Blockchain, Transfer Pricing, Custom Valuations and Indirect Taxes: the Potential of the "Trust Protocol" to Transform the Global Tax Environment

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1. Introduction

Blockchain is a technology based upon immutable records of transactional data that are written onto distributed ledgers cryptographically secured by various parties in a network. The potentials of this technology are enormous. The proponents of blockchain envision a world of peer-to-peer (P2P) transactions where the technology will overcome the lack of trust between unrelated parties and build use-cases around the complete disintermediation of the intermediary in commerce from traditional banks to new economy aggregators such as Uber and Airbnb. Amongst other applications, this technology can potentially revolutionize the current approaches and solutions to numerous tax issues, both domestic and cross-border. This article provides a preliminary illustration of the potential impacts the blockchain will have on some transfer pricing topics, as well as on custom valuations and indirect taxes.

2. The Trust Issues in Transfer Pricing, Custom Valuations and Indirect Taxes

The very existence of internal and external tax audit functions highlights that "there is a lack of trust all around."[2] Individuals do not trust governments and governments in turn do not trust individuals. Shareholders do not trust corporations and vice-versa. Corporations do not trust governments and in turn, governments need to audit corporations. Information asymmetries fuel

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[2] Amelia Schwanke, ´Bridging the Digital Gap: How Tax fits into Cryptocurrencies and Blockchain Development´, March 23, 2017 available at https://www2.deloitte.com/content/dam/Deloitte/ru/Documents/tax/bridging-the-%20digital-gap.pdf

ostensive or presumed conflicting interests, and are at the core of such lack of trust issue, which also shape international relations – countries and nations often do not trust one another.

This lack of trust between corporations, shareholders, governments and countries manifests itself many ways. Shareholders rely on board oversight over management and intricate governance structures to control their firms, including the engagement of external auditors seeking to ensure that financial statements are reliable fair. Governments regulate the conduct of the firm to protect shareholder and the public interests, as the commercial drive toward maximising profits can incentivise undesirable corporate behaviours – including tax avoidance that is inconsistent with the law.

Furthermore, transactional costs triggered by the absence of trust constitute key reasons for firms to exist, as Ronald Coase's ´Nature of the Firm´[3] points out, since undertaking collective activities within a firm reduces, inter alia, negotiation and transaction costs. That is, transactions between economic agents and units within a firm are based on a higher level of trust than with third parties. Consequently, it is not surprising that up to a third of world trade is estimated to take place within multinational enterprises (MNEs).[4] An increased level of trust between actors and entities within a MNE often exists, notwithstanding intra-group transactions take place across different entities across different jurisdictions.

However, each government has its own set of tax rules and regulations; hence, the trust issue vis-à-vis governments in such intra-group transactions does not disappear. This lack of trust between MNEs and governments is often highlighted by the existence of anti-tax avoidance rules in countries' legislations (i.e. general anti-avoidance rules – 'GAARs' – or specific anti-avoidance rules – 'SAARs'), whereby tax administrations are empowered with the ability to reassess the tax base of taxpayers located in their jurisdiction. Transfer pricing rules represent the most common

[3] Ronald H. Coase, ´The Nature of the Firm,´ *Economica*, New Series, Vol. 4, No. 16. (Nov., 1937), pp. 386-405. See also, R.J.S. Tavares, 'Multinational Firm Theory and International Tax Law: Seeking Coherence', 8 *World Tax Journal* 2, IBFD (2016).

[4] UNCTAD has dealt with these issues in several of their annual World Investment Reports (WIR), with estimates of about 1/3 of world trade being intra-firm and possibly as much as 80% of world trade being within Global Value Chains (both intra-firm and inter-firm trade). The 2013 edition of WIR provides a detailed analysis. For a short intro, see the UNCTAD Press Release to the UNCTAD report entitled GVCs and Development: Investment and Value Added Trade in the Global Economy (UNCTAD/PRESS/PR/2013/001), Geneva, Switzerland, (27 February 2013) available at - http://unctad.org/en/pages/PressRelease.aspx?OriginalVersionID=113

kind of SAARs and have been increasingly introduced into countries' legislations around the world in the recent years.[5] One of the aims of transfer pricing rules is to avoid that MNEs shift taxable profits out of a country's jurisdiction by means of intra-group transactions.[6] Therefore, transfer pricing rules are premised upon governments not trusting transactions between related parties.

