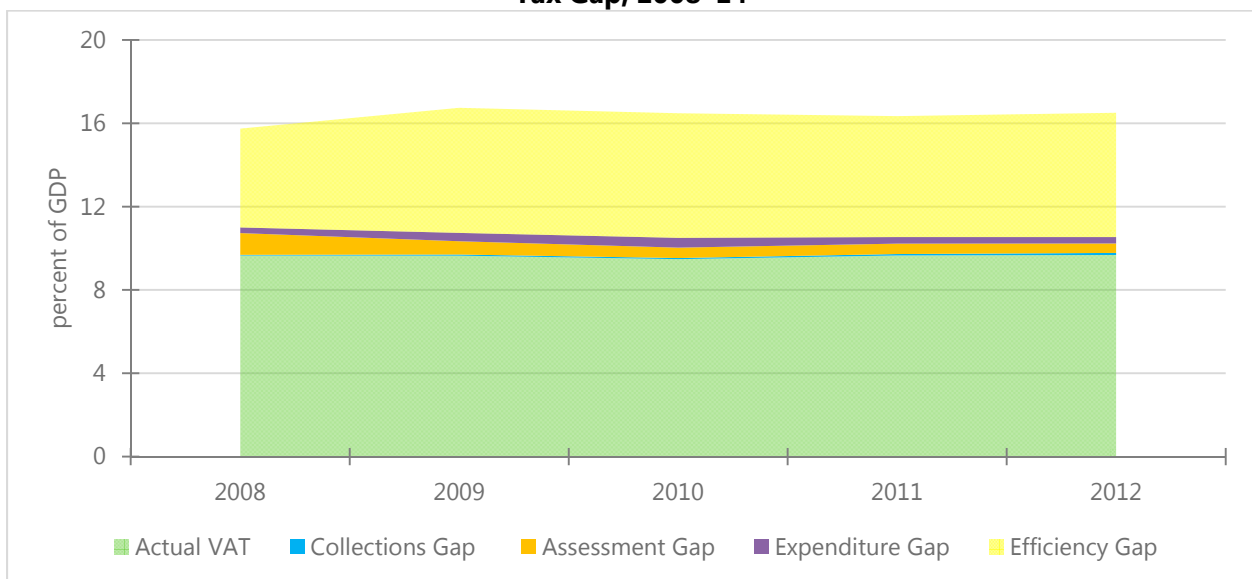
Figure 12. The Tax Gap, the Compliance Gap, and the Policy Gap, 2008–12



Sources: Denmark Statistics; Eurostat; SKAT; and staff calculations.

21. **The efficiency gap makes up the bulk of the overall VAT gap (Figure 13).** These four components of the overall gap could also be grouped by those with revenue mobilization potential (the collections gap, assessment gap, and expenditure gap) and those without (the efficiency gap). These results indicate that there is little room for revenue mobilization from the VAT in Denmark (apart from through rate changes).

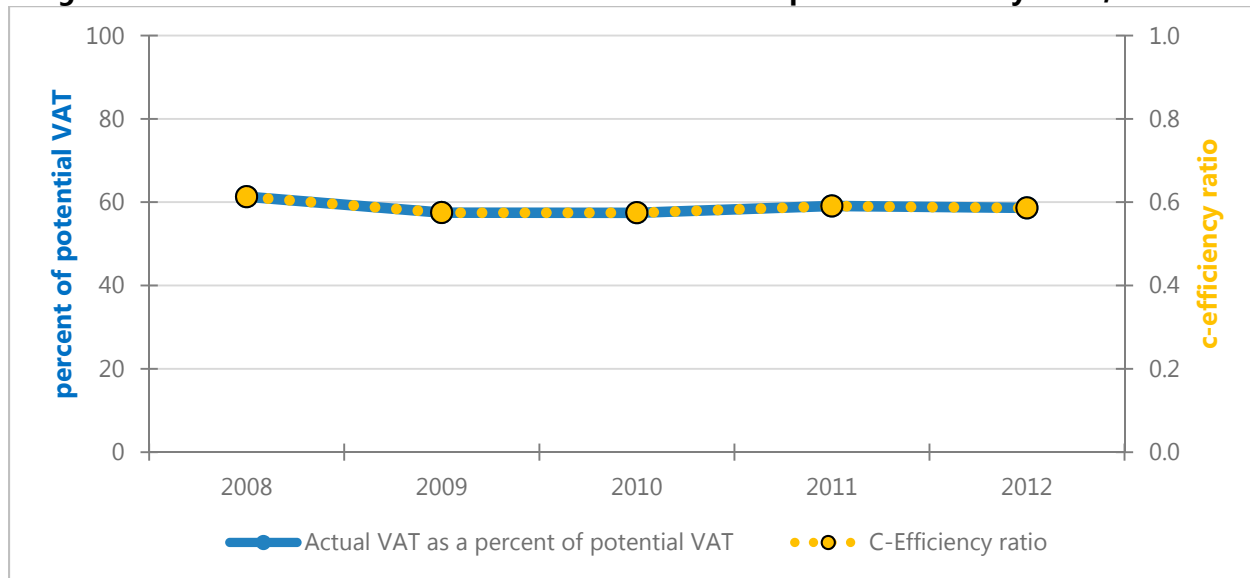
Figure 13. Actual Value-Added Tax and the Components of the Overall Value-Added Tax Gap, 2008–14



Sources: Denmark Statistics; Eurostat; SKAT; and staff calculations.

22. **These estimates are consistent with the observed trend in the c-efficiency ratio for the period (Figure 14).** In theory the c-efficiency ratio should be the inverse of the tax gap. In practice, however, there are a few differences in the measurement which could lead to differences in the values.¹⁰ In this case the two measures are consistent.

Figure 14. The Inverse of the Overall Value-Added Tax Gap and C-efficiency Ratio, 2008–12

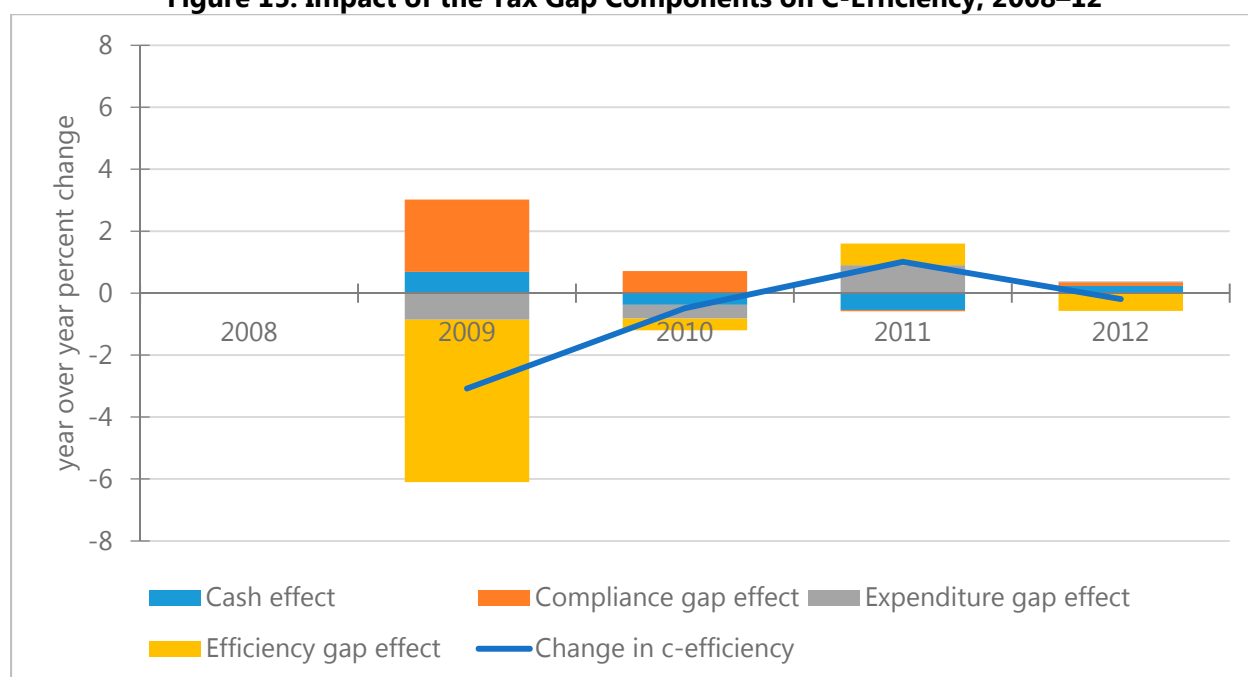


Sources: Denmark Statistics; SKAT; Eurostat; and staff calculations.

How the Components of the Tax Gap Affect C-Efficiency

23. **Between 2008 and 2009 there were both large positive and negative factors affecting the c-efficiency ratio, with the negative factors outweighing the positive ones (Figure 15).** In addition to the impacts of the various components of the tax gap (identified as the compliance gap effect, expenditure gap effect, and efficiency gap effect) there is also a “cash effect” identified. The cash effect measures the changes due to differences between the cash measurement of actual VAT used in the c-efficiency ratio and the accrual values used for the tax gap estimates (see Box 1 for a more detailed breakdown of these differences).

¹⁰ The actual VAT used in the calculation of the c-efficiency ratio is reported revenues, which are typically on a cash basis or in the case of European countries a lagged cash basis. For the tax gap measurement the RA-GAP methodology employs an accrued value for revenues. In addition the c-efficiency ratio uses final consumption as measured by national accounts as a proxy for the potential VAT base, but the model employed in the RA-GAP methodology makes some adjustments to this base to better align it with taxable domestic final consumption. In the National Accounts domestic consumption by nonnationals is treated as an export and removed from final consumption, but in most cases this is subject to VAT. Similarly the national accounts treats consumption abroad by nationals as imports and added to final consumption, but these are not subject to VAT.

Figure 15. Impact of the Tax Gap Components on C-Efficiency, 2008–12

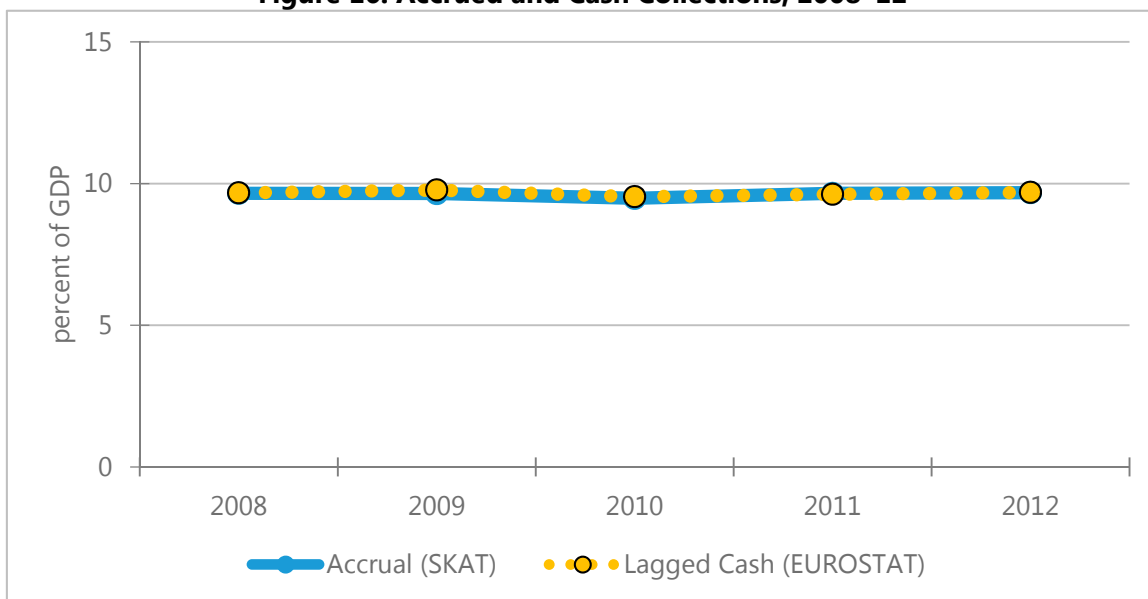
Sources: Denmark Statistics; Eurostat; SKAT; and staff calculations.

