

The Ohio State Technology Law Journal

**TAXATION IN THE AGE OF SMART CONTRACTS:  
THE CRYPTOKITTY CONUNDRUM**

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## I. Introduction

Smart contracts are computer-programmed series of permissions and automated events. Sometimes referred to as “unstoppable applications,”<sup>1</sup> they perform tasks automatically upon the occurrence of pre-determined triggers, without the intervention of trusted intermediaries such as lawyers, courts, or other legal institutions. They are ‘smart’ only in the way that artificial intelligence is smart—that is, they respond to stimuli coded into them by their programmers (so garbage in, garbage out). They might at some point be ‘smarter’ in machine learning terms, depending on the desirability of enabling machine-learned determinations to trigger predetermined consequences. The ability to carry out the terms of an agreement without facilitation by third parties makes smart contracts attractive to some in the private sector, seemingly streamlining functions that might otherwise be disrupted by disputes, mistakes, or mundane administrative matters such as information validation.

While the private sector enthuses over smart contracts, the response of regulators seems more guarded. Regulators might be wary to the extent that smart contracts can be used to bypass existing legal regimes by facilitating unconventional transactions. For tax authorities in particular, a rise in unconventional transactions, especially when accomplished via virtual processes that have no single owner or responsible party, disrupts a key mechanism for income taxation, namely, the use of third parties as tax collectors for specified transactions via reporting and withholding obligations. When the payor of potentially taxable income is foreign, virtual, unknown, or any combination thereof, and when the possible range of transactions do not fit familiar conventions, it is much harder to impose these obligations.<sup>2</sup>

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<sup>1</sup> See Arjuna Sky Kok, *Write A Simple Contract On Top Of Ethereum*, MEDIUM (May 2, 2018), <https://medium.com/coinmonks/write-a-simple-contract-on-top-of-ethereum-92b543594e84> [<https://perma.cc/BWZ2-6PJE>].

<sup>2</sup> In terms of reporting and withholding, the same problems arise in the cash economy, which is responsible for a significant amount of noncompliance with tax laws around the world. But in terms of the identification of reportable transactions, there may be base defining issues. The

The problem multiplies when the transfers are of solely virtual assets, one or more parties to the transaction is unknown, and the transaction platform is ‘located’ beyond the practical reach of the regulatory authority, even if legally within scope. The problem seems insurmountable if we imagine that smart contracts may one day be enabled to make decisions using machine-learning to transfer assets, rights, or other, yet to be defined things, with or without the active knowledge or action of the parties.

On the other hand, regulators might see smart contracts as an opportunity to increase compliance with law to the extent a government can either insert itself as a party to otherwise private agreements or design its own smart contract system to impose upon the populace.<sup>3</sup> For example, if a government can (in practical terms) write itself into a smart contract as an automatic payee upon the execution of a given transfer—or even to search out transfers and pay itself—the decentralized nature of the transaction, the anonymous nature of the transactors, the virtual nature of the assets, and even the knowledge of the beneficiaries—all are potentially irrelevant to the enforcement of a tax claim.<sup>4</sup>

Whether a particular government can effectively force its way into private agreements in order to exact a share in tax depends on its practical ability to enforce its will upon at least one of the transactors,

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OECD’s work on the digitalization of the economy captures some of the difficulty of base definition that could potentially be involved. See OECD, PROGRAMME OF WORK TO DEVELOP A CONSENSUS SOLUTION TO THE TAX CHALLENGES ARISING FROM THE DIGITALISATION OF THE ECONOMY, OECD/G20 INCLUSIVE FRAMEWORK ON BEPS, (2019), <http://www.oecd.org/tax/beps/programme-of-work-to-develop-a-consensus-solution-to-the-tax-challenges-arising-from-the-digitalisation-of-the-economy.pdf>.

<sup>3</sup> The idea would be to replicate government involvement in traditional contracts, which may be facilitated by systems such as transfer registration (such as apply in the case of real property transfers) or withholding taxes (such as apply in the case of sales, excise, transfer, and other taxes).

<sup>4</sup> For an optimistic view, see Richard T. Ainsworth & Andrew Shact, *Blockchain (Distributed Ledger Technology) Solves VAT Fraud*, (Bos. Univ. Sch. of Law, Law & Econ. Working Paper No. 16-41 2016), <https://www.bu.edu/law/files/2016/10/BLOCKCHAIN-3.pdf>; Richard T. Ainsworth, Musaad Alwohaibi & Mike Cheetham, *VATCoin: The GCC’s Cryptotaxcurrency 1* (Bos. Univ. Sch. of Law, Law & Econ. Working Paper No. 17-04, 2016), <https://www.bu.edu/law/files/2017/03/GCC-VATCoin.pdf> (proposing that states use smart contracts in VAT systems by integrating a token system with fiat currency).

the smart contract, or the platform upon which the contract is stored.<sup>5</sup> Assuming they are workable on a large scale at some time in the future, it is probably impossible to know whether smart contracts are ultimately more likely to burden or empower the state in its effort to tax.

This essay nevertheless explores the terrain in an effort to lay out the main factors at play. The discussion begins by providing a very brief explanation of the technical background, defining smart contracts, exploring some of their currently envisioned uses, and introducing the Ethereum-based CryptoKitties application as a base case to interrogate some of the challenges involved. The essay then explores why and how tax authorities might choose to fight the encroachment of smart contracts via rule adaptation, to benefit from smart contract innovation by intervening as a party in private smart contracts, or to attempt to corner the market by deploying their own smart contract technology in competition with private developers (or engage in some combination of these approaches), in each case returning to the CryptoKitty ecosystem as a concrete example. The discussion concludes with some predictions about how tax authorities are likely to respond to and interact with smart contracts.

## II. Background

Smart contracts have been described as neither smart nor contracts, so some explanation is in order.<sup>6</sup> The concept was introduced in 1994 by

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<sup>5</sup> For example, a government might claim *in rem* jurisdiction over a smart contract, but it is not clear how practical enforcement of such a claim could be executed except by having some kind of physical control over one of the parties to the transaction or in some cases, perhaps the platform developers. This is explored in more detail below.

