

Technology tools and the future of tax administration

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About this report

Tax has relied on technology from the earliest recorded historical times. The latest advances in digitalisation of economic activity bring challenge and opportunity for tax administrations. This short report identifies and discusses the key themes that policy and decision makers should have in mind when implementing changes to the machinery of tax administration.



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Introduction

Tax is essential to the existence of modern societies. For centuries, tax administrations have looked to the latest technological developments to assist in the task of fairly, or at least effectively, collecting taxes from the population at large, and the current shift to digitalisation of much of the economy is no different in the opportunities it presents directly to tax collectors.

The effective collection of tax is essential, and efficient collection desirable if countries are to be able to meet the tipping point for development and growth of 12.75% of GDP (Gaspar et al. 2016).

A HISTORICAL PERSPECTIVE

The origins of writing itself are attributed to the earliest accountants, as they tried to keep track of what was going into, and coming out of, communal granaries and storehouses. Maintaining a reference copy of the information about who owned what, and how much of it they still needed to hand over to the king, local lord or temple priests was an essential element in maintaining the integrity of those systems. One of the best-known architectural artefacts in the world, the Rosetta Stone, which was instrumental in unlocking the written language of ancient Egypt, is a tax decree.

The link between developing basic arithmetic and tax is obvious, but trigonometry also owes its roots to the Egyptian tax system. Local taxes were levied on the basis of how much land a

farmer was working; in order to compare the irregular areas of land accurately, the king's tax inspectors developed many of the techniques for measuring land area that we still use today. Of course, the same technology had uses in construction and engineering – which in turn drove trade and growth, allowing kingdoms and empires to grow – which in turn drove further innovation to support the expanding administrations.



As the size of kingdoms and empires increased, the need to transmit records and ease the operation of trade drove further advances. A key element that facilitated the transmission of detailed information, and took the place of blind trust in systems of value transfer, was the tally stick – a notched piece of wood or bone that was then split lengthways so that each party had a matching record of the value stored up somewhere. In time, the system was so trusted that the tallies themselves would be accepted as currency in commercial transactions – where the transaction recorded was tax paid, the tally was as good as a note drawn on the government. As a technology they had plenty of advantages, being easily created but difficult if not impossible to falsify with the techniques available at the time.

As paper and printing technology advanced, so taxes themselves were recorded in stamp or paper form, effectively prepaid and collected. Tax systems became more complex and sophisticated, as did the economies and

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legislative and social frameworks in which they sat. Information could be transmitted over great distances by telegraph, and later telex and fax, but all the while the recording would be paper based.


As transmission of the information moved from physical paper to digital formats communicated through desktop computers, and now laptops and increasingly smartphones, the reliance on linear, centralised paper-technology-based methods and processes has remained and with it, some of the flexibility for which it allows.

But one thing all the historic tax tools had in common was that they had originated in an environment where information was recorded in physical form, and duplication was a comparatively expensive process. The system of tax administration was built around physical data stores, relying primarily on paper-technology-based operations.

Capture of returns was central, and ran through a single point. Since the turn of the century, however, we have seen the start of a shift to a whole new world of tax, and business more generally, based on electronic records. The character of information is changing – its cost and, perhaps, its value too are in a state of flux.

One crucial point about digital records from an administrative perspective is that they are infinitely reproducible. Multiple actors can access a single centrally held record, and when it is updated for one user, it is updated for all of them. Thousands of lines of information can be shared at the push of a button, while the same data can be interrogated automatically by software in a tiny fraction of the time it would take to review and analyse the physical records. Tax administration is just starting to grasp some of the potential of this development, but, 'The future is already here; it's just not very evenly distributed'.¹

¹ Science fiction author William Gibson quoted by Chatterton and Newmarch 2017.



The broad shape of tax

Currently, taxes are divided into three fairly distinct categories (taxes on income streams/profits, taxes on transactions, and taxes on static wealth). New digital tools will interact with the compliance processes for each category in different ways. The implementation of digital tools has the potential to draw the three together, or crystallise the differences between them.