24. **The increase in the compliance gap between 2008 and 2009 also had a significant impact on c-efficiency ratio—mitigating what would have otherwise have been a much bigger decrease.** The effect of the decrease in the compliance gap between 2008 and 2009 is bigger than the combined effects of all factors for every other year in the period. Further work investigating the nature of this estimated decrease in the compliance gap should be undertaken; ideally this would involve unarchiving the required tax records for the period 2004–08 to allow for the analysis to be extended back over this period.

Box 1. Measurement of Actual Value-Added Tax

The RA-GAP approach to estimating the compliance gap employs an accrual measurement for actual VAT; that is associating the tax with the tax period, rather than with the payment period. This is done to better match the economic activity declared by the taxpayer (as provided on their VAT declaration) to the economic activity as recorded in the statistical data. In the long run, cash values for revenue should average out with the accrued values (ignoring penalties and interest). In the short run cash performance tends to be more volatile than accruals. In the case of Denmark there does not appear to be any significant difference between the accrual and cash performance (Figure 16). However, while these differences do not appear to be too significant in relation to overall collections, the differences can matter for the compliance gap.

Figure 16. Accrued and Cash Collections, 2008–12



Sources: Eurostat; SKAT; and staff calculations.

Differences between the accrual and cash values are largely driven by cash management issues; timing of debt collections, timing of refund payments, and the use of excess credit carry-forward mechanisms (wherein excess VAT credit is not immediately refunded, but is to be used as a credit towards future VAT obligations). Generally speaking there is a tendency for the cash measure to be pro-cyclical. Cash collections improve and excess credit accumulates during periods of economic growth, and cash collection worsens and excess credit is drawn down in periods of economic decline. Inflation can also play a role in differing accruals and cash measures. Due to the lag between a tax period and the payment deadline, severe inflation will have lower ratios of cash collections to economic activity as compared to the accrued collections to economic activity.

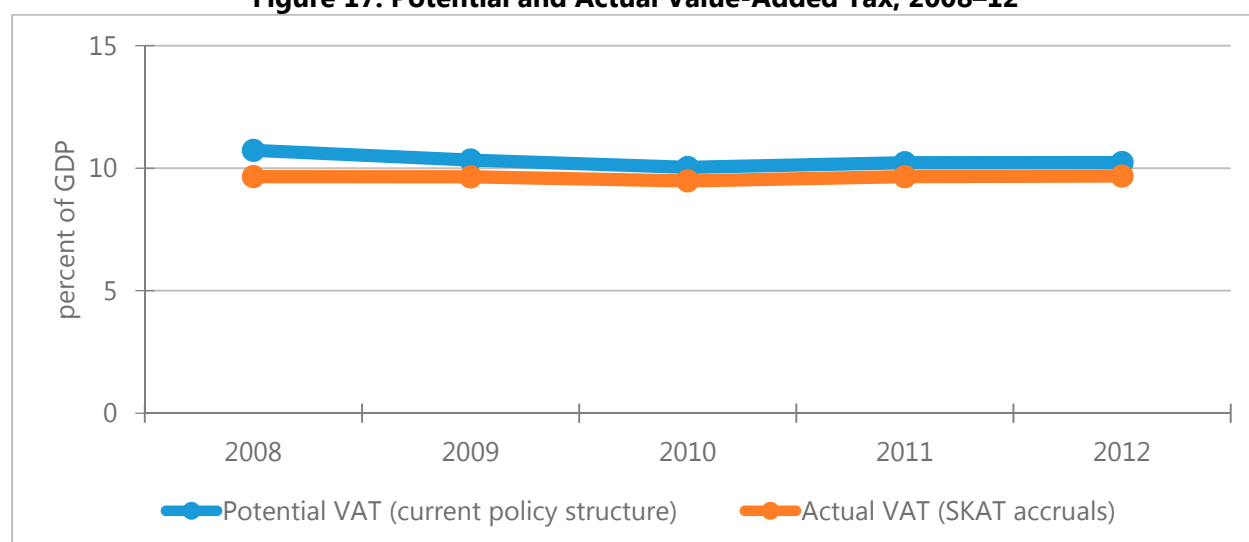
3. FURTHER ANALYSIS OF THE COMPLIANCE GAP

25. **It is not enough to understand how compliance has been changing, it is also necessary to understand why it may have been changing.** While an understanding of how the compliance gap has been changing over time is useful in evaluating the overall performance of a revenue administration, it does not necessarily assist an administration in understanding how to address any compliance issues. This section of the report includes some additional breakdowns of factors which affect the compliance gap in order to better understand what might be contributing to the changes in the compliance gap.

A. Potential and Actual Value-Added Tax

26. **Potential VAT, as a share of GDP, fell from 2008 to 2009 and then leveled out, while actual VAT to GDP remained constant over the same period (Figure 17).** The compliance gap, as discussed above is the difference between the potential VAT as estimated using the current policy framework, and accrued actual VAT collections. This means that the changes could be the result of changes in either or both of these measures, and so both should be reviewed when trying to determine where a change in the compliance gap might be coming from. However a simple comparison of these two values is insufficient for trying to identify the source of the change—while a comparison might show us which measure has been changing, it does not identify whether or not a measure *should* be changing. In other words the estimate for potential VAT could be correct, potential VAT should have decreased from 2008 to 2009, and so actual VAT should not be exhibiting a flat trend, it should have been higher in 2008.

Figure 17. Potential and Actual Value-Added Tax, 2008–12

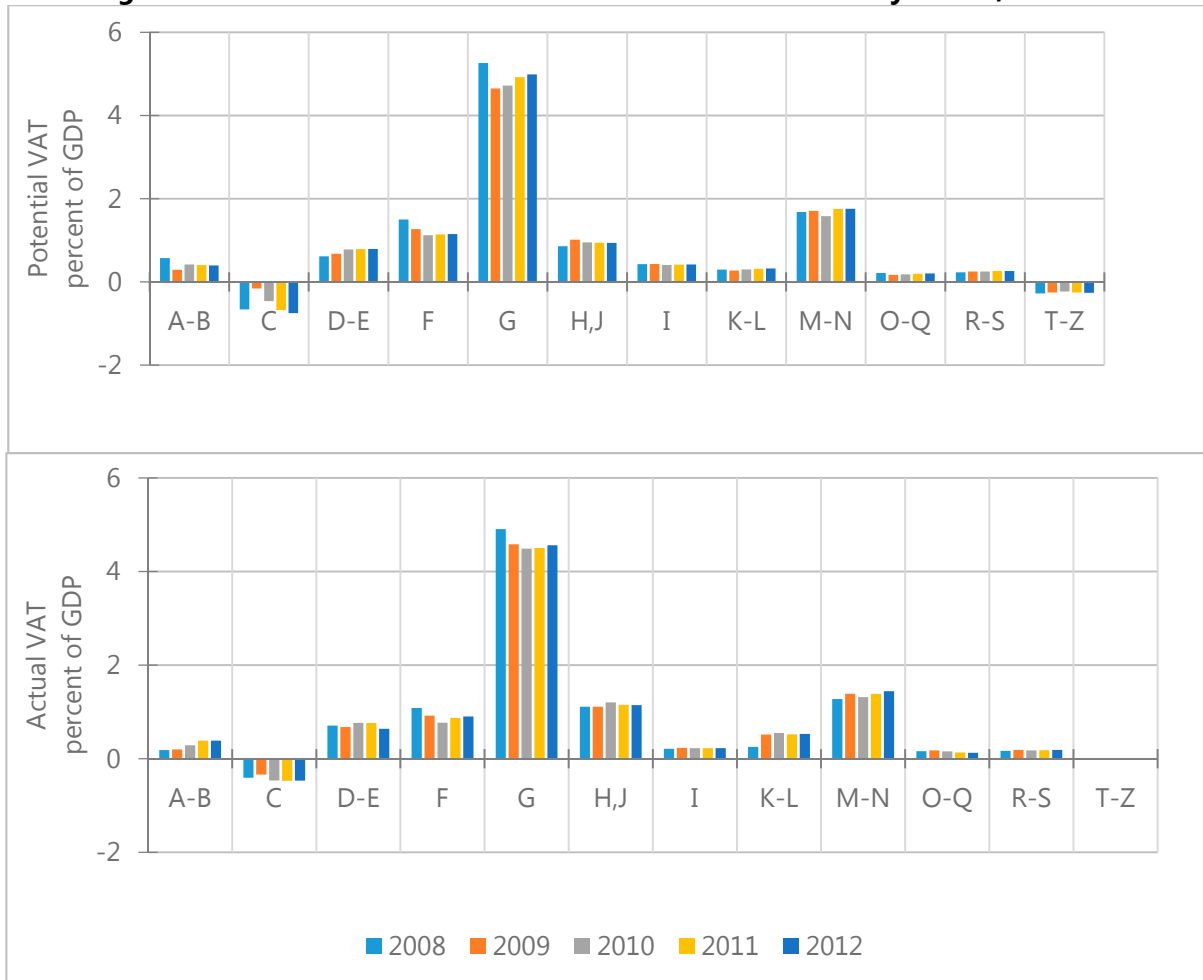


Sources: Denmark Statistics; SKAT; and staff calculations.

27. **Potential VAT per sector exhibits a little more year over year volatility than actual VAT in many sectors (Figure 18).** The general distribution of the collection burden is highly

similar however. Two of the most notable discrepancies between the trends in the charts could be related to modelling issues—the increasing potential VAT over 2008–12 for the trade sector is likely related to the decreasing potential VAT for the manufacturing sector. This is likely a problem in the allocation of exports between the two sectors in the potential VAT model. The negative potential VAT in the “Other” sector is an issue with the statistical data received; the data included values for intermediate consumption that were not attributed to any sector, resulting in input tax credits being calculated that could not be linked to any output.