<sup>6</sup> See, e.g., Mark Giancaspro, *Is a 'Smart Contract' Really a Smart Idea? Insights From a Legal Perspective*, 33 COMPUTER L. & SECURITY REV. 825, 828 (2017) (stating that contract law will have to adapt to regulate and enforce smart contracts); Stewart Macaulay, *Non-contractual Relations in Business: A Preliminary Study*, 28 AM. SOC. REV. 55 (1963) (explaining relational contracting); Max Raskin, *The Law and Legality of Smart Contracts*, 1 GEO. L. TECH. REV. 305, 305 (2017) (stating that smart contracts should be viewed as no more than a "form of more traditional agreements"); Philippa Ryan, *Smart Contract Relations in e-Commerce: Legal Implications of Exchanges Conducted on the Blockchain*, 7 TECH. INNOVATION MGMT. REV. 14 (2017) (noting that smart contracting's trust protocol can be understood as a form of non-contractual social exchange conducted without dispute and

computer scientist Nick Szabo, who defined a smart contract as a “computerized transaction protocol that executes the terms of a contract.”<sup>7</sup> The idea is to effectuate specified terms by having a computer program (rather than a person) automatically perform predetermined future functions at the occurrence of predetermined future stimuli.<sup>8</sup>

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resolved without recourse to the courts, which empirical legal scholars note is often the case with contractual affairs in any case); Alexander Savelyev, *Contract law 2.0: ‘Smart’ Contracts as the Beginning of the End of Classic Contract Law*, 26 INFO. & COMM. TECH. LAW 128, 128-30 (2017) (noting that smart contracts do not create obligations in the legal sense of the term).<sup>7</sup> Nick Szabo, *Smart Contracts*, (1994) (unpublished manuscript) <http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html>). This definition has largely carried through to contemporary discourse. *See, e.g.*, SMART CONTRACTS ALL., CHAMBER OF DIG. COMMERCE, SMART CONTRACTS: IS THE LAW READY? 10 (2018), <https://lowellmilkeninstitute.law.ucla.edu/wp-content/uploads/2018/08/Smart-Contracts-Whitepaper.pdf> (defining smart contracts in the context of blockchain technology as “computer code that, upon the occurrence of a specified condition or conditions, is capable of running automatically according to prespecified functions. The code can be stored and processed on a distributed ledger and would write any resulting change into the distributed ledger.”).

<sup>8</sup> Smart contracts are agreements written in computer code that use a typically decentralized distributed ledger, that is, a blockchain, to execute pre-determined commands to carry out specified functions. *See* Nick Szabo, *Formalizing and Securing Relationships on Public Networks*, 9 FIRST MONDAY 2 (1997), <http://ojphi.org/ojs/index.php/fm/article/view/548/469> (explaining how to write computer software-based ‘contractual clauses’ that prevent parties from terminating their performance obligations); *see also* VITALIK BUTERIN, A NEXT-GENERATION SMART CONTRACT AND DECENTRALIZED APPLICATION PLATFORM 1 (2014) (describing smart contracts as “systems which automatically move digital assets according to arbitrary pre-specified rules”); PRIMAVERA DE FILIPPI & AARON WRIGHT, *BLOCKCHAIN AND THE LAW: THE RULE OF CODE 73* (Harvard University Press, 2018) (describing Szabo’s work as the first to apply cryptographic protocols to execute digital contracts); Karen E. C. Levy, *Book-Smart, Not Street-Smart: Blockchain-Based Smart Contracts and The Social Workings of Law*, 3 ENGAGING SCI. TECH. & SOC. 1, 1 (2017) (“Smart contracts are agreements that utilize the blockchain—a digital ledger, distributed across a network, that securely records transactions between parties—to automatically and securely execute obligations when certain conditions are met...”). Because this essay focuses on how states might view smart contracts as both challenge and opportunity from a tax perspective, the many reasons why smart contracts are not contracts are beyond the scope of the present discussion. However, these issues are addressed at length in a growing body of scholarship that is skeptical of the usefulness and viability of the technology. *See, e.g.*, DAVID GERARD, *ATTACK OF THE 50 FOOT BLOCKCHAIN: BITCOIN, BLOCKCHAIN, ETHEREUM, & SMART CONTRACTS* 101 (explaining that “[c]omputer code maps very badly to real-world legal agreements, where the hard part is not normal operations, but what to do when things go wrong; immutability means you can’t fix problems, programmers need to write perfect bug-free programs first time every time, and the contract can’t be updated if circumstances or laws change; if the contract acts on real-world data, that data will often need human interpretation.”).

Ethereum founder Vitalik Buterin provided by way of example that “one might have a treasury contract of the form ‘A can withdraw up to X currency units per day, B can withdraw up to Y per day, A and B together can withdraw anything, and A can shut off B’s ability to withdraw.’”<sup>9</sup> Buterin’s example pertains to using smart contracts to issue cryptocurrencies to investors, such as was done in the use of Etherparty’s Rocket 2.0 to raise funds in an initial coin offering.<sup>10</sup> Smart contract proponents envision their widespread use for more conventional phenomena, such as the payment of a royalty to a musician upon every listen or download of a song from a streaming or retail platform.<sup>11</sup> But perhaps one of the most popularized uses of smart contracts is in the context of the trading and breeding of CryptoKitties.

CryptoKitties are digital assets traded on the Ethereum network, with the unique property of allowing propagation through digital breeding into new, unique digital assets.<sup>12</sup> CryptoKitties are a type of smart contract because each individual CryptoKitty is a digital asset with a code that emulates breeding by combining and manipulating data to generate new and unique data—the owner of two CryptoKitties can

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<sup>9</sup> See *Buterin, supra* note 8, at 1. Buterin further noted that “the logical extension of this is decentralized autonomous organizations (DAOs)—long-term smart contracts that contain the assets and encode the bylaws of an entire organization.” *Id.*

<sup>10</sup> See ETHERPARTY: PRODUCTS, <https://ico.etherparty.com/products>.

<sup>11</sup> Imogen Heap is credited as the first musician to attempt to release music via a blockchain-based smart contract. See George Howard, *Imogen Heap’s Mycelia: An Artists’ Approach for a Fair Trade Music Business, Inspired by Blockchain*, FORBES (July 17, 2015), <https://www.forbes.com/sites/georgehoward/2015/07/17/imogen-heaps-mycelia-an-artists-approach-for-a-fair-trade-music-business-inspired-by-blockchain/#30766f814969> [<https://perma.cc/7TKS-Q2CB>]; Imogen Heap, *Smart Contracts for the Music Industry*, MEDIUM (Mar. 15, 2018), <https://medium.com/humanizing-the-singularity/smart-contracts-for-the-music-industry-3e641f87cc7> [<https://perma.cc/P47X-HNVV>]. The venture was considered a complete failure, mostly due to the complexity involved in tying downloads to the Ethereum platform. See, e.g., GERARD, *supra* note 8, (“The next evolution of smart contracts for music distribution seeks to simplify and streamline access and download beyond cryptographic protocols.”); SOUNDAC, <https://soundac.io> [<https://perma.cc/9BV8-KCU9>] (describing its platform as “an ownerless, automated, globally distributed, Peer-to-Peer network” for musicians, music streaming service providers, and music retailers).

