Institution: University of Exeter		
Unit of Assessment: UoA 16 Economics and Econometrics		
Title of case study: Improving Tax Gap Measurement and Audit Strategies		
Period when the underpinning research was undertaken: 2014-2019		
Details of staff conducting the underpinning research from the submitting unit:		
Name(s):	**Role(s) (e.g. job title):**	**Period(s) employed by submitting HEI:**
Christos Kotsogiannis	Professor of Economics	2001–present
Gareth Myles	Professor of Economics	1996-2016
Period when the claimed impact occurred: 2016 - 2020		
Is this case study continued from a case study submitted in 2014? N		

1. Summary of the impact (indicative maximum 100 words)

The Tax Gap (the difference between tax liabilities and what is actually collected) is a major concern to government, with the UK's being £31 billion annually and the EU-28's, €1 trillion.

Informing UK Tax Policy: Engaged research by the University of Exeter's Tax Administration Research Centre (TARC), provided the UK body responsible for tax collection (HMRC), with powerful, robust confirmation of existing Tax Gap estimates for self-employment income, additionally identifying relevant economic sectors most prone to under-reporting, and so informing their tax gap reduction strategies.

Informing International Tax Policies: Internationally, research underpinned: (1) the Greek Tax Administration Authority's decision to restructure its national tax auditing strategy (at a cost of €160 million); (2) changes to the Bulgarian National Revenue Agency's VAT Tax Gap measurement process; (3) the Rwanda Revenue Agency's re-evaluation of its tax auditing strategy; and (4) strengthened the work of the prominent EU Tax Gap Project Group. Additionally, Kotsogiannis was asked to work with the International Monetary Fund to evaluate their world-leading TADAT tool, to improve performance of tax assessment globally.

2. Underpinning research (indicative maximum 500 words)

The Tax Gap is the difference between the amount of tax that should, in theory, be paid, and what is actually paid. Measurement of the Tax Gap is an important tool in helping governments to understand the relative size and nature of non-compliance, and then to develop effective strategies aimed at reducing the gap. Better understanding and measurement of the Tax Gap is a top priority for all revenue agencies. The UK's HMRC estimates the UK *income* Tax Gap to be in the region of £12 billion annually and in the EU-28 it is estimated to be over €50 billion a year. Corresponding annual UK Tax Gaps relating to *all forms* of tax are estimated to be £31 billion (UK; 4.7% of total theoretical tax liabilities) and €1 trillion (EU-28).

The major piece of research **[3.1]** underpinning this impact case study is the outcome of a longstanding close collaboration between the UK's HMRC, and Professors Kotsogiannis and Myles of the University of Exeter Business School Tax Administration Research Centre (TARC). HMRC representatives sit on TARC's Advisory Board and a PhD was delivered thorough this research (Ana Cinta G. Cabral).

The TARC/HMRC collaboration was consolidated through a research project led by Kotsogiannis (2013-2017) on Tax Gap measurement, which specifically focused on the UK's *Self-employment Income* Tax Gap – estimated to be £1 to £2 billion annually **[3.1]**. The project was commissioned directly and co-developed with the HMRC. Its aim was to contribute to improving understanding around some of the more challenging areas of tax gap estimation. The research **[3.1]** builds on the existing literature, which utilises the expenditure-based methodology to measure income tax non-compliance, and exploits the differing opportunity for under-reporting of the two employment groups, the self-employed and employed.

As income from employment is subject to 'withholding taxes', there are minimal possibilities for under-reporting, and thus the income of the employed is assumed to be accurately reported.

Through observing the expenditure pattern of the employed, the level of income necessary to sustain a certain level of expenditure can be ascertained. Therefore, any discrepancies between the income reported by the self-employed and the employed, at a certain level of expenditure, can be used to elicit the extent of hidden income by the former group. A key research finding was that the discrepancy observed is due to the taxpayer's decision to under-report their tax liabilities, as opposed to being due to reasons related to the heterogeneous behaviour of occupational groups and the differences in their preferences, or by consumers saving and consuming differently, or error in measuring the variables of interest **[3.1]**. This is an important finding and innovation because, when events are studied that do not lend themselves to measurement (as with the under-reporting of income), there might be several other explanations that challenge the underlying assumptions of the analysis, and could potentially bias the results, in this case, leading to a false attribution to income under-reporting.

Following several robustness tests, the research **[3.1]**, confirms that the results are not caused by different preferences between the self-employed and the employed. It shows that, on average, the self-employed report only 80.4% of their true income (or the self-employed income-gap is 19.6%). Given that self-employment income in the UK for the period of study (2010–2012) represented 5.5% of GDP, this translated into an estimate of unreported taxable income of 1.6% of GDP.

