

## VII. *Regulating the Blockchain Revolution: A Financial Industry Transformation*

### A. Introduction

The development of Bitcoin and its underlying distributed ledger system, the Blockchain, was a monumental revolution in transaction technology.<sup>1</sup> Using Bitcoin, any two parties can organize an instant, peer-to-peer exchange of money almost anywhere in the world without requiring the services of a financial institution.<sup>2</sup> At first glance, Bitcoin appeared to sound a death knell for today's financial services industry.<sup>3</sup> However, industry leaders have quickly responded by attempting to adopt the disruptive technology to supplement their existing services, rather than be displaced by it.<sup>4</sup> In particular, financial technology (FinTech) firms and leading financial institutions have invested millions of dollars in distributed ledger technology (DLT), systems modeled after the Blockchain, to increase efficiency and reduce transactions costs.<sup>5</sup> DLTs have been described as the "internet

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<sup>1</sup> Marc Andreessen, *Why Bitcoin Matters*, N.Y. TIMES: DEALBOOK (Jan. 21, 2014, 11:54 AM), <http://dealbook.nytimes.com/2014/01/21/why-bitcoin-matters/> [<https://perma.cc/R9MW-WEM7>].

<sup>2</sup> SATOSHI NAKAMOTO, BITCOIN: A PEER-TO-PEER ELECTRONIC CASH SYSTEM 1 (2008), <https://bitcoin.org/bitcoin.pdf> [<https://perma.cc/S8XY-MFY2>].

<sup>3</sup> David Andolfatto, *Bitcoin and Beyond: The Possibilities and the Pitfalls of Virtual Currencies*, FED. RES. BANK ST. LOUIS (Mar. 31, 2014), <https://www.stlouisfed.org/dialogue-with-the-fed/the-possibilities-and-the-pitfalls-of-virtual-currencies/videos/part-6-conclusion> [<https://perma.cc/X35H-82ZF>].

<sup>4</sup> See Cade Metz, *Why Wall Street Is Embracing the Blockchain—Its Biggest Threat*, WIRED (Feb. 16, 2016), <https://www.wired.com/2016/02/wall-street-is-embracing-the-blockchain-its-biggest-threat/> [<https://perma.cc/8MPP-8QA5>] ("Wall Street, it appears, has learned the lesson that Silicon Valley and its allies have taught industry after industry over the past few decades: embracing your biggest threat is the only way to prevent yourself from being overturned.").

<sup>5</sup> See, e.g., Press Release, VC Blockchain Investments Approach \$300 million in H1 2016 as Banks Lead Deployments, Juniper Research (Aug. 16, 2016), [https://www.juniperresearch.com/press/press-releases/vc-blockchain-investments-approach-%24300-millio-\(2\)?utm\\_source=juniperpr&utm\\_medium=email&utm\\_campaign=Future\\_Blockchain\\_16\\_PR2](https://www.juniperresearch.com/press/press-releases/vc-blockchain-investments-approach-%24300-millio-(2)?utm_source=juniperpr&utm_medium=email&utm_campaign=Future_Blockchain_16_PR2) [<https://perma.cc/BJ5H-2LHE>] ("[T]he total value of Venture Capital (VC) investment into blockchain technologies and Bitcoin

of value” where “every kind of asset, from money to music, could be stored, moved, transacted, exchanged and managed, all without powerful intermediaries.”<sup>6</sup> While U.S. financial services firms are eager to supplant legacy bank infrastructure with DLTs, the industry faces scarce regulatory guidance for combating operational and systemic risks.<sup>7</sup>

This article will evaluate the impact of distributed ledgers on the U.S. financial industry. Section B provides a historical background of how transactions have been handled before and after the introduction of DLTs. Section C demonstrates specific DLT uses and their respective impacts on the U.S. financial services industry. Next, Section D examines the history of DLT regulation. Finally, Section E reviews current proposals for regulating DLTs.

## **B. Background**

### **1. Transactions Today: Centralized Intermediaries**

In today’s financial system, trusted, centralized intermediaries must verify every transaction we initiate.<sup>8</sup> For example, when using a credit card to buy goods online, merchants receive payment only after

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companies totalled \$290 million in the first 6 months of the year.”); ERNST & YOUNG, IMPLEMENTING BLOCKCHAINS AND DISTRIBUTED INFRASTRUCTURE 2 (2016), [http://www.ey.com/Publication/vwLUAssets/EY-implementing-blockchains-and-distributed-infrastructure/\\$FILE/EY-implementing-blockchains-and-distributed-infrastructure.pdf](http://www.ey.com/Publication/vwLUAssets/EY-implementing-blockchains-and-distributed-infrastructure/$FILE/EY-implementing-blockchains-and-distributed-infrastructure.pdf) [https://perma.cc/3S7S-3394].