<sup>12</sup> See CRYPTOKITTIES, <https://www.cryptokitties.co> [<https://perma.cc/2HKT-GJJ8>] (describing itself as “a game centered around breedable, collectible, and oh-so-adorable creatures we call CryptoKitties! Each cat is one-of-a-kind and 100% owned by you; it cannot be replicated, taken away, or destroyed.”).

choose to breed them, but the resulting offspring is a product of automated computer code that produces unpredictable and unique results.<sup>13</sup> Newly generated CryptoKitties may be worth more or less than their parents, with prices for individual CryptoKitties rising to as high as US\$170,000.<sup>14</sup>

CryptoKitties are built on the Ethereum network, which largely popularized the smart contract phenomenon, but smart contracts might also be executed via NEO,<sup>15</sup> Chainlink,<sup>16</sup> EOS,<sup>17</sup> Stratis,<sup>18</sup> or multiple other networks.<sup>19</sup> In Ethereum and other networks, the term has been defined broadly to mean any program that runs on the blockchain (whether or not it actually executes any contractual terms). Ethereum's website currently provides samples of possible agreements that could be written as smart contracts, including a will, insurance policy, voting registry, sales contract or marriage contract.<sup>20</sup>

Much of the excitement—and the skepticism—around smart contracts relates to their potential to overcome the limitations of traditional law.<sup>21</sup> Continued enthusiasm means that proliferation is likely even though experience to date shows there is ample reason for caution.<sup>22</sup>

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<sup>13</sup> See *Getting Started*, CRYPTO Kitties, [https://guide.cryptokitties.co/guide/getting-started?\\_ga=2.186416622.671533876.1568573125-1637773996.1568573125](https://guide.cryptokitties.co/guide/getting-started?_ga=2.186416622.671533876.1568573125-1637773996.1568573125) [<https://perma.cc/5RA9-MSJ8>]; see also *Technical details*, CRYPTO Kitties, <https://www.cryptokitties.co/technical-details> [<https://perma.cc/H3VM-BUBG>] (explaining that “the smart contracts have over 4-billion variations of phenotypes (what you see) and genotypes (what you don’t see)”).

<sup>14</sup> CryptoKitties sales are tracked by a number of sites, for example CRYPTO Kitties SALES, <https://kittysales.herokuapp.com> [<https://perma.cc/U3QW-9LYW>].

<sup>15</sup> NEO is referred to colloquially as the Chinese Ethereum owing to its similarity. See NEO, <https://neo.org>.

<sup>16</sup> CHAINLINK, <https://chain.link> [<https://perma.cc/3D2T-BGRJ>] (“Your smart contracts connected to real world data, events and payments. The Chainlink network provides reliable tamper-proof inputs and outputs for complex smart contracts on any blockchain.”).

<sup>17</sup> EOS, <https://eos.io> [<https://perma.cc/QE4C-GXW6>] (“The most powerful infrastructure for decentralized applications”).

<sup>18</sup> Stratis is aimed at corporate use of blockchain processes and offers “blockchain as a service.” STRATIS, <https://stratisplatform.com> [<https://perma.cc/6EYP-AHNNH>].

<sup>19</sup> E.g., Buterin, *supra* note 8, at 1.

<sup>20</sup> ETHERSCRIPTER, <http://etherscripter.com/0-5-1/> (last visited Nov. 19, 2019) (the possible agreement is chosen from the “Samples” drop down on the top bar).

<sup>21</sup> This is characteristic of blockchain development. See e.g. Raskin, *supra* note 6, at 308 (smart contract enthusiasts believe that increasing the possibility of private enforcement of

This presents a dilemma for tax authorities. On the one hand, the tax law cannot ignore emerging technology when it has real impacts on investors and consumers, as smart contracts have already had. Wherever economically impactful transactions occur, the tax system is implicated whether regulators realize it and can manage it or not. There are potentially significant tax implications even if, in the most skeptical view, smart contracts are viewed by some as little more than high-tech Ponzi schemes that are likely to become increasingly irresponsible in tandem with the increasing skills of programmers to algorithmically empower them. These tax consequences might seem mundane in comparison to the excitement of the developing technology, perhaps, but they could prove vital to the continued functioning of the state as guardian of a minimally rational economic order.

On the other hand, if smart contracts do begin to take hold and become significant facilitators and governors of transactions, tax authorities might want to take a more proactive role than simply applying existing legal standards to new fact patterns. In considering its approach, tax authorities seem to have three possible approaches available to them, none of which are mutually exclusive: the tax authority might (1) fight the technology with familiar weapons, trying to overcome the obstacles to enforcement one at a time; (2) join the market, finding a way to benefit from the technology by forcibly inserting itself into private contract ordering; or (3) compete with the private sector to corner the market, by creating a rival platform to facilitate digital

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contracts will reduce both “the need and extent of monopolized police and legal services provided by the state”); *What is Ethereum?*, ETHERSCRIPTOR, [https://etherscripter.com/what\\_is\\_ethereum.html](https://etherscripter.com/what_is_ethereum.html) [<https://perma.cc/3SLJ-G6BK>] (claiming that “Ethereum is a new kind of law” that allows unbreakable contracts which can be “perfectly observed and enforced,” doing away with problematic ambiguity, expensive enforcement, and the need for government regulation).

<sup>22</sup> Perhaps the most well-known catastrophe relating to the unstoppable nature of smart contracts is the Ethereum DAO, a public investment fund hosted on the Ethereum blockchain, the coded flaws of which ultimately led to a fork in the Ether cryptocurrency. See Morgan E. Peck, *DAO May Be Dead After \$60 Million Theft*, IEEE SPECTRUM (June 17, 2016, 10:00 PM), <https://spectrum.ieee.org/tech-talk/computing/networks/dao-may-be-dead-after-40million-theft> [<https://perma.cc/T5UM-MRE4>].

transactions according to its own terms. Each of these are discussed in turn.

### III. Fight with Familiar Weapons

Probably the first response of the tax authority to any new technology is to, in effect, deny it any revolutionary quality and try to supplement the existing rules with familiar safeguards to allow taxation despite the newly identified obstacle.<sup>23</sup> The global response to the rise of the so-called ‘digitalized economy’ is illustrative of this approach, and provides a template for how tax authorities are likely to deal with smart contracts.

After announcing that tackling issues arising from the digital economy would be a major plank in its international initiative to counter base erosion and profit shifting (BEPS), in 2015 the Organisation for Economic Cooperation and Development (OECD) released an “Action 1 Report” that admitted to a lack of consensus on defining the digital economy, much less developing a coherent and mutually advantageous approach to taxing it.<sup>24</sup> Conceding that the digital economy is indistinct from the rest of the economy and could not be meaningfully distinguished for purposes of developing ring-fenced protective tax measures, the Action 1 Report outlined three options to tweak existing rule sets to act as safeguards against base erosion associated with emerging technologies, namely an expansion of nexus, a new withholding tax, and a new equalization levy.<sup>25</sup>

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<sup>23</sup> This would be consistent with the approach of many governments to smart contracts in general, except where they involve the sale of assets governed by securities regulations, such as in the case of initial token offerings. See, e.g., Pulat Yunusov, *The Law of Smart Contracts*, in A PRACTICAL GUIDE TO SMART CONTRACTS IN BLOCKCHAIN LAW 151 (Aaron Grinhaus ed. 2019) (stating that “regulators appear to apply the law to smart contracts and their applications by analogy to conventional concepts,” first because “the legal tradition is conservative and it tends to try to fit new facts to existing rules by analogy where possible,” and second because “smart contracts by their nature are one of the most regulation-proof technologies in history due to the decentralized nature of block chains. Without declaring war on smart contracts, the legal system can usually deal with them only by affecting people and property before they are committed to a smart contract or after the smart contract has finished executing”).

