

# Tax Risk Assessment and Assurance Reform in Response to the Digitalised Economy

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**Abstract:** The digitalisation of the economy has increased tax administrations' traditional tax risks and introduced new tax non-compliance risks, such as the use of income suppression software and tax fraud associated with the use of alternative payment methods, such as cryptocurrencies. This study focuses on the global reform that took place among tax authorities from a tax risk management and assurance perspective. The study was executed in two phases, including a cross-national literature review to synthesise international reform regarding tax risk management and assurance in response to the digitalisation of the economy. This process was followed by interviews with risk, technology and data experts of 30 global tax authorities in order to evaluate the level of implementation of the global reform measures identified in the first research phase. The research results suggest an imbalance in reform among participants from developed and developing economies. An inability to optimise tax risk and assurance management within the digitalised economy will negatively impact the tax authorities' ability to maximise tax collection within the digitalised economy. This is especially concerning if the significant role of digital platforms on future global economic value creation is considered.

**Keywords:** Data science, digitalised economy, information technology audit, risk management, tax reform.

## 1. Introduction

Few other organisations besides tax administrations have to deal with such a significant number of risks, not only including the standard array of enterprise risks, such as economic, financial, strategic, operational, fraud, compliance and information technology risks, but also

tax risks ([Boitnott, 2019](#); [European Commission, 2006](#)). The digitalisation of the economy has increased the risk of tax fraud and tax evasion and, as such, an agile and innovative risk management approach has never been as important as it is now ([Barbantini & Savini, 2018](#)).

Digital tools that are specifically designed to defraud tax authorities, as well as to disrupt the economy, have increased the risk of anonymity and the non-detection of tax fraud and evasion ([Ainsworth, 2016](#), [ICAEW, 2019](#); [OECD, 2013](#); [OECD, 2017a](#); [OECD, 2017b](#)). The digitalised economy introduced new business models to the global economy. Highly digitalised multi-national entities' (MNEs) main generators of income have shifted from tangible products and services coupled with a physical presence in specific jurisdictions to intangible assets, intellectual property, globalised digital services and digital or crypto currencies that lack physical presence and substance ([OECD, 2018](#)). The biggest companies in the world used to be manufacturers, retailers and property investment companies, but digitalisation changed this reality. Today, some of the biggest companies in the world are platform providers, data collectors and digital advertisers – all with limited physical presence and alternative value creation models ([ICAEW, 2019](#)).

Risk management is the process of managing a range of uncertainties about the outcomes of situations that affect value creation. The process's objective is to manage and control uncertainty and threats to value creation. The latter ensures that the operational process continues and effectively manages the possible impact of risk on organisational achievement ([Sithipolvanichgul, 2016](#)). The organisational achievement or mandate of tax authorities worldwide is to administer and enforce the revenue laws, which generally results in the collection of the bulk of revenues required to support a state or country ([Crandall, 2010](#)). Inference can therefore be drawn that a redundant and outdated risk management process and approach will impact tax authorities' ability to optimise tax revenue collection. This statement is supported by the compliance risk management guidance issued by the OECD ([2004](#)).

The risk management process can be divided into four main categories, namely risk identification, risk prevention, risk detection and correction ([Tripathi, 2013](#)). An optimised risk management process assists tax authorities to achieve their mandate, but also to ensure the equal treatment of taxpayers, to focus the assurance process on non-compliant taxpayers, to utilise the available resources (human, technology and finance) effectively, to increase the level of voluntary compliance, to ensure agility within the risk management system and to evaluate the probability of compliant taxpayers becoming non-compliant ([European Commission, 2006](#)). It is expected that this risk management process will remain valid within the digitalised economy, because the objectives of the risk management process remain unchanged. However, the approach to identify, assess, prioritise and correct tax risks within

the digitalised economy requires change. This required reform is mainly due to the way that highly digitalised enterprises create value and transact. These business models' global impact, and the strong reliance on and creation of data, further made tax risk management reform essential ([European Commission, 2006](#)).

Information sources that are used by tax authorities during the risk management process are increasingly based on data sourced from third parties and information generated in foreign jurisdictions. This data is often unstructured. The timing of tax risk management has also changed from ad-hoc, annual processes to (near) real-time ([OECD, 2017c](#)). The type of treatment changed along with simpler tasks becoming increasingly more automated and the application of methods to manage tax risk, where new tools and models are allowing administrations to manage "complete right datasets" rather than using risk-based approaches to allocate scarce resources ([OECD, 2017c](#)). The extent to which information or the collection of right data can be used during the tax risk management process is, however, limited by various factors. These factors include the tax authority's ability to ingest the information, the legality of the process, the value that new information or data can add in addition to what is already available (risk of information overflow), the capacity of information technology systems in use and the cost associated with obtaining new data ([European Commission, 2006](#)).

Although the pre-existing tax risk of non-registration, the understatement of taxable income, the overstatement of tax-deductible expenses and disguised transactions as a result of criminal activity remain relevant, the digitalisation of the economy has increased these risks significantly. This is mainly due to the business model changes and digital tools designed to manipulate taxable income. The literature, however, indicates that additional challenges were introduced with the digitalisation of the economy. The first challenge relates to tax authorities' legal right and ability to access and exchange data from digital platforms to enable them to identify and detect possible tax risks. Another challenge relates to the enforceability of country-specific tax legislation to non-registered international individuals or enterprises ([Azam, 2007](#); [European Commission, 2018](#)).

Furthermore, tax authorities must ensure that they appropriately respond to identified and/or detected tax risks. Risk covering or the correction process focuses on non-compliant individuals or enterprises and usually results in the recovery of tax shortfalls to the tax authority in cases where an identified or detected tax risk was realised. Rectification can take place in monetary terms by issuing or amending a tax assessment to recover the evaded tax and related penalties. In some cases, other sanctions, such as criminal sanctions, are available ([European Commission, 2006](#)). Criminal sanctions as corrective measures usually fall within the assurance or audit ambit. If executed successfully, these sanctions might have a deterrent

effect that not only applies to the behaviour of the individual or enterprise but, via its social and commercial network, influence other individuals or enterprises that have adopted similar tax positions ([European Commission, 2006](#)).

A tax audit or assurance is “an examination of whether a taxpayer has correctly assessed and reported their tax liability and fulfilled other obligations” ([OECD, 2006](#)). The assurance process of the majority of tax authorities can generally be divided into at least three categories. The first category refers to a verification process or single-issue audits where the verification is confined to only one potential non-compliance risk. These verifications take less time to perform and are used to review large numbers of taxpayers. The second category is “limited scope” audits where the assurance process is confined to specific risks per tax return submitted. The third category is “comprehensive/full audits”. The scope of these audits is all-encompassing and entails a comprehensive examination of all the information that is relevant to calculating the taxpayers’ tax liability and may include criminal investigations ([OECD, 2006](#)).

The World Economic Forum (WEF) ([2020](#)) estimates that 70% of new value created in the global economy over the next ten years will be based on digital platform business models. This change requires that reform takes place in not only international and domestic tax policy, legislation and the related systems to optimise tax administration, but it also requires a change in relation to the way that tax authorities manage tax risks and the related assurance process.

One of the questions that, however, arises is to what extent have tax authorities globally changed their risk management and assurance approach in order to optimise their ability to execute their mandate in response to the digitalised economy. The objective of this paper is to evaluate and analyse the reform of the tax risk management and assurance process of tax authorities, globally in response to the digitalisation of the economy.

Section 3 synthesises and evaluates the available literature in relation to international reform that took place regarding the tax risk assessment and assurance process in response to the digitalisation of the economy. The level of implementation of the main reform measures identified in section 3 are subsequently measured among selected international tax authorities. These research results and discussions are documented in section 4. The overall conclusion relating to global reform among tax authorities relating to tax risk management and assurance in response to the digitalisation of the economy is documented in section 5. Section 6 sets out the limitations on the scope of the study. Matters for future consideration and research are set out in section 7.

## 2. Methodology

An inductive, qualitative, cross-national study was executed to collect data with the intention to build new knowledge with regards to the research topic. The study was conducted in two phases. The first phase of data collection comprised a semi-structured and integrative literature review in order to identify, collect and synthesise data regarding tax authorities' tax risk management and assurance reform in response to the digitalisation of the economy. The objective of the literature review was to synthesise the cross-national data that is available in order to identify the main tax risk management and assurance reform measures implemented in response to the digitalisation of the economy. These identified measures were subsequently used to inform and formulate interview questions posed to selected global tax authorities in order to evaluate the level of global reform of tax authorities on the subject matter. Sources identified for the cross-national, integrative literature review were balanced between international organisations, such as the Organisation for Economic Co-operation and Development (OECD) and the European Commission, as well as important stakeholders within the business sector. It was found that documented academic literature on the research topic was limited. The literature review results were synthesised, analysed and documented in section 3, as per the four tax risk processes identified in section 1: tax risk identification, tax risk prevention, tax risk detection and tax risk correction measures.

The objective of the second phase of the study was to evaluate the level of global tax risk management and assurance reform against the main technologies and data-related reform measures identified in the first phase of the study. The second phase of the study therefore comprised the collection of data and knowledge by means of semi-structured, qualitative interviews whereby open-ended questions were posed to selected tax authorities. Data was collected from conducting group interviews, one-on-one interviews and by means of direct observation. Manson ([2010](#)) confirms the relevance and applicability of interviews as a method of data collection. Secondary objectives of the interviews were to confirm the credibility and reliability of the data collected during the literature review. It was, furthermore, to collect rich and multi-layered data on the research topic that is not available from open source data resources.

Green and Thorogood ([2004](#)) indicate that limited value will be added to a qualitative study when more than 20 participants are interviewed. Ritchie *et al.* ([2003](#)), furthermore, state that researchers should not interview more than 50 participants in order to enable the researcher to manage the complexity of the analysis and the communication of research results. Based on the preceding literature, a sample size of 30 tax authorities was considered to provide a sufficient level of saturation that would provide reliable research outputs.