<sup>6</sup> Don Tapscott, *How The Blockchain Is Changing Money*, TED (Aug. 2016), [https://www.ted.com/talks/don\\_tapscott\\_how\\_the\\_blockchain\\_is\\_changing\\_money\\_and\\_business/transcript?language=en#t-218685](https://www.ted.com/talks/don_tapscott_how_the_blockchain_is_changing_money_and_business/transcript?language=en#t-218685) [https://perma.cc/6XZ5-QHXV]

<sup>7</sup> See Henry Engler, *Blockchain Faces Maze of Regulatory Complexities, Questions and Challenges*, THOMPSON REUTERS (Feb. 23 2016), <https://blogs.thomsonreuters.com/answeron/blockchain-faces-maze-of-u-s-regulatory-complexities-questions-and-challenges/> [https://perma.cc/99KR-U42L] (observing Charlie Cooper had no idea how R3 CEV should gain regulatory approval of their blockchain applications).

<sup>8</sup> PHILLIP RAPOPORT ET AL., THE RIPPLE PROTOCOL: A DEEP DIVE FOR FINANCE PROFESSIONALS 7 (2014), <https://www.weusecoins.com/assets/pdf/library/Ripple%20Protocol%20-%20Deep%20Dive%20For%20Financial%20Professionals.pdf> [https://perma.cc/5MH7-TAN8].

their credit card network and bank process the transaction.<sup>9</sup> Over 90 percent of the total value of these electronic payments in the United States settle through the Automated Clearing House (ACH) Network.<sup>10</sup> ACH payments typically take one business day to process.<sup>11</sup> Although the ACH has introduced a new rule to allow same day settlement, banks will still likely “charge [consumers] a premium for processing same-day transactions.”<sup>12</sup>

Investors in the stock market must rely on the Depository Trust & Clearing Corporation (DTCC) to settle the “vast majority of [their] securities transactions.”<sup>13</sup> Security transactions take at least three business days to settle through the DTCC.<sup>14</sup> Since financial institutions do not share their internal databases detailing who owns which assets, intermediaries like the ACH Network and DTCC must query the databases of all institutions involved before clearing the

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<sup>9</sup> See Andrew Hinkes, *Blockchains, Smart Contracts, and the Death of Specific Performance*, INSIDE COUNS. (July 29, 2014), <http://www.insidecounsel.com/2014/07/29/blockchains-smart-contracts-and-the-death-of-speci> [<https://perma.cc/PM4E-YQXZ>].

<sup>10</sup> *Same Day ACH: Moving Payments Faster*, NACHA (Sept. 13, 2016), <https://www.nacha.org/rules/same-day-ach-moving-payments-faster> [<https://perma.cc/NEA4-DDF3>].

<sup>11</sup> *What is ACH?: Quick Facts About the Automated Clearing House (ACH) Network*, NACHA (Oct. 1, 2015), <https://www.nacha.org/news/what-ach-quick-facts-about-automated-clearing-house-ach-network> [<https://perma.cc/8QT7-RL7T>].

<sup>12</sup> *Same Day ACH: Moving Payments Faster*, *supra* note 10; Spencer Tierney, *ACH Transfers: How They Work*, NERDWALLET (Mar. 25, 2016), <https://www.nerdwallet.com/blog/banking/ach-transfers/> [<https://perma.cc/AM3P-H7NB>].

<sup>13</sup> Giulio Prisco, *DTCC and Digital Asset Holdings to Test Blockchain Solutions for the \$2.6 Trillion Repo Market*, BITCOIN MAG. (Mar. 30, 2016), <https://bitcoinmagazine.com/articles/dtcc-and-digital-asset-holdings-to-test-blockchain-solutions-for-the-trillion-repo-market-1459358814> [<https://perma.cc/QEZ9-TMJ2>]; DTCC, *EMBRACING DISRUPTION 16* (2016), <http://www.dtcc.com/~media/Files/PDFs/DTCC-Embracing-Disruption.pdf> [<https://perma.cc/4Q2S-Z4WK>].