<sup>24</sup> OECD, ADDRESSING THE TAX CHALLENGES OF THE DIGITAL ECONOMY: ACTION 1--2015 FINAL REPORT (2015).

<sup>25</sup> *Id.*

Later, the OECD released an “Interim Report” on the topic, revealing its findings to date and opening up a public consultation period.<sup>26</sup> The discussion of possible blockchain applications is fairly light in the Interim Report, with most of the attention focused on private cryptocurrency use.<sup>27</sup>

The OECD suggests that more consultation is needed, but suggests as possible regulatory solutions “legislative measures which require digital asset exchange platforms or other third parties to report and/or which allow tax administrations to request information on transactions regarding digital assets....”<sup>28</sup> This is a prime example of fighting with familiar weapons: most scholars view third party reporting and withholding as crucial to effective income taxation, and it is a common strategy to counter a broad range of income tax compliance issues.<sup>29</sup> The OECD’s proposed strategy to an identified menace is accordingly to apply these familiar enforcement mechanisms to the new challenge, as opposed to seeing the new challenge as essentially immune to the paradigmatic approach.

In the case of smart contracts, however, extending the paradigmatic approach poses some difficult challenges. This is partly because while smart contracts can bypass jurisdictional boundaries, the members of the OECD cannot. The public international law quality of territorial

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<sup>26</sup> OECD, TAX CHALLENGES ARISING FROM DIGITALISATION INTERIM REPORT (2018).

<sup>27</sup> *Id.* at 206-208.

<sup>28</sup> *Id.* at 208.

<sup>29</sup> See Leandra Lederman & Joseph C. Dugan, *Information Matters in Tax Enforcement*, 2020 B.Y.U. L. REV. (forthcoming 2020) (manuscript at 2, 52), <https://ssrn.com/abstract=3325598> (explaining that “government needs information about taxpayers’ transactions in order to determine whether their reporting is honest” and that third-party reporting helps the government obtain that information); Henrik Jacobsen Kleven et al., *Unwilling or Unable to Cheat? Evidence From a Tax Audit Experiment in Denmark*, 79 ECONOMETRICA 651, 653 (2011) (finding low levels of tax evasion occur when taxpayers “are unable to cheat successfully due to the widespread use of third-party reporting.”); Mark D. Phillips, *Individual Income Tax Compliance and Information Reporting: What Do the U.S. Data Show?*, 67 NAT’L TAX J. 531, 563 (2014) (finding that compliance with income tax law depends on matching income via third party reporting); Joel Slemrod, *Cheating Ourselves: The Economics of Tax Evasion*, 21 J. Econ. Persp. 25, 37 (2007) (correlating “the rate of compliance and the presence of enforcement mechanisms such as information reports and employer withholding.”). *But see* Wei Cui, *Taxation Without Information: The Institutional Foundations of Modern Tax Collection*, 20 U. PA. J. BUS. L. 93, 146 (2018).

jurisdiction has always effectively prevented enforcement of tax across borders without express cooperation. These jurisdictional boundary problems are rarely discussed explicitly in OECD documents, but they are an underlying force in all discussions involving international tax enforcement problems.<sup>30</sup>

But smart contracts' immunity to the paradigm is also likely because anything built upon distributed ledger technology lacks the one thing that makes taxation feasible—namely, a responsible party that can be pressed into service as the tax collector, even if not the ultimate taxpayer.<sup>31</sup> The OECD's Interim Report is simply silent on how to request information or require anything else of a party when, as in the case of a decentralized ledger, there is no one single person upon which to impose such a regulatory requirement.<sup>32</sup> Unfortunately, also lacking is an identifiable group of possible responsible parties, any one of which could be designated the tax

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<sup>30</sup> See generally Allison Christians, *Sovereignty, Taxation, and Social Contract*, 18 MINN. J. INT'L L. 99 (2009) (discussing the OECD's brief deliberation over the possibility of imposing sanctions on countries that refused to voluntarily cooperate with its standards for acceptable forms of tax competition, in the context of its work to curtail what it characterized as "harmful tax practices").

<sup>31</sup> See, e.g., Manoj Viswanathan, *Tax Compliance in a Decentralizing Economy*, 34 GA. ST. U. L. REV. 283 (2018) (explaining that tax compliance depends on information from centralized financial intermediaries such as brokers and employers, which can be circumvented by some digital economy platforms, for example in the case of some futures and derivatives contracts which escape registered exchanges as an intermediary, resulting in underreporting and presumably under-taxation of the proceeds of transactions); Clement Okello Migai, Julia de Jong & Jeffrey P. Owens, *The Sharing Economy: Turning Challenges Into Compliance Opportunities for Tax Administrations*, 16 EJOURNAL TAX RES. 395, 420-421 (2019) (noting that the proliferation of payments and transactions without third parties may lead to many services being provided in an opaque fashion, and explaining that the challenge for tax administrators is to design a system "that allows taxation of the growing economic sector" without incentivizing the rise of the informal or unregulated economy); see also Yunusov, *supra* note 23, at 147 ("[T]he fundamental reality of smart contracts and blockchains is that governments can regulate them only if one or more people have control over the smart contract or the block chain and the governments have physical jurisdiction over these people or their property.").

<sup>32</sup> See, e.g., Justin Cole, *Blockchain Business Structuring: Offshore Foundations and International Business Companies*, in A PRACTICAL GUIDE TO SMART CONTRACTS IN BLOCKCHAIN LAW 46 (Aaron Grinhaus ed. 2019) ("[T]he software development [of decentralized ledger technology] is distributed worldwide rather than in a single office in one country. Therefore, the argument as to where the code was written and where the subsequent profits should be recognized becomes more difficult to answer.").

matters party (as, for example, might be done to assign tax filing responsibility in the case of a limited partnership or limited liability company).<sup>33</sup> Smart contracts may be developed in any jurisdiction, with software written anywhere, running on blockchains maintained by hundreds or thousands of once and future miners located all over the globe. It is hard to imagine how imposing reporting and withholding requirements is going to work.

Consider the example of CryptoKitties introduced above. CryptoKitties are traded in ETH using a third party platform called Dapper.<sup>34</sup> Therefore, to buy CryptoKitties requires acquiring ETH (for example with fiat currency or another cryptocurrency), creating a Dapper account, creating a CryptoKitty account that links to the Dapper account, and then purchasing the CryptoKitties; breeding costs an additional fee in ETH.<sup>35</sup> ETH can be purchased through a number of exchanges; Dapper allows purchase via credit card, such as via Simplex, a licensed financial institution.<sup>36</sup>

In terms of any one government identifying a third party information reporting and tax withholding agent, the CryptoKitty universe appears to provide an abundance of options, yet it is possible that none has all of the information needed by a particular tax authority. Simplex in particular seems capable of providing useful information since it is a financial institution that collects tax relevant information when facilitating fiat-crypto currency transactions.<sup>37</sup> However, the information Simplex gathers is in the context of an exchange of fiat currency into one or more cryptocurrencies, and the transfer of such

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<sup>33</sup> I.R.C. § 301.6231(a)(7)-1 (2001).