Most of these rules use the arm's length principle ('ALP') to ensure that terms and conditions of such transactions are agreed as if they would be made between unrelated parties. In other words, the ALP aims at granting that terms and conditions of transactions between associated enterprises are not distorted by the special relationship existing between them, as being part of the same MNE. Ultimately, the application of this principle by tax administrations should grant that profits (and their taxation) realized by MNEs' are aligned with value creation.

Similarly, customs authorities seek to eliminate the effects of any potential distortion on the transaction value declared for customs duty by importers. For various reasons, importers of goods may be tempted to vary the actual cost of goods imported or exported. Based on the lack of trust on the value of goods declared for customs purposes, the World Customs Organisation (WCO) has come up with the WTO Valuation Agreement which is formally known as the Agreement on Implementation of Article VII of the General Agreement on Tariffs and Trade (GATT) 1994.[7] The agreement aims to provide a single system for the valuation of imported goods for Customs purposes that is not only fair, uniform and neutral but one that also simultaneously aligns with the commercial reality of the transaction whilst outlawing the use of arbitrary or fictitious Customs values.

The Customs valuation system is pivoted on the price actually paid or payable for the goods at the point of export when sold for export to the country of importation but makes provision for certain adjustments to take into account the reality of the transaction (also known as the

[5] The number of countries having transfer pricing legislation in place has increased from a mere four in 1994 to more than 100 in 2016, based on some studies issued by big four advisory firms. See also Petruzzi, R., 'Global Transfer Pricing Developments', in: Lang, M., Storck, A., Petruzzi, R. (Eds.), *Transfer Pricing Developments around the World*, forthcoming.

[6] This anti-avoidance aim of transfer pricing legislations, however, is highly debated.

[7] The WTO Valuation Agreement is available at http://www.wcoomd.org/en/topics/valuation/overview/wto-valuation-agreement.aspx. It replaced the GATT Valuation Code as a result of the Uruguay Round multilateral trade negotiations which created the WTO in 1994.

transactional value method). To provide more predictability, stability and transparency for trade, the agreement also provides for alternative methods which must be applied in a hierarchical order where the transactional method is inapplicable.[8]

However, when applying the ALP and customs valuation principles, both tax administrations and customs authorities encounter a number of relevant challenges: the asymmetry of information between MNEs and government officials,[9] the lack of or limited availability of data on transactions between unrelated parties, especially in some regions,[10] as well as the compliance burden related to the assessment of these principles might increase the above-mentioned mistrust between taxpayers and tax administrations. The significance of these issues is also highlighted by the considerable volume of guidance provided by the OECD, the UN, and the WBG on how to implement transfer pricing rules, and by the WCO on how to implement customs valuations.

Furthermore, these issues concern as well indirect taxes. Indeed, in cases involving indirect taxes, the lack of trust is manifest in the prevalence of carrousel frauds. Such frauds typically involve more than one enterprise selling goods or services in a chain of trade – called a 'carrousel' – for a sum including VAT and not passing that VAT on to the tax authorities or claiming VAT credits when no VAT was paid in the first place. Such fraud was estimated to cost Europe 50 billion Euros a year[11]. An instance of fraud prevalent in developing countries involves mis-invoicing or counterfeit invoices to claim excessive VAT refunds. Cross-border transactions are particularly susceptible to such frauds. As a result, tax administrations invest heavily in nationwide systems to verify invoices and match VAT returns and reports (see below).

3. Blockchain and Trust

[8] In the preferred order, these are the transaction value of identical goods, the transaction value of similar goods, the deductive value method, the computed value method and the fall-back method.