Figure 18. Trends in Potential and Actual Value-Added Tax by Sector, 2008–12



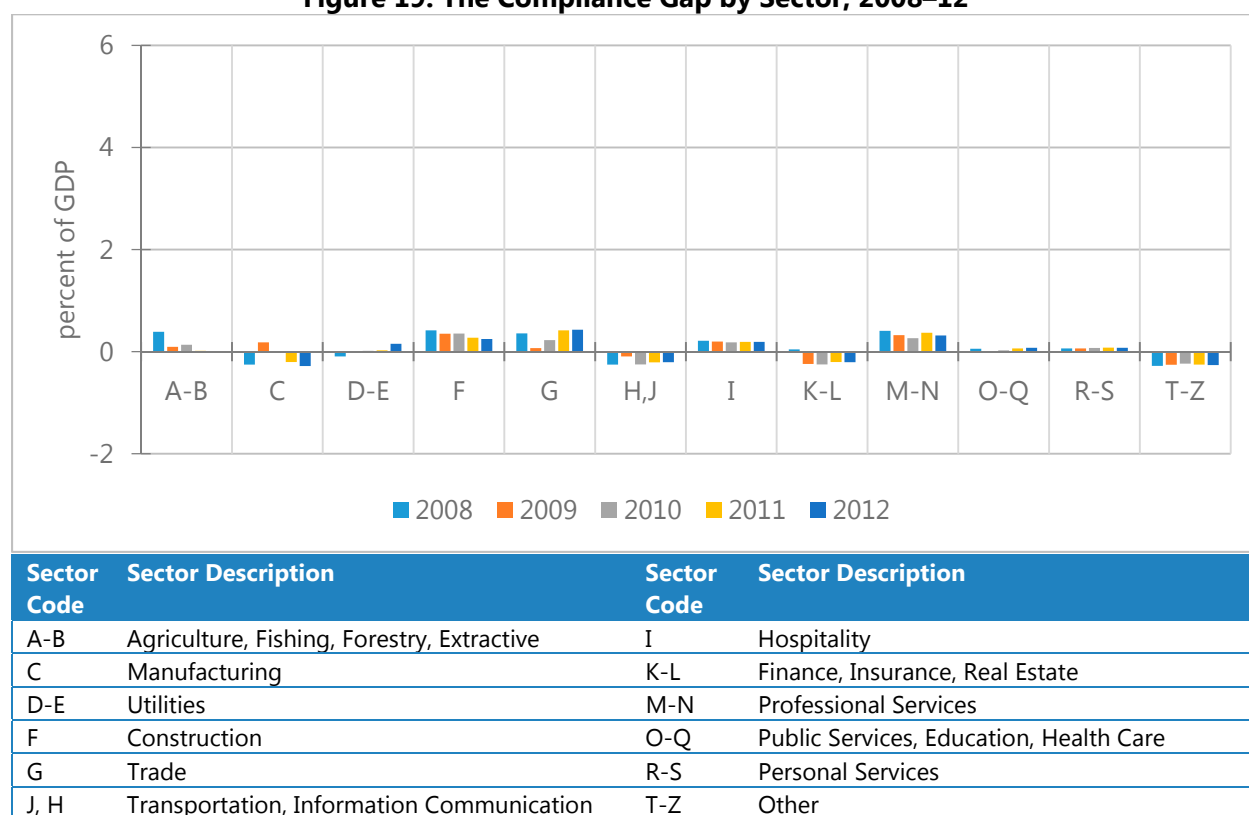
Sector Code	Sector Description	Sector Code	Sector Description
A-B	Agriculture, Fishing, Forestry, Extractive	I	Hospitality
C	Manufacturing	K-L	Finance, Insurance, Real Estate
D-E	Utilities	M-N	Professional Services
F	Construction	O-Q	Public Services, Education, Health Care
G	Trade	R-S	Personal Services
H, J	Transportation, Information Communication	T-Z	Other

Sources: Denmark Statistics; SKAT; and staff calculations.

B. The Compliance Gap by Sector

28. **The compliance gap appears to be concentrated in two sectors: the professional services sector, and the construction sector (Figure 19).** While the gap in the trade sector appears to be as large as these other two sectors, the gap for this sector may be over-estimated. As discussed above, there may be an issue with the distribution of exports between the manufacturing sector and the trade sector, and so the negative gaps appearing in the manufacturing sector likely offset the gaps in the trade sector—this would leave the trade sector with a negligible gap.¹¹

Figure 19. The Compliance Gap by Sector, 2008–12



Sources: Denmark Statistics; SKAT; and staff calculations.

29. **The larger compliance gap for 2008 appears to be coming from the agriculture, fishing, forestry and extractive sector, and the finance, insurance and real estate sector.** Again, while there is also a spike in the value for the trade sector in 2008, this is likely offset by the negative value appearing for the manufacturing sector. While the spike for the agriculture

¹¹ It should be noted that SKAT's VAT gap analysis, based on large random audit programs, finds that the Trade sector is the largest contributor to the VAT gap. In both cases the results are not conclusive, and should only be considered suggestive of where the gap for the full population lies. These differing results highlight why it is actually ideal to use both top-down estimates (like the RA-GAP approach) and bottom-up estimates (like the SKAT approach) to analyze the nature of the tax gap.

sector is apparent, the spike for the financial sector is a little more subtle—for the financial sector the inclusion here is due to it not having the negative gap appearing in the other years in the period. What is also of interest in the gap for the financial services sector is that this breakdown suggests that in this case it is a variation in the actual VAT that is leading to the gap value; actual VAT for the Financial sector in 2008, as shown in Figure 18, is lower than for the rest of the period, while the potential VAT is constant.

30. **The negative gaps appearing are either due to misallocation of actual VAT (a business might have the wrong sector code attributed to it in the registry) or due to overestimation of the potential taxable activity.** The former effect would not affect the overall gap estimate just the distribution of the gap, while the latter effect would imply an overestimation of the overall gap—in either case the overall impact is quite small. It is likely that the negative gaps for the information and communications sector and the finance, insurance and real estate sectors are due to misallocation—taxpayers are being registered as participating in these sectors when they are really engaged in another. The negative gap in the T-Z sector is the result of their being inputs in the statistical data which could not be attributed to any sector—this means, however, that this relatively large negative gap is attributable to some of the other sectors, thus implying the gaps for some of the sectors are being over-stated (it does not impact the overall result).

C. Comparison to Other Estimates

31. **There are two main other sources for compliance gap estimates for Denmark; SKATs own estimates, and the EU-wide estimates commissioned by the EC.** In Denmark, tax gap analysis has been conducted by SKAT from 2006. This has largely been performed using a “bottom-up” approach, involving a random audit program for VAT.¹² Given the expense associated with such an approach, SKAT has not been producing annual results. The EC has so far commissioned two main VAT gap studies for the EU; the “Reckon report,” published in 2009, and the CASE studies, published originally in 2013 with an update released in 2014.¹³ As the Reckon reported only covered the period 2000–06 their results will not be included in this comparison.

¹² There are essentially two approaches to estimating compliance gaps: “top down” and “bottom up.” The former estimates the gap indirectly by constructing an estimate of the potential VAT and subtracting actual VAT, the latter method is a direct approach where data on the size of known compliance losses are used to estimate the overall losses due to noncompliance.

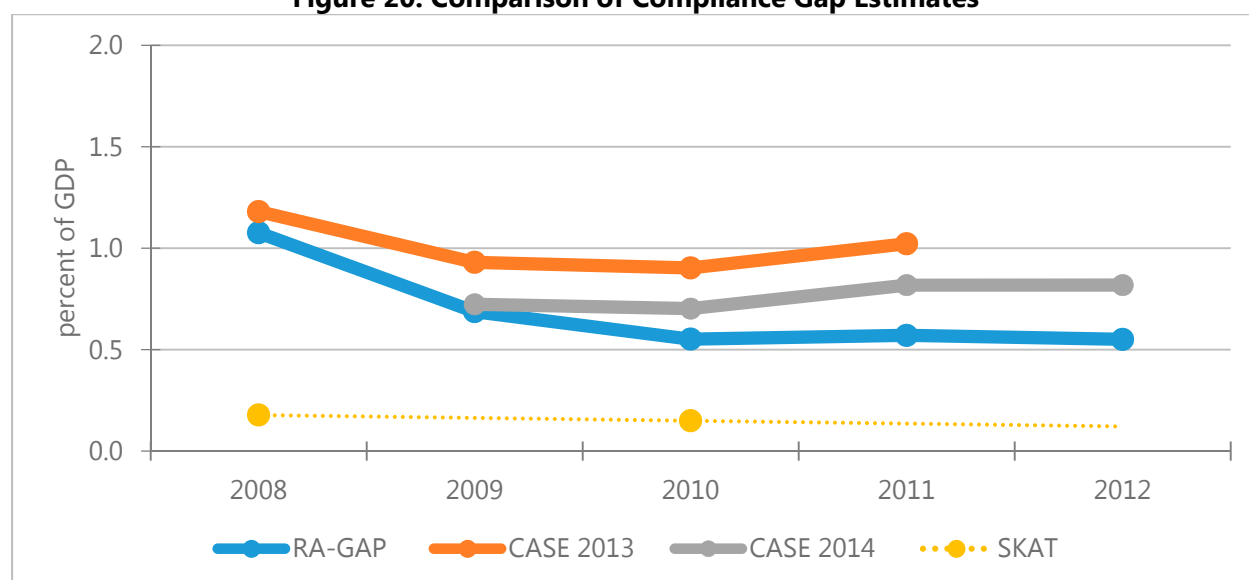
¹³ Reckon, 2009: “*Study to quantify and analyse the VAT Gap in the EU-25 Member States*,” Reckon LLP, September, 2009.

CASE, 2013; “*Study to quantify and analyse the VAT Gap in the EU-27 Member States*” Final Report Taxation and Customs Union (TAXUD)/2012/DE/316 for the EC, TAXUD.

CASE, 2014; “*2012 Update Report to the Study to quantify and analyse the VAT Gap in the EU-27 Member States*,” TAXUD/2013/DE/321 FWC No TAXUD/2010/CC/104 for the EC TAXUD.

32. **The RA-GAP results lie between the CASE results and SKAT's own estimates (Figure 20).** Top-down approaches to gap estimation, as employed by RA-GAP and CASE typically result in higher estimates than bottom-up approaches, as used by SKAT. As discussed below, there are in fact some systemic reasons why it should be expected that the SKAT results are lower than the other two estimates. While the RA-GAP results are somewhat lower than the CASE results, both indicate a decline from 2008 to 2010. The CASE results, however, indicate a small increase from 2010 to 2011 which is not present in the RA-GAP results. It should be noted that while the differences between these three estimates, the range of these differences is fairly limited, roughly within a half point of GDP, and they all a relatively low compliance gap.

Figure 20. Comparison of Compliance Gap Estimates



Sources: Center for Social and Economic Research; Denmark Statistics; SKAT; and staff calculations.

The Danish Customs and Tax Administration Compliance Gap Estimation Methodology

33. **The SKAT's published VAT gap estimates will be systematically lower than the compliance gaps estimated by a top-down approach.** SKAT VAT gap estimates are based on the results of their bi-annual random audit programs, which have more limited coverage of than a top-down model. A top-down model should catch all VAT losses, whether or not their risks have been identified, whereas the random audit program is limited in the following dimensions:

- Random audit programs are unlikely to discover larger, more organized cases of fraud and evasion. This is partly because such cases are much rarer than lower-level, 'mass-market' errors and under-declarations; and partly because the perpetrators will be actively seeking to hide their noncompliance, and specific intelligence is generally required to discover it—which will not generally be available for a random audit, not selected according to risk. In particular, repayment fraud is an endemic risk in VAT, and is pursued on a very large scale by sophisticated criminal organizations, who can be very adept at concealing the fraud from scrutiny by revenue officials without prior risk assessment or specific intelligence

- Although every business in Denmark is required to join the business register, it is possible that smaller businesses, particularly in the cash or informal economy, are unregistered. If this is so, they will not be in the sample frame used by SKAT, and so not included in the resultant VAT gap estimate. This could be a particular issue in Denmark, because there are no minimum income thresholds for personal income tax (PIT) or corporate income tax (CIT) liability, and a very low threshold for VAT. However, studies have found that a very large proportion of the businesses active in the informal economy in Denmark are operating below the VAT threshold. For such small businesses, there is no VAT liability and so no contribution to the VAT gap. Overall, SKAT believes that the omission of the informal economy from their sample frame will have only a marginal impact on the estimated VAT gap estimate.¹⁴
- SKAT excludes firms employing over 250 people from their sample of businesses on practical grounds. SKAT considers that checking such firms would be very costly, and believes that this subpopulation is too heterogeneous for inferences to be drawn from their audit results.
- To the extent that aggressive tax planning and avoidance schemes creates new definitions for transactions in terms of location, timing or type of supply that differ from those used in national accounts, these transactions will be included in the RA-GAP potential VAT calculation and thus the VAT compliance gap unless specifically identified and adjusted out of the model. However, such losses are not included in SKAT estimates, because they are unlikely to be identified in the random audit program due to their low incidence and complexity.¹⁵

¹⁴ Studies conducted in Denmark by SKAT and the independent research foundation, Rockwool Foundation Research Unit, have found that around 20 percent of the Danish population spend an average of over three hours per week in informal, cash employment. (The cash economy was found to be predominantly in the building, hotel and cleaning sectors, which is a common finding internationally). This work is likely not declared for tax and so represents a component of the tax gap. However, the total hours worked in such informal circumstances only amounts to about 3 percent of all hours worked, with relatively low income. This suggests that overall the amounts involved are only equivalent to around 1–2 percent of tax revenues. As well, the same studies suggest that not all of this nominal tax loss would be recoverable even if SKAT could achieve perfect compliance by taxpayers. The studies found that if such work was taxed, only about one-third would continue; the remainder would either be substituted by purchasers doing the work themselves or simply not be done at all. So, of Danish krone (Kr)16 billion nominally due on such work, less than Kr8 billion would actually be recoverable. (This is of course an argument to introduce appropriate minimum income thresholds for PIT and CIT, and raise the threshold for VAT registration; so that they better match the realities of tax compliance and administration in Denmark.)