<sup>34</sup> DAPPER, <https://www.meetdapper.com> [<https://perma.cc/X8RK-YSBV>].

<sup>35</sup> The fee varies but is typically 0.008 ETH, or about US\$1.51 at the time of this publication.

<sup>36</sup> As such, Simplex adheres to AML/CFT standards and requires government identification to process purchases of cryptocurrency using conventional credit cards. About Us: What We're Doing, SIMPLEX, <https://www.simplex.com/about/> [<https://perma.cc/8HLH-HLFK>] ("Simplex is a licensed financial institution that provides an online fraud-free payment processing solution.").

<sup>37</sup> The expansion of international coordination on financial regulation will expand information gathering and reporting obligations going forward, but it is expected that peer-to-peer transactions will continue to escape regulation. *See, e.g.*, Michael J. Casey, *The Cat and Mouse Game of Crypto Regulation Enters a New Phase*, COINDESK (May 27, 2019, 8:00 PM), <https://www.coindesk.com/the-cat-and-mouse-game-of-crypto-regulation-enters-a-new-phase>.

cryptocurrencies to a Dapper wallet. Purchasing cryptocurrency with fiat currency is not a taxable event; it is the subsequent exchange that potentially gives rise to taxation.

In turn, Dapper might be able to provide some tax information about the exchange of cryptocurrencies by CryptoKitty buyers and sellers. To do so effectively, however, Dapper would have to track the cost base,<sup>38</sup> holding period, and sale prices earned by all CryptoKitty users (which is potentially feasible), as well as the tax residence of all users at all relevant times. This was not likely feasible before June of 2019, because tax residence is not necessarily information that Dapper would have possessed.<sup>39</sup> However, the recent adoption of expanded information exchange among virtual asset dealers in respect of transactions between them may alter this result going forward.<sup>40</sup>

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<sup>38</sup> This presumably includes the dollar value of the ETH-based purchase price plus the transaction fee (gas) paid to miners to complete purchase, in the case of existing CryptoKitties, or transaction and “birthing” fees, in the case of newly created CryptoKitties. *See FAQs, CRYPTOKITTIES*, <https://www.cryptokitties.co/faq#how-much-does-it-cost-to-play-cryptokitties> (last visited Nov. 19, 2019); *see also* DENVER ACCOUNTING GRP., *Taxation of CryptoKitties*, DIG. CURRENCY ACCT. (Dec. 7, 2017), <https://digitalcurrencyaccounting.com/2017/12/07/taxation-of-cryptokitties/> [<https://perma.cc/5CKL-4JPX>] (discussing U.S. tax treatment of CryptoKitty transactions).

<sup>39</sup> Setting up a Dapper account requires providing a phone number, which could serve as a proxy for residence, or at least indicia of residence, as it is in the case of regulations respecting ownership of foreign bank accounts in U.S. law and in the Common Reporting Standard adopted by OECD countries. *See, e.g., Understanding How The Common Reporting Standard (CRS) and Foreign Account Tax Compliance Act (FATCA) Affect You – An FAQ*, CANADIAN BANKERS ASS’N: BANKING BASICS (Dec. 21, 2017), <https://cba.ca/understanding-the-common-reporting-standard> (explaining that under these standards, financial accounts are “subject to ongoing review for any changes in client information (such as address or phone number) that could indicate a change of tax residence”). Using a weak proxy for tax residence creates a relatively high likelihood of error including through manipulation by the taxpayer, but it may nevertheless increase voluntary compliance with relevant tax laws.

<sup>40</sup> *See* Fin. Action Task Force, *Interpretive Note to Recommendation 15*, in *The FATF Recommendations 70, 71* (2019) (“Countries should ensure that originating [virtual asset service providers] obtain and hold required and accurate originator information and required beneficiary information on virtual asset transfers, submit the above information to beneficiary VASPs ... and make it available on request to appropriate authorities.”); *see also* Fin. Action Task Force, *Outcomes FATF Plenary, 16-21 June 2019*, (June 21, 2019), FATF: PUBLICATIONS <https://www.fatf-gafi.org/publications/fatfgeneral/documents/outcomes-plenary-june-2019.html> (describing the new measures as necessary to “prevent the misuse of virtual assets for money laundering and terrorist financing and the financing of proliferation”).

It seems likely that as countries increase their regulation of virtual assets for purposes of money laundering and terrorist financing, the information that will be gathered and shared across countries will include tax relevant information. This makes the prospect of increased withholding and reporting obligations respecting smart contracts increasingly feasible, so long as transactions occur in regulated custodial wallets (as in the case of Simplex and Dapper).<sup>41</sup> However, this assumes that significant information gaps that currently permeate virtual asset activities are surmountable.<sup>42</sup> Even if this is possible, the imposition of detailed information reporting obligations for virtual asset service providers do not extend to peer-to-peer transactions involving unregulated entities or platforms, which are a large and growing segment of the virtual asset market.<sup>43</sup>

#### IV. Join the Market

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<sup>41</sup> This is debatable since crypto addresses lack the kind of precise information associated with traditional financial institutions. *See, e.g.*, Letter from Glob. Dig. Fin., to the Fin. Action Task Force 4-5 (April 7, 2019), <https://www.gdf.io/wp-content/uploads/2018/01/GDF-Input-to-the-FATF-public-statement-of-22-Feb-2019-FINAL.pdf> (noting that unlike a wire transfer, which includes the recipient's bank location, branch information and account numbers, a crypto transaction requires only an address, which does not indicate a destination, is unregistered, and can be created at any time).

<sup>42</sup> *See, e.g.*, Letter from Glob. Dig. Fin., *supra* note 41, at 5-6 (stating that among the significant issues for effective regulation is a series of information gaps in the virtual asset supply chain, notably "1. An originating VASP (where one is used) does not have knowledge of the beneficiary VASP nor the beneficiary details. 2. The virtual asset holder (i.e. the originator) does not even need to know the beneficiary name nor which VASP they use, if any. 3. The originating VASP simply writes the transaction to the ledger for it to be validated as a legitimate transaction. There is no concept of notification to a beneficiary. 4. The beneficiary VASP (where one is used) receives the transaction by reading the ledger and reconciling a change on the ledger in relation to a virtual asset address it maintains. It does not receive any notification 5 or request from an originating VASP, nor does it know who the originating address belongs to. 5. Even if an originating VASP could collect beneficiary VASP and the ultimate beneficiary's details, there is no way to reliably validate that the details entered are accurate (i.e. if incorrect information is supplied by the originator, it would not prevent the transaction from being written to the ledger)").