[9] See OECD, BEPS Frequently Asked Questions - http://www.oecd.org/ctp/beps-frequentlyaskedquestions.htm; OECD Public Discussion Draft BEPS Action 8: Hard to Value Intangibles June 14 – 18, 2015

[10] The Platform for Collaboration on Tax (OECD, IMF, UN and World Bank Group) Discussion Draft: A Toolkit for Addressing Difficulties in Accessing Comparables Data for Transfer Pricing Analyses available at http://www.oecd.org/tax/discussion-draft-a-toolkit-for-addressing-difficulties-in-accessing-comparables-data-for-transfer-pricing-analyses.pdf

[11] See https://www.theguardian.com/business/2006/jul/11/crime.politics

Blockchain was first thrust into public view as the technology underlying Bitcoin, which addresses the lack of trust in the financial system following the 2007/2008 financial crisis.[14] In 2015 the Economist dubbed it the `trust machine` as it "… *lets people who have no particular confidence in each other collaborate without having to go through a neutral central authority*."[15] How can the `trust machine` help to overcome the lack of trust between governments and MNEs in transfer pricing and custom valuations? The answer to the question lies in the key features that underlie the blockchain, which include the following:[16]

a) Distributed ledger: in a blockchain, a single entity or party does not control data or information. All the participants collectively keep the ledger up to date. Similarly, each party to a transaction can individually access the entire database including the complete history of a transaction and also verify the records of its transaction partners without going through an intermediary. Additionally, there is no loss of records in case of a crash as the ledger is distributed amongst different participants and computers on the network.
b) Immutability: as soon as a transaction is entered into, the blockchain and the accounts are updated, the records cannot be altered because they are linked to every transaction record that came before it. The records are irreversible through the deployment of complex computational algorithims that ensure that records are permanent, chronologically ordered and available to all others on the network. In the event that a party wishes to alter the record, they will be required to pass a new entry that will be added to the old block and this will be evident to all participants. This ensures that the transaction is permanent and unalterable.
c) Peer-to-peer transmission: all communication in a blockchain occurs directly between peers instead of through a central node. Each node stores and forwards information to all other nodes.
d) Computational logic: the digital nature of the ledger means that blockchain transactions can be tied to computational logic and in essence programmed. Hence, users can set up algorithims and rules that automatically trigger transactions between nodes.

[14] David Yemack, ´Corporate Governance and Blockchains´ Review of Finance, 2017, 7-31,12
[15] The Economist, ´The Promise of the Blockchain: The Trust Machine´ October 31, 2015
[16] Adapted from "How Blockchains Work" in Allison Berke, How Safe are Blockchains? It Depends, Harvard Business Review, March 2, 2017

e) Transparency and pseudonymity: every transaction and its associated value are visible to anyone with access to the system. Blockchain might give more transparency to parties who conceptually have a lack of trust in each other.

f) Smart Contracts: this is a contract that is coded into computer language rather than written in legal language and that is self-executing upon the fulfilment of certain conditions. The enumerated potential benefits include low costs associated with contracting, enforcement and compliance which may make it more appropriate for low-value transactions. Although the development of smart contracts is still at the nascent stages, it presents opportunities for automating payments.[17]

The transparency provided by blockchain as well as its immutable nature and ability of all participants to access it in real time might, therefore, considerably increase the level of trust between any parties involved, as well as remove the need for reconciling each transaction with the various counterparties.[18]

4. Potential Impact on Transfer Pricing

Blockchain as a 'trust protocol'[19] can help overcome the above-mentioned issues and mistrust between taxpayers and tax administrations and enhance the implementation of transfer pricing rules and application of the ALP in a number of ways, including the following:

(a) Transfer pricing documentation

Information asymmetry usually exists between MNEs and the tax administration, often in favour of MNEs. However, such asymmetry could also exist, advertently or inadvertently, between group entities within an MNE, as well as between tax administrations in different countries. The consequences of such asymmetry within the MNE may be a lack of understanding of the supply or value chain, poor documentation for billing, for recharging as

[17] U.K. Government Office for Science (2016), Distributed Ledger Technology, Beyond Blockchain, Design and Production, WordLink (2016) available at www.gov.uk/go-science. see also Preparing for Digital Taxation in a Blockchain World, Channing Flynn, EY, November 28, 2016 available at - https://www.bna.com/preparing-digital-taxation-n73014447764/

[18] For more details see Blockchain: Taxation and Regulatory Challenges and Opportunities, Report on the first multi-stakeholder meeting held in Vienna on 15-16 March 2017 by the WU Global Tax Policy Centre and the New Economy Taxation.

[19] McKinsey & Company, How Blockchains Could Change the World, Interview May 2016 - http://www.mckinsey.com/industries/high-tech/our-insights/how-blockchains-could-change-the-world

well as for transfer pricing documentation purposes, and the non-fulfilment of regulatory and compliance requirements.