For different types of tax, the benefits vary. As regards direct administration, for taxes on profits the benefits of automation accrue round calculation and analysis. In practice, as long as the profits are assessed on an aggregate of transactions, over a period of time, and adjusted for external legal operations, the existing model whereby the taxpayer collates the relevant entries, analyses and adjusts them, then transmits them in one discrete packet to the authority, is going to survive.

Of course, there are benefits for the authority: by setting out the format of submissions and mandating the use of tools such as the eXtensible Business Reporting Language (XBRL) tagging, the tax body can put itself in a position where bulk data can be collected and analysed, with the results then used to profile returns into high or low risk for enquiry. Technology can streamline elements of the process, but the basic shape of the mechanisms will remain the same.

For transaction-based taxes such as value-added taxes (VATs) and goods and services taxes the impact can be more fundamental. Several jurisdictions now

require the use of fiscal tills for their sales taxes, and with advances in technology these can transmit digital records to the authorities. Where the infrastructure is available, these submissions can be in real time, and several theoretical models have been developed to build on the real-time submission of information to reduce the scope for fraud and error.

The ultimate extension of such payment mechanisms would see the sales tax element of the payment on a given transaction being transmitted directly to the tax authority's account, never even touching the merchant's hands: something that we are already seeing as a realistic development for online sales. But even before we reach such highly developed models, which of course require significant infrastructure to be feasible, the advantages of digitalisation can already be seen.

Historically, China had suffered its own variant on the 'missing trader', or 'carousel', VAT frauds that have plagued the EU. The fraudulent trader would present a VAT invoice generating a significant repayment, the counterparty

to which was registered (apparently) in another province at the opposite end of the country. The delay of up to six weeks in posting the paperwork to the corresponding tax office in the other province, and discovering that the counterparty in fact did not exist and no repayment should have been made, was ample time for the criminals to bank and transfer their repayment, before closing down the original business and accounts and slipping away with the profits. The introduction of centralised computer record-keeping in The Golden Tax System programme put paid to the scam; much as traders in the EU can verify the validity of a VAT number through Europe's VAT Information Exchange System, so the Chinese authorities for the first time were able to check the legitimacy of the repayment claim within a commercially acceptable time before making (or withholding) the repayment (State Administration of Taxation of the PRC n.d.).

Nonetheless, while technology was well able to deal with the issue of entirely false special VAT invoices (SVIs), the legal characteristics of the contemporary VAT system meant that even though the

As more and more information about taxpayers is held online, so the authorities can start to build up a picture of how online footprints align to types of tax filing.

basic checks as to whether the named entities existed could now be undertaken, cross-checking input to output VAT would not necessarily confirm the validity of the value of any claims. Digital tools can only operate within the legal framework set up by governments.

For wealth taxes and capital gains taxes, the direct benefit of digital filing over paper filing is less clear cut – but even here there are advantages that can be exploited. For instance, where land registry records are themselves held digitally, communication between the authorities can offer scope for matching returns to transactions in real time. For land and property transactions in particular, the use of distributed ledger technology or, as more commonly referred to, ‘blockchain-based smart contracts’, offers opportunities not just for streamlining the operation of land registries, but also for eliminating the scope for errors or delays in the operation of stamp duties and similar taxes.

This is not primarily a tax-driven development, and it may not necessarily be the tax outcome that represents the most significant gain for society as a whole. Of course, there is the transparency argument that by holding registers of property in publicly accessible form it is easier to hold the owners of property to account for the taxes that may be due on income arising from it, but more directly there are cases from around the world of title to land being misappropriated as a consequence of the compromising of centrally held (manual) registers, and the use of decentralised database mechanisms could have some real value to add in such cases.

There are wider benefits to be seen from the authorities’ perspective as well. It’s not just direct links between land registries and tax systems that can pay off. As more and more information about

taxpayers is held online, so the authorities can start to build up a picture of how online footprints align to types of tax filing. In the UK, HMRC’s Connect system pulls in information from a wide range of sources, and generates a profile for each individual taxpayer. Trained operators are soon able to distinguish between a compliant individual’s profile and one that will merit further investigation. Staying ‘off the grid’ to circumvent detection will not work either. Aerial imagery and geographic information systems enable tax authorities to spot irregularities and inconsistencies in property tax filings in a completely new way.