<sup>43</sup> *See, e.g.*, Casey, *supra* note 37; *see also* Marc Hochstein, *Beyond KYC: Regulators Set to Adopt Tough New Rules for Crypto Exchanges*, COINDESK, (May 20, 2019, 12:00 PM), <https://www.coindesk.com/beyond-kyc-global-regulators-appear-set-to-adopt-tough-new-rules-for-crypto-exchanges> [<https://perma.cc/T9GD-JK66>].

The second possible strategy of government would seem to be forcibly inserting itself into the private sector's development of the emerging technology to achieve its enforcement goals.<sup>44</sup> In this scenario, the tax authority would simply seek to become a named payee in as many smart contracts as possible, thus replicating the withholding mechanism in any automated contract execution. As in the case of the adaptation strategy described above, there are currently some exacting technical and jurisdictional barriers to this approach. A possible future in which machine learning algorithms help governments detect the creation of smart contracts on a platform-by-platform basis might potentially increase compliance opportunities.

This could follow the platform-based compliance model for indirect taxes, mentioned in the OECD's Action 1 Report as a possible safeguard measure. Currently there is a relatively short list of retail sales platforms in existence such that governments could potentially reap fairly large indirect (goods and services) tax compliance gains by forging cooperative tax withholding agreements with selected companies (for example, Amazon, AirBnB, Uber, and so on).<sup>45</sup>

Similarly, even though there are more than a thousand cryptocurrencies in existence and more forming all the time, there are leading blockchain platforms and relatively dominant cryptocurrencies, most prominently bitcoin and, in relation to smart contracts, ether. Moreover, the pool of large scale miners of these dominant cryptocurrencies also seems to be fairly limited, potentially

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<sup>44</sup> This would effectively override the wishes of some proponents of smart contracts. *See, e.g.,* Raskin, *supra* note 6, at 307 (noting that the point of smart contracts is to "protect individual autonomy over state diktat").

<sup>45</sup> This has been a strategy by the government of Quebec in respect of provincial goods and services taxes, for example. *See* THE CANADIAN PRESS, *Airbnb Agrees to Pay Lodging Taxes in Quebec*, MONTREAL GAZETTE, Aug. 29, 2017, <https://montrealgazette.com/news/local-news/airbnb-agrees-to-pay-lodging-taxes-in-quebec> ("Airbnb's Alex Dagg said the agreement underlines just how the company and a province can work in tandem. 'As the first of its kind tax agreement in this country, this is a landmark announcement and a defining moment for Airbnb, not just in Quebec, but in all of Canada,' Dagg, Airbnb's public policy manager for Canada, told the news conference."). Whether Quebec is making similar efforts with AirBnB competitors, such as academichomes.com, has not been made public.

providing viable targets of tax authority's negotiated compliance efforts.<sup>46</sup>

A likely point of entry beyond cryptocurrency miners or an elusive decentralized ledger itself is traditional financial institutions. Large retail banks and credit card companies also happen to be some of the world's biggest investors in blockchain technology. For example, Wells Fargo, the Bank of America, the Bank of New York, and Mastercard have each filed dozens of patents for various blockchain-based payment systems; in particular, Mastercard has filed patents for systems linking fiat currency accounts to digital assets.<sup>47</sup> This makes them potential links in an enforcement chain.

To the extent that so-called fiat currencies—the U.S. dollar, especially—continue to be stable and reliable compared to any cryptocurrency (as seems likely), the traditional financial intermediaries will continue to be a vital part of the overall economic landscape. Financial intermediaries, moreover, remain susceptible to national tax regulation.<sup>48</sup> To the extent they are adapting to blockchain, these institutions may provide a vital link between tax authorities and

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<sup>46</sup> The effective centralization of blockchain due to the monopolization of mining by large scale miners is a problem for blockchain's anti-regulatory proponents but an opportunity for certain governments, as profitable large scale mining may only be possible in certain countries (i.e., where it is cold and the electricity is cheap, as in Quebec and Iceland). By one estimate, the current electricity cost to mine one bitcoin, valued at the time of this writing at US\$3,977, is approximately US\$3,965 in Canada, US\$4,746 in Iceland, and US\$4,758 in the United States. *Cost of Mining a Bitcoin Worldwide*, IMGUR (Jan. 16, 2018), <https://imgur.com/a/ngs7m>. Factoring in the cost of equipment and facilities, the profit margin on mining thus depends heavily on the current market price of the mined cryptocurrency. See, e.g., Andrew Geyl (OrganofCorti), *November 6th 2016 Bitcoin Network Statistics*, NEIGHBORHOOD POOL WATCH: BITCOIN MINING POOL, NETWORK, AND EXCHANGE ANALYSIS (Nov. 7, 2016), <http://organofcorti.blogspot.com>. In addition to electricity costs, the cost of hardware is significant. Since the introduction of Bitcoin, there have been four generations of mining devices: Central Processing Units (CPUs), Graphics Processing Units (GPUs), Field Programmable Gate Arrays (FPGAs), and Application-Specific Integrated Circuits (ASICs). Conversion from one system to another to improve mining outcomes involves an investment of \$100,000 or more.

<sup>47</sup> See, e.g., U.S. Patent No. 10,026,082 (issued July 17, 2018); Canadian Patent No. 2,986,563 (issued Nov. 24, 2016).

<sup>48</sup> As evidenced by FATCA and the common reporting standard, as well as the recent developments by the FATF. See discussion *supra*.

elusive taxpayers and transactions.<sup>49</sup> As such, they may be the best or only hope of governments to join rather than fight the advent of cryptocurrency-based transactions, smart contracts, and future uses of blockchain based applications.<sup>50</sup>

Returning to the CryptoKitty example, one could imagine that a tax authority could seek to write itself into the Dapper platform, whereby it becomes a payee alongside the miners to whom transaction fees are paid as CryptoKitty buyers and sellers undertake their transactions, including propagation of their assets through breeding. This would in effect constitute a software-enabled withholding function: Dapper would presumably transfer the tax payment, in ETH, to an account of the tax authority in the same manner as it currently transfers gas to ETH miners.

Because ETH is not a currency for tax purposes, this would amount to a transfer of the taxpayer's property to the tax authority, which may be objectionable because it triggers a gain (thus resulting in additional tax) or a loss (which may or may not impact the taxpayer's income for the year). It seems likely that taxpayers would seek to identify tax-favourable identification of the specific ETH being transferred in order to minimize these tax effects, thus complicating the picture.