The sample was selected by firstly identifying and specifically selecting the leading tax authorities with regards to tax risk management and assurance reform in response to the digitalisation of the economy, as identified during the integrative cross-national literature review. The sample was subsequently supplemented by random sample selection. In order to ensure that the sample was representative of the global country population, tax authorities from both developed and developing economies were selected. The classification of developed versus developing economies, as indicated by the United Nations ([2020](#)), was used. For the purpose of this study, one selected participant from a country classified as “economies in transition” in terms of the United Nations’ ([2020](#)) classification was categorised under “developing economies” because it shared more characteristics with the participants of the developing economies. Further consideration was given to the fact that 36 countries from a total of 195 countries globally are regarded as developed economies ([United Nations, 2020](#); [Worldometer, 2020](#)). These 36 countries represent approximately 18% of the total geographical population. The sample of participating tax authorities consequently included five tax authorities from developed economies (18% of the total sample of 30 participants) and 25 tax authorities from developing economies.

The tax authorities selected for interview purposes are representative of Africa, Asia and Australasia, Europe and North America. The participants who were identified for interviews within the various tax authorities were key senior employees and experts within the field of tax risk management and assurance and were nominated by the tax authorities themselves. These participants were afforded the opportunity to respond in person, via digital platforms, telephonically or in writing. The preferred interview method of the interviewees was adopted, and the interviews were conducted in person, telephonically or per digital communication platforms. The interview questions, together with the purpose of the study, were circulated to the respective tax authorities prior to the interviews. A minimum set of open-ended questions was posed to all the interviewees to ensure a minimum amount of knowledge and data would be collected.

Tax authorities, globally, follow different approaches regarding the level of transparency relating to tax risk and assurance management processes and measures. Some follow a transparent approach where the various tax risk measures and processes are shared openly (through publications) with the public. Other tax authorities, however, restrict access to these measures and processes to approved employees within the tax authorities only. While respecting these vastly different internationally adopted approaches, cognisance was also taken of the fact that possible weaknesses in the general environment and internal controls shared during the study by participants might put the participating tax authorities in a

compromised position in some form or another. In order to ensure a safe environment for the participants that allows for the collection of accurate data without publicly exposing the possible weaknesses of participating tax authorities, it was agreed that the participants of the study would remain anonymous.

The reliability and credibility of the research results were tested with three different triangulation methods. Supplementary literature reviews were conducted to verify the results, the research results were discussed with other international experts in the field, and different sources were used to collect and verify the research results. Observers were also invited to the interviews to ensure unbiased interpretation of interview results.

### 3. Literature Review Results and Discussion

#### 3.1 Tax risk identification in response to the digitalised economy

In the literature, three main “platforms” introduced by the digitalisation of the economy are cited. These platforms are e-commerce, the shared or gig economy, and transacting with digital currencies or assets ([Azam, 2007](#); [OECD, 2020](#); [PwC, 2018](#)). It is suggested that the main tax risks associated with a digitalised economy include the fact that the taxpayer might not be registered within the tax jurisdiction where taxes are due. The lack of visibility of business activity within the digitalised economy increases this risk significantly ([OECD, 2017b](#)).

Another risk cited by the literature is the incomplete or inaccurate declaration of taxable income due to either a lack of knowledge of the specific tax requirements per tax jurisdiction or due to intentional tax evasion ([European Commission, 2006](#)). The utilisation of digital currencies or asset platforms also poses a major risk for intentional or unintentional tax evasion due to the (perceived) anonymous nature of the transactions and due to the uncertainty regarding the tax implications of these transactions ([Smith, 2018](#)).

Globally, there is a risk for either double or the non-taxation of businesses and individuals who operate within the digitalised economy ([PwC, 2018](#)). The current inconsistency among tax authorities globally regarding the legislative and administrative response to tax administration within the digitalised economy further increases the abovementioned tax risks ([Ernst & Young, 2019b](#); [OECD, 2017d](#)).

The risk identification process is followed by the design and implementation of mitigating measures to prevent, detect or correct the identified tax risks ([Frame, 2003](#)). International reform and controls that are put in place in order to prevent, detect or correct the identified tax risks, as per the literature, are discussed in sections 3.2 to 3.4.

### 3.2 Tax risk prevention reform measures in response to the digitalisation of the economy

The objective of preventative measures is to stop a threat from occurring and is specifically applicable to risks that are regarded as high priority with a major impact ([Frame, 2003](#)). While preventative measures are not always 100% effective, they do provide the tax administration with the first line of defence to prevent base erosion and profit shifting (BEPS) and/or possible tax fraud or evasion. From the literature, it is clear that the main preventative measures used by tax authorities in order to prevent the realisation of tax risks identified in section 3.1 include legislative reform, access to data of digital platforms, digital invoicing solutions and taxpayer education. These measures are discussed below.

**Legislative amendments - direct and indirect taxes:** Several countries either amended their tax legislation in order to make specific provision for tax within the digitalised economy and/or issued practice notes in order to address the identified tax risks associated with the digitalised economy. Examples of countries that made legislative amendments in relation to direct and indirect taxes in order to prevent the tax risks associated with the digitalised economy from occurring include Albania, Argentina, Armenia, Australia, Austria, Bangladesh, Belarus, Bulgaria, Botswana, Brazil, Canada, Chile, China, Croatia, Denmark, Finland, France, Germany, Ghana, Guatemala, Iceland, India, Israel, Italy, Japan, Kenya, Malta, Malaysia, Moldova, New Zealand, Nigeria, Norway, Pakistan, Philippines, Poland, Portugal, Romania, Russia, Serbia, Singapore, Slovakia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Tanzania, Thailand, Turkey, United Kingdom (UK), United States of America (USA), Uganda, Uruguay and Zimbabwe ([Ernst & Young, 2019b](#); [Huang, 2019](#); [IBFD, 2019](#); [KPMG, 2019](#); [Taxamo, 2019](#); [The Law Library of Congress, 2018](#)).

In the literature, however, it is cited that the legislative reform associated with the digitalised economy is complex and lacks uniformity ([Ernst & Young, 2019b](#); [European Commission, 2006](#); [Katz, 2015](#); [United Nations, 2019](#)). The complexity of legislative reform might therefore have exacerbated the tax risk of non-compliance within the digitalised economy.

**Access to data of digital platforms:** Digital platforms are “systems that entities can build on, that are open and not proprietary” ([Accenture, 2016](#)). Digital platforms are foundational to the majority of digital retail enterprises and it can be expected that the extraction and analysis of tax-related data should yield a high level of success in preventing and detecting tax non-compliance and fraud.

Australia and Argentina amended their legislation in order to ensure access to tax related data and make electronic distribution platforms liable for the collection of VAT/GST with regards to specified digital goods and services ([Musgrove, 2019](#); [OECD, 2018](#)). The European Union

(EU) submitted a proposal for an implementation regulation in order to achieve the same results, effective from December 2020. The EU also made provision that these digital platforms share tax-relevant information with them in order to assist with tax compliance ([OECD, 2018](#)). The province of Ontario in Canada partnered with Airbnb to launch a new pilot project where Airbnb will educate its hosts through an email notification during tax season to remind them of their tax obligations ([OECD, 2017b](#)). Withholding tax arrangements made with platform sellers in order to prevent tax evasion was also identified by the Italian and Mexican tax authorities ([OECD, 2019](#)).

In the literature it is suggested that the lines and responsibilities between government and business with regards to tax collection and tax risk prevention and detection are “blurring” due to the digitalisation of the economy. Limited literature could, however, be identified that communicates the successes of the implementation of the abovementioned preventative measures.

**Electronic invoicing solutions:** Electronic invoicing solutions are based on the “online” authorisation of invoices and other documents. The taxpayer has to apply to the tax authority for authorisation to issue the invoice before the approval of a business operation like, for example, the sale of goods or services. Authorisation is required by the tax authority in order for the invoice to be considered a valid invoice with fiscal value. The information is validated online and, if the invoice is authorised, an authorisation code or digital signature is allocated to it. Some models allow for the tax authority to store all the information entered on their database, while other models allow access to the information stored on the taxpayer’s database.

These tools provide the tax authority with the information of the issuer and the receiver of the invoice, which, in turn, allows the tax authority to issue pre-populated tax returns based on verified transactions. It should be noted that the e-invoicing rules applied by the various tax authorities globally differ with regards to the method, tax types, taxpayers and parties of the business transactions ([Czingege, 2019](#); [Deloitte, 2017](#); [OECD, 2017b](#); [Palazzi, 2018](#)). This is important to note as the application and implementation of e-invoicing as a preventative and detective measure will depend on the specific country’s risk evaluation per tax type, industry and enterprise.

Examples of tax authorities cited to have implemented electronic invoicing solutions as a preventative tax risk measure include Albania, Argentina, Armenia, Austria, Belgium, Brazil, Chile, China, Czech Republic, Columbia, Greece, France, Germany, Hungary, Indonesia, India, Italy, Kenya, Mexico, Peru, Russia, Singapore, Spain, the Slovak Republic and the UK. France will implement mandatory e-invoicing and pre-populated VAT returns from 2023 onwards

([Deloitte, 2020](#)). E-invoicing varies at scale on implementation between these countries and the objective of the solution is not only to prevent tax fraud, but also to detect it in cases where the preventative measure was unsuccessful.

From the literature, it can be pointed out that the majority of the tax authorities introduced the new tool by means of a phased-in approach. Cognisance should furthermore be taken that this preventative tool will have to be evaluated and adapted continuously to adapt to new technology and related tax evasion or fraud risks. E-invoicing can, furthermore, not currently be legally enforced upon non-resident businesses operating within the digitalised economy ([Deloitte, 2020](#); [OECD, 2017b](#); [Stanley-Smith, 2019](#)).