Online submission of taxpayer returns is well established around the world. Systems are more or less advanced in different jurisdictions, but most OECD countries now have at least the capacity, if not the outright requirement, for some returns to be filed online. Corporation taxes are a common candidate for online filing, while for many individual taxpayers the adoption of technological methods for other everyday tasks makes their availability for tax filings a viable option.

In fact, behind this simple concept of ‘online filing’ lie a range of technological approaches. The option that is imposed on taxpayers will have implications not just for current tax collection capacity, but also for future development of services and even, indeed, for the wider activities of the taxpayers.

Filing a return is essentially the transmission of information from taxpayer to authority. At its most basic, online filing means simply the requirement that the information is transferred not on paper but in some electronic format – but this could mean no more than an electronic image of the paper form, with no additional functionality over the paper form beyond ease of replication.

US examples

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In Ascension Parish, Louisiana, the local assessor convinced the parish's tax districts to invest in aerial mapping technology; this produced detailed images of parish properties. By combining data from the images with property tax records, the assessment team were able to analyse and review property changes on their computers to determine whether a field inspection was necessary. In 2014, the effort paid off by uncovering 6,000 property improvements that were not on the tax rolls, resulting in \$18.1m in new annual tax revenue.

Furthermore, in Anne Arundel County, Maryland, assessors launched a pilot programme combining aerial imagery and property tax data that enabled assessors to inspect 10,435 homes. This was more than double the number they had been able to review over the corresponding period a year before. The properties reviewed represented 17% of the total number of parcels of land, expanding the property tax base in the county by nearly \$32m. The State Department of Assessments and Taxation extrapolated those results to predict that the state's tax base could grow by \$1.4bn if the same technology were used in every county (IPTI Xtracts 2016).

Rwanda example

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In 2013, the Rwandan government started the rollout of Electronic Billing Machines (EBMs) to counter a range of problems identified with the domestic VAT system. The existing paper-based process was vulnerable to forgeries and manipulation, with duplicated sales invoice books, suppressed sales figures and false refund claims all among issues encountered by the tax authority during tax audits. A new legal framework was introduced, requiring traders to buy and use EBMs, with phased implementation and a number of complementary measures, both encouragement and enforcement, to ensure compliance (OECD 2017: 42 et seq.).

By 2015, Rwanda's VAT collection rates were increasing by 20% a year, and the authorities were identifying (and prosecuting) undue refund claims. By April 2018 the tax authority estimated that the EBMs had cut the VAT compliance burden from 45 hours to 5 hours a year, and plans were announced for replacing the physical hardware of the EBM with a free, government-issued software-based equivalent, geared up for use on the newer technology of smartphones as well as on the taxpayers' own computers. One key indicator of the importance and effectiveness of the initiative is Rwanda's ranking in the World Bank Doing Business index, whose 2019 report places Rwanda at 29, the only low-income economy in the top 50 (World Bank 2019: 4).

Afghanistan example

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A part of the huge US-led programme to help develop the Afghan economy, US business Chemonics was contracted to implement an e-payments system for the payment of customs duties (SIGAR 2017). Estimates suggested that up to half the customs payments due were being stolen before reaching the public purse, and given the importance of customs duties (accounting for up to 30% of the total revenue actually collected²) the implications were significant. Nonetheless, despite rolling out the appropriate hardware to over 90% of collection locations within the time frame of the project, the target of having 75% of customs duties paid electronically was missed. After three years, only 0.74% of duties were being paid through the system, despite similar systems having been successfully rolled out by Chemonics in other jurisdictions.

Among the issues highlighted in the US Special Inspector General for Afghan Reconstruction's report, the lack of infrastructure to support the full chain of payments was a key factor discouraging traders from using the system.

Commercial banks could not access the central bank's electronic customs clearance system, forcing them to scan and transmit supporting paperwork manually before payments could clear. With absolutely no positive incentive to switch away from existing practices, the vested interests of those who could benefit from the lack of transparency and accountability in the cash system remained ascendant. Traders could conceal the true value of transactions, frustrating attempts at establishing profits for direct tax purposes. Financial intermediaries could benefit from the flow of cash (and commissions).