Beyond this tax issue there are a number of technical difficulties involved including that the government would have to accept tax payment in ETH. If the tax authority would not accept ETH, it would have to establish whose responsibility it would be to pay the

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<sup>49</sup> Thus, governments are likely to pursue strategies to increase the flow of information between financial intermediaries and regulatory authorities on grounds of improving the relevant technological infrastructure. *See, e.g.*, Gov't Office for Sci., *FinTech Futures: The UK as a World Leader in Financial Technologies*, 2015, GS/15/3, at 23 ("Government could take the lead by commissioning a 'digital modernisation strategy' for and in collaboration with the financial services industry, to determine what desirable components make up the UK's critical national financial services technology infrastructure and possible gaps, threats and opportunities.").

<sup>50</sup> The OECD recently reported on using new technologies to improve tax administration, but it focuses mainly on big data and does discuss distributed ledger technologies. *See* OECD, *Technologies for Better Tax Administration: A Practical Guide for Revenue Bodies* (2016),

transaction fees involved in converting ETH to fiat currency (and whose responsibility it is to deal with currency fluctuations).

It seems likely that these costs would be the taxpayer's responsibility, which may raise additional objections in terms of the impact of the tax as well as in terms of achieving horizontal equity among taxpayers. Moreover, if the withholding is not a final tax, the taxpayer would have to be given information regarding the amount of fiat currency effectively paid to the tax authority and there could be issues involved in factoring in currency fluctuations in the refund process.<sup>51</sup> All of these technical details could presumably be worked out, but with considerable complexity involved as the number and volume of cryptocurrency types and transactions increases.

## V. Corner the Market

Finally, hinted at in the OECD's Interim Report on digital taxation is the possibility that governments might seek to capitalize on their unique position by creating their own applications of emerging technology. To date, the scope of development in taxation applications seems to be focused on indirect tax compliance, but it seems inevitable that governments will seek to eliminate an unregulated market by developing their own blockchain platforms, and then try to get the private sector to transact on that instead of elsewhere (whether by compulsion or economic incentive).<sup>52</sup>

In terms of the more straightforward, compliance-oriented approach, the OECD's Interim Report on digital taxation points to tax administrations' potential use of blockchain to increase the "efficiency and security of income and transaction reporting."<sup>53</sup> There is scant

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<sup>51</sup> For example, a taxpayer might object if the payment withheld is not fully refunded due to differences in the conversion rate (and perhaps the required transaction fee) at the time of the withholding and that of the refund payment.

<sup>52</sup> See, e.g., Kimberly Johnson, *What Blockchain Is and What It Can Do*, Wall St. J. (June 19, 2016), <https://www.wsj.com/articles/what-blockchain-is-and-what-it-can-do-1466388185> (describing a survey of 800 executives and technology experts at the World Economic Forum who predicted (on average) that governments would be using blockchain to collect taxes by 2023).

<sup>53</sup> OECD, *supra* note 26, at 206.

detail as to how tax administrations would achieve this, however it is clear that some governments are experimenting with blockchain applications for regulatory purposes, including some for taxation.

For example, China's Shenzhen Special Economic Zone and Guangdong Municipal Tax Bureau are working on blockchain applications to implement electronic invoice platforms.<sup>54</sup> The Shenzhen Municipal Taxation Bureau worked with Chinese tech giant Tencent to "successfully connect[t] the blockchain invoice system with the WeChat payment platform" (the implications of which are not clear), while the Guangdong platform is still under development.<sup>55</sup> The rationale is that blockchain will improve efficiency and transparency of invoice services, because in the view of the tax authority, "Blockchain technology has established a highly mutual trust data sharing mechanism among tax authorities, invoice service providers, taxpayers and other parties."<sup>56</sup> In the same vein, Thailand's Revenue Department is working on a blockchain application to fight VAT fraud.<sup>57</sup>

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<sup>54</sup> See Max Yakubowski, Guangdong Province to Use Blockchain-Based Electronic Tax Invoices for E-Commerce, Cointelegraph, (Feb. 18, 2019) [hereinafter Yakubowski I], <https://cointelegraph.com/news/china-guangdong-province-to-use-blockchain-based-electronic-tax-invoices-for-e-commerce> [<https://perma.cc/H5FT-QWYM>]; Max Yakubowski, Shenzhen Special Economic Zone to Use Blockchain for Electronic Tax Invoices, Cointelegraph (Dec. 12, 2018) [hereinafter Yakubowski II], <https://cointelegraph.com/news/china-shenzhen-special-economic-zone-to-use-blockchain-for-electronic-tax-invoices> [<https://perma.cc/7C6V-SPMW>]; see also *Blockchain Will Be Used by Chinese Government for Taxation and Electronic Invoices Issuance*, COINFOX (July 31, 2017), <http://www.coinfox.info/novosti/7335-blockchain-will-be-used-by-chinese-government-for-taxation-and-electronic-invoices-issuance> [<https://perma.cc/7NGS-GZEE>].

<sup>55</sup> Yakubowski II, *supra* note 54.

<sup>56</sup> Yakubowski I, *supra* note 54.

<sup>57</sup> Wichit Chantanusornsiri, *Blockchain Undergoes Tests for Tracking VAT Payments*, BANKOK POST, Dec. 3, 2018, <https://www.bangkokpost.com/business/news/1586614/blockchain-undergoes-tests-for-tracking-vat-payments>. State use of blockchain for this purpose is advocated by Richard T. Ainsworth and Andrew Shact, *supra* note 4, and has been modeled by Olivier Rikken, *Blockchain Real Time Tax* (Aug. 22, 2017), <https://www.linkedin.com/pulse/blockchain-real-time-tax-olivier-rikken/> [<https://perma.cc/KDG7-YTGJ>]. In addition, accounting firms are exploring the possibilities. See, e.g., PRICEWATERHOUSECOOPERS, HOW BLOCKCHAIN TECHNOLOGY COULD IMPROVE THE TAX SYSTEM (2016), <https://www.pwc.co.uk/issues/futuretax/assets/documents/how-blockchain-could-improve-the-tax-system.pdf>; Piotr Barański, *Blockchain Technology and Its Potential in Taxes*, DELOITTE (Dec. 2017), <https://www2.deloitte.com/pl/en/pages/tax/articles/blockchain-technology.html>.

Beyond tax compliance, however, governments are experimenting with market-cornering innovations in other areas involving blockchain, which may ultimately lend themselves to the kind of data pools that make developing machine learning algorithms very attractive. Current efforts may serve as the groundwork for future public control of private smart contracts in a way that would allow governments to accomplish directly what they would otherwise be looking to accomplish through cooperation, as described in the market joining approach above.