¹⁵ There is a strong argument that these sort of 'losses' should not be included in the compliance gap, because they are legal (i.e., policy) issues, not compliance issues. This is something of a grey area, and these types of activities range from entirely acceptable (e.g., using agreed retail schemes to estimate VAT liabilities on mixed supplies and cash sales) to extremely egregious (e.g., value shifting not reflecting actual economic rents). In practice, most administrations estimating top down gaps include avoidance in

(continued)

- SKAT publishes the results of their random audit programs both including and excluding outliers.¹⁶ However, with respect to reporting tax gaps against the Finance Act measure, outliers are excluded. SKAT identifies outlier audit results from their published tax gap estimates, using a method developed by Anders Milhøj, associate professor in Statistics at the University of Copenhagen. Given the purpose of the Finance Act gap measure as a performance indicator for SKAT, this is a reasonable position to take. The RA-GAP approach, which produces a top-down estimate of the VAT gap, is not affected by outliers.

34. **The exclusion of larger firms from the SKAT's random audit program is of particular concern.** The exclusion of firms with more than 250 employees from the program sample will reduce the total amount of the estimated compliance gap. SKAT takes this into account in their reporting of the estimated gap as a percentage of VAT revenues by excluding revenues from such firms from their figure for total VAT receipts. This creates two potential uncertainties in using the reported percentage as an indicator of the overall VAT gap, as follows:

- The compliance gap for large businesses may be systematically higher or lower as a proportion of their VAT revenues than the gap for all taxpayers. If so, this will bias the reported gap as an indicator of the overall compliance gap. This issue has been investigated by SKAT, who found evidence that VAT noncompliance as a percent of liability decreases sharply with the size of businesses (Figure 16). Thus the exclusion of large businesses from the random audit program will have a conservative impact, in that it will skew the observed VAT gap upwards relative to the overall VAT gap for all businesses.
- The adjustment does not take into account the fact that the net VAT revenues from a subpopulation of VAT taxpayers may not be the same as the net 'sticking' tax from that group—some of the net VAT due would be recoverable as input tax by other taxpayers were it charged correctly.¹⁷ It is not generally possible to determine the extent or

their compliance gap. This is partly a pragmatic reflection of the difficulty of estimating the amounts lost via avoidance for the purposes of making an adjustment to the model; and partly a reflection of the fact that tackling egregious avoidance is generally part of the tax administration's remit and should therefore be reflected in the tax gap as a high-level performance indicator for the tax administration.

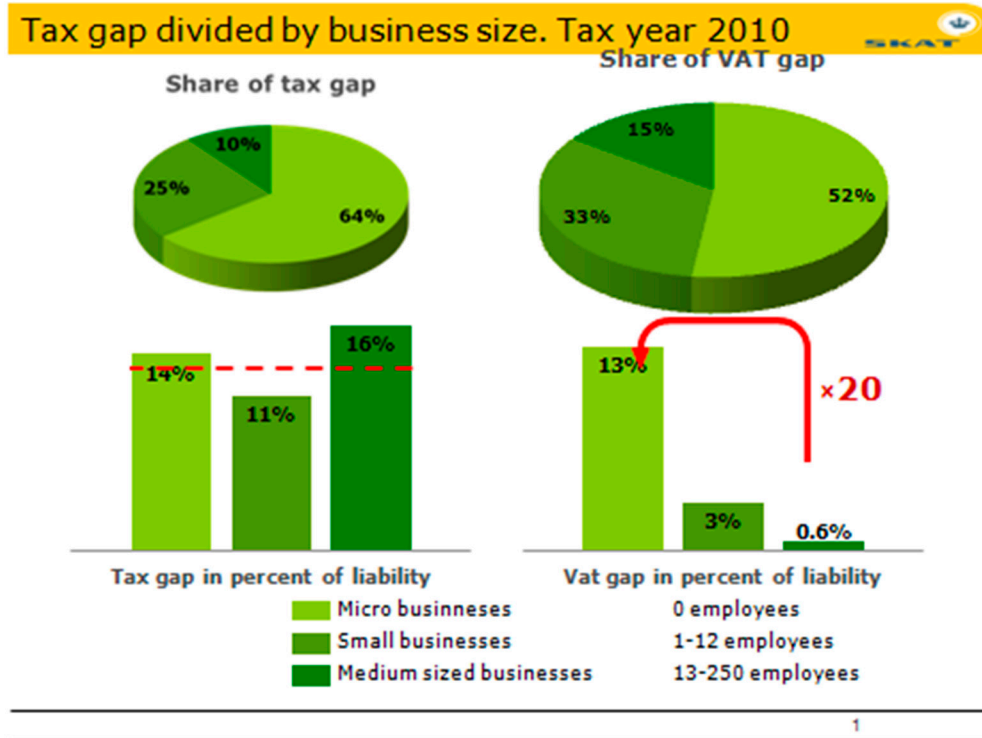
¹⁶ Normally, the exclusion of outlier results would be expected to reduce the observed losses and consequently the estimated gap. However, this is not necessarily so. In 2008, the random audits program found that one business had failed to claim a large VAT deduction to which it was entitled—they had overstated their net liability. The amount involved made this finding an outlier, so excluding this outlier actually increases the estimated VAT gap

¹⁷ For example, in an extreme case where a subpopulation consists entirely of businesses making supplies to fully taxable, compliant businesses, nonreporting of output tax in the subpopulation becomes irrelevant because any output tax that they did declare would be recovered by their customers as input tax credits. In such a case apparent VAT gap losses in subpopulation do not contribute to the total net VAT gap. This scenario is admittedly unlikely, but does illustrate that not all losses observed for individual

(continued)

direction of the net effect of this from VAT returns, but it does introduce some uncertainty into the extrapolation from the reported results to an implied estimate for the whole tax payer population. However, SKAT's estimated VAT gap remains the appropriate measure for the taxpayer population being measured.

Figure 16. Tax Gaps for Different Size Businesses in Denmark



Source: Country authorities.

subpopulations contribute to the total gap— compliance gaps in one subpopulation may be reversed by 'negative' compliance gaps in others (i.e., where too much net VAT is paid relative to theoretical liabilities).

4. THE DANISH CUSTOMS AND TAX ADMINISTRATION GAP AND RISK MANGEMENT PROGRAM

A. Use of Tax Gap Analysis in the Danish Customs and Tax Administration

35. **In Denmark, the authorities produce comprehensive tax gap and risk analysis based on bi-annual random audit programs.** The programs are described in more detail in Appendix II. SKAT has published their tax gap estimates and subsidiary analysis bi-annually since 2009 in accordance with an agreement between the Ministry of Finance and Ministry of Taxation. Denmark's Finance Act contains a statutory requirement for SKAT to publish their estimated tax gaps annually, using their bi-annual random audit programs,¹⁸ specifying the methodology and data sources to be used in some detail. The Finance Act also sets SKAT a mandatory target of maintaining the tax gap in Denmark at less than 2 percent.

36. **The tax gap target mandated for SKAT is a proxy measure, which does not represent the actual tax gap.** The tax gap metric is defined in the Finance Act; SKAT's target is to maintain this tax gap at less than 2 percent. SKAT is in the process of reducing its staff numbers and expenditure, so this target of maintaining the tax gap level, actually represents increasing efficiency. However, the definitions used for the target will tend to understate the true level of the actual total tax gap. The metric will be systematically biased as a measure of the actual tax gap, for the following reasons:

- Overall, the tax gap is only calculated for the three largest taxes in Denmark. It is likely that the tax gaps for other taxes will be systematically different from those three taxes, though it is not known in which direction and by how much any such bias will be.
- As discussed above, the tax gaps found in the SKAT random audit programs will only represent a part of overall compliance gaps. This will bias the metric heavily downwards. In particular, organized, potentially large scale evasion and fraud (an endemic risk in European VAT) is highly unlikely to be identified by random audits.
- By adding arrears to the tax gaps found in random audit programs, the Finance Act metric will be double counting tax gap amounts to the extent that those under-declarations identified in the random audit remain unpaid. This will bias the metric upwards, though by an unquantifiable amount.
- Collections are used as a proxy for total liabilities, but they will be systematically lower (by the amount of the tax gap). This will bias the metric upwards, though only by a marginal amount given Denmark's low tax gaps.

¹⁸ Tax gap estimates for those years not covered by a random audit program are projected from the years that are by using growth in the relevant head of duty receipts.

- VAT Collections used in the metric are gross amounts, excluding VAT refunds. This will heavily bias the metric downwards because the tax gap is a function of net collections. Most of this bias will come from the exclusion of VAT refunds, which are an integral part of European VAT, typically amounting to one third to a half of gross collections.
- The estimated tax gap excludes outliers. This is justifiable in a performance indicator, since the inclusion of outliers can skew observed changes from one period to another. However, their exclusion will skew the metric itself, though perhaps in different directions in different years.
- Collections for the metric are calculated on a cash basis, which may not reflect the underlying level of the tax gap. Although this should not introduce systematic bias to the metric, cash collections are generally more volatile than accrued amounts, and this may have a disproportionate effect in times of economic stress, such as the recession of 2009.

37. **The random audit program represents a significant investment of SKAT's resources, and the publication of tax gap estimates takes place long after the tax periods surveyed.** Field work for the survey can only start after the end of each reporting period, and audit queries can take several months to complete. The analysis and reporting of the results also takes a long time. (The reporting stage itself can take several months to allow senior stakeholders to resolve handling issues.) Consequently, there is a long delay between noncompliance activities and the publication of corresponding tax gap estimates. The most recent estimate is for 2010; at the time of writing this report (April 2015), preliminary results are available for 2012, but not yet published. This long lag reduces the value of the tax gap estimates as contemporary performance indicators, and the processes are currently being reviewed by SKAT to find ways of speeding up the processes involved.

38. **SKAT justifies the costs of their random audit programs by the extensive use they make of the detailed analysis.** In addition to the use of random audit results to estimate the Danish tax gap, SKAT use more detailed analysis extensively to support tax administration and compliance decision making. Results from the program have motivated legal measures to reduce noncompliance. The random audit programs provide very detailed risk profiles for taxpayer compliance behavior, which are used to test and improve operational risk selection.