As more and more intra-group transactions migrate onto blockchains, the transparency that is an inherent virtue of Blockchain as distributed ledgers will lead to a much greater clarity and better understanding of the supply or value chain. This will enhance MNEs' ability to trace, analyse, articulate and document the functions, assets and risks across their supply and value chains. This would greatly facilitate transfer pricing policy setting and more effective documentation. This ability to trace via immutable records on the blockchain can reduce their compliance and audit defense burden as it often relates to the possibility to retrieving and producing documentation. The transparent records of financial flows on these distributed ledgers can also facilitate reconciliation both in accounting and also vis-à-vis the underlying intra-group transactional flows, which may be different from the billing and payment financial flows.[20]

The recent developments of transfer pricing rules under BEPS Action 13[21] has trended towards greater transparency by requiring MNEs to maintain a Master File and Local Files which are much more descriptive of the overall value and supply chains, various types of related party transactions (intangibles, financing, services, etc.) and the attendant transfer pricing policies. This massive increase in compliance burden to MNEs does not, however, immediately led to increased trust between tax authorities and MNEs, nor does it shed further light on the transactional level details which is in turn dependent on the finance and accounting systems and database records by the MNEs. Blockchain may play a significant role in bringing resolutions down to the transactional level and enhancing trust by providing contemporaneous records of transactions that are immutable that goes towards substantiating what is described in the Master File, Local Files as well as Country-by-Country Reports.

(b) Availability of comparable data

[20] Davi Yemack, supra 8/9, 25
[21] OECD BEPS Action 13 Report: Transfer Pricing Documentation and Country-by-Country Reporting, October 5, 2015

The lack of comparables has hampered the efforts of many tax administrations, particularly in developing countries, in analysing the transfer pricing arrangements of MNEs. This issue has been analysed under the work of numerous international organization, e.g. IMF, OECD, UN, and WBG[22], as well as the EU.[23] In many instances, comparable data exists, but are not public and significant variability in transaction means that adjustments have to be made to take into account of both transactional and region specific factors before such comparables can be used in a transfer pricing analysis. Generally, tax administrations in developing countries are resource constrained and cannot afford the commercial databases from which they could obtain comparables.

The increasingly widespread adoption of blockchain will result in more and more transparent, retrievably ledgers of transactional records. The resultant transactional level data, if made available to both governments and taxpayers, can contribute greatly to data availability, address the lack of comparables and enhance comparability, given the tendency of blockchain transactions to be standardized. This will reduce the need for tax authorities to resort to secret comparables. Further, the use of smart contracts in a distributed manner to impose or enforce standardized contractual terms means more standardization at the micro-levels that will enhance comparability. Imogen Heap proposes using smart contracts to empower artists to control their outputs by allowing them to bypass studios in releasing their work, control terms under which they are released, determine the sharing of revenues among other things.[24] Smart contracts can therefore be used to impose standardized license or lending terms on the end user party, which must be accepted by the end-user in intra-group transactions before, for example, they can be granted rights to use a software.

(c) Authenticating services rendered and costs recharged

[22] The Platform for Collaboration on Tax (OECD, IMF, UN and World Bank Group) Discussion Draft: A Toolkit for Addressing Difficulties in Accessing Comparables Data for Transfer Pricing Analyses available at https://www.oecd.org/tax/discussion-draft-a-toolkit-for-addressing-difficulties-in-accessing-comparables-data-for-transfer-pricing-analyses.pdf

[23] EU Joint Transfer Pricing Forum Draft Report on the use of Comparables in the EU, Brussels June 2016 - https://ec.europa.eu/taxation_customs/sites/taxation/files/jtpf0072016revencomparablesreport_.pdf

[24] Imogen Heap, ´Decentralising the Music Industry with Blockchain´ May 14, 2016 - http://myceliaformusic.org/2016/05/14/imogen-heap-decentralising-the-music-industry-with-blockchain/

In some instances, it is onerous for tax administrations, especially those from developing countries, to verify whether services were actually rendered as well as the actual cost recharged. Management and services fees were cited in the BEPS project as a major source of base erosion for developing countries.[25] The allowable mark-up or profit margin attributed to such intra-group services is often not contentious – the controversy stems from the uncertainty as to whether services are actually performed and at what cost. Blockchain can ensure that transactions between related parties really take place and that the conduct of the related parties when executing intra-group contracts are fundamentally consistent with those contracts through smart contracts.