**Taxpayer education:** From the literature, it was found that tax authorities in countries, such as Australia, Denmark, France, Greece, Hungary, Ireland, Italy, Japan, the Netherlands, Norway, Singapore and the UK, have launched comprehensive education campaigns as a preventative tax risk management measure. Various platforms and technologies are used in order to educate individuals, businesses and tax representatives regarding the various tax implications and considerations within the digitalised economy ([OECD, 2019](#)). New platforms used by these tax authorities include LinkedIn, Facebook, Twitter, digital webinars and online courses and workshops with relevant learning manuals.

### 3.3 Tax risk detection reform measures in response to the digitalisation of the economy

In the literature, it is highlighted that leading tax authorities rely heavily on Internet data collection or scraping tools, data science and analysis to detect tax risks within the digitalised economy. Tax risk detection reform measures that are cited in the literature follow in the discussion below.

**Digital data collection tools:** Examples of tax authorities cited in the literature that use tools to collect data from cyberspace include, but are not limited to, Austria, Belgium, Japan and the UK. These tax authorities monitor the Internet using different Internet scraping tools (web harvesting or web data extraction), some of which are open source and others that are custom-made tools. The intelligence that is gathered is fed into compliance projects, such as letters to presumptive taxpayers and information campaigns. The collected data is furthermore used to analyse and is matched to existing taxpayer information, records and registers ([HM Revenue & Customs, 2018](#); [OECD, 2017b](#)).

The Belgium tax authority obtain the necessary data by either asking for data from the taxpayer or the owner of the platform on which the data is stored, or the data is “harvested” by the tax authority itself. According to the Belgium tax authority, the request for information

from platforms is not necessarily a good approach, as the information that may be requested is limited to “power users”, users with an extended amount of activity and users with a turnover of more than their VAT threshold ([Dierickx, 2017](#)). E-forensic techniques are used to collect data in cases where the platform or the taxpayer refuse to provide the requested data. According to Dierickx ([2017](#)), the harvesting of Internet data, even from compliant taxpayers, is not a “protection of privacy” challenge, because the data is publicly available and is therefore regarded as “open source intelligence data”.

**Data matching and predictive data analytics:** Jacobs ([2017](#)) recommends strategies (from a digitalisation perspective) that can improve the tax risk identification and detection process. The first recommendation is the linking of data to the taxpayer’s consumption. Tax authorities can obtain the data relating to taxpayers’ consumption that is predicted to be digitalised to a large extent in the near future in order to project the possible income of consumers and compare it to the actual income that is declared for tax purposes. One foreseen challenge regarding this approach is the tendency of consumers to spend more than what they earn.

Another detection measure that is cited is to link taxpayer data to wealth and capital income. Assets, such as publicly traded assets, closely held assets, home ownership, pensions and bequests or estates can be used to analyse the overall wealth of the taxpayer against its tax records ([Jacobs, 2017](#)).

A third tax non-compliance detection measure that is recommended by Jacobs ([2017](#)) is the cross-border linking of data on wealth and capital. By way of global collaboration, taxpayer information in relation to asset ownership (shares, property and pensions) and capital income (interests, dividends, capital gains, property values and pension accrual) can be obtained for further analysis. Studies predict that, globally, we are headed towards a mainly cashless economy ([Achord et al., 2017](#)). The utilisation of consumers as third-party reports might consequently also be a source of data that can be utilised to implement tax risk detection measures.

If the prediction regarding a cashless economy is accurate, the majority of consumer transactions will be in a digital format. Therefore, tax authorities can estimate the aggregate sales of particular businesses either through electronic payment information or with the use of information on consumption from digital platforms. The estimated revenue and taxable income can be predicted with data that is obtained according to the abovementioned recommendations and compared to declared tax returns and/or the taxpayer register in cases where the individual or enterprise is not registered for tax.

Some of the abovementioned recommendations have been actioned to some degree in terms of the country-by-country (CbC) reporting that forms part of action 13 of the OECD's BEPS initiatives. This enables tax authorities to exchange cross-border information in relation to company revenue, income, tax paid and accrued, employment, capital, retained earnings, tangible assets and activities ([Deloitte, 2016](#)). CbC reporting, however, only applies to multi-national entities with a revenue of €750 million and above. The current requirements therefore exclude high-net-worth individuals and enterprises that fall below the reporting threshold. Furthermore, not all countries currently participate in the initiative ([KPMG, 2020](#)).

Tax authorities that are cited in the literature that implement advanced data matching and predictive analytics as a tax risk detection tool in response to the digitalisation of the economy include, but are not limited to, Australia, Finland and Canada.

Australia makes extensive use of third-party data. The tax authority has access to information held in the Australian Transaction Reports and Analysis Centre (AUSTRAC), which is Australia's financial intelligence unit with a regulatory responsibility for anti-money laundering and counter-terrorism financing ([Australian Taxation Office, 2020a](#)). This information was used to trace the flow of funds to drivers and renters from abroad to local banks from where they are distributed.

The information is subsequently matched to the tax returns submitted by the businesses or individuals and other related information in order to detect any discrepancies in income declared for tax purposes ([Australian Taxation Office, 2020a](#)). As a result, the tax authority identified various unregistered business activities. In addition, the tax authority is working with major platform facilitators, such as Uber and Airbnb, in order to collect tax-related data (i.e. drivers and lessors of properties) ([OECD, 2017b](#)).

Finland utilises comparative data extensively to control both the digitalised and "traditional" economy. The data includes payment provider data that is received from credit card companies and other data from Finnish payment service providers. The tax authority also receives data from multiple digital platforms, such as digital currency brokers and intermediaries and sharing economy platforms ([Ruuhanen, 2017](#)). In this way, the Finnish tax authority is able to identify, detect and respond to the risks associated with VAT non-compliance by analysing credit card payment providers' data. They also implemented detective measures with regards to digital currency transactions that led to the identification of over 300 cases related to digital currencies, together with the personal income taxation process, in 2016 ([Ruuhanen, 2017](#)). In addition, they have increased the analytical ability concerning bitcoin blockchains by using software tools that are designed for the specific purpose. The main objective of the detection measure is to obtain an overall view of the

taxpayer's cryptocurrency activity. The tool enables the tax authority to discover trade by Finnish bitcoin users in foreign markets ([Ruuhanen, 2017](#)).

**Data visualisation:** In the literature, it is cited that certain countries' tax authorities, such as Malaysia, New Zealand and Singapore, use social network analysis that includes the visualisation of connections between individuals and entities in order to detect tax fraud. The social network analysis also identifies links between taxpayers, joint bank accounts, addresses and/or shared telephone numbers that are used to detect possible tax non-compliance ([Ernst & Young, 2016](#); [OECD, 2017b](#)).

Limited literature could be identified with regards to the specific use of artificial intelligence (AI) and machine learning as a tool for tax risk detection by specified tax authorities in response to the digitalisation of the economy.

### 3.4 Tax assurance reform measures in response to the digitalisation of the economy

Findings in the literature indicate that leading tax authorities reformed their assurance processes in response to the digitalisation of the economy by changing their assurance approach, digitalising assurance tools and utilising data analytics as an assurance tool. The reform measures that are cited in the literature are discussed below.

**Standard audit file for tax:** Angola, Austria, Czech Republic, France, Germany, Kazakhstan, Lithuania, Luxemburg, Netherlands, Norway, Poland, Portugal, Singapore and Slovakia have been cited as countries that have adopted the “Standard Audit File for Tax” (SAF-T) to either its full extent or according to a modified version ([Gampl, 2019](#); [Deloitte, 2017](#); [Ernst & Young, 2019a](#)). The standard was defined by the OECD in 2005 and the objective is to assist with the exchange of transactional data between tax authorities and taxpayers. It, furthermore, improves substantive testing within the tax authorities' audit and assurance units ([Ernst & Young, 2019a](#)).

Three implementation approaches were cited, which include data to be provided at the request of the tax authority (usually prior to the audit or assurance process), submission of data on a periodical basis in addition to the indirect tax return, and the submission of transactional data as a replacement of the periodic indirect tax return ([Trowbridge, 2019](#)).

**Multi-disciplinary assurance teams:** Belgium was cited as following an integrated audit approach with multi-disciplinary, digital teams. The teams consist of experts in five specialisations: e-commerce in order to obtain and analyse unstructured data from the Internet; e-audit in order to obtain and analyse structured data from digital bookkeeping systems (such as enterprise resource planning (ERP systems)), in most instances with the co-

operation of the taxpayer; e-forensics, in order to obtain and analyse non-structured data in cases where there is a lack of co-operation of the taxpayer and/or in cases of serious fraud; e-cash registers, in order to obtain and analyse structured data from cash-registers; and e-audit mining that includes data analysis and the evaluation of electronic stored information for content and context, including key patterns, topics, people and discussions. Predictive analyses and AI are utilised in this latter process ([Dierickx, 2017](#)).

**e-audits:** e-audits were introduced in 2018 by the Australian taxation authority (ATO). An e-audit or information technology (IT) audit is a system-based auditing method that is used to understand the clients' business, systems and processes, governance and controls. The method extracts and analyses the client's data and obtains an understanding of the business using computer-assisted verification (CAV) methodologies. The ATO conducts e-audits as part of their "top 320 private groups and top 1 000 performance" programme ([Australian Taxation Office, 2020b](#)). An e-audit enables the ATO to assess and appropriately address the tax and audit risks that large market entities may pose from a tax perspective.

The e-audit process also adds value to taxpayers, as they receive a report with the outcome of the engagement, a risk rating that is assigned to their information technology systems, and recommendations to mitigate these risks. While the e-audits form an integral part of the ATO's assurance process, the results can be used by the taxpayer in order to address the vulnerabilities in their digital system(s) ([Dyce, 2017](#)). The ATO evaluates the accounting systems used by the taxpayer, the system architecture and how the data flows through the system(s), the format and extent of taxpayer electronic records, and the documentation available to assist in the auditors' analysis ([Australian Tax Office, 2020b](#)).