39. **SKAT plans to develop its tax gap analysis by increasing its coverage and level of disaggregation.** In addition to reducing reporting lags, SKAT is committed to further development of its tax gap analysis. First, they plan to extend the coverage to include other taxes, principally excise duties. Second, they intend to decompose their tax gap estimates into 22 component parts corresponding to a segmentation framework that was introduced in 2013 for SKAT's compliance strategy (Figure 21) and organizational structure. SKAT has in the process of determining the methods that will be used to measure each of these segments, but it is clear that they will vary considerably. As well, it will not be possible to use random audits for all of the segments, though a random audit program for excise duty segments is being planned.

Figure 21. Danish Customs and Tax Administration Segmentation of Taxpayer Populations and Risks

Segmentation		
Individuals	Enterprises	Customs and excises
Tax return	Micro enterprises	Customs agents
Third party data	Small enterprises	Small enterprises – excises
Globalisation	Mediumsized and large enterprises	Excise smuggling
Financial assets	Public enterprises and institutions	Customs duties – non-EU countries
Vehicles	Non-profit-making institutions	
Properties	The largest enterprises	
Prohibitions and restrictions	Transfer pricing	Non-observed economy
Prohibitions and restrictions		Non-observed economy – individuals
Financial crime (penal code)		Non-observed economy – enterprises
		Non-registered enterprises

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Sources: Country authorities.

B. Observations

40. **SKAT's use of the detailed results from the random audit programs represents a very good way to bring together tax gap analysis and risk management.** The high costs of running large random audit programs make it difficult to justify them purely on the grounds of quantifying the tax gap. Furthermore, such programs will only identify part of the overall tax gap; losses from more complex or hidden noncompliance are unlikely to be discovered in the surveys. However, SKAT derives a lot of added value from the exercises by using the detailed results to test and improve the risk profiles used in their case selection for compliance interventions, and as evidence to justify legal measures to improve compliance.

41. **SKAT's design of their random audit programs optimizes their efficiency in terms of both accuracy per unit sampling cost and minimizing opportunity costs.** For example, for the private individual's sample, SKAT stratifies the sample for their surveys by using their risk profiles to determine each stratum, and then over-sampling the high risk strata and under-

sampling the low risk strata. The results of the random audit programs have shown that this risk selection is effective,¹⁹ which means that this approach has at least three benefits:

- increased accuracy in the total result for a given sample size;
- decreased opportunity costs, because less audit time is spent on lower-yield cases; and
- improved motivation for audit staff, because they are more likely to be auditing higher risk cases.

42. **SKAT plans to broaden and improve their tax gap analysis are challenging.** There are two broad aspects to SKAT plans to develop their tax gap analysis: (1) extending the coverage of the analysis to other taxes; and (2) estimating the tax gaps for each of 22 segments identified in SKAT's 2013 compliance strategy. These plans create potential issues, as follows:

- SKAT will use a third random audit program to identify noncompliance in taxes other than VAT and personal and corporate income taxes, chiefly excise duties, using a register of businesses as the sample frame. However, there will be significant compliance risks that crystallize in households' behavior rather than in businesses—most obviously in cross-border excise smuggling, which will likely be taking place outside registered businesses. However, the Danish Ministry of Taxation publishes bi-annual reports on cross-border smuggling, so this issue is covered by that publication. There may be a residual risk of excise goods producers and distributors operating in the informal economy and thus not in the sample frame of registered businesses, but this is unlikely to have a significant impact—excise goods are relatively high visibility commodities and the existence of a large informal market for them would not go unnoticed in an advanced economy like Denmark.
- Denmark has a large number of taxes other than PIT, CIT, and VAT—about 70 excise duties alone (though the exact number depends on how different taxes are defined). SKAT intends to cover all of these in the random audit exercise for excise duties, but recognizes that it will not be feasible to estimate individual tax gaps for every one of the excise duties individually, and will report aggregate, or pooled, totals.
- SKAT has previously reviewed the use of consumption surveys to estimate potential excise duty receipts, which can then be compared to actual receipts to estimate the tax gap, as practiced in other countries, in particular for alcohol, beer and soda water. However, consumption of these goods as reported in Statistics Denmark's household survey is measured in Kroner, while excise duties are levied on volumes. SKAT could not find a way to convert reliably the reported expenditure to volumes consumed.²⁰

¹⁹ For example, the report of the 2010 random audit program for private individuals shows a hit rate of 31.4 per cent for high risk cases, 22.9 per cent for medium risk, and 3.7 per cent for low risk taxpayers.

²⁰As well, under-reporting of consumption of alcohol and tobacco is an endemic issue found internationally in consumer surveys. The reasons for this under-reporting are not entirely clear, but may be due to a combination of consumers genuinely under-estimating their consumption (for example,

(continued)

There may also be reluctance in consumers to report consumption of illicit goods. The random audit program planned by SKAT as the alternative approach will inevitably carry significant direct and opportunity costs, but these can be offset if SKAT uses the detailed results in much the same way as for their existing random audit program.

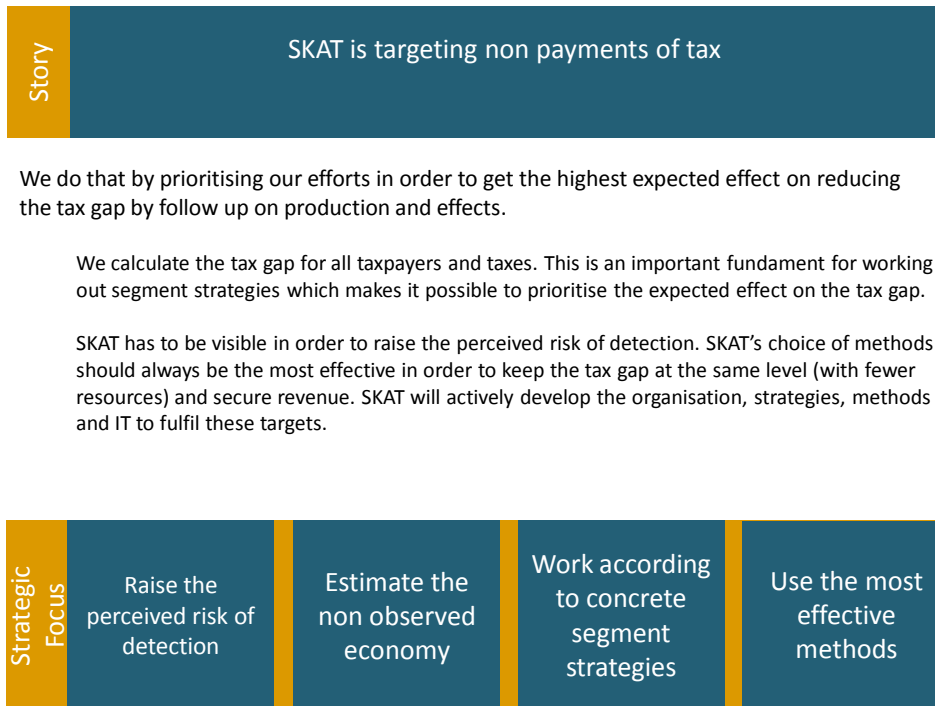
- Estimating the total tax gap for every one of the 22 segments identified in SKAT's 2013 compliance strategy (Figure 21, above, and Figure 22) will be difficult. For some of these segments, this should be relatively straightforward; for example, the tax gap in small and medium enterprises can be estimated from the existing random audit programs. However, some will be much more challenging; for example the unobserved economy and very large corporations. The measurement issues in the latter are compounded by the difficulty of defining and identifying compliance losses for very large - especially multi-national - firms engaging in sophisticated and complex tax planning/avoidance arrangements. For the unobserved economy, SKAT relies on studies regularly published by the Rockwool Foundation Research Unit, an independent, not-for-profit organization that commissions surveys of the cash economy that are conducted by Statistics Denmark.²¹

reporting 'typical' consumption and excluding special events or binge consumption) and being reluctant (perhaps even unconsciously) to admit to their full consumption of commodities held to be social 'bads.' Studies have established that such under-reporting can be as much as 40 percent, so an appropriate adjustment must be made to reported consumption when comparing it to declared clearances of such goods.

²¹ Such surveys achieve high response rates in Denmark, which indicates that the risk of significant selection bias and under-reporting is relatively low. This is thought to be due to the fact that (a) the surveys are carried out by independent researchers; and (b) Statistics Denmark has a very good reputation among the public.

Figure 22. Danish Customs and Tax Administration Compliance Strategy

Compliance



Sources: Country authorities.

43. **In addition to the measurement issues for each segment, SKAT faces two problems when bringing the individual segment tax gaps into a common framework for planning and resource allocation.** First, the segments identified are a mixture of taxpayer populations and particular risks or behaviors, for example individuals and cars (i.e., the risks of not paying registration fees, nonduty paid imports etc.). This mixture of types of segments creates overlaps and care will be needed to delineate each segment so as to avoid double counting of tax gap amounts. As well, the segmentation and its analysis need to be reviewed to ensure it provides complete coverage of Danish taxpayer populations and compliance risks.

C. Suggested Areas for Future Work

44. **Adopting the RA-GAP VAT gap model would provide an overview of the VAT compliance gap that complements SKAT's existing analysis of random audit program results.** The fieldwork for the current random audit programs and the analysis of their results, though it bears significant costs, is entirely proportionate to the benefits from their use in testing and developing operational risk profiles. The design and methodology of the exercises are appropriate and fit for purpose; it represents very good practice that receives widespread international recognition. However, the results of these programs only provide a partial picture of compliance losses in Denmark. In just the same way that RA-GAP's top down approach can

benefit from the more detailed, bottom-up analysis of taxpayers' behavior derived from random audit programs, SKAT's tax gap analysis would benefit from the perspective of an overview of all VAT compliance losses that can be derived from the RA-GAP model. The sectoral decomposition of the VAT gap in the RA-GAP model would also add value to SKAT's tax gap analysis.

45. **SKAT could explore ways of deriving more benefits from the analysis of their random audit program results.** Currently, SKAT compares the results of random audits to risk-based audits to test and develop the performance of their risk profiles for private individuals. Using the random audit results, either alone or in conjunction with other management information, could help monitor or improve performance in other areas. For example, distributional analysis of random audit results is used by the U.S. Internal Revenue Service to research the efficiency and performance of individual auditors and determinants.

46. **SKAT could explore ways of using their detailed VAT return and payment data to monitor trends and changes in risks.** Micro-level and aggregate analysis of trends in VAT declarations and adjustments, and payments can be used routinely to monitor the potential emergence of new risks and changes to existing risks. This monitoring is best done as a collaborative exercise between quantitative analysts and tax experts. For example, a spike or step increase in large refund claims in a particular sector could be a routine seasonal effect or an indicator of refund fraud taking place in that sector. Similarly, repeated excess credit claims by an individual trader could be because they are, for example, a regular exporter or they might imply unsustainable loss-making, which could indicate under-reporting of VAT liabilities or fraud.

47. **SKAT should develop a mapping framework to enable tax gaps to be estimated for each of their compliance segments.** The segmentation used by SKAT for its compliance strategy does not easily translate to existing tax gap analysis. A mapping framework will be needed to allocate existing tax gap analysis to the different segments and identify gaps in that analysis while avoiding double counting in overlapping segments. The total of the tax gaps allocated to each segment should also be tested for completeness. For VAT a top down model, such as the RA-GAP model, could be used to estimate the total gap. For excises, a comparison of consumption levels and trends against clearances could be used. For other taxes, it may be necessary to rely on softer analytical techniques such as structured conversations with compliance experts and tax professionals to build up a picture of tax losses generally.