Until the surrounding legal and commercial infrastructure moved on, the technology alone sat unused – but as those solutions started to come online, in the World Bank's 2019 'Doing Business' survey, Afghanistan was the single top improver, albeit an achievement based on enhancements to the legal framework for business, alongside automation of all tax submissions (World Bank 2019: 14).

² Figures for the first 11 months of Afghan Fiscal Year 1395, between December 2015 and November 2016. (SIGAR 2017: Footnote 1).



The present (and near future)

The one big difference between the transformation of the physical economy and the changes that digitalisation is bringing to tax is timescale.

In the field of illumination it took decades for electric light to start to displace earlier technology to any significant extent. Just a street or two down from ACCA's London headquarters is the Savoy Theatre, the first public building in the world to be lit entirely by electric lights in 1881, over 130 years ago – and yet just a couple of streets away, Covent Garden is still lit by some of the 1,500 gas lamps that even today illuminate stretches of central London.

We cannot expect anything like the same gradual approach to the adoption of digital tools for tax. The systems are centrally run and administered by the authorities, and the authorities can see all too clearly the advantages to themselves of the features discussed earlier. Not only that, but also the pace of change in the wider world has accelerated. Like the future, this change may not be evenly distributed, and there will be significant pockets of inertia for some time to come, but enough taxpayers are using digital applications in their everyday lives and businesses that the critical mass for change is already there.

The changing patterns of employment and consumption that new generations are adopting, or being forced into, are fundamentally revising the fabric of national economies. We hear plenty about the 'gig' economy, about how future generations are more interested in experiences than ownership, and about how tools such as 3D printing are going to revolutionise production and consumption of physical goods. The detail of how those shifts will materialise has yet to become clear, but the domestic and global economies of the future seem set to look very different from those of the past.

Nonetheless, while there is the scope for further integration of tax authorities' systems for streamlining the taxpayer experience and enhancing their own internal administrative efficiency, significant changes to the underlying bases of taxation seem unlikely in most economies. The confluence of political and practical constraints on radical innovation in the legal basis of taxation are unlikely to be challenged by whatever benefits new technological tools could offer at an administrative level. If there is to be a more fundamental revision of how society funds itself then, rather than being driven by the process (tax tools), it

would need wider economic changes (to patterns of consumption and production; tax base shifts, etc.) to force a departure from the recognised tax models.

In the field of personal taxation, there is currently scope for distinguishing between treatment of salaried employees, subject only to income taxes, typically withheld by employers, on salaries and pensions, and businesses run with a profit motive where the individual owner remains responsible for the assessment of taxes on their own profits. Different tax tools could be developed for the different streams of taxpayer, but there is increasingly a recognition that the historical distinction between the classes of employed and self-employed individuals is being compromised by wider changes in patterns of employment and engagement, such as the rise of the gig economy and platform-based models of service and sales provision.

Current models of business, and the way its profits are taxed, are built around familiar structures and conventions. The overwhelming majority of commercial economic activity takes place through one of three forms, sole traders, partnerships and limited liability

With the development of virtual and cryptocurrency technologies, new business models are blurring the distinctions between traditional forms, and challenging the fundamentals of taxation while they are at it.

companies, and the mechanisms by which society identifies and taxes the returns on those forms are well known. Financing through equity or debt captures the returns to capital, while taxes on employment income and self-employed trading are well established. Company accounts operate in common formats, while the measurement of profits, and costs, is all expressed in common and freely exchanged national currencies.

But new patterns and models of businesses can challenge those formats. Crowdfunding of production models is increasingly popular, but how are the investors to be treated? Are they customers who have simply made a down payment on the product, or investors receiving their dividend in kind? With the development of virtual and cryptocurrency technologies, new business models are blurring the distinctions between traditional forms, and challenging the fundamentals of taxation while they are at it.

Software developers have already experimented with a non-incorporated business structure, crowdfunded entirely in cryptocurrencies, something that poses challenges beyond the tax field and affects the corporate reporting and audit worlds. Such a structure would sit outside every known framework of transparency, accountability and regulation. In 2016, the Ethereum-based DAO (decentralised autonomous organisation) hit the headlines – first for crowdfunding a non-incorporated business venture in cryptocurrency (Waters 2016a), and then for demonstrating why it is not a good idea to throw away several hundred years' of social development in favour of an untested software model, when it was shown to be insecure (Waters 2016b).