<sup>14</sup> DTCC, *supra* note 13.

transaction.<sup>15</sup> The process takes time and labor, which results in fees to consumers and merchants.<sup>16</sup>

## 2. The Future: Blockchain and Distributed Ledger Technology

In contrast, parties who transact in Bitcoin share a single public database of real-time ownership of assets—the Blockchain<sup>17</sup>—so reliance on costly, time-consuming intermediaries to confirm title (here, a party’s Bitcoin balance) and to settle transactions is unnecessary.<sup>18</sup> Anyone can access the real-time history of transactions on the Blockchain.<sup>19</sup> The master ledger is constantly replicated across a network of computers, so there is “no central database that can be hacked.”<sup>20</sup> For every transaction, “a record of the change in ownership is immediately inscribed on the [B]lockchain, and payment and settlement of the trade occur simultaneously.”<sup>21</sup> The Blockchain’s cryptography prevents retroactive modifications to the transaction

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<sup>15</sup> Marco A. Santori, *Why Cos. Must Pay Attention to Delaware’s Blockchain Plan*, LAW360 (May 19, 2016, 11:23 AM), <http://www.law360.com/articles/796423/why-cos-must-pay-attention-to-delaware-s-blockchain-plan> [<https://perma.cc/385V-5G7M>].

<sup>16</sup> See RAPOPORT ET AL., *supra* note 8, at 37 (“In the current payments ecosystem, merchants pay a fee for accepting electronic payments called the merchant discount rate (MDR).”).

<sup>17</sup> “A blockchain is a ledger of transactions between parties on a network. The difference between a blockchain and a traditional database is that the ledger is ‘distributed.’ That is, each party on the network maintains a complete copy of the same ledger. The parties all participate collectively in the validation and recordation of transactions on the ledger via a computerized consensus protocol.” Santori, *supra* note 15.

<sup>18</sup> *Id.*

<sup>19</sup> Kevin Petrasic & Matthew Bornfreund, *Beyond Bitcoin: The Blockchain Revolution in Financial Services*, WHITE & CASE (Mar. 7, 2016), <http://www.whitecase.com/publications/insight/beyond-bitcoin-blockchain-revolution-financial-services> [<https://perma.cc/7HK7-8ENK>].

<sup>20</sup> Jonathan Chevreu, *Bitcoin and Blockchain Could be the Start of a Bigger Revolution than the Internet Itself*, FIN. POST (May 6, 2016), <http://business.financialpost.com/news/fp-street/bitcoin-and-blockchain-could-be-the-start-of-a-bigger-revolution-than-the-internet-itself> [<https://perma.cc/7HK7-8ENK>].

<sup>21</sup> Petrasic & Bornfreund, *supra* note 19.

database.<sup>22</sup> Most importantly, the Blockchain removes the need to trust intermediaries like private banks and central banks in verifying transaction data because “information regarding each transaction is transparently held in a digitally shared database in the cloud.”<sup>23</sup>

The Blockchain does have its limitations, since it is only designed to record the movement of a single asset type: Bitcoins.<sup>24</sup> As a result, FinTech firms have looked beyond Bitcoin to develop distributed ledgers capable of transferring currencies,<sup>25</sup> securities,<sup>26</sup> and digital assets<sup>27</sup> using the underlying framework of the Blockchain as a model. As an alternative to public DLTs<sup>28</sup> like the Blockchain, developers have also created private<sup>29</sup> and consortium DLTs.<sup>30</sup> DLTs

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<sup>22</sup> Richard Lumb, *Downside of Bitcoin: A Ledger That Can't Be Corrected*, N.Y. TIMES: DEALBOOK (Sept. 9, 2016), <http://www.nytimes.com/2016/09/10/business/dealbook/downside-of-virtual-currencies-a-ledger-that-cant-be-corrected.html> [https://perma.cc/Q5AZ-BP9M].

<sup>23</sup> Barry Libert et al., *How Blockchain Technology Will Disrupt Financial Services Firms*, KNOWLEDGE@WHARTON (May 24, 2016), <http://knowledge.wharton.upenn.edu/article/blockchain-technology-will-disrupt-financial-services-firms/> [https://perma.cc/M4X7-KAXE].

<sup>24</sup> See Carlo R.W. de Meijer, *Blockchain, Distributed and Shared Ledger, Permissionless and Permissioned*, LINKEDIN: PULSE (Apr. 15, 2016).

<sup>25</sup> See *XRP Portal*, RIPPLE (Sept. 25, 2016), <https://ripple.com/xrp-portal/> [https://perma.cc/2RVW-5ZLY].

<sup>26</sup> See Press Release, Nasdaq Linq Enables First-Ever Private Securities Issuance Documented with Blockchain Technology, Nasdaq (Dec. 30, 2015), <http://ir.nasdaq.com/releasedetail.cfm?releaseid=948326> [https://perma.cc/7T6L-N88E].

<sup>27</sup> See Raunaq Vaisoha, *Colu Launch Taps Bitcoin Blockchain to Digitize Assets, Starting with Music*, COIN TELEGRAPH (Aug. 12, 2015), <https://cointelegraph.com/news/colu-launch-taps-bitcoin-blockchain-to-digitize-assets-starting-with-music> [https://perma.cc/7QDJ-V67V].