An e-audit generally has two objectives, namely: the review of the organisation's computer and information systems in order to evaluate the integrity of its production systems and potential security weaknesses; and, secondly, to undertake a tax audit where data analytics are used as a tool within the assurance process ([Australian Taxation Office, 2020b](#)).

**Specialised assurance software and data analytics:** In the literature, it is cited that the tax authorities of Austria, Australia, Denmark, Canada, Finland, Mexico, the Netherlands, New Zealand, Slovenia, Sweden, the UK and the USA have implemented advanced assurance and audit tools that harness the advantages of big data analysis, expert knowledge building, and sharing and digital customised audit software and toolkits ([OECD, 2006](#)). In this way, the traditional audit and assurance function has consequently been digitised, to a large extent.

### 3.5 Summarised results per integrative cross-national literature review

The tax risk and assurance measures implemented by leading tax authorities in response to the digitalisation of the economy, as cited in the literature, are synthesised in Table 1.

**Table 1. Synthesis of identified tax risk and assurance reform measures in response to the digitalisation of the economy as cited per literature**

Tax prevention reform measures	Tax detection reform measures	Tax assurance reform
Legislative reform	Digital data collection tools	Standard audit file for tax
Access to data: digital platforms and subsequent data ingestion and analytics	Data matching and predictive data analytics	Multi-disciplinary assurance teams
E-invoicing	Data visualisation	E-audits
Taxpayer education		Specialised assurance software and data analytics

Source: Authors' own (2020)

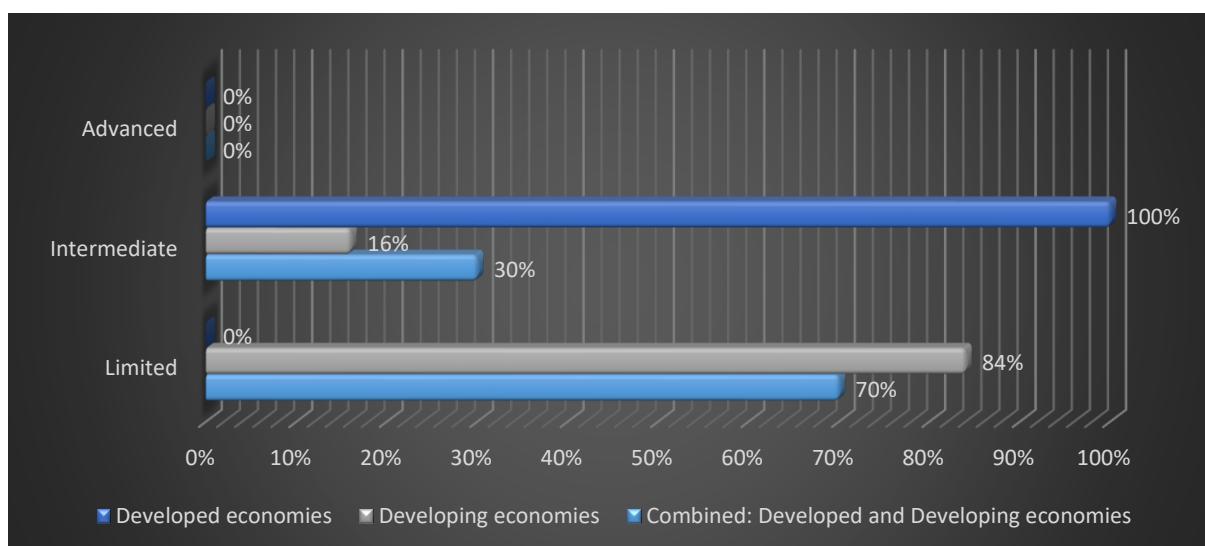
In order to test the extent of global reform and the implementation of the measures identified, as per the integrative literature review, selected international tax authorities were interviewed. The reform measures were limited to technology and data-related reform only. Legislative reform and taxpayer education were therefore excluded from the interview results. The results are documented in section 4.

## 4. Interview Results and Discussion

During the interviews, it became apparent that there is a major difference in the response levels among participating tax authorities from developed and developing economies. Due to the fact that, globally, there are more developing economies than developed economies and that this is reflected in the sample, there is a possibility that the interview results may be distorted if the results of the participating tax authorities from developed and developing economies are combined without first providing the reader with results that are categorised according to their economic classification. Consequently, the interview results were documented according to three categories, namely "participating tax authorities from developed economies", "participating tax authorities from developing economies" and "Combined: Developed and Developing economies". The combined results reflect the synthesized study results of the interviews of both the developed and developing economies. These results will not be discussed individually per interview question below, as it is a combination of the results of the participating tax authorities from developing and developed economies that are discussed in detail below.

## 4.1 Utilisation of data and technology as a tax risk management tool

Sections 3.2 and 3.3 highlight the critical role of technology and data in the tax risk management process. Measures identified in section 3 include data matching and predictive analytics, e-invoicing and data visualisation. In order to establish whether the participating tax authorities utilise technology and data as a tool for tax risk management, the following question was posed to the participants: *“To what extent does your tax authority use technology and data in order to identify, prevent and detect tax risks within the digitalised economy?”* The results are illustrated in Figure 1.



**Figure 1. Extent to which participating tax authorities use technology and data in order to identify, prevent and detect tax risk within the digitalised economy**

Source: Authors' own (2020)

An “advanced” response was allocated to participants where an array of data sources was utilised to identify tax risks. These sources included, but were not limited to, digital and cryptocurrency platforms, payment intermediaries, financial institutions, data collected with the use of web crawlers, internally collected data through the tax submission and payment process, as well as international data sharing programmes. Data is accurate, complete and consolidated into one database or data warehouse and is used across the organisation. The use of tools, such as data matching, predictive analytics and data visualisation, was optimised. Automation and AI were also used to their full extent in order to identify tax risks.

An “intermediate” response was allocated to participants who collected data from an array of sources associated with the digitalised economy, such as digital platforms and utilised tools, including automation, data matching, analyses and data visualisation tax risk management tools. However, AI was not implemented in full and data was not in all instances consolidated but, in some instances, used in siloes.

A “limited” rating was allocated to tax authorities that utilise older versions of technology and data science in order to identify risk with the utilisation of data and information. These tax authorities also store and have access to various sources of data and information, but do not utilise it optimally for tax risk management purposes. An example where data is not utilised optimally is where data is collected from various sources, but not fully integrated into the risk management process. A “limited” rating was also allocated to tax administrations who have not yet digitalised their tax risk management process or are in the process of digitalisation. Furthermore, a “limited” rating was allocated to tax authorities who initiated the implementation of tools and data in order to manage risk and where the data utilised for this purpose was limited.

None of the participating tax authorities demonstrated an “advanced” use of technology and data in order to identify, prevent and detect tax risk within the digitalised economy. All the participants from developed economies and 16% of participants from developing economies use technology and data on an “intermediate” level to manage tax risks within the digitalised economy. Eighty-four percent of the participating tax authorities from developing economies utilise technology and data for tax risk management purposes, to a limited extent. Some observations in this regard follows.

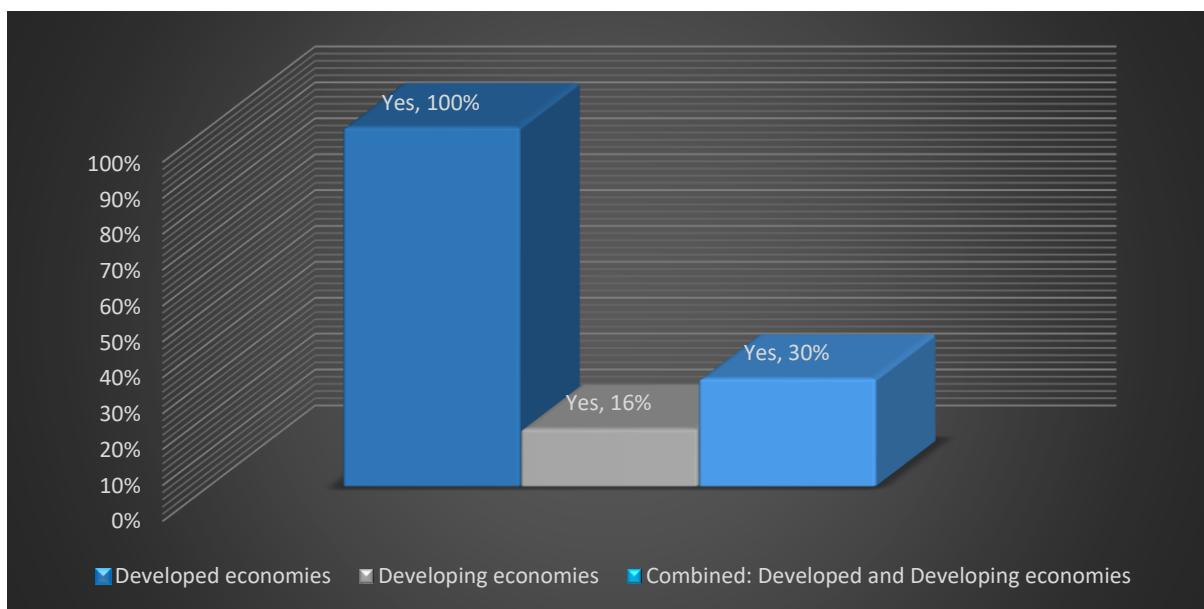
One of the participants buys data from data collection enterprises and makes use of these businesses to identify, for example, high volume transactions exceeding a certain amount of bandwidth. This data is then used to identify and detect tax risks. Customs data is also extracted by two of the participating tax authorities where a specific focus is placed on large consignors with low value imports to identify possible digital sales rendered within the country. This data was not only used to identify and detect possible tax risks, but also to educate the identified enterprises on a one-on-one basis in relation to the tax consequences and tax liabilities associated with the identified transactions.

