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INSIGHT: Blockchain and Distributed Ledgers—Another Wave of Challenges to Tax and Transfer Pricing From the Digital Economy



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Dramatic rises and falls in the trading value of crypto-assets have taken center stage in the blockchain space. While crypto-asset values ride this roller coaster, we should not lose sight of the development of the business changes and the related tax issues that arise from blockchain technology. Many blockchain business models are three to four years old now, and evidence of their application, and potential is becoming more visible. Distributed ledger technologies have already proved their worth in some areas where problems of identification and corruption have a high cost on limited resources as non-profit organizations (NGOs) will attest. In more entrenched and lucrative markets that the industry aims to disintermediate, such as Fintech, blockchains seem to be on the cusp of broader acceptance in initial use cases. This could signal the beginning of a substantial expansion of blockchain applications.

As these businesses gain traction and their infrastructures begin to grow and evolve, consideration of and some of the tax and transfer pricing issues raised by this technology, and related business models becomes important. In this article we provide a flavor of what distributed ledger technologies offer, how they operate, what they might become, and pose some of the ''to be answered'' questions that they raise for the current tax system.

WHAT IS BLOCKCHAIN?

There are numerous guides to understanding the blockchain, at a variety of reader levels, that are worth reading. The technology is constantly evolving, but hopefully the description that follows will give readers sufficient information to make our points resonate clearly. While there are slightly differing definitions of what a blockchain is, one definition that resonated with us was:

''*The blockchain is a digital ledger that is shared across a decentralized network of independent computers, which update and maintain it in a way that allows anyone to prove the record is complete and uncorrupted.*'' (Michael J. Casey and Paul Vigna, *The Truth Machine: The Blockchain and the Future of Everything*, (St. Martin's Press, 2018))

At its core, blockchain technologies have their roots in trying to solve some fundamental frictions inherent within trust, reliability, and security in internet enabled-businesses. Throughout this article we use the term blockchain synonymously with peer-to-peer distributed ledger applications. The central idea is that if a wide group of independent parties agree on an event, corroborate the same record of that event and the same record leading up to the event, and those records can be protected and made difficult to invalidate or change, the more likely the event and the related transaction record is to be correct and trustworthy. If the history of transactions in the ledger also has a similar level of trustworthiness, and new transactions are permanently linked to historical transactions, the current state of the database information can be considered equally trustworthy. This level of security and immutability provides the basis for a blockchain potential application to a wide variety of uses where immutability and trust are critical to value such as stores of value, ownership of valuable assets, digital currencies, tokens, securities; or records

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of importance such as personnel records, voter rolls, property records, etc.

These ideas are embodied in a type of sequential transactional database called a distributed ledger, the name reflecting that multiple independent parties hold copies of the same ledger and agree to the accuracy of its historical record before accepting new transactions. Distributed ledgers are generated and operated by transaction and storage software incorporating algorithmic and cryptographic elements that establish the rules and mechanisms for agreeing with transactions and processing them onto the distributed ledger. These rules and mechanisms may address a number of processes, including queueing for processing; the validation and encryption of transactions and their links to the historical providence of the ''block'' to the known ledger through the determination of unique cryptographic keys; the confirmation of ''proof of work'', or other for consensus mechanism for validation, for a proposed block at the required level of encryption by a quorum of the other distributed ledger holders; and the cryptographic addition of these transactions to the ''chain'' of permanent transaction records, which then become the immutable record for all ledgers on the network. These activities are performed on a competitive basis by participants in a blockchain community, so there are also rules for re-buffering transactions that were part of potential blocks that were not ultimately agreed to by a quorum of the participants in the ledger.

It's a gross over-simplification, but the security of blockchains have several layers that may include:

- the basic requirements for the transaction information,
- trusted portals for presenting transactions to the network,
- the number of participants (nodes) in the network,
- the difficulty of the algorithmic puzzle required to ''mine'' a block of transactions that are encrypted correctly,
- required consistency with the previously validated historical record as part of the transaction information and encryption process,
- the quorum/number of other ledger participants that is needed to confirm the blocks' encryption solution before its acceptance onto the permanent record across all ledgers in the network, and
- how many encrypted fragments and layers that store the ledger and transaction record on the database.

The independent competitive processing and validation required in a blockchain takes time and a lot of dedicated infrastructure and energy to operate and be successful. This includes the participation of numerous independent ''miners'' who perform the necessary encryption and validation activity to process transaction blocks. To reward and encourage the efforts of the numbers of independent participants required to run a secure distributed ledger network, blockchains reward participants such as miners and validators for successful encryption and network acceptance of blocks, as well as other participant for activities important to the ledger's operation. Rewards for these efforts are typically granted in some form of crypto-asset. This is because many blockchain companies have spurned the more restrictive and expensive traditional angel and venture capital funding available for emerging industries and have instead self-funded by using their technology to create unique crypto-assets.