<sup>28</sup> A public DLT is one “that anyone in the world can read, anyone in the world can send transactions to and expect to see them included if they are valid, and anyone in the world can participate in the *consensus process*—the process for determining what blocks get added to the chain and what the current state is.” Vitalik Buterin, *On Public and Private Blockchains*, ETHEREUM BLOG (Aug. 7, 2015), <https://blog.ethereum.org/2015/08/07/on-public-and-private-blockchains/> [https://perma.cc/N87S-MCK2].

<sup>29</sup> Private DLTs are those “where write permissions are kept centralized to one organization. Read permissions may be public or restricted to an arbitrary extent. Likely applications include database management, auditing, etc internal to a single company, and so public readability may not be necessary in many cases at all, though in other cases public auditability is desired.” *Id.*

provide many advantages over traditional transaction systems, namely: “security, transparency, full life-cycle transaction history, real-time [transactions], immutability and cost efficiency.”<sup>31</sup>

The appeal of distributed ledgers is also apparent when considering the transaction costs of today’s financial industry.<sup>32</sup> Santander InnoVentures<sup>33</sup> estimates using DLTs to facilitate cross-border payments, securities trading, and regulatory compliance could save the financial sector up to \$20 billion per year by 2022.<sup>34</sup> However, whether FinTech startups will replace historical financial service leaders, or if the leading financial service firms will successfully adapt DLTs to their current business models, is still unclear.<sup>35</sup> Some believe it is only a matter of time before “broader financial services and banking industries [will] shift to [B]lockchain and network-based approaches.”<sup>36</sup>

### C. Potential Uses and Impacts of DLTs

The following subsections introduce and discuss the impact of three potential DLT uses: (1) reducing costs in cross-border payments, (2) providing the technological backbone for self-executing “smart contracts,” and (3) improving regulatory compliance.

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<sup>30</sup> Consortium DLTs are those “where the consensus process is controlled by a pre-selected set of nodes; for example, one might imagine a consortium of 15 financial institutions, each of which operates a node and of which 10 must sign every block in order for the block to be valid.” *Id.*

<sup>31</sup> LORY KEHOE ET AL., DELOITTE, BLOCKCHAIN: DISRUPTING THE FINANCIAL SERVICES INDUSTRY? 2 (2015), [https://www2.deloitte.com/content/dam/Deloitte/ie/Documents/FinancialServices/IE\\_Cons\\_Blockchain\\_1015.pdf](https://www2.deloitte.com/content/dam/Deloitte/ie/Documents/FinancialServices/IE_Cons_Blockchain_1015.pdf) [<https://perma.cc/D584-GCW6>].

<sup>32</sup> MARIANO BELINKY, SANTANDER, THE FINTECH 2.0 PAPER: REBOOTING FINANCIAL SERVICES 15 (2015), <http://santanderinnoventures.com/wp-content/uploads/2015/06/The-Fintech-2-0-Paper.pdf> [<https://perma.cc/TZ37-S5JE>].

<sup>33</sup> Santander InnoVentures is a fund which primarily invested “disruptive innovat[tors] in the FinTech space.” SANTANDER INNOVENTURES, <http://santanderinnoventures.com/> [<https://perma.cc/U3Y6-AXVC>].

<sup>34</sup> *Id.*

<sup>35</sup> See Libert, *supra* note 23.

<sup>36</sup> *Id.*

## 1. Reduced Costs in Cross-Border Payments

One of the groundbreaking uses of DLT is its ability to facilitate inexpensive cross-border payments.<sup>37</sup> To transfer payments overseas, banks currently maintain foreign currency reserves in correspondent accounts in overseas banks.<sup>38</sup> When a bank has no correspondent account in the terminal country, it must use costly intermediary banks to broker the transaction.<sup>39</sup> Most banks rely on the Swift network<sup>40</sup> to facilitate their cross-border transactions in a “secure, standardized and reliable environment.”<sup>41</sup>

At the center of improving cross-border payments with DLT is FinTech start-up Ripple.<sup>42</sup> Ripple uses DLT to allow banks and payment networks to send real-time, cross-border payments.<sup>43</sup> Ripple removes the need for banks to maintain capital-intensive correspondent accounts in overseas banks.<sup>44</sup> Ripple’s public algorithm “automatically matches . . . payment with the best-possible FX

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<sup>37</sup> See Lori Ciavarella, *For Cross-Border Payments, Blockchain Is Like “Email for Money,”* PAYTHINK (June 24, 2016), <http://www.paymentsource.com/news/paythink/for-cross-border-payments-blockchain-is-like-email-for-money-3024465-1.html> [<https://perma.cc/6NZ2-V8MW>].