Further analysis **[3.2]**, carried out in collaboration with HMRC, identified the economic sectors which are contributing to the UK's Hidden Economy (defined as the economy operating outside formal channels) with the highest risk of income under-reporting.

The initial major piece of research **[3.1]** subsequently led to cooperation with a number of other national revenue authorities, including the Bulgarian National Revenue Agency (BNRA). With the support of the BNRA, TARC was awarded £100,000 by the Alan Turing Institute (2018-2020) for the project 'Detecting Anomalies in Networks: The Case of VAT', which investigated Value Added Tax (VAT) fraud, being a component part of the Tax Gap. The project was delivered in collaboration with University College London. Insights obtained from the work with HMRC **[3.1]** were combined with Bulgarian administrative tax data, and resulted in a report and scientific contribution analysing how the VAT Tax Gap, resulting from fraud, can be minimised in Bulgaria **[3.3].** Using an algorithm, the research identified 8,000 registered traders from the Bulgarian tax base, previously categorised as low risk, that were in fact non-compliant.

The initial research **[3.1]** was also developed to estimate the income Tax Gap in Greece in 2018 in collaboration with the Hellenic Republic's Independent Authority for Public Revenue (IAPR).

Kotsogiannis' continuing collaboration with UK's HMRC's Tax Gap team, and the new work with the BNRA **[3.3]**, subsequently led to the development and presentation of research which considered how revenue agencies can optimally choose the sample of tax payers to audit, with the objective of narrowing the Tax Gap **[3.4]**.

The TARC research portfolio also led to cooperation with the Rwanda Revenue Authority on an original policy report evaluating its audit strategy **[3.5]**. This delivered preliminary and provisional estimates of the effect of Rwanda Revenue Authority (RRA) audits on reporting behaviour after one and two years following the end of the whole audit process for Corporate Income Taxes (CIT).

3. References to the research (indicative maximum of six references)

[3.1] Ana Cinta G. Cabral, **Christos Kotsogiannis** and **Gareth Myles** (2019). `Self-Employment Income Gap in Great Britain: How Much and Who?' *CESifo Economic Studies* pp. 84–107, https://doi.org/10.1093/cesifo/ify015

[3.2] Ana Cinta G. Cabral, **Christos Kotsogiannis** and **Gareth Myles**. (2016). Moonlighting in Great Britain: An estimation of income under-reporting. Presentation to UK's HMRC's Tax Gap Team and Hidden Economy Group. Available on request.

[3.3] Angelos Alexopoulos, Petros Dellaportas, Stanley Gyoshev, **Christos Kotsogiannis**, Trifon Pavkov. (2020) 'Detecting network anomalies in the Value Added Taxes (VAT) system.' https://tarc.exeter.ac.uk/media/universityofexeter/businessschool/documents/centres/tarc/publications/reports/Detecting_Network_Anomalies_in_the_VAT_system.pdf.

[3.4] Evangelos Ioannides, Petros Dellaportas and **Christos Kotsogiannis** (2019). Sample size determination for risk-based tax auditing. *J R Stat Soc Series A*. 2020;00:1–15. https://doi.org/10.1111/rssa.12618

[3.5] **Christos Kotsogiannis** and Luca Salvadori. (2020). `Evaluation of CIT Audits.' TARC Interim Policy Report. Confidential report evaluating audit strategy in Rwanda. Available on request.

4. Details of the impact (indicative maximum 750 words)

Better understanding and measurement of the Tax Gap is a top priority for all revenue agencies. TARC research has delivered impact to national government tax and revenue collection agencies in four different countries – the UK, Greece, Bulgaria, and Rwanda - generated through collaborative working approaches with national agencies: UK's HMRC, the Independent Authority for Public Revenue of the Hellenic Republic (IAPR), Bulgarian National Revenue Agency (BRNA) and Rwanda Revenue Agency (RRA). TARC research has **provided robust confirmation of existing estimates of Tax Gaps**; helped **identify the economic sectors which are more prone to under-declaring their tax liabilities**; and **contributed to national reforms including the restructuring of tax auditing and planning**. The research also contributed to the international tax and revenue community through work with the prominent European Commission's Tax Gap Project Group and through leading an influential International Monetary Fund review of their TADAT tool.