Another participant demonstrated the extent to which they use technology and data in order to identify tax risks within the digitalised economy. Risks are assessed on a (near) real-time basis, predictive analytics are utilised, risk scoring is used to identify high-risk taxpayers, benchmarking and dynamic benchmarking are also done with the use of technology and data. Two of the participants stressed the importance of the integrity of data used during the tax risk management process and confirmed that they use the taxpayers themselves in order to verify the accuracy of their data, which not only confirms the accuracy of taxpayer data, but also builds the trust relationship between the taxpayer and the tax authority. They also utilise third-party information and match it to the in-house data to perform “test audits” on the data in order to ensure the accuracy and completeness.

Finally, data visualisation is also used by most of the participating tax authorities from developed economies in order to identify and detect tax risks. Although some participating tax authorities from developing economies also make use of data visualisation, the results of the visualisations are not in all instances actioned into risk identification, prevention and detection tools. Reasons for low digital maturity levels and limited utilisation of technology and data as a risk management tool include the lack of political support, political interference, budgetary constraints and a lack of the required skills and experience.

## 4.2 Data and information collection from cyberspace

In order to identify non-compliant individuals and enterprises that operate within the digitalised economy, the use of digital data collection tools as a critical tax risk detection measure is identified in section 3.3. In order to assess to which extent technology is used to monitor and gather data from the Internet and related platforms, the following question was posed to the participants: *“Does your tax authority survey transactions within the digitalised economy for purposes of effective and efficient tax risk management?”* The results are demonstrated in Figure 2.



**Figure 2. Utilisation of technology in order to collect data and information from cyberspace**

Source: Authors' own (2020)

All participating tax authorities from developed economies use software to obtain data and information from cyberspace. Only 16% of the participants from developing economies obtain information and data from cyberspace for tax risk management purposes, while 84% do not currently utilise technology at all in order to obtain information and data from cyberspace.

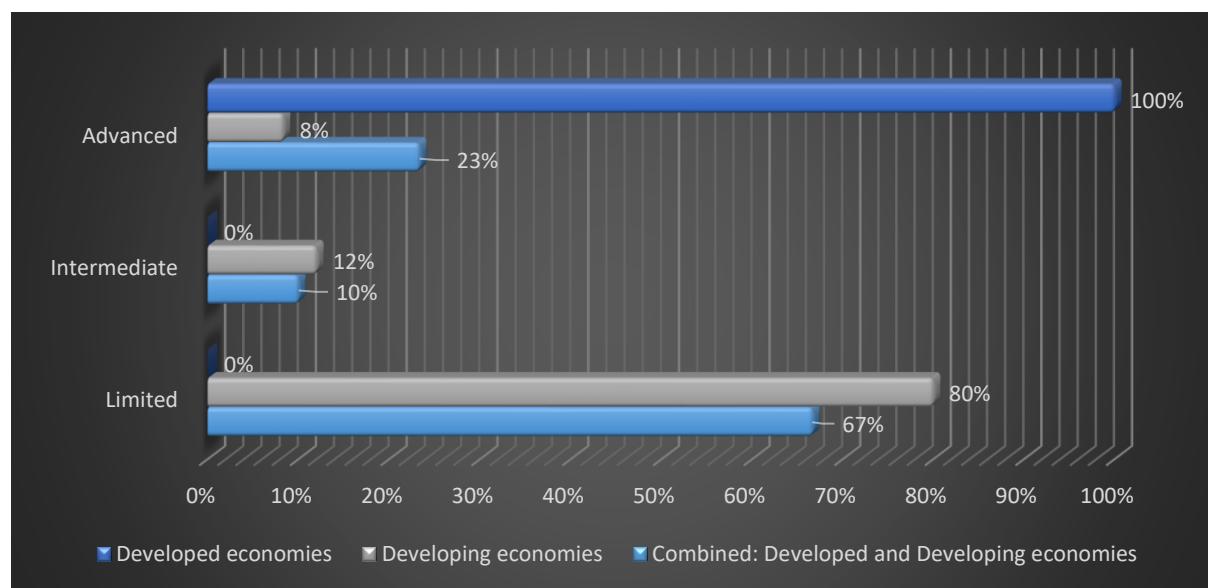
One of the participants from a developing economy established an e-commerce department that only focuses on the identification and detection of tax risks within the e-commerce

environment. The tax authority uses various Internet scrapers and web crawlers to identify taxable activity and utilises technology and data techniques in order to process the data into usable information and knowledge. The collected data is used in order to register the identified individuals and enterprises who are not registered for tax and/or to issue revised tax returns through the assurance process where discrepancies are identified.

The use of open source versus custom-made Internet scrapers varied among the participants. A challenge identified by participants from developing economies is legislative constraints (privacy concerns) with regards to taxpayer data collection within the digitalised economy.

### 4.3 Extent and source of data used during the tax risk management process

In sections 3.2 and 3.3 it is indicated that various new data sources are used in response to the digitalisation of the economy in order to manage tax risks. In order to establish what reform took place with regards to the access to data, data types and sources used in the tax risk management process, the following questions were posed to the participants: “*What type of data and information sources are used by your tax authority for tax risk identification and analysis? Is the data limited to taxpayer and return data collected internally or are other data sources, such as third-party data, accessed and utilised as well?*” The results are illustrated in Figure 3.



**Figure 3. The extent and source of data and information utilised during the tax risk management process**  
Source: Authors' own (2020)

Data wrangling encompasses the technical and business processes that are used to generate valuable insights from disparate data sources, including extraction and transformation from structured, semi-structured and unstructured data sources ([Altair, 2020](#)). In cases where this process is applicable to the participating tax authority, an “advanced” rating was allocated.

All the participating tax authorities from developed economies extensively utilise data and information from disparate data sources during the risk management process. Eight per cent of participating tax authorities from developing economies apply data wrangling. The data sources in these instances include data from online platforms, payment intermediaries and some also collect data from digital currency platforms.

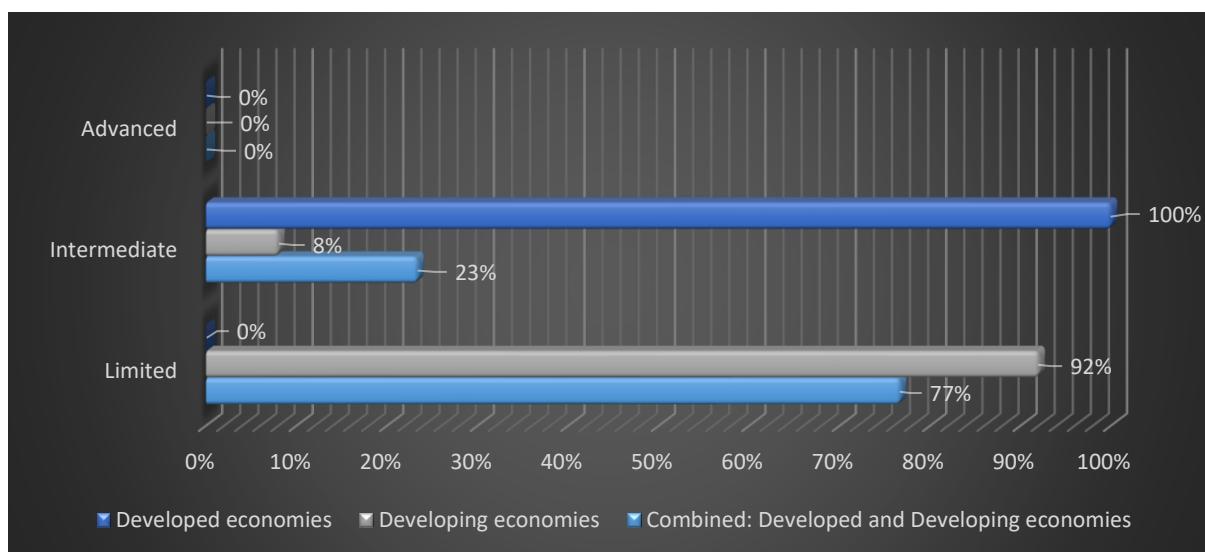
An “intermediate” rating was allocated in cases where internally generated data was utilised during the tax risk management process, and data from third parties was obtained, but not utilised to its full extent. Twelve per cent of participating tax authorities from developing economies utilised data that was generated externally and collected third-party data, but its usage was not optimised.

In cases where a “limited” response was allocated to the tax authority, the utilisation of internal data for tax risk management was limited and, in cases where third-party data and information was available, it was not utilised optimally. Most of the tax authorities that were interviewed and are at least on an intermediate level of digital maturity collect data from traditional financial institutions, but do not use this data optimally in order to identify and detect tax risks. It should be noted that, essentially, the absence of data collection from digital platforms implies limited reform in relation to the digitalised economy and would imply a weakened tax risk management process.

Two of the participants indicated that the significant increase of collection and storage of taxpayer data drastically increased the tax authority’s cyber-security risks. One of these participants also implemented e-invoicing and stores all e-invoicing data.

#### 4.4 Utilisation of automation and AI during the tax risk management process

One of the benefits associated with the digitalised economy is the utilisation of AI and machine learning. This capability enables tax authorities to continuously build new intelligence and knowledge based on data and information collected from various parties and platforms with limited human intervention and cost. In order to establish the extent to which tax authorities are utilising AI and machine learning in the tax risk management process, the following question was posed to the participants: *“To what extent does your tax authority use automation and advanced applications, such as artificial intelligence, to identify and analyse risk?”* The results are demonstrated in Figure 4.



**Figure 4. The extent of automation and AI utilised during the risk management process**

Source: Authors' own (2020)

The research results reflect that none of the participating tax authorities utilise AI and machine learning to its full extent. An environment where AI and machine learning is used to such an extent during the tax risk management process that it requires only human oversight with maximum risk identification, prevention and detection outputs would be regarded as an “advanced” application.