<sup>38</sup> Fernando L. Aenlle-Rocha, *Correspondent Banking After September 11*, L.A. L. 27 (Sept. 2002).

<sup>39</sup> See *Beneficiary Banks, Intermediary/Corresponding Banks, and Associated Fees*, AIARC (2016), <http://aiarc.org/FAQ-Beneficiary-Intermediary-Correspondent-Banks-and-Associated-Fees> [<https://perma.cc/388N-THVY>].

<sup>40</sup> “Swift provides a network that enables financial institutions to send and receive information about financial transactions in a secure, standardized and reliable environment. The majority of banks use the Swift network to send money. As of September 2010, more than 9,000 financial institutions in 209 countries, were sending and receiving an average of over 15 million messages per day, compared with just 2.4 million a day in 1995.” Chris Skinner, *Will the Blockchain Replace Swift?*, AM. BANKER (Mar. 8, 2016), <http://www.americanbanker.com/bankthink/will-the-blockchain-replace-swift-1079740-1.html> [<https://perma.cc/7D5J-JZBM>].

<sup>41</sup> *Id.*

<sup>42</sup> See Elliot Maras, *Ripple: It’s Time for a Blockchain Cross-Border Payment Network*, CRYPTOCOINS NEWS (July 16, 2016), <https://www.cryptocoinsnews.com/ripple-blockchain-cross-border-payments/> [<https://perma.cc/MRY7-NF6R>].

<sup>43</sup> Ryan Zagone & Wellington Sculley, *Executive Summary for Financial Institutions*, RIPPLE (2016), <https://ripple.com/solutions/executive-summary-for-financial-institutions/> [<https://perma.cc/5ZR8-FAR7>].

<sup>44</sup> *Id.*

[rate].”<sup>45</sup> One suggested use is lowering the fees of remittances.<sup>46</sup> Using Ripple, banks can save 60 percent of their total processing costs on a \$500 payment, significantly increasing the amount of money available to remittance recipients.<sup>47</sup>

Some believe Ripple’s distributed ledger could eventually replace the Swift network for interbank payments.<sup>48</sup> Morgan Stanley has stated that adopting a Ripple-like payment system could “shorten settlement periods, speed up transactions and reduce the risk of fraud.”<sup>49</sup> Morgan Stanley considers Ripple to be a leading international payment alternative to Swift.<sup>50</sup>

## 2. Self-Executing “Smart Contracts”

Another highly touted DLT innovation is the smart contract.<sup>51</sup> Ethereum, a well-known leader in smart contracts, allows users to execute transactions based on messages transferred on a DLT.<sup>52</sup> For example, vehicle financing companies have contemplated using smart contracts to keep track of car finance payments.<sup>53</sup> When a customer fails to make a timely payment, a smart contract could automatically

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<sup>45</sup> *Id.*

<sup>46</sup> See *Use Case: Retail Remittances*, RIPPLE, <https://ripple.com/solutions/retail-remittances/> [<https://perma.cc/BM7X-SS7B>] (“Ripple’s fee pre-disclosure, status tracking and payment confirmation enables banks to provide a low-cost remittance service to attract new clients with an improved customer experience.”).

<sup>47</sup> *Id.*

<sup>48</sup> Skinner, *supra* note 40.

<sup>49</sup> MORGAN STANLEY, GLOBAL INSIGHT: BLOCKCHAIN IN BANKING: DISRUPTIVE THREAT OR TOOL? 6 (2016), <http://www.the-blockchain.com/docs/Morgan-Stanley-blockchain-report.pdf> [<https://perma.cc/9XAL-8N8U>].

<sup>50</sup> *Id.*

<sup>51</sup> See Josh Stark, *Making Sense of Blockchain Smart Contracts*, COINDESK (June 4, 2016), <http://www.coindesk.com/making-sense-smart-contracts/> [<https://perma.cc/A7LA-Y86L>].

<sup>52</sup> See Paul Vigna, *BitBeat: Ethereum Opens Its ‘Frontier’ for Business*, WALL ST. J.: MONEYBEAT (July 31, 2015, 3:19 PM), <http://blogs.wsj.com/moneybeat/2015/07/31/bitbeat-ethereum-opens-its-frontier-for-business/> [<https://perma.cc/H2FX-6GZE>].