48. **SKAT could consider establishing a working or steering group for their tax gap analysis.** Tax gaps, and the need to minimize them, are central to a revenue authority's purpose. As well, tax professionals and compliance risk experts in SKAT can bring valuable insights to tax gap analysis from their operational experience and ongoing engagement with taxpayers. A working group of tax gap analysts and operational staff could help to inform tax gap analysis, improve information flows and processes within SKAT and resolve apparent anomalies. Similarly, a steering group of senior stakeholders could help ensure that analytical priorities reflect SKAT priorities appropriately.

49. **The tax gap target for SKAT stipulated in the Finance Act should be reviewed.** As currently operationalized, the tax gap measure that is used in the Finance Act as a strategic target for SKAT is flawed. It is sufficiently consistent over time to monitor important aspects of SKAT's performance and to serve as a proxy for wider performance. However, it is not internally consistent as a measure of the tax gap and has only partial coverage of the total compliance gaps in Denmark, missing important risks in taxes other than VAT, PIT, and CIT, and in large scale revenue evasion, avoidance and fraud. Although there is not yet any indication of this risk crystallizing in Denmark, the current metric could create a perverse incentive for SKAT to focus on low-level, mass-market errors and evasion rather than more egregious, larger scale noncompliance because it is only the former that are picked up in the current measure.

50. **From a measurement perspective, the metric used for SKAT's tax gap target could be improved.** In particular the metric should be improved in two ways:

- To be internally consistent, for the VAT the metric should compare tax gap losses identified by the random audit programs to the total net (not gross) amounts of tax due in the survey samples. The current comparison of tax gaps extrapolated from the survey results to total collections does not compare like with like; and the exclusion of refunds from collections overstates the amount of tax due.
- A better approach in principle would be to target overall tax gaps, so as to track SKAT's management of the entire Danish tax gaps. SKAT's current tax gap analysis does not extend this far, so a movement towards such a measure would require a significant investment in an analytical program to develop estimates for all the major taxes in Denmark. An alternative would be to use the current tax gap analysis as a measure for SKAT's performance in controlling lower level, 'mass market' losses, and use a separate measure for more complex or more organized tax gap losses.

51. **The appropriateness of a numerical tax gap target for SKAT performance could be reviewed.** In general, the use of numerical tax gap targets as performance measures is not recommended. Tax gap estimates are necessarily imprecise 'broad-brush' measures, and are often heavily lagged; so they do not generally make good, contemporary performance indicators, even in reasonably stable compliance environments. However, the current target is expressed as a requirement to keep the (proxy) tax gap below a set level, which is not actually a very precise metric; and so, as currently defined, is not inappropriate.

52. **SKAT should seek ways to reduce the lag between fieldwork for the random audit programs and publication of their tax gap estimates.** Currently, there is a very long lag between noncompliance taking place and the reporting of results. (For example, the most recently published results at the time of writing this report in 2015 are for the reporting period 2010.) This not only compromises the usefulness of the tax gap estimates as contemporary performance indicators, but reduces their usefulness as fiscal risk indicators, and could undermine the motivation of field staff carrying out the audits. Ways to reduce the current delays in the process of collating, analyzing and reporting the results should be sought. In

particular, the need for extended reviews of the final report purely for presentational purposes should be critically reviewed. Not only does the extended review introduce further delays in the publication process, but it could undermine public confidence in the figures if the extended scrutiny (by nonanalysts) is believed to be caused by politically-motivated attempts to manipulate the figures or their presentation.

53. **SKAT tax gap analysts should establish working-level links with the Ministry of Taxation, who are responsible for maintaining Denmark's EU Own Resources account.** As an EU member state Denmark makes contributions to the EC, the Own Resources component of which is based on VAT revenues. The calculation of this contribution includes a standardized model of the VAT base, known as the Weighted Average Rate (WAR) of VAT. The form of this model is essentially a top-down, final consumption-based potential VAT model. The need for standardization across all EU member states leads to the WAR being a somewhat stylized, artificial estimate, but the modeling decisions and understanding of national accounts needed for the WAR are much the same as those for the RA-GAP model. The Ministry of Taxation is responsible for the WAR in Denmark, and a working link between tax gap analysts in SKAT and the WAR analytical unit would help build common understanding and good quality data in both models.

54. **Existing tax gap studies indicate that the introduction of minimum income thresholds for PIT and CIT liability, and increased thresholds for VAT, could be usefully considered.** Tax gap studies conducted by SKAT and the independent Rockwool Foundation Research Unit have established that a large number of taxpayers are not declaring small amounts of tax due on income from part-time work, property rental or hobbies. The amounts due in such cases are too small for cost-effective administration and compliance, so there may be a case for formalizing the position by introducing appropriate thresholds for PIT and CIT, and increasing the existing (very low) threshold for VAT.

APPENDIX I. The Revenue Administration-Gap Analysis Program

Model and Methodology

A. Introduction

RA-GAP aims at estimating potential tax revenues from macroeconomic data, and finding out the magnitude of gap by comparing it to appropriately evaluated actual tax revenues. In order to analyze the gap, the best way is to break down both revenue data into economic sectors and trace the trend of gap through time. This enables us to capture the reasons for fluctuations in the overall gap indicator, whether due to changes in potential revenue or to compliance issues in specific sectors.

The difference between the potential revenue under the current tax rules with full compliance and the actual revenue is called a compliance gap. RA-GAP will treat this gap as a representative indicator, and analyze its level and changes. Other indicators based on hypothetical tax legislation and the analyses of effects due to changes in tax policies ('policy gap' in RA-GAP) will be provided as supplementary components to help to explain the level and changes of potential revenues and gaps.

The general approach of the RA-GAP methodology is to estimate the size of the compliance gap on a *top-down* basis. That is, it sets out to estimate the total size of compliance losses by comparing actual VAT collections to potential VAT collections estimated from economic statistics covering the whole of the VAT tax base. The critical advantages of this approach are that (a) it should cover all compliance losses, whether or not they have been separately identified; and (b) the results can be compared to the costs of tax expenditures and reliefs as barriers to revenue mobilization. The alternative, *bottom-up*, approach of estimating losses of each behavioral component of the compliance gap individually may also be used to help identify drivers of the total gap.

Estimating Potential Value-Added Tax Revenue

Potential tax revenue can be generally calculated as the sum of the product of potential tax bases and corresponding statutory tax rates. For VAT, there are several approaches to estimate the tax bases from macroeconomic statistics, e.g., from simply taking final consumption or by capturing the ends of VAT chains by looking at demand data.

In the RA-GAP, the aim is to deal with each sector's value added, i.e., output minus input, as VAT tax bases. Tracking value added by each sector along the line of production chains is exactly how VAT due is actually determined. In addition, in real VAT systems there are a large number of different treatments for commodities and sectors, such as exemption and the application of different tax rates. This approach enables us to directly reflect such systems in the estimation of overall potential tax revenues. It also carries an advantage that sectoral potential revenues can

be easily estimated and matched to actual sectoral tax collections in the analysis, which enables the identification of causes of the level and changes to the overall gap.

It may be possible to adopt other approaches, such as using detailed household surveys and demand data, depending on the nature and quality of available data in a specific country. The worth of any method depends on the quality of data, and alternative approach might produce more reliable estimate if the used data are more reliable than the value added approach.

It should be noted that any approaches using macroeconomic statistics have error margins—due to simplifications in modeling and difficulty in measuring the full impact of the shadow economy. In addition, this kind of top-down approach in estimating potential revenues carries an inherent risk of overestimating potential VAT within the extant tax law because of tax avoidance activities and other questions of legal interpretation. Those may be technically complying with tax rules, but the reduction of revenue cannot easily be captured in the estimation. Without a specific adjustment, it would therefore be included in the compliance gap number, even though it requires a policy response or litigation, not administrative measures.

Determining the Corresponding Actual Value-Added Tax Revenue

The next step is to measure the amount of actual VAT collections. Tax is obviously collected in cash and all tax authorities record yearly cash collections, netting out payments and refunds during the period. However, in the analysis of RA-GAP, it is important to compare the potential tax revenue with the amount actually collected out from that potential in order to trace correctly the relative changes in compliance. Since cash collection in a specific period does not necessarily correspond to the tax due that accrued in the same period, it is necessary to allocate the cash collection data to the periods in which tax due actually accrued.

In general, yearly cash collection is the most eye-catching data, not least because total cash payments are one of the most reliable sets of data. The RA-GAP approach will use cash collection data, but it will link collected tax revenue and underlying economic activities. This can be achieved through fully utilizing the vast volume of individual tax return and payment records available to tax authorities. This procedure helps us to capture the real trend of the compliance gap without the effects of concurrent lags in payments and refunds. Where appropriate, the RA-GAP estimates will be reconciled to cash-based estimates so as to allow tax administrations to better understand this linkage.

The tax collection data will be sorted out into sectors in the economy, and compared to the potential revenues for each sector. Using sectoral or institutional collections data will help us to understand trends, by considering specific features. A comparison of potential VAT collections against actual collections for each individual sector also allows us to identify those sectors with larger compliance gaps, and thus some insight as to the nature and placement of noncompliance in the country.

It would be also useful to take into account assessment data showing amounts assessed but not yet collected at specific points. Such data will also help analyzing the causes of changes in compliance level, and may give useful information of a need for streamlining systems such as investigation, assessment and enforcement.

Relative Size of 'Compliance Gap' to 'Policy Gap'

RA-GAP will treat a compliance gap as a representative indicator, and analyze its level and changes. As a further analysis, the magnitude of the compliance gap can be compared with the impact of policy measures, by using the indicators based on hypothetical tax legislation and the analyses of effects due to changes in tax policies. RA-GAP will provide this indicator as a 'policy gap' (Figure 18). This analysis can provide policy makers and administrators with a perspective on necessary actions for revenue mobilization.

B. Measuring Potential Revenues for a Value-Added Tax

The RA-GAP employs a model designed to estimate the taxable value-added across all sectors of the economy. The approach is similar in structure to the method individual taxpayers use to determine their individual liabilities. The tax liability for an individual taxpayer is determined by the amount they pay customs on their imports, plus the VAT they must charge on their output sold domestically (exports being zero-rated), less the VAT they paid on their inputs. The value-added model works with statistical data available through national accounts supply-use tables, or input-output tables, to estimate the potential amount of tax on imports by a sector, plus the tax applicable to the output of a sector, less the amount of input tax credit due the sector.¹

¹ An alternate model structure for estimating the potential revenues for a VAT is to use statistical data on final consumption to determine the VAT paid by the end consumer, and then add an estimate of the amount of final VAT borne by exempt businesses using statistics on intermediate demand. In theory both methods should yield similar results, as they are both theoretically identical definitions of the potential tax base. This equivalence is similar to the basic National Accounts identity:

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

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. "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.

The Potential Revenues Model

The value-added based potential revenues model is:

$$PV^s = \sum_c (M_c^s \times \tau_c) \times r^s + \left[\sum_c (Y_c^s - X_c^s) \times \tau_c \right] \times r^s - \left[\sum_c (N_c^s + I_c^s) \times \tau_c \right] \times r^s \times (1 - e^s) \times \eta_c^s$$

Where,

PV^s = the potential net VAT for a sector,

M_c^s = imports by sector s of commodity c,

Y_c^s = output by sector s of commodity c,

X_c^s = exports by sector s of commodity c,

N_c^s = intermediate demand (consumption) by sector s of commodity c,

I_c^s = investment by sector s of commodity c,

τ_c = the VAT rate that applies to commodity c (zero if zero-rated or exempt),

η_c^s = the proportion of input tax credits for commodity c by sector s allowed to be claimed,

r^s = the proportion of output for a sector produced by registered businesses, and

e^s = the proportion of output for a sector which is exempt output.