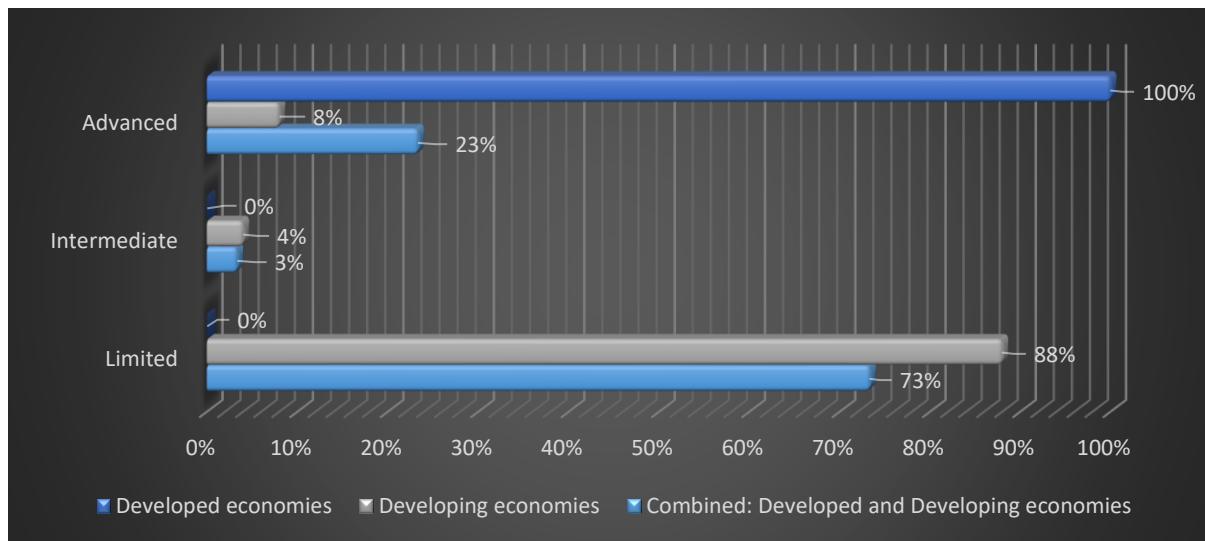
An “intermediate” response was regarded as one where the use of AI and machine learning or segments of machine learning are utilised in some instances, or in parts of the tax risk management process. All the participating tax authorities from developed economies (100%) and 8% of participants from developing economies utilised AI and machine learning to some extent.

A “limited” response was allocated in instances where AI and machine learning were not used at all. Ninety-two percent of the interviewed tax authorities in developing economies do not make use of AI or machine learning in any form. The optimised utilisation of AI and machine learning requires accurate and complete datasets that are currently not present at the majority of participating tax authorities from developing economies. This was confirmed as one of the reasons for the low implementation rate by participants from developing economies, at this stage.

#### 4.5 Change of tax audit approach in response to the digitalisation of the economy

Section 3.4 indicates that leading tax authorities have changed their audit approach and methodology in response to the digitalisation of the economy. Identified measures include the use of multi-disciplinary audit teams, the implementation of e-audits, audit software and the application of data analytics as an assurance or audit tool. In order to establish the reform that

took place with regards to the assurance process among the participating tax authorities, the following question was posed to the participants: *“To what extent did your tax authority change your audit or assurance approach in response to the digitalised economy?”* The results are illustrated in Figure 5.



**Figure 5. Participating tax authorities’ response from an audit/assurance approach and methodology perspective**

Source: Authors’ own (2020)

An “advanced” response from a tax assurance perspective was allocated to cases where the audit approach and methodology were changed in order to consider the IT environment of the taxpayer, audit or investigation software is utilised and if the utilisation of data science was introduced as an integral part of the assurance process. An advanced response was observed among 100% of the participants from developed economies and among 8% of the participants from developing economies.

An “intermediate” response was allocated where tax authorities did not change their audit approach, but only their methodology. Of the interviewed tax authorities from developing economies, only 4% changed the methods used during the audit and assurance process in response to the digitalised economy, while 88% of tax authorities interviewed did not make any changes to their audit approach or methodology. A “limited” response was allocated to these tax authorities.

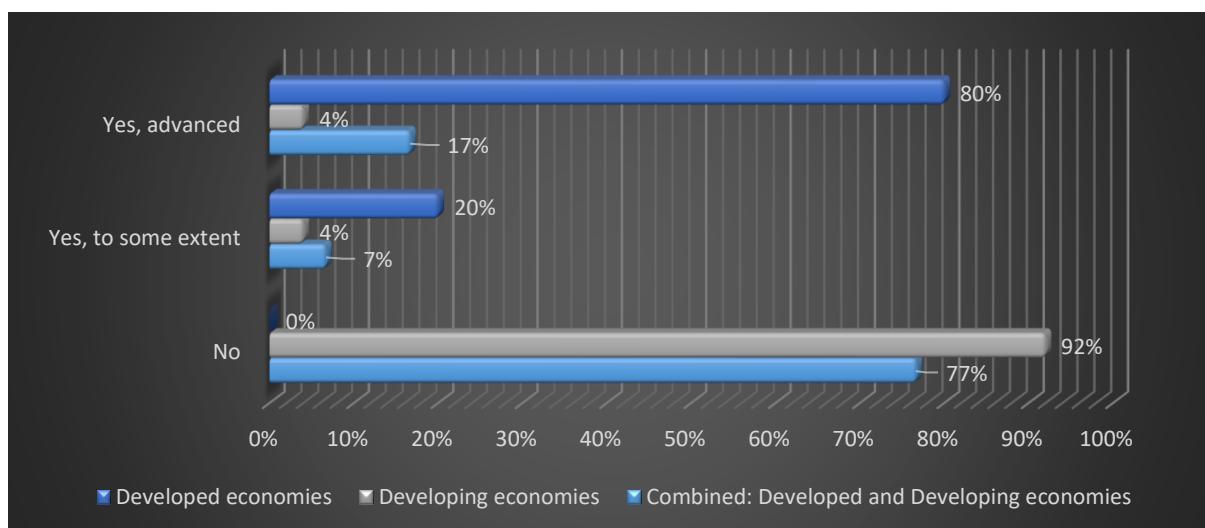
Some of the participants from developing economies indicated that they use “paper-based” audits in the absence of audit software. A lack of audit software is associated with risks, such as the loss or tampering with audit evidence. A paper-based audit is also not regarded as an optimised audit method within a highly digitalised environment associated with high data and transactional volumes.

One of the participants noted that the increased access to open source data and information enhanced the assurance process significantly. The tax authorities that conducted audits for highly digitalised multinational entities raised a concern regarding the accessibility to accounting data across borders. In order to assess the completeness and accuracy of, for example, declared taxable revenue, the ideal is to have access to the population of, for example, sales, and to calculate the amount of taxable sales that took place within a specific jurisdiction. However, challenges exist regarding the legality to request the population of sales in cases where this data is hosted in a different jurisdiction. The participants further stated that, although the exchange of information among tax authorities is possible, such requests in terms of the current methods and channels are time consuming and impractical within a digitalised economy.

One of the tax authorities is in the process of migrating the assurance process and related tools and data to a cloud application, as they are of the view that it would streamline the process. Seven of the tax authorities that were interviewed indicated that they make use of multi-disciplinary teams during the assurance process.

#### 4.6 IT audits or e-audits

In section 3.4, the implementation of e-audits in response to the digitalisation of the economy is identified. In order to assess to which extent tax authorities have adopted the use of information technology or e-audits, the following question was posed to the participants: *“Does your tax authority execute information technology audits/e-audits?”* The results are demonstrated in Figure 6.



**Figure 6. The application of information technology audits/e-audits**

Source: Authors' own (2020)

Eighty percent of participating tax authorities from developed economies indicated that they have introduced IT audits or e-audits as part of the assurance process, while 4% of

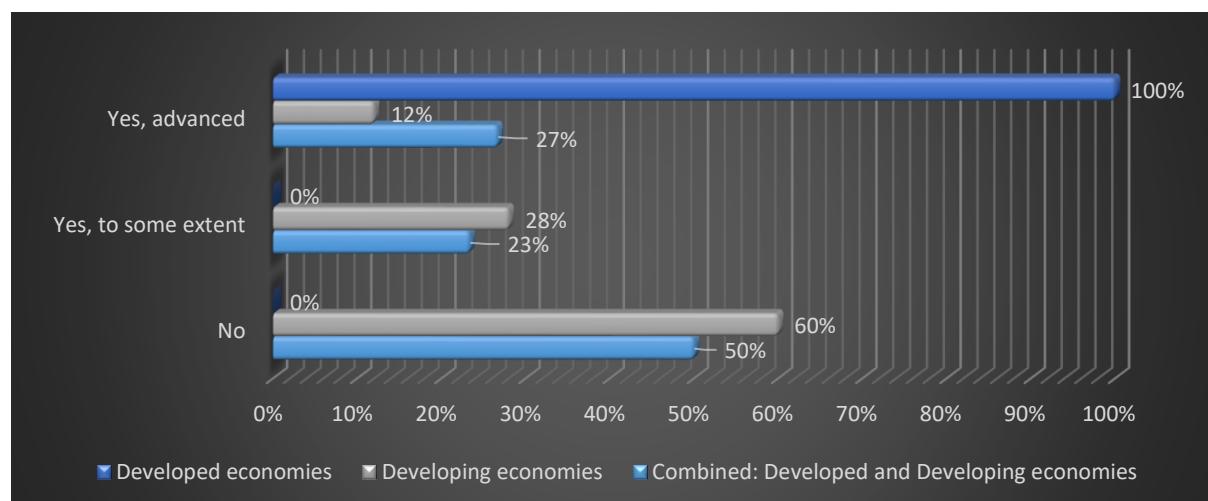
participating tax authorities from developing economies implemented IT audits. These audits are based on the risk profile of the taxpayer and the approach is consequently not applicable to all taxpayers under audit.