(d) Functional analysis

Information asymmetry across the supply or value chain may hamper effective functional analysis across multiple countries. Blockchain could be used to track the movement of goods and services as well as usage of intangible property worldwide, across the supply or value chain. The availability of trusted transactional level data can lead to an efficient functional analysis. For example, in tracking where a software code is written, and where it is downloaded and used, it could enable the DEMPE analysis[26] in identifying where the value is created thus more accurately allocate intangible related returns to key people functions. The DEMPE analysis is considered a significant factor in determining both the ALP of a controlled transaction as well as the determination of the reward due to an entity as a result of the exploitation of an intangible owned by the group. With smart contracts, such allocation can even be automated to follow the transfer pricing policy of an MNE across its entities globally.

(e) Co-operative compliance

[25]OECD (2015), *Explanatory Statement,* OECD/G20 Base Erosion and Profit Shifting Project, OECD, 15 - www.oecd.org/tax/beps-explanatory-statement-2015.pdf . See also OECD (2015b) Aligning Transfer Pricing Outcomes with Value Creation, Actions 8 – 10-2015 Final Reports, OECD/G20 Base Erosion and Profit Shifting Project,, OECD Publishing Paris,

[26] It is usual to reward members of a MNE compensation based on the ALP of the function they perform. with specific reference to intangibles, DEMPE stands for development, enhancement, maintenance, protection, and exploitation of intangibles. See OECD (2015), *Aligning Transfer Pricing Outcomes with Value Creation, Actions 8-10 - 2015 Final Reports*, OECD Publishing, Paris. DOI: http://dx.doi.org/10.1787/9789264241244-en

One of the attributes of blockchain is its ability to provide auditors with an immutable audit trail that can prove provenance of a related party transaction that is contemporaneously time-stamped as trusted proof that the transaction occurred and the terms under which it occurred. The trust created by the verifiability of underlying transactional level data increase trust between taxpayer and tax administrators. This can pave the way for more cooperative compliance and reduce disputes arising from mistrust between taxpayers and tax administrations.

(f) Dispute resolutions

Trusted transactional level data could lead to better dispute resolution where the dispute arises from factual data. IBM recently built a blockchain for its global financing unit (IBM Global Financing) and reportedly saved up to 75% in time tied in transaction disputes within its own network of more than 4,000 partners and suppliers. According to IBM, within months of deployment, the dispute-resolution time dropped from 40 to 10 days on average.[27] At a Competent Authority level, it is conceivable that more and better data can aid in negotiations, make dispute resolution more efficient or even avoid disputes altogether. Blockchain can also be adopted in the sphere of exchange information in enhancing trust between enterprises and multiple tax administrations across different jurisdictions as sensitive taxpayer information is exchanged.

At scale with the proliferation of Blockchains, it is conceivable that the vastly increased availability of CUPs and transactional level data could reverse the trend in recent decades of transfer pricing moving away from the traditional transactions based methods to the transactional profits methods (profit splits and TNMM) which looks at transactions in the aggregate and in providing the comparables and detail that enables the traditional methods to be applied. Moreover, having clarity into transactional level detail can reduce the need to recharacterize transactions or look beyond the contract to the conduct of parties. In the future, smart self-executing contracts have the potential to police the execution for contracts autonomous and thereby verifiably ensuring that the conduct of the parties are consistent with

[27] Alan M. Field, ´Blockchain for Freight?´ Journal of Commerce, March 6, 2017, 89- 90

their contract. All the above will help return transfer pricing to its ALP roots which is in essence, an analysis at the transactional level.[28]

5. Potential Impact on Custom Valuation (and Classification)

As mentioned above, customs authorities seek to eliminate the effects of any potential distortion on the transaction value declared for customs duty purposes that might be generated in related party transactions. In this context, blockchain may potentially be applied by Customs administrations to help them arrive at the correct value for Customs declaration.

Customs valuation is a regulated procedure applied to determine the dutiable value of imported goods. The WCO prescribes six methods that can be used under different circumstances. The starting point is usually the transactional value method largely based on documentary input from the importer. However, the customs administrations have a right to "… satisfy themselves as to the truth or accuracy of any statement, document or declaration."[29] In instances where transactions are maintained on a blockchain may obviate the need of a customs administration to satisfy themselves on the truth or accuracy of the declaration as there will be a transparent, immutable record of the value across the supply chain. The blockchain could also provide a rich source of transactional level data for comparison.