Enthusiasm for those models may have been tempered, but they will come in due course, and for individual transactions there are already clear benefits of blockchain technology-based applications; adding a 'pay the tax' line into those contracts could have significant implications for compliance.

There has been a massive growth in borderline service models in transport service provision, with the rise of transport platforms, whether these are displacing existing taxi and public transport networks or satisfying the demand for delivery services, themselves driven by the growth of online purchasing. The individuals providing the services are often characterised by the parties as self-employed but their work may bear many of the hallmarks of what has traditionally been treated, and taxed, as employment. Quite apart from the short-term compliance implications of this change, there will be longer-term implications for the underlying structure of tax systems, as models built on a system in which employees stay in the same single static relationship for years on end start to break down.

For production there are also huge changes to come. There is another physical revolution in manufacturing approaching, as automation reverses the historical trend for manufacturing businesses to base production where labour is cheap. Already identified in the clothing industry (Hoskins 2016), there is potential for 'smart factories', where the human labour has been mostly replaced by robots, to re-onshore industrial and high-tech production facilities, bringing them back to the developed economies where demand is strongest. Taking into account proximity to market and availability of highly skilled staff to oversee the robots, the move makes economic sense for a business, and reduces the environmental costs associated with shipping the completed product half way around the world.

Tax implications arise from these technological changes. The most obvious one is that the local employment taxes raised on the factory labour will fall. Depending upon the structure of the group and proportion of value added by the manufacturing process, there will be a relocation of a proportion of the profit arising on the final sale of the goods; whether the taxes shift to follow this profit

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will depend upon the legal arrangements of both the group and each jurisdiction in which it operates. But there are wider implications. The passage of the finished goods from one customs jurisdiction to another will have given rise to duties that will probably now be chargeable elsewhere. Transportation and haulage activities will have declined, and with them the associated tax take.

Looking further ahead, a report by the investment bank ING (2017) estimates that as much as 40% of cross-border trade could be eliminated by 3D printing of components and even of finished products. That may result not simply in factories moving but in many cases in their ceasing to exist altogether as the creation of complex products such as cars could all be undertaken in one place, with components previously machined elsewhere and brought on site simply being printed off internally from licensed patterns. Indeed, the report's projections cited the automotive sector, with its proliferation of complex components, as one of the sectors most deeply

affected by this technological advance – but there are other technologies likely to have just as significant an impact on the wider business world and its interaction with the tax system.

The move away from fossil-fuel-powered internal combustion engines to electric power will reduce the number of moving parts and required complex components in each vehicle produced, affecting the tax profile of the production process, while the big impact of the consumer side will be reduced consumption of heavily taxed fossil fuels at the pump.

The digital economy is giving us a brave new future in which it is increasingly difficult to assess the point in the supply chain at which value creation actually happens – and so perhaps the current models of profit taxation will retreat and be replaced with a broader reliance on the consumption taxes, which as we have already seen is the area where digital tools may perhaps have the biggest impact on our daily experience.



Are we potentially looking at taxes on, or taxes as, data?

There is an increasing recognition that digitalisation and the exploitation of digital data have the potential to revolutionise the operation of economies well beyond the minor disruption seen so far. Digitalisation is affecting not just how we produce and consume goods and services but also the very goods and services that are required.

That in turn has implications for the shape of the tax systems of the future, and how administrations should implement them.

Many jurisdictions have homed in on the apparent mismatch between the local activities of internet-based companies and the profile of tax payments made by these 'new economy' businesses. Just as the administration of tax has historically been built on the basis of physical paper forms, so the legislative net cast around business activities has been built on the assumption of physical presence in a given territory to establish a taxable nexus. The existence of the internet has opened up opportunities for businesses to operate in any jurisdiction without the need to enter it physically – the World Wide Web opens up access to consumers, and whether services are directly consumed digitally or goods are ordered online and shipped across borders, governments are seeing a flow of residents' time and money out of their economies for the benefit of others.