Venezuela's adoption of a state cryptocurrency, the petro, serves as an example of this approach.<sup>58</sup> Other examples include Australia's announcement that it is exploring the use of blockchain in one department to "provide secure and transparent international trade and supply management through a pan-government framework"<sup>59</sup> and in another to "achieve better sustainability and traceability" and "meet consumer demands of sustainably-sourced products."<sup>60</sup>

Blockchain-based supply chain traceability is a significant area of development in the private sector and Australia is not the only government potentially setting up a platform to rival the private sectors' offerings.<sup>61</sup> China also announced in 2019 that it was

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<sup>58</sup> See, e.g., David Hundeyin, *Controversial Venezuelan State Cryptocurrency 'Petro' is Now for Sale*, (Oct. 31, 2018, 7:15 AM), <https://www.ccn.com/controversial-venezuelan-state-cryptocurrency-petro-is-now-for-sale> [<https://perma.cc/8ST8-FXSJ>]; Kevin Helms, *Maduro Orders Price of Venezuela's 'Cryptocurrency' to More Than Double*, Bitcoin.com (Dec. 2, 2018), <https://news.bitcoin.com/maduro-price-venezuelas-cryptocurrency/> [<https://perma.cc/Z3KT-VYB2>] (observing that the petro is not a true cryptocurrency because its price is being set by the government; 1 petro is intended to equal the price of one barrel of oil).

<sup>59</sup> Sujha Sundarajan, *Australian Government Loots to Blockchain for Trade Modernization*, COINDESK (May 10, 2018, 10:05 AM), <https://www.coindesk.com/australian-government-airs-blockchain-plan-for-trade-modernization/> [<https://perma.cc/RJ3H-FT9J>].

<sup>60</sup> Lester Wan, *Sustainable Sugar: Australia to Employ Blockchain to Boost Provenance and Profitability*, FOODNAVIGATOR-ASIA.COM, (July 31, 2018, 2:09 PM), <https://www.foodnavigator-asia.com/Article/2018/07/31/Sustainable-sugar-Australia-to-employ-blockchain-to-boost-provenance-and-profitability> [<https://perma.cc/53WQ-3U7R>].

<sup>61</sup> Supply chain management is a key area of blockchain research, including but not limited to companies focused on fair trade and sustainability. See e.g., Ian Allison, *IBM's Food Blockchain is Going Live with a Supermarket Giant on Board*, COINDESK, (Oct. 8, 2018, 11:30 AM), <https://www.coindesk.com/ibm-food-supply-chain-blockchain-carrefour-live-production>; Miceal Corkery & Nathaniel Popper, *From Farm to Blockchain: Walmart Tracks*

developing a blockchain-based system to “strengthen supervision of food and drug quality assurance with better traceability and anti-counterfeiting measures.”<sup>62</sup> Similarly, the United Nations announced that it would introduce a blockchain-based system to monitor the movement of food from Djibouti’s port (receipt of shipment) to Ethiopia (location of UN food operations) in an effort to manage its humanitarian food relief efforts, which are susceptible to misuse in war-torn destinations.<sup>63</sup>

Blockchain-based supply chains would provide governments with a vast amount of information that could be valuable for all sorts of regulatory purposes. In the tax scenario, to the extent that governments can develop viable blockchain platforms that provide a valuable service to businesses and consumers without charge, they potentially draw in more parties and private transactions which ultimately allow them to start collecting information leading to tax enforcement.

Returning to the CryptoKitty example, the idea would be that a government would seek to provide a platform to replace either Simplex or Dapper (or both), bypassing financial institutions and setting up a streamlined fiat-to-crypto exchange application and then enlisting the CryptoKitty development team to incorporate its software into their application.<sup>64</sup> The obvious advantage to such an approach is

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Its Lettuce, N.Y. TIMES (Sept. 24, 2018), <https://www.nytimes.com/2018/09/24/business/walmart-blockchain-lettuce.html> [https://perma.cc/NH22-8PZD]; Kim S. Nash, *Walmart-Led Blockchain Effort Seeks Farm to Grocery Aisle View of Food Supply*, WALL ST. JOURNAL: CIO JOURNAL (June 25, 2018, 1:05 PM) <https://blogs.wsj.com/cio/2018/06/25/walmart-led-blockchain-effort-seeks-farm-to-grocery-aisle-view-of-food-supply-chain/> [https://perma.cc/3DYC-LW4P] (explaining that the IBM Food Trust, designed to trace food recalls within minutes of detected problems); Helen Partz, *US Seafood Giant Bumble Bee Foods to Use SAP Blockchain Tech in Supply Chain*, COINTELEGRAPH, (March 8, 2019), <https://cointelegraph.com/news/north-american-seafood-firm-to-use-blockchain-tech-in-supply-chain> [https://perma.cc/U3JY-R7DY].  
<sup>62</sup> Adrian Zmudzinski, *Chinese District Food and Drug Administration to Use Blockchain for Quality Assurance*, COINTELEGRAPH (Feb. 1, 2019), <https://cointelegraph.com/news/chinese-district-food-and-drug-administration-to-use-blockchain-for-quality-assurance> [https://perma.cc/YEC4-FMZ6].

<sup>63</sup> See Anna Baydakova, *UN Food Program to Expand Blockchain Testing to African Supply Chain*, COINDESK (Sept. 26, 2018, 12:00 PM), <https://www.coindesk.com/un-food-program-to-expand-blockchain-testing-to-african-supply-chain> [https://perma.cc/8LEH-AKU5].

<sup>64</sup> Identifying and negotiating with virtual asset providers would be cumbersome. Whether a government might instead require virtual asset providers to use its platform is debatable.

that the government that successfully created such a platform would control all the relevant transactions and no additional reporting or withholding by third parties would be required. The disadvantage would be that other tax authorities would still have to rely on international cooperation in order to get the information they require for their own compliance efforts.

Current state-based smart contract applications are still nascent and it is not clear where they may lead in terms of tax enforcement. In any case, broader social control is likely to be the main consequence, if not the primary object, of these efforts. The extent to which individuals will voluntarily embrace such systems and accept the regulatory consequences thereof—whether tax related or otherwise—is yet to be determined.

## **VI. Conclusion**

Smart contracts, like blockchain technology itself, are a work in progress. It might be too early to undertake a useful analysis of the normative implications of government use of these technologies to either fight, join, or try to dominate the market for virtual assets in direct competition with the ambitions of private law orders. A cautious, responsive approach using the familiar methods of third party withholding and reporting seems most likely to be the one that OECD countries will take, especially given recent developments in the international regulation of financial intermediaries through the Financial Action Task Force. But some states might invest in becoming technological first movers in order to gain more control over virtual asset activities and innovations.

Accordingly, albeit for different reasons, there is little reason to anticipate that tax authorities will successfully implement tax administration goals through smart contract systems. There are still ample ways for governments to effectuate automated digital transfers where the parties to transactions, the transactions, or the platforms are subject to their physical control.

Short of web censorship (which is likely to fail in practice even if it could bypass legal barriers), to date there is little evidence that governments will be able to use any form of technology to gain full control over virtual assets, virtual platforms, or decentralized networks. There is similarly little reason to believe that any government will develop a rival platform to attract private sector transactions away from unregulated alternatives. Instead, the most likely scenario is the road taken to date, which is to narrowly address the worst tax system abuses with familiar safeguards to the best ability of the tax administrator, subject to resource constraints as well as legal barriers. This is a quixotic fight to be sure, but it will be fought until some other political equilibrium emerges.