Twenty percent of participating tax authorities from developed economies and 4% of interviewed tax authorities from developing economies indicated that they implemented IT audits to some extent. In these instances, the tax authorities implemented computer-assisted audit techniques, but not the evaluation of the general IT and security environment of the taxpayer.

Ninety-two percent of participating tax authorities from developing economies did not implement IT audits as part of the assurance process. The lack of IT audits or e-audits is associated with an increased risk of inaccurate and/or incomplete financial information provided for audit and assurance purposes ([Deloitte, 2018](#)).

#### 4.7 Data analytics as a tax audit/assurance tool

Section 3.4 indicates the use of data analytics as an assurance tool in response to the digitalised economy. In order to assess whether tax authorities use data science during the assurance process, the following question was posed to the participants: “*Does your tax authority use data analytics during the assurance processes?*” The results are illustrated in Figure 7.



**Figure 7. Utilisation of data analytics during the assurance process**

Source: Authors' own (2020)

The research results reflected that all participating tax authorities from developed economies and 12% of participants from developing economies make extensive use of data analytics during the assurance process. Twenty-eight percent of participants from developing economies indicated that they make use of data analytics as an assurance tool, to some extent, while 60% of them indicated that they do not make use of it at all.

One of the participants indicated that pre-built analytical tools are provided to the assurance teams in order to optimise the use of data analytics during the assurance process.

## 5. Conclusion

The research results suggest that some international tax authorities responded to the changing global external environment which, in this case, is the digitalisation of the economy. These tax authorities are embracing the benefits of digitalisation in order to address the tax risks associated with the digitalised economy, although there is certainly scope for enhancement. The identified measures that were put in place by some international tax authorities include legislative reform, e-invoicing, taxpayer education, access to data of digital platforms, advanced application of data science, analytics and visualisation.

A significant amount of reform with regards to tax assurance was also identified and includes, but is not limited to, the implementation of assurance software, e-audits, the use of multi-disciplinary audit teams and the application of data analytics as an audit tool. The research results, however, indicate that the level of implementation of the identified tax risk and assurance measures are inconsistent if they are evaluated from a global perspective. The research results, as per section 4, highlight the fact that there is a sharp contrast between the level of tax risk management and assurance reform between participating tax authorities from developed and developing economies.

The research results indicate that the reform that took place to date among the participating tax authorities from developed economies was, overall, on an intermediate to advanced level. Advanced utilisation of AI and automation could, however, be considered as a further advancement to the current tax risk and assurance measures in place. In contrast, the research results reflect that, in general, participating tax authorities from developing economies find tax risk management and assurance within a changed digitalised landscape challenging. Their response in order to keep up with an exponentially changing digitalised economy therefore remains limited in most instances.

The fact that participants from developing economies' response, in relation to the tax risk management and assurance process, was, in general, rated as limited, raises concerns relating to these tax authorities' ability to protect their tax base and recover tax losses from highly digitalised MNEs that create value within their respective jurisdictions. It further raises concerns regarding these tax authorities' current and future ability to successfully deliver on their mandate as national revenue collectors. This concern is especially raised in light of the WEF's ([2020](#)) estimate that 70% of the new global economic value created over the next ten years will be based on digital platform business models.

## 6. Limitations

The scope of the research was limited to the tax risk management process and full-scope audit and assurance process. Although tax authorities manage an array of risks and conduct various levels of assurance, as per the introductory discussion in section 1, this study and the related literature review were limited to the tax risk management process and the full-scope or comprehensive audits or assurance processes due to the significance of their impact on the tax authorities' ability to fulfil their mandate as revenue collectors.

The scope of interviews with tax authorities to measure tax risk and assurance reform in response to the digitalisation of the economy, as documented in section 4, was, furthermore, limited to technology and data reform only. Tax legislative as well as digital tax administrative reform in response to the digitalisation of the economy, as identified in section 3, will be addressed in a separate study.

## 7. Further Consideration and Studies

Studies in human behaviour and psychology with regards to cyberspace suggest that human behaviour within this environment differs in some instances and under certain circumstances ([Amichai-Hamburger, 2005](#)). It further suggests that an array of new tools and techniques are used in order to commit various criminal offences, which include but is not limited to tax fraud ([Goodman, 2016](#)).

Limited literature could, however, be identified regarding taxpayer behaviour within the digitalised economy and their propensity to commit tax evasion within cyberspace. Research regarding taxpayer behaviour within the digitalised economy and their inclination to commit tax fraud or tax evasion will thus contribute richly to the business community and academia alike.

Further research with regards to the development and utilisation of software and tools such as AI and machine learning in order to identify possible “high-risk” non-compliant taxpayers within the digitalised economy might further enrich the scientific and business community.

## 8. Acknowledgements

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## References

- Accenture. (2016). Discussing new platforms within the digital economy. Available from: <https://www.accenture.com/us-en/platform-economy>.

- Achord, S., Chan, J., Collier, I., Nardani, S., & Rochemont, S. (2017). A Cashless Society: Benefits, Risks and Issues (Interim Paper). Institute and Faculty of Actuaries. Available from: <https://www.actuaries.org.uk/system/files/field/document/A%20Cashless%20Society-%20Benefits%2C%20Risks%20and%20Issues%20%28Interim%20Paper%29%20-%20disclaimer.pdf>.
- Ainsworth, R. T. (2016). Sales suppression: The international dimension. *American University Law Review*, 56(12), 41. Available from: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2848973](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2848973)
- Altair. (2020). What is Data Wrangling? Available from: <https://www.altair.com/what-is-data-wrangling/>
- Amichai-Hamburger, Y. (2005). *The Social Net. Human behaviour in cyberspace*. London, Oxford.
- Australian Taxation Office. (2020a). Data matching protocols. Retrieved from <https://www.ato.gov.au/General/Gen/Data-matching-protocols/?page=1#Current data matching protocols>.
- Australian Taxation Office. (2020b). Computer assisted verification: e-Audit and risk assessment. Retrieved from <https://www.ato.gov.au/General/Gen/Computer-assisted-verification--e-Audit-and-risk-assessment/?=redirected>.
- Azam, R. (2007). E-Commerce Taxation and Cyberspace Law: The Integrative Adaptation Model. *Virginia Journal of Law & Technology*, 12(5), 1-34.
- Barbantini, P. V., & Savini, P. (2018). Digital transformation in Italy: between past and future. Available from: [https://www.iota-tax.org/sites/default/files/publications/public\\_files/impact-of-digitalisation-online-final.pdf](https://www.iota-tax.org/sites/default/files/publications/public_files/impact-of-digitalisation-online-final.pdf)
- Boitnott, J. (2019). 7 Business Risks Every Business Should Plan For. Available from: <https://www.americanexpress.com/en-us/business/trends-and-insights/articles/7-business-risks-every-business-should-plan-for/>
- Crandall, W. (2010). Revenue Administration: Autonomy in Tax Administration and Revenue Authority Model. International Monetary Fund: Fiscal Affairs Department. Available from: <https://www.imf.org/external/pubs/ft/tnm/2010/tnm1012.pdf>
- Czingege, C. T. (2019). Risk Management in order to enhance compliance of taxpayers in Hungary. Intra-European Organisation of Tax Administrations. IOTA Papers April 2019.
- Deloitte. (2016). Country-by-Country Reporting. Available from: <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tax/dttl-tax-country-by-country-reporting-faqs.pdf>
- Deloitte. (2017). From e-Audit files upon demand to real-time reporting. Are you ready for SAF-T?. Available from: <https://www2.deloitte.com/content/dam/Deloitte/be/Documents/tax/PPT/Deloitte%20Academy%20Seminar%2020170616.pdf>
- Deloitte. (2018). General IT controls (GITC): Risk and Impact. Available from: <https://www2.deloitte.com/content/dam/Deloitte/in/Documents/risk/in-ra-general-it-controls-noexp.pdf>