The legal arguments about how to capture digitalised activities effectively within the tax system of a particular jurisdiction lie beyond the scope of this report, but there are technological issues that will inevitably constrain what may or may not be feasible and should be considered alongside any policy aspects. The key features of most digital taxes proposed so far are that they identify a particular sector, apply a high threshold and then tax income arising from certain activities. Setting aside the economic distortions inherent in any discriminatory tax, it is clear that in order to identify the subject matter of the tax, technology will need to provide the means.

Identification of customers where physical sales take place, or indeed where there is a payment trail for services supplied, is a well-established process. The difficulty in the new proposals, however, is that the 'target' is typically user participation. While providers are able to measure this in aggregate, and model broad outcomes

and trends, the precise measurements that are desirable for the assessment of taxes have not been needed until now.

The service providers, and tax authorities, need to agree on a number of definitions (eg of a user or of what constitutes 'participation') and then establish how to capture them. From a technical perspective, the precise terms of the tax may not be so important – what is going to be fundamental is creating an audit trail from a certain digital footprint to a given individual or jurisdiction. It will be a matter of law whether the taxes are levied on the basis of simple 'screen impressions' or recognise that individual users (which is what the 'value' will be based on) may have multiple devices across which they access a particular provider. The impact on the design of the tax is that while it may be easy to establish on an aggregate basis how many times a particular advertisement is served up to users viewing in a particular jurisdiction, working out the number of

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unique individuals connected to that jurisdiction for tax purposes is a far more invasive process.

It is clearly technologically possible for the site provider to register and track the logins of unique users via their account credentials, as this is pretty much the basis of the service they provide to users. In most cases, the users' registration details will also give the service provider a clear indication of the jurisdiction with which their 'consumption' should be associated for tax purposes.

Nonetheless, tracking this information and then using it to supply details to the tax authorities raises a number of wider regulatory issues around compliance with privacy rules. The fact that tracking data can be exploited to generate financial gain is one of the main reasons that privacy legislation has been implemented in a number of arenas, not least the EU General Data Protection Regulation. So tax authorities will need to consider carefully the wider trust and taxpayer morale implications of effectively unpicking these protections in order to assess taxes.

It is already the case that many users distrust the internet businesses to pay their taxes willingly; the conflicting drivers between protecting privacy and sacrificing it in order to collect tax may well prove irreconcilable, especially given that to be properly effective these taxes need to operate across national borders. In addition, the other aspects of local legislation, technology and, in particular, social sensibilities about personal data and the obligation to pay tax, and attitudes to social media, will inevitably constrict local policy decisions, driving differing approaches on either side of national borders.

Some commentators have suggested that data-driven businesses could 'settle their account with society' through sharing data, rather than necessarily making cash payments based on accounting treatments (Morgan 2018). Such a radical reform would involve considerable fundamental changes in technology, processes and public attitudes (and possibly the redefinition of the term 'tax') but has some clear potential benefits.



Having tools is not the same as using them

The adoption of technology, even where available, varies widely both between and within countries. The range of individual experience and capability is probably the most diverse it has ever been in many workplaces.

In a typical developed economy those born in the 1950s and 1960s will have spent their formative years in environments based entirely on paper bureaucracy. Children of the 1970s may have been exposed to computers at school, but will have done most of their early 'technology learning' in a business environment. Those born in the 1980s and 1990s will have grown up in environments increasingly dominated by digital technologies, with the newest entrants into business and the taxpaying world having never experienced a world without the internet, mobile phones and instant communications and information transfers and duplication. And within each population there will be some who have adopted every advance at the earliest opportunity, and others whose learning has crystallised at a particular point.

The particular characteristics of digital tools also raise entirely novel issues or business in implementation. Historically, business systems were primarily physical structures with the related implications for economies of scale and fixed costs of infrastructure. The cost constraints on scaling of digital tools are, however, far lower. Where once only the largest businesses had access to

data collection and analysis tools, now they are within reach of the smallest microbusiness. The scope is available through Cloud service providers for businesses of any size to implement more or less integrated technology solutions for every business process.