<sup>53</sup> See Peter Coy & Olga Kharif, *This Is Your Company on Blockchain*, BLOOMBERG (Aug. 25, 2016), <http://www.bloomberg.com/news/articles/2016-08-25/this-is-your-company-on-blockchain> [<https://perma.cc/554B-K7XE>].



transfer title back to the financing company and prevent a vehicle from starting.<sup>54</sup> In the future, smart contracts could eliminate the need for financial clearing houses and escrow agents because financial markets could trade “fully-digital assets across blockchain networks, with the terms of those trades enforced by code.”<sup>55</sup>

### 3. Improving Regulatory Compliance

Distributed ledgers also have a use in improving regulatory compliance.<sup>56</sup> Transaction records on the ledger would “create an audit trail for regulators to verify compliance” in real time.<sup>57</sup> For example, regulators could have used DLT records to allow for a “far prompter, better-informed and more calibrated regulatory intervention [to the financial crisis in 2008] instead of the disorganized response that unfortunately ensued.”<sup>58</sup> Financial institutions could use public ledger history to significantly reduce the time dedicated to anti-money laundering and know-your-customer procedures when onboarding new clients.<sup>59</sup>

#### D. Current Regulation: Virtual Currencies

Currently, regulation is not targeted at DLTs themselves, but rather at the use of virtual currencies on such DLTs.<sup>60</sup> While virtual currencies are not necessary for a DLT to operate, they do serve a

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<sup>54</sup> *Id.*

<sup>55</sup> Josh Stark, *How Close Are Smart Contracts to Impacting Real-World Law?*, COINDESK (Apr. 11, 2016), <http://www.coindesk.com/blockchain-smarts-contracts-real-world-law/> [<https://perma.cc/XX9P-BM4U>].

<sup>56</sup> See Cliff Moyce, *How Blockchain Can Revolutionize Regulatory Compliance*, CORP. COMPLIANCE INSIGHTS (Aug. 10, 2016), <http://corporatecomplianceinsights.com/blockchain-regulatory-compliance/> [<https://perma.cc/BGW2-Q7S7>].

<sup>57</sup> *Id.*

<sup>58</sup> J. Christopher Giancarlo, *Comment: With Blockchain, Regulators Should First Do No Harm*, FIN. TIMES (Apr. 12, 2016), <https://www.ft.com/content/8090cc80-fff6-11e5-99cb-83242733f755> [<https://perma.cc/NXA6-NXQ6>].

<sup>59</sup> Moyce, *supra* note 56.

<sup>60</sup> Eric Sibbitt et al., *Blockchain and Financial Services: Hype or Herald?*, LEXOLOGY (Nov. 8, 2016), <http://www.lexology.com/library/detail.aspx?g=ff07a4e6-e120-4fc5-adeb-c3f122e947ce> [<https://perma.cc/2FK8-E5EE>].

variety of complementary functions.<sup>61</sup> For instance, Ripple's XRP currency: (1) operates as a bridge currency in foreign exchange transactions,<sup>62</sup> (2) imposes costs on ledger spamming,<sup>63</sup> and (3) awards activities seen as beneficial to the distributed ledger network.<sup>64</sup>

At the federal level, Financial Crimes Enforcement Network (FinCEN), the Commodity Futures Trading Commission (CFTC), and the Internal Revenue Service (IRS) regulate virtual currencies as currency, commodities, and property, respectively.<sup>65</sup> The inconsistent legal status of virtual currencies is a barrier to DLT adoption in the United States because developers are unable to determine how to “transfer[] and grant[] security over interests in such assets;” judge their “treatment in insolvency;” or apply “insolvency protection.”<sup>66</sup>

At the state level, few legislatures have adopted a regulatory framework for virtual currencies.<sup>67</sup> New York is at the forefront regulating FinTech firms through its BitLicense charter, which regulates firms dealing in virtual currencies.<sup>68</sup> New York granted its second BitLicense to Ripple on June 13, 2016.<sup>69</sup>

### E. Future Regulation: Distributed Ledgers

Very little regulatory guidance exists on distributed ledgers themselves, which are predicted to have a much “greater impact than the virtual currencies derived from [them].”<sup>70</sup> The Financial Stability

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<sup>61</sup> See generally *XRP Portal*, *supra* note 25.

<sup>62</sup> *Id.*

<sup>63</sup> *Id.*

<sup>64</sup> *Id.*

<sup>65</sup> *The Arduous Task of Regulating Bitcoin*, STRATFOR (Aug. 3, 2016), <https://www.stratfor.com/analysis/arduous-task-regulating-bitcoin> [<https://perma.cc/TY87-GYZF>].

<sup>66</sup> WORLD FED'N OF EXCHS., FINANCIAL MARKET INFRASTRUCTURES AND DISTRIBUTED LEDGER TECHNOLOGY 6–7 (2016), <https://www.world-exchanges.org/home/index.php/files/18/Studies%20-%20Reports/349/WFE%20IOSCO%20AMCC%20DLT%20report.pdf> [<https://perma.cc/DMU4-K682>].