Values for each of these variables are determined as follows:

Y, X, M, N, and I: Data for these variables is obtained from their respective components in statistical supply-use (or input-output) tables. The data for the external trades, X and M, require some adjustment before being input into the model; this adjustment is described below.

τ_c : This is the first of the two “policy variables” in the model. The values for τ_c are obtained from the tax rate structure for each commodity, except for trade services. The explanation and method for the trade services are described below. For the calculation of hypothetical revenues under reference tax structure, the standard rate is assigned to the full vector τ_c , apart from those supplies typically exempted internationally (margin-based financial services, life insurance, and residential rents).

η_c^s : This is the second policy variable in the model. The values in estimating current potential revenues are determined by any specific statutory limitations on input tax credits, such as a general disallowance of input tax credits for restaurant meals; such a disallowance would be indicated by a value of 0 for the commodity of restaurant meals across all sectors; the default value is 1. All values in η_c^s are set to 1 for the calculation of revenues under reference tax structure.

r^s : Estimates for the values for r^s are determined in conjunction with the authorities, possibly making use of business licensing data, or Customs transactions data.²

e^s : The proportion of output for a sector which is taxable is a function of τ_c . The values for e^s are determined by comparing the value of exempt output in a sector to the total output of the sector. That is $e^s = \sum_c (Y_c^s \times \tau'_c) / \sum_c (Y_c^s)$, where τ'_c is a vector which distinguishes whether commodity c is exempt ($\tau'_c = 1$) or taxable ($\tau'_c = 0$).³

Adjustments for Variables X and M

Adjustments to the raw statistical data for exports and imports as supplied by the supply-use tables (or input-output table) are necessary. Specifically the values for exports needs to be adjusted to remove the value of domestic consumption by nonnationals, and the value of consumption abroad by nationals which is included in the values for imports needs to be removed.⁴

² There is an assumption here that the same value of r^s applies across Y, X, I, and N. It can be shown that this assumption is only of consequence if there are any significant difference between the level of r^s for Y and X. As the level of r^s is generally fairly close to one, the results are not that sensitive to this assumption. As such, while it might be more technically correct to come up with separate values for Y and X, this would likely greatly increase the time and effort required to construct the model with no discernible difference in the final results.

³ This assumes that the proportion of inputs to output used in producing the taxable supplies and nontaxable supplies is identical. While this is most likely not the case for any individual taxpayer, many jurisdictions use just such an apportionment rule to determine the allowable amount of input tax credits for businesses making split supplies (taxable and exempt supplies). In such case this model treatment would exactly coincide with the statutory requirement. In jurisdictions where taxpayers are allowed to apportion their supplies based on actual use, e^s could be determined by tax return data on the proportion of input tax being creditable to those sectors with exempt output—presuming the required information is being captured on the return.

⁴ In a best case scenario the supply and use tables will specifically include the data used for these out these special categories of imports and exports (domestic consumption by nonnationals, and consumption abroad by nationals) making it simple to adjust the tables to the definitions for VAT purposes. In cases where this specific data is not available, an approximation can be made by removing values for the import or export of services which are typically consumed at the place of supply—such as hotel and restaurant supplies, and local transportation supplies.

Determining the Weighted Average Statutory Rate for the Output of the Trade Sector

To determine the value for τ_c applicable to the retail and wholesale trade services, a weighted average statutory rate is determined based on the trade margins by commodity type. This rate is determined as follows:

$$\tau_T = \sum_{c'} (\tau_{c'} \times K_{c'}) / \sum_{c'} (K_{c'}) ,$$

where,

τ_T = the weighted average statutory rate for the trade services commodities,

$\tau_{c'}$ = the statutory rate for commodity c' , where c' includes all commodities but the trade services commodities, and

$K_{c'}$ = is the trade margins associated with commodity c' .

Accommodating Complexities in the Policy Structure

While the two policy variables τ_c and η_c^s can be used to model most policy structures, there are some structures which they are able to accommodate. There are too not uncommon circumstances in particular which either requires adjustments to the inputs into the model, or adjustments to the structure of the model:

- a) a tax structure that has provisions which relate to a sector as a whole, as opposed to a particular type of supply or commodity; for example an exemption which applies to the financial sector instead of particular financial services; and
- b) a tax structure that has special provisions for particular types of transactions; for example the zero-rating of certain otherwise taxable business-to-business transactions.

Sector Specific Tax Rates

Sector specific tax rates can be accommodated by using a sector by commodity matrix of tax rates, τ_c^s , instead of the simple vector in commodity space, τ_c , for the treatment of the tax to be applied to output, and in the computation of input tax credits. The simple τ_c vector of rates would still apply against imports.

The calculation of e^s also needs to be adjusted in such cases. Instead of using $\sum_c (Y_c^s \times \tau'_c)$, to determine e^s , as specified in the equation above, the calculation would include the term $\sum_c (Y_c^s \times \tau_c^{s'})$, where $\tau_c^{s'}$ is a matrix of specific vector of ones and zeros, with one indicates an exempt commodity c for sector s – so $\tau_c^{s'}$ would have a vector of zeros for any exempt sectors.

Transaction Specific Treatments

Dealing with transaction specific treatments, where a different rate schedule might apply to a supply depending on the nature of either the supplier or recipient generally requires additional data on the value of these supplies. These specific treatments cannot, in fact be accommodated in the model and must be dealt with on the data side. There are two classes of these types of transactions, taxpayer-to-taxpayer transactions, and taxpayer-to-final consumer transactions. These two classes of transactions require separate treatments.

b) Taxpayer-to-taxpayer transactions

There are two potential solutions to deal with this circumstance: split the commodity into two component commodities based on their tax treatment, or to ignore such transactions. To split a commodity requires adding a new commodity to the supply use tables and to the policy variables. Adjustments to both the output and input variables would be needed. This treatment requires data on the value of these transactions.

It is also possible to simply ignore these transactions. These transactions have no net impact on the overall gap estimate; they only impact the value of the gap at the sectoral level. The gap for one sector in the transaction will include some of the gap which should be allocated to the other sector.

c) Taxpayer-to-final consumer transactions

Again special tax treatments under this category require treatment on the data side. In this case the final estimate of the potential VAT from the retail sector would need to be reduced by external estimates of the cost of the tax expenditure.

C. Measuring Actual Collections

The RA-GAP measures actual tax collections from the same economic activities upon which potential revenues are estimated. It requires reallocation of cash collection data into the periods in which tax due actually accrued.⁵ These reallocated data are called 'accrued collections,' formulated as follows:

$$AV^s = C^s + P^s - R^s (+ OP^s)$$

Where,

AV^s = accrued VAT collections for the period;

⁵ While in the long run cash collections and accrual cash collections should balance out, there can be wide variations between the two for a given period, as cash collections will include arrears collections from other periods and the stock of arrears changes.

C^s = collections at customs in the period;

P^s = payments received for the period;

R^s = excess credit accrued for the period; and

OP^s = payments offset by excess credit (excess credit carried forward to offset tax due, or excess credit accrued for the period used to offset tax owing for the past periods).

Values for each of these variables are determined as follows:

C^s : Collections at customs in the period, by sector, are obtained from the customs declaration database. Declaration data necessary to determine these amounts includes: the value of VAT payments on imports, the date of entry for the declaration the payment is associated with, and the sector of activity for the taxpayer making the declaration.

P^s : Payments received for a period is obtained from the payments transaction database. The data needed from the payment transactions database would include: the value of VAT payments made (exclusive of interest or penalties), the date of payment, the tax period for which the payment is for, and the sector of the taxpayer who made the payment.

R^s : To determine the amount of excess credit in a tax period, data from the tax returns database is required.⁶ The data to be extracted would include: the value of excess credit, the tax period the excess credit return was submitted for, the date of filing for the return, and the sector of activity of the taxpayer who filed the return.⁷

⁶ While the transactions database may include data on actual refunds paid, data on the value of excess credits accrued in a period will be needed in order to properly measure the accrued collections. If the excess credit is used to offset other tax obligations, it should be recognized as a reduction in net VAT collections.

⁷ In order to properly measure excess credit for a given period, it may be necessary to compute it from some of the fundamental line items on the return, rather than using the reported value for net tax owing. The proper computation of net tax for the period should be: output tax on supplies made in the period, plus any self-assessed VAT on imports, minus VAT paid on inputs used in making taxable supplies. If this value does need to be recomputed, it will need to be computed on a taxpayer by taxpayer basis.

OP^s: This variable only applies in jurisdictions where taxpayers are required, or allowed, to carry excess credit generated in one period forward for use against any obligations in the next period, in place of a refund request, or to offset past tax liabilities by excess credit. These data would again need to be obtained from the tax return database, in addition to the related tax period, and the sector of the taxpayer.⁸

There are a few additional nuances to the tax return and payments data necessary to consider when completing gap estimates, which are discussed below.

D. Measuring and Reporting the Compliance Gap

The compliance gap, as stated above, is measured by the current potential collections, as determined in step 1, minus the actual collections, as determined in step 2. As the value for accrued collections will change over time, the value for the gap will change over time. There are two general measures that RA-GAP uses in order to provide standardized static measures of the compliance gap which can be used comparatively over time, and across jurisdictions:

- 1) the compliance gap at the time of filing; and
- 2) the compliance gap at the time of Estimation.

The methods for measuring these two indicators, specifically the data considerations, are provided below. In addition there are some other measures which could be conducted dependent on data availability.

The Compliance Gap at the Time of Filing

The compliance gap at the time of filing is measured at the original filing/payment deadline. In measuring the accrued collections, data for P^s , R^s , and OP^s are filtered to only select payments and returns received before their appropriate deadlines. The tax return data selected for R^s and OP^s is the data as originally submitted by the taxpayer.⁹ This measure for the gap will not

⁸ The amount of excess credit used to offset tax owing is generally not recorded explicitly on either the return or in the return database. The method for determining this value is: if the net tax owing (as determined above) is greater than zero, and the excess credit carried forward is greater than zero then the amount of excess credit used as a tax payment is either the net tax owing, if the excess credit carried forward is greater than the net tax owing, or the excess credit carried forward, if the net tax owing is greater than the excess credit carried forward.

⁹ Most tax administration information systems keep track of the original values on a tax return, plus all subsequent changes. As the notion with this compliance gap measure is to attempt to measure only

(continued)

change over time, and provides a basis for comparison as to how the gap evolves over time as the administration collects on arrears and yields additional assessments.

The Compliance Gap at the Time of Estimation

The compliance gap at the time of estimation is measured using the latest available data for returns filed, assessment values, and collection and refund payment values. Ideally this measurement would occur annually using the annual anniversary of the last filing/payment deadline for a tax year. Data for the variable P^S is filtered to select payments made by that date. The tax returns data for variables R^S and OP^S is the current assessed values for the data as of that date.¹⁰ This value will change from year to year, but the value as measured at a particular point in time will remain static. Comparing changes to this measure of the compliance gap over time can provide insight into the collection performance of the administration.

Reporting the Compliance Gap

While the measure for the compliance gap above was expressed as simply being the difference between the potential revenues and actual collections, RA-GAP more commonly expresses the compliance gap as:

$$\frac{CPV - AV}{CPV}$$

or the compliance gap as a percentage of current potential revenues. This provides a more useful measure for comparing changes in the value over time, and across jurisdictions.¹¹ The

voluntary compliance, then it is important that the return values used not reflect any subsequent assessment actions by the authorities.