The case can even be made that technological solutions actually benefit small and medium-sized enterprises (SMEs) disproportionately over their larger competitors. The costs of change and implementing new systems in smaller enterprises are lower, and the risks around failure more easily mitigated. The agility with which smaller businesses can change to a new process is mirrored by their scope for changing back if there are problems with a new system. For larger enterprises the bureaucratic inertia of the system is likely to mean that once a change programme has started, to stop or reverse it might cost as much or more than having it fail.

In practice, there is also growing pressure on larger businesses to adapt constantly to their changing environment, and digital tools are often a key part of that. The nature of competition is such, however,

that their approaches will differ. In the words of Francis Gross, senior adviser at the European Central Bank, 'Adopting new technology fast is risky, yet it can be a matter of survival in a competitive environment...Technology races on and becomes ever more diverse' (Gross 2018). That, of course, poses a problem for regulators and tax administrators. The benefits to the tax authority of digital information stem from ease of processing and analysis, but if businesses are creating their own digital records in different formats then that key characteristic is lost.

On the other hand, the more the tax system restricts the tools and processes that taxpaying businesses can use, the greater the risk that the system will stifle economic growth. The difficulty is most acute in those sectors of the economy where digitalisation has broken down national barriers, exposing domestic businesses compromised by local regulation to international competitors unfettered by those rules. Inevitably, these are also the sectors where digital tools and processes are most embedded into commercial practice, and could in theory cause least disruption and offer the most benefits to the tax authority.

While larger businesses might be more able to afford experts to design and implement their systems than SMEs, purchase will still be dependent on board sign-off, and at the mercy of the wider business once rolled out.

Across the economy more generally, there is evidence that while most businesses have at least some level of technological awareness and use computers to a greater or lesser extent, they are by no means fully exploiting the potential benefits of the technology. While larger businesses might be more able to afford experts to design and implement their systems than SMEs, purchase will still be dependent on board sign-off, and at the mercy of the wider business once rolled out. For smaller businesses, while simply buying a computer or installing electronic stock control may bring some benefits, it is unlikely that the owners will stumble upon the ideal integrated solution by chance.

Why is this important for policymakers in the tax world? Because many programmes of tax automation and digitalisation are based upon evidence, or even anecdote, that the population at large 'use technology'. In practice, if the business itself does not have integrated systems, there will be limits to the efficiencies that the tax administration can exploit. Incomplete, imperfect or incompatible digital systems will not be able to offer any of the benefits that rely on homogeneous data or common interfaces.

For policymakers seeking to encourage the take-up by business of more efficient automated tools, there is naturally a temptation to mandate the use of technology, thereby forcing through the changes. But there is a risk that forcing change will in some cases do more harm than good.

The global discussions about the possible uses of blockchain technology have encompassed tax and tax information. There are clear benefits from certainty in tax records. The scope for developing 'self-executing tax returns', analogous to the self-executing contracts appearing in some fields of business, would no doubt appeal to many fiscs. There are, however, a number of other important factors to consider before rushing to embrace the latest trend.

The most important is that while blockchain may be a solution to some of the above problems, is it the best solution? Blockchain is by its nature a decentralised technology, and best suited to decentralised processes. In situations

where there is a centrally controlled register then some form of more conventional database is likely to be quicker, cheaper and more appropriate.

Which aspects of the tax system, then, might usefully adopt a decentralised model, and which are inevitably centralised or asymmetric? Tax is by its very nature an asymmetric centralised concept. It is by definition the act of a centralised authority, and the legal frameworks and relationships within which it functions are fundamentally different to the commercial agreements that underpin business relationships. The roles of taxpayer and state are quite distinct, and could never be reversed.

Assessing which elements of the system could therefore benefit from the new technology will be fundamental to constructive adoption. Two key areas where proponents have advanced blockchain-based solutions for existing problems are VAT and Transfer Pricing (see eg Deloitte 2017). While both are closely related to the calculation of the income and profits subject to direct corporate taxation, neither forms a part of the profits assessment per se. Both fields rely upon an accurate and agreed record of discrete business transactions, between disparate parties. For the parties to these commercial transactions there are visible advantages of maintaining an accurate and immutable record of their dealings, beyond the advantages for the tax authority.