Crypto-assets can also be created directly by the distributed ledger participants. To have value, these crypto-assets need to be capable of ownership and protection, have perceived usefulness, and have liquidity, preferably into Fiat currencies. The immediate value of these crypto-assets (which can be both highly volatile and speculative) comes from others' willingness to trade them. Their long-term business value, however, should eventually reflect their use as the stores of value or ''currency'' that the network ecosystem uses to conduct transactions on and around the ledger.

Public blockchains may provide all these attributes directly between participants through the Internet, but many crypto-assets (including Bitcoin) are also traded on one of the numerous public trading exchanges that have sprung up for crypto-assets that provide a more familiar type of consolidated environment for the average person to trade and store these assets than more direct means of exchange. The liquidity that comes with being on a public exchange typically increases value, but also adds speculative volatility related risks. For investors and traders this might be why they are purchasing and selling these assets. For blockchain companies trying to use these assets to fund business development, however, volatility in your biggest store of value used to fund the business can distract from good business investment decisions.

Blockchain technologies are still in their relative infancy and still suffer their own frictions. While public ledger networks and private or mixed blockchains with the most stringent encryption criteria are the most secure, it may take days to settle transactions, which limits their applications to those where security takes priority over speed. For other applications where speed is more important, the validation and acceptance process may just take too long or some of the security features may need to be relaxed. In some networks, like Bitcoin, market pricing has formed around the mining fees which can be bid, and fast transaction processing is possible but at a high mining fee.

Some frictions in blockchains are creating subindustries and new intermediaries in the disintermediation game. While mining began as a largely egalitarian endeavor across the Internet, the investment required to be successful in this activity on public ledgers has led to rapid consolidation of most of the processing power into a few industry players, mainly in China. This dependency concentration weakens the security of the ledger, and along with skepticism or regulatory need in some applications has also given rise to a growing number of private distributed ledger networks. As mentioned previously because of the inherent trust issues with the Internet, many participants in crypto-asset markets prefer to rely on exchanges or other intermediaries that may not actually be part of blockchains, but which become trusted portals. There are solutions to all of these problems that exist or are being developed, but many currently come at the expense of security in favor of processing speed and reduced cost.

With the above in mind, it can be seen that blockchains are much more than just a technology. They are new forms of more secure transactional platforms; part database, part transaction processor, part network orchestrator, and part security monitor, that offer a new

approach for businesses and other applications and are therefore also evangelists' and developers' playgrounds. Blockchains have the potential to fundamentally alter the architecture that connects parties, records transactions, and maintains stores of value used across many types of applications. Like many internet-based business models, the success of a given blockchain network (and its crypto-asset value) will depend upon achieving network effects. Networks that provide appreciably better solutions than the existing database and transaction technologies will drive or generate the more transaction processing volumes, which then increases the value of the network and associated crypto-assets. Breadth of use cases, numbers of participants, ease of access, transaction processing speed, and the maintenance of security and trust are all important to long term success. Ideally, blockchain technology will facilitate a reduction in the need for intermediaries that primarily undertake activities to establish the trust necessary to make marketplaces and transactions function and will therefore reduce transaction costs. However, the potential loss of those intermediaries is also one of the problems facing the regulation and taxation of activity on blockchains.

INDUSTRY DEVELOPMENT AND VALUE DRIVERS

As a transactional database technology, many blockchain businesses are essentially technology enabled transaction networks. While one of their goals is to disintermediate certain transactions and markets, in some instances blockchain companies may not actually be blockchain participants but aspire to become new, hopefully leaner, intermediaries. As highlighted above, blockchain companies hoping to succeed in the market need not only better technology solutions than offered by competitors, but also the wide adoption by participants to conduct large numbers of transactions using their technology to achieve the desired network effects. Developing all these attributes is an iterative process of platform and feature development, and incentives to one side or the other of the platform until a critical mass of actors is attained and a virtuous cycle of network effects takes hold to drive transaction volumes.

Public or industry blockchain distributed ledgers are neither owned nor controlled by any one party. Instead they are usually overseen by a foundation comprising the participants and other stakeholders. Ideally the more open, distributed and diverse the participation in a ledger is, the more secure it is likely to be. Private blockchains are also being created among industry participants in which there are a reduced number of ''trusted'' network participants or network nodes. Depending on the encryption and validation rules of these blockchains, this may make these ledgers quicker to process transaction, but at a trade-off of lower security.