Informing UK Government Tax Policy: The underpinning research **[3.1]** confirmed HMRC estimates of Tax Gap magnitudes relating to self-employed income in the UK, providing them with *"external assurance"* **[5.1]** and a powerful measure of the robustness of their own analytical approach. The research was the *"outcome of longstanding collaboration"* **[5.1],** co-developed by TARC and the HMRC's Tax Gap team between 2014 and 2016, along with contributions from HMRC's Knowledge, Analytics and Investigations Team and Hidden Economy Team. It was driven by HMRC's strategy around the validation of its approaches by obtaining alternative measurements of the UK's Tax Gap, to deepen its understanding of that gap, and provide "*the foundation for HMRC's strategies which are most effective at reducing the gap*" **[5.1].** .

The TARC Programme Manager for HMRC explained: "*Professor Kotsogiannis provided work which supported HMRC's understanding of the self-employed income Tax Gap. This has been a valuable contribution to HMRC. Estimating the Tax Gap…is an important tool for understanding the relative size and nature of non-compliance.*" **[5.1].** As the research also identifies 'risky sectors' (i.e. those most prone to tax under-reporting), she further confirmed that HMRC was able to more efficiently target their auditing and tax investigation resources towards these sectors **[5.1]:** *"the research developed the approach to explore under-declaration of second/additional incomes, which are part of the moonlighting hidden economy"* and therefore *"provided valuable external insight into the key sectors in which this took place"* **[5.1].** Between 2014 and 2018, Kotsogiannis' team delivered six presentations (based on **[3.1, 3.2]**) to HMRC's Tax Gap team which *"helped to build shared understanding on the range of analytical approaches"* available to HMRC **[5.1].**

Informing International Tax Policies

European Commission Tax Gap Project Group: The impact of the research **[3.1]** was extended through Kotsogiannis being invited to present findings to the prominent Tax Gap Project Group, established under the EU's FISCALIS 2020 programme. Coordinated by the EC's Directorate General for Taxation and Customs Union, this Group was established to pool knowledge and share experience in existing Tax Gap estimations across the EU-28. In Nov 2015, Kotsogiannis presented to representatives of EU member states' National Revenue Authorities working on the Tax Gap and the Hidden Economy, and the research was cited in, and contributed, to the Tax Gap Project Group's 2016 report: 'The Concept of Tax Gaps. Report on VAT Gap Estimations' **[5.2].**

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International Monetary Fund (IMF): As a further measure of the global significance and impact reach of TARC's work, Kotsogiannis was approached by the IMF to work collaboratively with a team of experts, to evaluate the impact of their world-leading TADAT tool – the International Tax Administration Diagnostic Assessment Tool. This tool assesses the speed of tax administration reforms and intends to improve performance of tax assessment globally.

5. Sources to corroborate the impact (indicative maximum of 10 references)

[5.1] Letter of testimony from TARC Programme Manager. Knowledge, Analysis and Intelligence Group, UK HMRC. (11/08/2020)

[5.2] European Commission DG TAXATION AND CUSTOMS UNION. The Concept of Tax Gaps: Report on VAT Gap Estimations. FISCALIS Tax Gap Project Group. Mar 2016. https://web.archive.org/web/20200408162300/https://ec.europa.eu/taxation_customs/sites/taxation/files/docs/body/tgpg_report_en.pdf.

[5.3] Letter of testimony from Directorate of Strategic Planning, Independent Authority for Public Revenue of Hellenic Republic (IAPR). May 2018.

[5.4] IAPR. Investment and reform plan. 2017. Blueprint requesting **€160 million** from the government of the Hellenic Republic to finance IAPR structural reforms. Please note, document is in Greek.

[5.5] Letter of testimony from Director General of the National Revenue Agency (NRA), Bulgaria (26/03/2020).

[5.6] Email correspondence with Director General, National Revenue Agency, Bulgaria. (28/12/2020). Reference to NRA's active use of the underpinning R files and adoption of method.

[5.7] TARC Report. Evaluation of CIT (Corporate Income Taxes) Audits. Interim and Confidential. Prepared for the Rwanda Revenue Authority (RRA). Sep 2020.

[5.8] Memorandum of Understanding between TARC and Rwanda Revenue Authority (RRA) for collaboration on tax administration research for a 3 year period (2019-2022). Jul 2019.

[5.9] Email correspondence with Deputy Commissioner, Research & Planning Department, RRA, setting out details for a programme of Capacity Building Workshops (24.11-20-18.12.20) and PowerPoint slides for 'TARC Workshop on Audit Evaluation, Dec 9th 2020'.

[5.10] Crotty, J., Kostogiannis, C. and R. Leigh. TADAT: May 2019 Survey Results. Key messages, lessons for capacity development and next possible steps. Prepared for the TADAT Secretariat, IMF. 2019.