Nonetheless, that actual calculation of the final profits figure for the business, or the submission of the aggregated transaction data as entries for the VAT return, will in contrast be areas where there is unlikely to be much direct benefit to third parties from the use of distributed ledger technology. In many situations, especially where the assessment of corporation tax liabilities is concerned, businesses will be sensitive to the possible commercial implications of overly detailed exposure of production and management strategies that could be revealed by the supporting analysis required by the tax authority. The tax authority benefits from digitalised information can be served equally well, or even better, by interrogation and analysis of a privately held central database.

Most developed economies benefit from high levels of voluntary taxpayer compliance, with many relying to a significant extent on taxpayer self-assessment to support the domestic compliance framework.

CAN TECHNOLOGY EVER REPLACE TAXPAYER MORALE?

Most developed economies benefit from high levels of voluntary taxpayer compliance, with many relying to a significant extent on taxpayer self-assessment to support the domestic compliance framework. The phenomenon of 'taxpayer morale' has been subject of academic research across the globe, and in practical terms its impact is undeniable.

One of the key considerations for tax administrators is that if taxpayers are operating in an environment where they know that all tax affairs are transparent, and records immutable, will that significantly reduce the scope for evasion and could technology do the same for avoidance?

The knock-on impacts of such developments for the shape of the administration – the types of expertise needed, and the administration's role as supporter or enforcer – would depend upon the extent to which taxpayers continue to regard paying tax as a moral duty, or even privilege, or come to view it simply as a mechanical consequence of transactions. Segregation of taxpayer communities into the willingly compliant, the reluctantly compliant, the careless and finally the deliberately non-compliant would be redrawn, and with it the authorities' deployment of resource to manage each population.

Some practical points

Tax administrations do not exist in a vacuum and the digital tools themselves are evolving. There is a challenge for tax administrations: the development and implementation of technological innovation in the private sector is in constant, fluid evolution, with multiple different strands of development running in parallel. Consumers adopt the latest, or cheapest, technology at will. The commercial world addresses interoperability as the need arises, but examples of technological incompatibilities abound, such as smartphone chargers and headphone connections that only connect with gadgets of a specific brand.

Tax authorities do not have the luxury of constant evolution. Tax legislation, and the enabling administrative tools, exist as unique fixed structures, with change inevitably undertaken as a wholesale restatement of the environment for all taxpayers, no matter what their current circumstances. Tax authorities are already keenly aware of their obligation to serve every

taxpayer, and balance the widely diverging needs of individuals against the shared communal costs of providing the tools for compliance with the requirements of the system.

As businesses rely evermore closely on digital tools, tax authorities must recognise and manage the risk that in imposing upon business a particular technology that suits an authority's needs, they may be depriving business of the opportunity to exploit the most economically efficient technology, stifling competition and even growth. How much flexibility should tax administrations build in, and how compatible is the authority's chosen technology likely to be with existing or future technologies? The decision on where the line should be drawn between government efficiencies and taxpayer inconvenience will have significant, wider, social and economic implications. Would depriving businesses of access to the most effective tools be a price worth paying for more efficient tax administration?



One of the key things about technology is that its adoption is rarely universal or instant – and it does not follow the same linear path of progression everywhere it appears. Early adopters can find themselves distracted by maintaining legacy systems, while others leapfrog ahead of them.

Approaches that work well in one market might not work at all in another, and external factors can completely change the dynamic within which the tax system operates. Tax administrations need to be sensitive to the local environment, and to other factors in the local economy, before seeking to implement costly measures which may not repay the investment.

The linkage between business and economic activities, the shape of the tax system, and the capacity and priorities of the society within which both sit is so intimate that a significant change in one will inevitably affect the others.

Technology is driving huge changes in the means and mechanisms of production. Those same advances are affording consumers the opportunity of enjoying existing products and services in new ways, or exploring entirely new options.

Political developments are driving shifts in both state spending and governmental interference in private-sector activities. While neither development directly affects the tools used to operate the tax administration, the changing aims of those who run the system and the environment in which it operates will define the characteristics needed to

ensure the efficient and effective administration of government levies. Governments may need to look at entirely new taxes, and with that should be open to exploring the best fit with local conditions, allowing them to balance the costs of implementation with the returns from it.



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