Currently, blockchain technology is such that intermediaries have naturally formed around many blockchains to facilitate trust in these new businesses, enhancing access and liquidity in the process. As previously mentioned, there are also concentrations of resources that are devoted to the infrastructure supporting public ledgers in the mining space, particularly in China. No doubt, other sub-industries will emerge as the use of these technologies grows and market forces act to address blockchains own frictions.

As nascent businesses, new blockchain companies start life by identifying the niche or need they are trying to solve. Some are focused on particular markets, transactional areas or businesses. Others are broader and more foundational. Whatever their application, new blockchain companies must first identify the use case and refine the technology to this application and prove their incremental benefits over incumbent solutions by demonstrating reduced cost, increased security, increased speed, or all of the above. In this respect several platforms like Ethereum have emerged that both provide the building blocks for and host distributed ledgers. These may also have their own crypto-asset or allow creation of compatible ones.

With regards to technology, public blockchain technology is based on open source code and therefore patents and other legal protections to the technology are generally limited to methods, processes, and know-how. This is not a huge issue for sustainable advantage—there are many industries, including the existing database industry, that use open source code. However, it may complicate the understanding value drivers, value of specific use cases of the technology, and the attribution of ownership in these businesses.

Blockchains that make it to proof-of-concept for their technology solution with a viable use case will need to attract Alpha participants and find test transactions to work on to gain trust and show realization of their potential. This can be a costly and time-consuming exercise. With a shortage of blockchain-skilled engineers, there is a current bottleneck in getting adoption of blockchain solutions within many operating businesses. Further, for many businesses and target markets for blockchains, the highest initial returns go to adopters in less well-developed markets and use cases, where transaction friction and intermediary costs are greatest. For some, their business models and target markets may necessarily need to adapt to on-the-ground market conditions and receptiveness. Most blockchain companies, like Internet companies before them, are trying out different business and revenue models to find the best ones and/or gain faster adoption.

Much of the early stage technical and network development that is undertaken is generally conducted centrally in the core of the business, working directly with chief technologists and the initial customers around the world. However, as noted above, many initial customers and test use cases are outside of traditional, mature markets, and the value of building out networks internationally as quickly as possible is understood, so we see these businesses establishing local presences quite quickly, even though their activities may appear quite limited. These local offices may perform a mixture of technology evangelism, market research, customer identification, and pre-sales validation and preparation.

As customers start to take interest in the technology, local activities will necessarily start to include technical support for evaluation, testing, and hopefully implementation and support. Engineers and consultants may work at client sites designing and advising on use cases, evaluation and implementation. If blockchain follows the sort of development profile we have seen for other new software adoption, it's likely these initial steps and customers will lead to more standardized products and implementation that can scale the adoption of the technology more quickly and efficiently. This will be key to building their networks and will also lead to more abil-

ity for local parties to make sales and manage local customer accounts. As such understanding the roles and successful contributions for each business may take investigation and an understanding of the history of business or industry and the main twists and turns.

Eventually, successful blockchain networks may come to dominate their markets or the nature of the industry may naturally lead to concentration to maximize volumes and cost efficiency. If too powerful, this may stifle competition and given rise to the type of monopolistic or oligopolistic tendencies we see in many digital market places. However, as we can see, blockchain technologies and companies have a very long way to go before they have to worry about those problems. In most respects, blockchain technologies are really just reaching first base.

UNIQUE FEATURES AND ASSOCIATED TAX CONSEQUENCES

Blockchain businesses are rather unique in their ability to create valuable, tradable crypto-assets to self-fund their initial development, despite not having established businesses. These assets give rise to a number of tax consequences depending on their character and usage. As the most valuable part of many of these businesses, the use and/or trading of these assets may be the single biggest source of revenue for many blockchain companies. These are a natural focus for tax authorities and regulators at the moment, but a discussion of these tax consequences is best left to those more knowledgeable in these areas. From a business perspective, however, crypto-asset values should eventually be reflective of the success of the blockchain network and their usage within the ecosystem. The unique features and tax consequences we highlight are as follows:

1) Blockchain and the Nexus Test,
2) Key Intangible Assets in Blockchain and Tax Planning Opportunities, and
3) Use of Blockchain in Tax Compliance

Blockchain and the Nexus Test

Blockchains potentially raise even more problems for taxable income sourcing for the international tax community than other digital businesses, and may give rise to complex determinations around nexus, sourcing, character, and value attribution where such determinations need to be made.