- Deloitte. (2020). The fourth industrial revolution and its impact on tax. Available from: <https://www2.deloitte.com/content/dam/Deloitte/is/Documents/tax/skattadagur/2020/Johannes%20Laxafoss%20-%20The%20fourth%20industrial%20revolution%20and%20its%20impact%20on%20tax.pdf>
- Dierickx, D. (2017). The Belgium compliance model and the methodology to obtain data from “sharing economy” platforms. Available from: [https://www.iota-tax.org/sites/default/files/publications/public\\_files/disruptive-business-models.pdf](https://www.iota-tax.org/sites/default/files/publications/public_files/disruptive-business-models.pdf)
- Dyce, T. (2017). ATO e-Audit methodologies – leading the world in compliance innovation. Available from: <https://www.linkedin.com/pulse/ato-e-audit-methodologies-leading-world-compliance-innovation-dyce/>
- Ernst & Young. (2016). The tax authority of the future: How tax authorities are using analytics to deliver new levels of value. Available from: <https://www.ey.com/Publication/vwLUAssets/ey-the-tax-authority-of-the-future/%24File/ey-the-tax-authority-of-the-future.pdf>
- Ernst & Young. (2019a). Worldwide VAT, GST and Sales Tax Guide. Retrieved from [https://www.ey.com/Publication/vwLUAssets/ey-2019-Worldwide-VAT-GST-and-Sales-Tax-Guide/\\$FILE/ey-2019-Worldwide-VAT-GST-and-Sales-Tax-Guide.PDF](https://www.ey.com/Publication/vwLUAssets/ey-2019-Worldwide-VAT-GST-and-Sales-Tax-Guide/$FILE/ey-2019-Worldwide-VAT-GST-and-Sales-Tax-Guide.PDF)
- Ernst & Young. (2019b). How taxing the digital economy debate impacts all global businesses. Available from: [https://www.ey.com/en\\_gl/tax/how-taxing-the-digital-economy-debate-impacts-all-global-businesses](https://www.ey.com/en_gl/tax/how-taxing-the-digital-economy-debate-impacts-all-global-businesses)
- European Commission: Directorate-General Taxation and Customs Union. (2006). Risk management guide for tax administrations, Fiscalis Risk Analysis Project Group. Available from: [https://ec.europa.eu/taxation\\_customs/sites/taxation/files/resources/documents/taxation/tax\\_cooperation/gen\\_overview/risk\\_management\\_guide\\_for\\_tax\\_administrations\\_en.pdf](https://ec.europa.eu/taxation_customs/sites/taxation/files/resources/documents/taxation/tax_cooperation/gen_overview/risk_management_guide_for_tax_administrations_en.pdf)
- European Commission: Directorate-General Taxation and Customs Union. (2018). EU VAT Forum: Consolidated report on Cooperation between Member States and Business in the field of e-commerce/modern commerce. Available from: [https://ec.europa.eu/taxation\\_customs/sites/taxation/files/d-1507602\\_report\\_consolidated\\_en.pdf](https://ec.europa.eu/taxation_customs/sites/taxation/files/d-1507602_report_consolidated_en.pdf)
- Frame, J. D. (2003). *Managing Risks in Organizations: A guide for Managers*. San Francisco. Jossey-Bass.
- GAMPL, M. (2019). SAF-T: Definition, overview, changes in 2019/2020. Available from: <https://www.hellotax.com/blog/saf-t/>
- Green, J., & Thorogood, N. (2004). *Qualitative methods for health research*. London, Sage.
- Goodman, M. (2016). *Future crimes: Inside the digital underground and the battle for our connected world*. 1<sup>st</sup> ed. London, Transworld publishers.
- HM Revenue & Customs. (2018). The role of online platforms ensuring compliance by their users. Available from: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/687363/The%20role%20of%20online%20platforms%20in%20ensuring%20tax%20compliance%20by%20their%20users.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/687363/The%20role%20of%20online%20platforms%20in%20ensuring%20tax%20compliance%20by%20their%20users.pdf)

- Huang, R. (2019). Seven countries where cryptocurrency investments are not taxed. Available from: <https://www.forbes.com/sites/rogerhuang/2019/06/24/seven-countries-where-cryptocurrency-investments-are-not-taxed/#1108d6fb7303>
- IBFD. (2019). Taxation of the digital economy. Symposium conducted at the meeting of the Malaysian Tax Academy. Kuala Lumpur, Malaysia.
- ICAEW. (2019). Digitalisation of tax: international perspectives. ICAEW thought leadership: IT Faculty. Available from: <https://www.icaew.com/-/media/corporate/files/technical/information-technology/thought-leadership/digital-tax.ashx>.
- Jacobs, B. (2017). Digitization and taxation. Digital revolutions in public finance. International Monetary Fund. Available from: <https://www.elibrary.imf.org/view/IMF071/24304-9781484315224/24304-9781484315224/Other formats/Excerpt/24304-9781484316719.pdf?redirect=true>
- Katz, R. (2015). The impact of taxation on the digital economy: Discussion paper. Available from: [https://www.itu.int/en/ITU-D/Conferences/GSR/Documents/GSR2015/Discussion\\_papers\\_and\\_Presentations/GSR16\\_Discussion-Paper\\_Taxation\\_Latest\\_web.pdf](https://www.itu.int/en/ITU-D/Conferences/GSR/Documents/GSR2015/Discussion_papers_and_Presentations/GSR16_Discussion-Paper_Taxation_Latest_web.pdf)
- KPMG. (2019). Taxation of the digitalized economy. Available from: <https://tax.kpmg.us/content/dam/tax/en/pdfs/2019/digitalized-economy-taxation-developments-summary.pdf>
- KPMG. (2020). BEPS Action 13: Country implementation summary. Available from: <https://home.kpmg/content/dam/kpmg/us/pdf/2020/03/beps-action-13-march19-2020.pdf>
- Manson, M. (2010). Sample size and saturation in PhD studies using qualitative interviews. *Forum Qualitative Sozialforschung*, 11(3), 8.
- Musgrove, A. (2019). Digital taxes down under: Australia's GST. Available from: <https://quaderno.io/blog/digital-taxes-australias-gst/>
- OECD. (2004). Compliance risk management: Managing and improving tax compliance. Available from: <https://www.oecd.org/tax/administration/33818656.pdf>
- OECD. (2006). Strengthening tax audit capabilities: General principles and approaches. Available from: <https://www.oecd.org/tax/administration/37589900.pdf>
- OECD. (2013). Electronic sales suppression: A threat to tax revenues. Available from: <https://www.oecd.org/ctp/crime/ElectronicSalesSupression.pdf>
- OECD. (2017a). Fighting tax crime: The ten global principles. Available from: <https://www.oecd.org/tax/crime/fighting-tax-crime-the-ten-global-principles.pdf>
- OECD. (2017b). Technology tools to tackle tax evasion and tax fraud. Available from: <https://www.oecd.org/tax/crime/technology-tools-to-tackle-tax-evasion-and-tax-fraud.htm>
- OECD. (2017c). Tax administration 2017: Comparative information on OECD and other advanced and emerging economies. Available from: <http://receita.economia.gov.br/noticias/ascom/2017/outubro/receita-federal-tem-participacao-em-publicacao-da-organizacao-para-a-cooperacao-e-desenvolvimento->

[economico-ocde/fta-tax-administration-2017-comparative-information-on-oecd-and-other-advanced-and-emerging-economies.pdf](#)

OECD. (2017d). Tax challenges of digitalisation. Available from: <https://www.oecd.org/tax/beps/tax-challenges-digitalisation-part-1-comments-on-request-for-input-2017.pdf>

OECD. (2018). Tax challenges arising from the digitalisation – Interim report 2018: inclusive framework of BEPS. OECD/G20 base erosion and profit shifting project. OECD, Paris.

OECD. (2019). The role of digital platforms in the collection of VAT/GST on online sales. Available from: <https://www.oecd-ilibrary.org/sites/eoe2dd2d-en/1/2/2/index.html?itemId=/content/publication/eoe2dd2d-en&csp=c7840253bdbd74444e9e16fb3718e8e1&itemIGO=oecd&itemContentType=book>

OECD. (2020). Model rules for reporting by platform operators with respect to sellers in the shared and gig economy. Available from: <https://www.oecd.org/tax/exchange-of-tax-information/public-consultation-document-model-rules-reporting-platform-operators-with-respect-sellers-sharing-gig-economy.pdf>

Palazzi, C. (2018). Italy: Mandatory e-invoicing in Italy: Final implementation. Available from: <https://www.mondaq.com/italy/sales-taxes-vat-gst/766312/mandatory-e-invoicing-in-italy-final-implementation-phase>

PwC. (2018). OECD and EC release disparate recommendations on tax and the digitalisation of the economy. Available from: <https://www.pwc.com/gx/en/tax/newsletters/tax-policy-bulletin/assets/pwc-oecd-and-ec-recommendations-on-tax-and-digitalisation-of-economy.pdf>

Ritchie, J., Lewis, J., & Elam, G. (2003). Designing and selecting samples. In: Ritchie, J., & Lewis, J., editors. *Qualitative research practice: a guide for social science students and researchers*. London, Sage.

Ruuuhonen, P. (2017). Seize the moment, as it might be too late tomorrow – Digital economy offers challenges and opportunities to all tax administrations. Available from: [https://www.iota-tax.org/sites/default/files/publications/public\\_files/disruptive-business-models.pdf](https://www.iota-tax.org/sites/default/files/publications/public_files/disruptive-business-models.pdf)

Sithipolvanichgul, J. (2016). Enterprise risk management and firm performance: Developing risk management measurement in accounting practice. University of Edinburgh. (Thesis - PhD).

Smith, K. (2018). Tax havens for the masses: How crypto makes tax evasion easy. Available from: <https://www.coininsider.com/cryptocurrency-tax-evasion/>

Stanley-Smith, Joe. (2019). Media companies support digital taxation proposals. Available from: <https://www.internationaltaxreview.com/article/b1f7my5g48nzy1/media-companies-support-digital-taxation-proposals>

Taxamo. (2019). Digital tax rules in operation across the globe. Available from: <https://blog.taxamo.com/insights/digital-tax-rules-in-operation>

Tripathi, A. (2013). A model framework for measuring and managing operational risks in treasury operations in financial institutions. Birla Institute of Technology and Science: India. (Thesis – PhD).

Trowbridge, P. (2019). SAF-T – Where are we now? Available from: <https://sovoso.com/blog/2019/06/19/saf-t-where-are-we-now/>

The Law Library of Congress. (2018). Regulation of cryptocurrency around the world. Available from: <https://www.loc.gov/law/help/cryptocurrency/cryptocurrency-world-survey.pdf>. Retrieved March 2020.

United Nations. (2019). Tax issues related to the digitalization of the economy: Report. United Nations: New York. Available from: [https://www.un.org/esa/ffd/wp-content/uploads/2019/04/18STM\\_CRP12-Work-on-taxation-issues-digitalization.pdf](https://www.un.org/esa/ffd/wp-content/uploads/2019/04/18STM_CRP12-Work-on-taxation-issues-digitalization.pdf)

United Nations. (2020). World economic situation and prospects. Available from: [https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/WESP2020\\_Annex.pdf](https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/WESP2020_Annex.pdf). Retrieved August 2020.

World Economic Forum. (2020). Navigating industry disruptions, transitioning to a new normal. Available from: <https://www.weforum.org/platforms/shaping-the-future-of-digital-economy-and-new-value-creation>

Worldometer. (2020). Retrieved from: <https://www.worldometers.info/geography/how-many-countries-are-there-in-the-world/>.