<sup>67</sup> *The Arduous Task of Regulating Bitcoin*, *supra* note 65.

<sup>68</sup> *Id.*

<sup>69</sup> Pete Rizzo, *New York Regulators Grant Second BitLicense to Ripple*, COINDESK (June 13, 2016), <http://www.coindesk.com/new-york-bitlicense-ripple/> [<https://perma.cc/VL92-RKSD>].

<sup>70</sup> *The Arduous Task of Regulating Bitcoin*, *supra* note 65.

Oversight Council<sup>71</sup> has noted DLTs may provide numerous benefits to the financial services industry, but the innovation may also “pose . . . risks which market participants and . . . regulators will need to monitor.”<sup>72</sup> Distributed ledgers have introduced two concerns: operational risks and systemic risks.<sup>73</sup> One example of operational risk is DLT’s susceptibility to a 51 percent attack.<sup>74</sup> These attacks “come from parties who control at least 51% of the computing power that the . . . system uses to validate transactions and create the blockchain (or transaction ledger).”<sup>75</sup> As for systemic risk, regulators worry about the stability of the financial system as distributed ledgers “reduce the importance of . . . centralized intermediaries.”<sup>76</sup> Regulators concede “vulnerabilities associated with [DLTs] may not become apparent until they are deployed at scale.”<sup>77</sup>

This lack of regulatory clarity is holding back real-world DLT implementation in financial services.<sup>78</sup> In a DLT world, transactions will settle instantly without the need for centralized intermediaries.<sup>79</sup> Therefore, regulators will need to revisit contemporary rules, which are premised on the necessity of these intermediaries.<sup>80</sup> For example, DLT companies are unsure whether to

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<sup>71</sup> The Financial Stability Oversight Council is a department within the U.S. Treasury made up of a “collaborative body . . . bring[ing] together the expertise of the federal financial regulators, . . . insurance expert[s] . . . , and state regulators” to “constrain excessive risk in the [U.S.] financial system.” *About FSOC*, FIN. STABILITY OVERSIGHT COUNCIL (2016), <https://www.treasury.gov/initiatives/fsoc/about/Pages/default.aspx> [<https://perma.cc/67AQ-GSZ9>].

<sup>72</sup> FIN. STABILITY OVERSIGHT COUNCIL, 2016 ANN. REP. 127 (2016), <http://www.treasury.gov/initiatives/fsoc/studies-reports/Documents/FSOC%202016%20Annual%20Report.pdf> [<https://perma.cc/X9EW-Z4Q4>].

<sup>73</sup> See Angela Watch, *The Bitcoin Blockchain As Financial Market Infrastructure: A Consideration of Operational Risk*, 18 N.Y.U. J. LEGIS. & PUB. POL’Y 837, 854 (2015).

<sup>74</sup> *Id.* at 861.

<sup>75</sup> *Id.*

<sup>76</sup> FIN. STABILITY OVERSIGHT COUNCIL, *supra* note 72.

<sup>77</sup> *See id.*

<sup>78</sup> See Huw Jones, *Exchanges Call for Regulatory Clarity over Blockchain Use*, REUTERS (Aug. 25, 2016), <http://www.reuters.com/article/us-exchange-regulations-blockchain-idUSKCN11017Q> [<https://perma.cc/NGD6-4DMC>].

<sup>79</sup> *See* Engler, *supra* note 7.

<sup>80</sup> FIN. STABILITY OVERSIGHT COUNCIL, *supra* note 72.

apply the “settlement finality”<sup>81</sup> rules of the Securities Exchange Commission (SEC) or the CFTC.<sup>82</sup>

In response to regulatory uncertainty, Congress and federal agencies are currently considering four competing regulatory proposals: (1) sandbox regulation, (2) do no harm and principles-based regulation, (3) regulation by a single, centralized agency authority, and (4) regulation by federal charter.<sup>83</sup>

### 1. **Sandbox Regulation and The Do No Harm Approach**

In a move to prevent a loss of FinTech business to the United Kingdom’s “sandbox” regulatory regime, U.S. House Representative Patrick McHenry introduced a bill proposing an American sandbox approach to regulating FinTech firms in September 2016.<sup>84</sup> Sandbox style regulation would allow DLT firms to work side-by-side with regulators to “test a new product or business model with a limited launch, without going through the full regulatory process.”<sup>85</sup> The bill calls for several federal agencies to establish “Financial Services Innovation Offices” within their respective agencies, which would work in concert to approve FinTech products and services.<sup>86</sup> Innovators would need to prove to regulators that their product serves a public interest, improves access to financial products or services, and does not pose systemic risk to consumers or the financial system.<sup>87</sup>

A sandbox approach would allow DLT developers to request changes to existing rules at any participating agency.<sup>88</sup> Sandbox

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<sup>81</sup> Santori, *supra* note 15 (“Settlement finality refers to the point in time where the definitive transfer of ownership—not merely custody—occurs between parties to a transaction. Practically, it is the point at which settlement instructions are irrevocable and the transaction becomes irreversible.”).