Additionally, the Harmonized Commodity Description and Coding System popularly known as the "Harmonized System" or simply "HS" for classifying imported and exported goods determines the rates of tariffs, and serves to collect international trade statistics.[30] Importers and customs administration often disagree on the HS code and corresponding tariff rate for a given product, leading to disputes that can be fact-intensive. Also in this case, blockchain technology can help. Product specifications and characteristics which drive HS code classification can be reliably identified, leading to higher compliance with import and export rules and tariffs, as well as regulations pertaining to safety and counterfeit measures.[31] Indeed some organizations are

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[28] Petruzzi, R., 'The Arm's Length Principle: Between Legal Fiction and Economic Reality', in: Lang, M., Storck, A., Petruzzi, R. (Eds.), *Transfer Pricing in a Post-BEPS World* (Amsterdam: Wolters Kluwer, 2016), pp. 1-32.

[29] Article 17, GATT

[30] WCO, What is the Harmonized System - http://www.wcoomd.org/en/topics/nomenclature/overview/what-is-the-harmonized-system.aspx

[31] IBM, ´Building Trust in Governments: Exploring the Potential of Blockchains´, 7 - https://www-935.ibm.com/services/us/gbs/thoughtleadership/blockchain-for-government/

already employing blockchains to track provenance of foods from farm to fork. For instance, Walmart, IBM and Tsinghua University in Beijing are working on a blockchain to follow the movement of Pork in China. BHP is already using technology to track mineral analysis done by outside vendors.[32]

In another use case, IBM and Maersk[33] are working with a network of shippers, freight forwarders, ocean carriers, ports and customs authorities to build a new global trade digitization solution. The project will greatly reduce the cost and complexity of trading by using blockchain to establish transparency among the mentioned parties and, among other things, reduce fraud and errors. The blockchain is intended to provide all the participants, including the customs administration, end-to-end visibility based on their level of permission and enable them to view the goods progress through the supply chain as well as the status of customs documents, bills of lading and other data. More importantly, the solution is intended to give real time visibility to customs administrations, significantly improving the information available for risk analysis and targeting hence increasing safety, security and efficiency in border inspection clearance procedures. These blockchains present a rich potential for assisting importers, exporters and customs administrations in correctly classifying goods within the HS system based on their history within the blockchains.

Governments may also impose policies requiring firms to use domestically manufactured goods or domestically supplied services for them to be allowed to operate in an economy are known as Local content requirements ('LCRs').[34] Some trading blocks require that LCRs are met before goods can be imported. With an ambitious plan of providing complete transparency over the entire supply chain, Provenance is testing blockchain for tracking the origin of food. Where customs administration has access to such data, proving that a shipment is compliant with local regulations could be automatically solved easily.[35] In another use case, Everledger is working on

[32] Michael J. Casey and Pindar Wong, Global supply chain are about to get better, thanks to blockchain, Harvard Business Review, March 13, 2017

[33] IBM, Maersk and IBM Unveil First Industry-Wide Cross-Border Supply Chain Solution on Blockchain March 7, 2017 http://www-03.ibm.com/press/us/en/pressrelease/51712.wss

[34] OECD (2016), Trade Policy Note – The Economic Impact of Local Content Requirements, February 2016, 1

[35] Rob Knight, We Don't Need Political Solutions for Global Trade – We Need Practical Ones, Harvard Business Rebiew, March 9, 2017

a blockchain ledger system that will help jewellers comply with regulations against 'blood diamonds'.[36] All these presents possibilities for customs administrations to tap into blockchains to overcome common problems posed by lack of trust in counterparties.