This is because:

■ A block of transactions requires both successful encryption and successful validation by a quorum of other participants before it is ''accepted'' and the transactions therein are approved and become part of the permanent ledger record. While multiple ledger participants are necessary, any individual participant is also redundant, i.e., no one ledger participant executes a transaction, controls the ledger, or is needed for the ledger to be sustained.

■ Some blockchains have layers of cryptographic and physical security, which may mean that an instance of the ledger at one participant may be itself dispersed among servers and locations within that participant. This may give at least the appearance of having multiple ledger owners and therefore potential for controversy around income attributable not only to participants but also within participants, and assertions of ownership of the database assets.

■ Individual engineering efforts, efforts to proselytize on behalf of a particular company, or attract Alpha or Beta customers, all of which are part of the steps necessarily to get the business off the ground and build the network, may give rise to a wide variety of views over the attribution of value related to these network effects.

All these factors make the locus of a transaction difficult to determine under the current international tax nexus rules. In public ledgers, which use the Internet, it may be impossible to identify the specific miners and validators, but it may also be unnecessary given they are mainly independent and remunerated with an arm's-length fee. For private ledgers, all parties involved in the transaction are likely to be known. However, when a transaction takes place in a public network, it may be difficult to describe—in the context of a tax audit—where assets are held and by whom, and who controls the ledger. Sub-industries participating in public ledgers may provide a clear location and potential arm's-length pricing for certain individual participant activities, but the focus for tax nexus of the transactions running through distributed ledgers likely need to be on the participants on either side of the transactions being processed, or where the transaction is introduced to the ledger absent other factual points of reference.

From an economic and risk perspective, currently the local operations of many of these businesses are set up as cost plus service provides and supported with one sided testing using the transactional net margin method (TNMM)/comparable profits method (CPM). If blockchain companies grow their network and start to become profitable, local markets are likely going to want a larger share of the pie reflecting their ''market'' contribution to the network. In this case, it may be appropriate to view and characterize their current activities differently and give some thought to related bearing of losses required to reach those future network profits.

Key Intangible Assets in Blockchain and Tax Planning Opportunities

In these early stages of the blockchain industry and businesses, many of the key assets and intangibles have yet to be created. Technologies (i.e., processes and know-how), business models, engineering workforce, and management expertise are likely the main existing intangibles. In discussing each entities' contributions to the development or use of intangibles across a multinational enterprise, the 2017 Organization for Economic Cooperation and Development (OECD) Guidelines refer to a new analysis called ''DEMPE.'' A DEMPE analysis refers to identifying entities involved in the development, enhancement, maintenance, protection, and exploitation of intangibles. The DEMPE functions for key technologies in a public blockchain business may be a mixture of community property and community developer contributions under a foundation, and unique company or business application specific overlays, solutions and adaptations that may be developed, owned and legally protected by individual companies. Private blockchain networks may have completely owned and developed technologies. Ownable technologies may be

centralized around sources of investment and related DEMPE functions. Engineering workforces in place with blockchain experience may have premium value, as will other positions where resources are scarce.

Premiums, however, may be temporary as returns attract new resources. The value some intangibles associated with blockchain businesses have may well be limited to their replacement cost until profitable businesses emerge. Individual and collective customer, supplier and/or market participant intangibles will grow in importance as the business grows. All elements of networks are important, some having more importance than others during different times in the development of the network. Over time and with success, the business may also generate network brand value based on its trust and performance.

Depending on the development of the business and network, local market contributions may be limited, but that is may change over time and the historical investments and contributions should also factor into this assessment. The accessibility of the Internet may also mean that competitive and disruptive blockchain networks, like their current digital market place cousins, may attract users from countries where the businesses themselves do not have any presence or a relatively minor one. This may also lead to similar challenges from these markets for some form of taxable income to be earned regardless of any currently agreed tax nexus from local transactions, people, assets, or activity (DEMPE or otherwise).

The embryonic stage of blockchain companies can provide these companies with intellectual property (IP) planning opportunities within the base erosion and profit shifting (BEPS)-inspired tax legal frameworks that emerges from the current chaos. Many important assets are still to be created as they work to increase adoption across multiple jurisdictions and markets. The optimal tax structure depends on a number of factors, including where the company operates, main customers/target markets, how it intends to go to market, and the likely tax attributes that will arise along the road ahead. For some companies, this may mean two or more subsidiaries entering into joint development or cost sharing arrangements as regional expansion occurs, buying into the pre-existing intangibles through a platform contribution transaction to take advantage of potentially more optimal (tax or regulatory) non-U.S. locations, despite the risk that aggressive tax authorities challenge the company's attribution of IP ownership and risks. For others, it could mean a businesses's U.S. entity acquiring (or retaining) IP to centralize ownership and economic exploitation rights associated with its blockchain technologies, using the U.S. as a shield against BEPs abuse claims. In both circumstances, tax executives are in a better position to implement new tax structures while the IP is relatively less valuable and largely unproven in the market.