¹⁰ Some compromise might be needed in regards to the assessed values, as not all administration information systems record the date for all changes to a return. As such, the compliance gap calculation might have to specify that it is based on the assessed data as of the date of extraction. Managing a consistent timeframe between each annual measurement would then involve maintaining a fairly consistent data extraction anniversary date.

¹¹ While an argument could be made that a value for the compliance gap measured purely as $CPV - AV$ is of more relevance, as it provides the authorities and policy makers a value for the potential yield to be gained in particular period from increased compliance efforts, this can be misleading—the value does not on its own give an indication of how much of that yield might be *reasonably* gained.

values of the compliance gaps are also expressed as percentages of GDP, to provide a common basis for comparison with economic activities and the magnitude of policy gaps.

APPENDIX II. The Danish Customs and Tax Administration Gap and Risk Management Program

A. Use of Tax Gap Analysis in the Danish Customs and Tax Administration

In Denmark, the authorities produce comprehensive tax gap and risk analysis based on bi-annual random audit programs. SKAT's Compliance Planning and Analysis Department is responsible for two large bi-annual surveys of taxpayer compliance. The surveys take stratified random samples of taxpayers drawn from the Danish business and personal registers respectively, both of which should have universal coverage of their respective populations.¹ The business survey samples around 3,000 businesses, of which about 2,000 should be registered for VAT, 1,000 are liable for CIT and 2,000 for personal income tax as self-employed individuals. The household survey samples around 4,500 individuals, most of whom are employed, though it does also include nontaxpayers such as pensioners and students with personal incomes below Kr 42,000 per year. Self-employed individuals are treated as businesses for sampling purposes in these surveys. Every taxpayer sampled in the random audit program is subjected to a comprehensive audit by a trained auditor from SKAT's field staff.

SKAT has published their tax gap estimates and subsidiary analysis bi-annually since 2009 in accordance with an agreement between the Ministry of Finance and Ministry of Taxation. Denmark's Finance Act contains a statutory requirement for SKAT to publish their estimated tax gaps annually, using their bi-annual random audit programs,³ specifying the methodology and data sources to be used in some detail.⁴ The Finance Act also sets SKAT a mandatory target of

¹ However, the sample used for the business survey excludes firms employing more than 250 people (see below).

² The registration threshold for VAT in Denmark is Kr 50,000 per year, which is very low; so businesses in this context include individuals with part-time self-employed work or hobby sales. There is no lower threshold for PIT and CIT so all active businesses, including the self-employed, should be registered for tax.

³ Tax gap estimates for those years not covered by a random audit program are projected from the years that are by using growth in the relevant head of duty receipts.

⁴ Until 2011, the Finance Act specified that the tax gap for PIT should be estimated using national accounts data to estimate the potential revenue. However, SKAT found that the national accounts data was insufficiently detailed and that the results of such an approach were very volatile. Consequently, they used the results of their random audit program to estimate the PIT gap, which approach is now supported by the Finance Act.

maintaining the tax gap in Denmark at less than 2 percent. The tax gaps published by SKAT cover businesses taxes (VAT, corporation tax and income tax for the self-employed) and personal income taxes (payable by employees).

The first VAT gap estimated by SKAT was for 2006, published in 2009. In addition to publishing the tax gap estimates themselves, SKAT publishes its analysis of the tax gap impact of individual types of error and evasion, where sufficiently robust estimates are available.⁵ SKAT is also planning to start estimating tax gaps for the other Danish tax (principally excise duties).

The tax gap target mandated for SKAT is a proxy measure, which does not represent the actual tax gap. The tax gap targeted by SKAT is defined in the Finance Act as (total tax gap)/(total collections); SKAT's target is to maintain this tax gap at less than 2 percent. SKAT is in the process of reducing its staff numbers and expenditure, so this target of maintaining the tax gap at a set level, actually represents increasing efficiency. The terms in the equation are given the following statutory definitions:

- **Tax gap:** the total amount, in Kroner, of under-declared VAT found in the SKAT random audit program (i.e., for VAT, PIT, and CIT), plus uncollected arrears. It does not include any amounts for other taxes
- **Total collections:** the total (cash), for VAT, PIT, and CIT, of tax remitted on time, tax remitted after the filing date but without SKAT intervention, and tax remitted following enforcement and compliance interventions. These amounts are defined as being of total amounts remitted, excluding refunds.

The definitions used for SKAT's statutory tax gap target (i.e., SKAT's performance indicator) will tend to understate the true level of the actual total tax gap. The metric prescribed in the Finance Act will be systematically biased as a measure of the actual tax gap, for the following reasons:

- Overall, the tax gap is only calculated for the three largest taxes in Denmark. It is likely that the tax gaps for other taxes will be systematically different from those three taxes, though it is not known in which direction and by how much any such bias will be.
- As discussed above, the tax gaps found in the SKAT random audit programs will only represent a part of overall compliance gaps. This will bias the metric heavily downwards. In particular, organized, potentially large scale evasion and fraud (an endemic risk in European VAT) is highly unlikely to be identified by random audits.

⁵ For VAT, SKAT attributes observed noncompliance to 69 error types. However, for the majority of these types only a very small number of instances are observed in random audit programs. Estimates of the impact of each of those types are not published, because the sub samples involved are too small to allow reliable inferences to be drawn. For example, in the 2008 program, the individual impacts of 22 of the 69 error types were reported in SKAT's report.

- By adding arrears to the tax gaps found in random audit programs, the Finance Act metric will be double counting tax gap amounts to the extent that those under-declarations identified in the random audit remain unpaid. This will bias the metric upwards, though by an unquantifiable amount.
- Collections are used as a proxy for total liabilities, but they will be systematically lower (by the amount of the tax gap). This will bias the metric upwards, though only by a marginal amount given Denmark's low tax gaps.
- Collections used in the metric are gross amounts, excluding VAT refunds. This will heavily bias the metric downwards because the tax gap is a function of net collections. Most of this bias will come from the exclusion of VAT refunds, which are an integral part of European VAT, typically amounting to one third to a half of gross collections.
- The estimated tax gap excludes outliers. This is justifiable in a performance indicator, since the inclusion of outliers can skew observed changes from one period to another. However, their exclusion will skew the metric itself, though perhaps in different directions in different years.
- Collections for the metric are calculated on a cash basis, which may not reflect the underlying level of the tax gap. Although this should not introduce systematic bias to the metric, cash collections are generally more volatile than accrued amounts, and this may have a disproportionate effect in times of economic stress, such as the recession of 2009.

The random audit program represents a significant investment of SKAT's resources. The first random audit program, for 2006, sampled a large proportion of businesses and individuals, taking up about twenty percent of SKAT's audit resources. Subsequent survey samples have been smaller, but still take up around 10–15 percent of compliance resources. The scale of the programs means that they also have a substantial organizational impact, requiring strong management and administrative processes.

The publication of tax gap estimates based on random audit programs takes place long after the tax periods surveyed. Field work for the survey can only start after the end of each reporting period, and audit queries can take several months to complete. In addition, the results need to be input onto databases (using a dedicated team to minimize input errors and inconsistencies), analyzed and reported—each of which stages can take several months. (The reporting stage itself can take several months to allow senior stakeholders to resolve handling issues.) Consequently, there is a long delay between noncompliance activities and the publication of corresponding tax gap estimates. The most recent estimate is for 2010; at the time of writing this report (April 2015), results are being analyzed for 2012, with preliminary results expected in October 2014 and final results to be published in May 2015. This long lag reduces the value of the tax gap estimates as contemporary performance indicators, and the processes are currently being reviewed by SKAT to find ways of speeding up the processes involved.

SKAT justifies the costs of their random audit programs by the extensive use they make of the detailed analysis. In addition to the use of random audit results to estimate the Danish tax gap, SKAT use more detailed analysis extensively to support tax administration and compliance decision making. Most obviously, the analysis is used to test risk profiles for compliance work (see below), but it is also used for administration policy decisions. As an example of the latter, evidence from the first survey of individuals showed high risks of nondeclarations by self-employed and employees where no or only limited information on third party income was available independently of their tax returns. In particular, the information received by SKAT from third parties on capital gains on stocks and bonds made by individuals was insufficient to allow them to calculate tax liabilities in the absence of taxpayer declarations. Consequent on this finding, an administrative change was introduced in 2010 requiring third parties to supply sufficient information to allow the introduction of locked, pre-populated cells on individual employee taxpayers' returns to show the amounts due, without requiring more information from the taxpayer. This has had a significant impact on the PIT tax gap, with SKAT's informal calculations suggesting that the additional revenue yield from this one measure more than covers the administrative costs of all their random audit programs.

The random audit programs provide very detailed risk profiles for taxpayer compliance behavior. SKAT has used the random audit programs, used to test the efficiency of about 200 risk profiles created by them previously (primarily for employees). The results are reported by SKAT to have shown the pre-existing risk selection to be "very effective."

Risk profiles are used to stratify random audit samples. The risk profiles are categorized into high and medium risks, and those taxpayers not meeting any of the risk profiles are classified as low risk. This allows SKAT to over-sample high and medium risk populations (more so for the former), and under-sample low risk populations. This design has the benefits of (a) increasing the efficiency of the sample; (b) reducing opportunity costs of the survey; and (c) improving the motivation of auditors undertaking the random audits.


SKAT plans to develop its tax gap analysis by increasing its coverage and level of disaggregation. In addition to reducing reporting lags, SKAT is committed to further development of its tax gap analysis. First, they plan to extend the coverage to include other taxes, principally excise duties.⁶ Second, they intend to decompose their tax gap estimates into 22⁷ component parts corresponding to a segmentation framework that was introduced in 2013

⁶ SKAT reviewed the possibility of estimating tax gaps for tobacco, alcohol and soda water excise duties some years ago, but were unable to identify a sufficiently robust and cost-effective methodological (top-down) approach to such estimates. Their current proposal is to use a random audit program for excise duties.

⁷ The correspondence between this number and the number of error types reported in SKAT's tax gap reports is simply a coincidence—there is no link between the two groupings

for SKAT's compliance strategy (Figure 21) and organizational structure. SKAT has yet to determine the methods that will be used to measure each of these segments, but it is clear that they will vary considerably. As well, it is clear that it will not be possible to use random audits for all of the segments, though a random audit program for excise duty segments is being planned.

Figure 23. Danish Customs and Tax Administration Segmentation of Taxpayer Populations and Risks

Segmentation			
Individuals	Enterprises	Customs and excises	
Tax return	Micro enterprises	Customs agents	
Third party data	Small enterprises	Small enterprises – excises	
Globalisation	Mediumsized and large enterprises	Excise smuggling	
Financial assets	Public enterprises and institutions	Customs duties – non-EU countries	
Vehicles	Non-profit-making institutions		
Properties	The largest enterprises		
Prohibitions and restrictions	Transfer pricing	Non-observed economy	
Prohibitions and restrictions		Non-observed economy – individuals	
Financial crime (penal code)		Non-observed economy – enterprises	
		Non-registered enterprises	

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Sources: Country authorities.

Any requirement for increased disaggregation of the results of random audit programs will mean a need for increased sample sizes. To the extent that random audits programs are used to determine more detailed tax gap estimates they will need to be designed so that predicted sub-samples for each segment are large enough to generate reliable results. Where this is an issue, SKAT intends to meet this requirement by deriving moving averages from pooled results for more than one year. The advantage of this approach is that it removes the need for increased samples each year with attendant increases in direct and opportunity costs. The potential disadvantage is that it increases the lag between fieldwork and reporting, and smooths potential significant changes from one year to the next. However, SKAT reports that the segments' relative sizes and impacts are quite stable in the short term, so this factor should not critically undermine their analysis.