6. Potential Impact on Indirect Taxes

More and more countries are introducing indirect taxes and with them, cumbersome bespoke compliance systems that are nationwide. Example of these include the China's Golden Tax System where VAT payers must report the absolute output and input VAT data from their GTS records. The expectation is that numbers recorded in the GTS are factual[37]. Rwanda has taken the traditional digital invoice security model, and connected it to a central security portal at the Rwanda Revenue Authority. Rwanda will now be able to securely monitor transactions in close to real-time.[38]

One of the challenges of these systems is that they are not built with the taxpayer's circumstances or systems in mind. On the taxpayer's side, the compliance burden is substantial and extremely manual. A typical indirect tax process flow within an MNE involves the following elements:

(i) First, recording invoices and purchase order information from suppliers, vendors and related parties, including seeking amended invoices if the information in incorrect. These records can reside in multiple systems across an MNE;

(ii) Next, extracting the relevant information from such systems, often into Excel, in a format that allows sorting and analysis;

(iii) Further sorting the information and computing the Indirect tax based on individual country rules;

(iv) Complying with individual country requirements as to the reporting formats that each tax administration demands

(v) Arranging for Treasury and/or external banks to make payments

[36] Michael J. Casey and Pindar Wong, supra. See also Sarah Underwood, Blockchain Beyond Bitcoin, Communications of the ACM, November 2016/Vol.59/No.11, 16

[37] See http://taxinsights.ey.com/archive/archive-articles/vat-reporting-in-china-puts-companies-to-the-test.aspx

[38] See Richard Thompson Ainsworth, "Rwanda -- Cutting-Edge VAT Compliance", Boston Univ. School of Law, Law and Economics Research Paper No. 13-46, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2327521

(vi) Collating the tax administration confirmation of acceptance.

Upon audit, reconciling and tracing the various steps above to prove veracity to the auditor becomes a resource draining challenge at best that is further complicated where cross-border transactions involve reporting and systems requirements which differ country to country. It is well-nigh impossible for MNEs to under-take transactional testing and investigations to detect variances and close any reconciliation gap as is often recommended by their advisors as best practices given that VAT filing deadline can be short and transaction volumes high.

A Blockchain solution to the above would involve having the various stakeholders both external and internal vendors, suppliers, partners and internal parties (accounting, finance, settlements, treasury and other functions) agree with the external parties (tax administrators, including cross border and state level indirect tax administrations) on common templates for capturing the invoice and purchase order information on the Blockchain, common terms of acceptance and approval that can be written onto the Blockchain in smart contracts and ultimately permissioned access by the tax administrators to such immutable records. The end-to-end traceability and ability to sample test trusted transactional records mean that both internal compliance resources and external audit teams can be reduced and their efforts redirected to other areas or to improving dispute resolution. The transparency afforded by Blockchain offers further possibilities lie in applying big data analytics to detect patterns of systematic errors or fraud. The point is here Blockchain is applied largely within an MNE's supply or transactional chain than the prototypical P2P use-case which involves resolving the trust issues between unrelated parties.

Such a Blockchain system whilst challenging to implement, would the authors submit, be no less challenging than say the nationwide VAT system that is being designed and implemented across India. And a system built on Blockchain offers a number of advantages such as immutability, no central point of failure and so on over more conventional national central database-server type solutions.

7. Evolution Not Revolution: Hybridity is Most Likely Way Forward

The above use cases for using Blockchain in taxation and customs are still at their nascent stage. The technology itself faces some challenges and may not solve everything. Unique identifiers,

data privacy and confidentiality in the context of public blockchains are amongst the key concerns. Scalability and data transfer and integration with existing systems are further concerns.[39] Moreover, there are practical difficulties that come with the disruption of replacing current intra-group arrangements and IT systems with blockchains, which are particularly important for tax and customs administrations. Furthermore, the many current initiatives that are private or public blockchains need a common standard or platform to be interoperable. There will be a need for internationally agreed standards.[40] The law will also need to accommodate the digitally defined, dematerialized, automated and denationalized nature of blockchains and smart contracts. There will be a need for regional collaboration to ensure coordinated regulatory response across jurisdictions.[41]

Nevertheless, the potential of blockchain to transform transfer pricing, customs valuations (and classifications) and indirect taxes is palpable. Because of the limitations described above, the authors are of the opinion that hybridity, rather than a blockchain revolution as postulated by others, in the short term, is the more likely evolutionary outcome as the use of blockchain spreads. This evolution will be characterized by hybridity in three senses. First, blockchain may be deployed alongside, rather than replacing existing arrangements and systems. Those of us with experience dealing with accounting systems changes will appreciate that unless you have the luxury of building a new Blockchain system ground up, such what the Gulf Cooperation Council appears to be doing with their VAT introduction[42], it is extremely difficult to transition from entrenched systems to Blockchain as a complete substitute. In addition, there may be issues of data confidentiality where a multinational is unwilling or unable under the law to disclose or put sensitive information on the Blockchain. It is much more feasible to have the Blockchain sit above and across pre-existing multiple databases to record the transactional level information without radically changing existing processes. Hence, many Blockchain solutions in large MNEs