When considering their tax structures, blockchain companies with a presence in the U.S. should consider the complicating impact of the 2017 Tax Cuts and Jobs Act (TCJA). A company's attributes and benefits under TCJA are often highly specific to its facts and circumstances. Structure, characterization, and sourcing may affect the key international provisions around global intangible low-taxed income (GILTI), foreign-derived intangible income (FDII), base erosion and anti-abuse tax (BEAT), and foreign tax credits. Capital investment and engineering may be affected by accelerated and/or delayed deductions, all of which may affect their operating cash flows and valuations. Other countries have introduced tax incentives and/or specific regulatory measures that provide blockchain companies with more certainty around the regulation and tax treatment of transactions in crypto-assets and of network profits. Consequently, the assessment of optimal operating and tax structures is very much a moving target for many blockchain companies.

Role of Intermediaries and Use of Blockchain in Tax and Transfer Pricing Compliance and Collection

A further interesting aspect of blockchains is their impact on tax administration and compliance. In many market places or supply chains, intermediaries are not only the sources of trust for participants, but also the gateways by which regulators and tax authorities may monitor and capture information about transactions and participants. An obvious example of this are companies like brokers, that may record transactions, withhold taxes, prepare statements, report gains and losses and basis to customers and to the tax authorities. Where blockchains disintermediate actors within the supply chain, tax authorities may find themselves blind to these transactions and reliance on much less sophisticated or compliance knowledgeable users and participants to self-report.

We already note that many business models in the Blockchain 1.0 world involve new intermediaries which may be conscripted to take on that role like the crypto-asset/coin-trading exchanges. Even in a world where the blockchains achieve their nirvana and intermediaries disappear, blockchains can include the development of smart contracts for transaction execution, elements of which governments may add to monitor transactions and even potentially perform necessary tax compliance and collection activities. Smart contracts may actually provide the ability to do this in real time rather than waiting for estimated payments or returns to be filed. These same smart contracts may also be used by intercompany participants in a blockchain to execute transfer pricing and profit allocations in the network.

CONCLUSIONS

It is clear that blockchain technologies and businesses provide challenges and opportunities for tax administrations as well as taxpayers and their advisors. From a tax perspective, it's clear that it's going to be difficult to fit some of the facts around blockchain-related transactions into the current international tax framework and guidance is needed. Taxable income models that attribute value to contributions and thereby determine transfer pricing and profit or loss outcomes will require additional thought. On the other hand, for businesses in this space, now is the time to think about the most efficient future operating structures while the cost of creating or moving key elements of future business value is not prohibitive.

This will no doubt become an increasing focus of the OECD and international community over the next few years as blockchain enabled technologies gain traction. The OECD has devoted efforts to understand the block-

chain industry and its challenges, having had initial exploratory conference between policy makers, followed by its first public annual Blockchain Policy Forum in 2018, with another planned for September 2019.

We note that the international tax world is currently in the throes of a reevaluation of the distribution of and taxation of the spoils from the Internet's biggest businesses. These are familiar areas of debate around the taxation of the digital economy under BEPS Action 1 and the ongoing discussions at the OECD, most recently elaborated in the *Addressing the Tax Challenges of the Digitalization of the Economy—Policy Note of January 23, 2019*. One of the vexing problems within this debate is how to consider the changing importance of capital, assets, and activity contributions during the evolution of these businesses, and to recognize the parties that made those investments and contributions over time. In technology-based digital market places and networks these may track the development of the initial technology and a successful business model, the investments in different sides of market place or to gain network users and, if successful, the emergence of brands and adjacent or new uses for the platform.

All elements were needed to reach the position where these large digital companies achieved the network effects they currently enjoy (and to become a transfer pricing/profit attribution problem for governments), and all required some level of risk and investment to be made. Blockchain technologies and businesses may well reach a similar point in their future; however, as of now most blockchain businesses are at a stage in their development that there's much less operating profit, if any, to fight over. However, as policy makers and tax authorities tackle the more immediate issues surrounding crypto-assets, we suggest that they also take time to observe the changes and forces at work in this industry's development as it may help build a better approach to some of the tax issues with the digital economy.

This column does not necessarily reflect the opinion of The Bureau of National Affairs, Inc. or its owners.

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