[39] Sarah Underwood, supra, 16

[40] Michael J. Casey and Pindar Wong, supra

[41] IBM, Building Trust in Governments: Exploring the Potential of Blockchains, 18 - https://www-935.ibm.com/services/us/gbs/thoughtleadership/blockchain-for-government/

[42] Richard Thompson Ainsworth, "Blockchain, Bitcoin, and VAT in the GCC: The Missing Trader Example", Boston Univ. School of Law, Law and Economics Research Paper No. 17-05, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2919056

will likely be complementary to and co-exists with existing systems, rather than replace or disintermediate entire functions. Secondly, for tax and customs purposes or a combination of both, we will see more permissioned, private blockchains rather than the initial burst of 'bitcoin type' of public and open blockchains, since both governments and taxpayers are unwilling or cannot by law completely disclose certain data. Third, but not least, Blockchain, in the authors' view, the history of the internet has proven time again that the power of monopolies, regulations and the capabilities and greater resources of large MNEs are not to be scoffed at. To this end, the example of Napster's evolution – the P2P technology of an earlier internet generation and how it had since evolved and subsequently become co-opted and co-existing with the big companies that it threatened to disintermediate as embodied in Apple's iTunes – is instructive. Larges MNEs have deeper expertise and the resources to out-compete or absorb new technologies, rendering changes from such technology evolutionary and improvements incremental, rather than revolutionary – there will be many successful use-cases of P2P models that completely disrupts traditional businesses but equally, the large MNEs have equal chance of adapting, incubating start-ups or outmanoeuvring their upstart competitors. Ultimately, Ronald Coase's rationale for the need for organizing economic activities around the firm where non-market production can be more efficient and the other inherent advantages in intra-group transactions cannot be met by Blockchain and will not disappear in the foreseeable future with Blockchain.

8. Conclusion

Blockchain will have a significant impact on transfer pricing, custom valuations and indirect taxes in overcoming the above-mentioned mistrust between taxpayers, tax administrations, and custom authorities and in recording and enabling verification of P2P transactions between related parties, blockchain holds great promise to enhance trust, reduce VAT fraud and even restore the ALP to its roots. The optimist may even point to the tantalising prospect of unifying the three major areas of taxation which hitherto, had developed separate principles, systems and administrations – Direct tax, Indirect tax and Customs. An example of this is where the capture of "nature of service" information on an invoice for VAT purposes can help determine the appropriate withholding rate to apply, whether the transfer pricing mark-up is correct and

whether such intercompany services need to be included in as Value For Duty for customs purposes. More broadly however, Blockchain has its limitations and wonderful as its characteristics may be, it has to live with and coexist with the firm, and with Ronald Coase. Blockhain will not bring about the utopia of a world of P2P and trusted transactions between un-trusted third parties it certainly has the potential to transform transfer pricing and custom valuations as we currently know them.

These and other issues are currently being examined in the context of the WU Global Tax Policy Centre and the New Economy Taxation (NET) multi-stakeholder project on the challenges and opportunities opened up by Blockchain for the operation of tax system. The first meeting in this new series was held in Vienna, Austria from March 15 – 16, 2017 with future Symposiums in Singapore on August 15 – 16, 2017[43] and in New York on May 22, 2018. Apart from the transfer pricing, customs valuation and indirect taxed perspectives, the series is targeting payroll taxes, and registries of land and beneficial ownership as potential areas where distributed open ledger technology could transform the operation of tax systems.[44]

[43] Please email Ms. Maeve Nic Samhradain at maeve.nic.samhradain@wu.ac.at for more details or info@netax.org for registration.

[44] See https://www.wu.ac.at/en/taxlaw/institute/gtpc/events-and-activities/. Please also see Stephanie Soong Johnson and Lewis Alexander, New Frontiers: Tax Administrations Explore Blockchain, Tax Analysts, 2017.