<sup>82</sup> Engler, *supra* note 7.

<sup>83</sup> See *infra* notes 86, 94, 99, 114 and accompanying text.

<sup>84</sup> Financial Services Innovation Act of 2016, H.R. 6118, 114th Cong. (2016); Rachel Witkowski, *U.S. House Bill Aims to Set Up ‘Sandbox’ for Fintech Innovation*, WALL. ST. J. (Sept. 22, 2016), <http://www.wsj.com/articles/u-s-house-bill-aims-to-set-up-sandbox-for-fintech-innovation-1474539893> [<https://perma.cc/QW7M-3WZM>].

<sup>85</sup> Witkowski, *supra* note 84.

<sup>86</sup> *Id.*

<sup>87</sup> *Id.*

<sup>88</sup> Elizabeth Dexheimer, *Every Regulator Gets a Piece of Fintech Under Lawmaker’s Plan*, BLOOMBERG (Sept. 22, 2016), <http://www.bloomberg.com/news/articles/2016-09-22/every-regulator-gets-a-piece-of-fintech-under-lawmaker-s-plan>.

regulation also ensures regulators would stay in sync with the pace of new DLT products.<sup>89</sup> However, a multi-agency approach to regulation has proven to be difficult in the past, as evidenced by the slow pace of rulemaking by multiple agencies for the Dodd-Frank Act.<sup>90</sup> DLT proponents are concerned industry “popularity could overwhelm . . . regulators,” further delaying the approval process.<sup>91</sup>

## 2. Do No Harm: Principles-Based Approach

CFTC Commissioner J. Christopher Giancarlo has endorsed a regulatory model somewhat similar to sandbox regulation—the “do no harm” approach.<sup>92</sup> Giancarlo believes the “do no harm” approach to the Internet, where the U.S. government allowed the private sector to take the lead in early innovation, would serve as a good model for distributed ledger adoption.<sup>93</sup> Under this regulatory framework, companies would “not have to seek government’s permission, only its forbearance, to develop DLT [products] . . . .”<sup>94</sup> However, Giancarlo goes a step further than sandbox regulation by calling upon cooperation between U.S. and international regulatory bodies to formulate principle-based rules to provide “flexibility, certainty and harmonization necessary for [DLT] to flourish.”<sup>95</sup> Under principle-based regulation, regulators would forgo “rigid application of existing rules designed for a bygone technological era” and foster a “predictable, consistent and straightforward legal environment . . . .” for DLT innovators.<sup>96</sup>

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[bloomberg.com/news/articles/2016-09-22/every-regulator-gets-a-piece-of-fintech-under-lawmaker-s-plan](http://bloomberg.com/news/articles/2016-09-22/every-regulator-gets-a-piece-of-fintech-under-lawmaker-s-plan) [<https://perma.cc/M2XY-K6MP>].

<sup>89</sup> *Id.*

<sup>90</sup> *Id.*

<sup>91</sup> Witkowski, *supra* note 84.

<sup>92</sup> See J. Christopher Giancarlo, Commissioner, Commodities Futures Trading Comm’n, Special Address Before the Depository Trust & Clearing Corporation 2016 Blockchain Symposium: Regulators and the Blockchain: First, Do No Harm (Mar. 29, 2016), <http://www.cftc.gov/PressRoom/SpeechesTestimony/opagiancarlo-13> [<https://perma.cc/2BLS-XRSX>].

<sup>93</sup> *Id.*

<sup>94</sup> *Id.*

<sup>95</sup> *Id.*

<sup>96</sup> *Id.*

### 3. OCC Office of Innovation

On March 31, 2016, the Office of the Comptroller of the Currency (OCC) released its *Reasonable Innovation* whitepaper, proposing creation of a centralized “Office of Innovation” within the OCC.<sup>97</sup> The office would be a one-stop-shop for DLT developers to “vet ideas before . . . mak[ing] a formal request or launch[ing] an innovative product or service.”<sup>98</sup> The OCC believes meetings between innovators and OCC officers could address early “supervisory, policy, legal or precedent-setting issues, or concerns.”<sup>99</sup>

Supporters argued the office could improve communication between innovators and the OCC, possibly lowering the inconsistencies and inefficiencies of the current procedure where banks individually contact examiners or agency experts for different subject matters.<sup>100</sup> One FinTech firm welcomed the idea of the office because it could quickly identify risks, communicate such risks to the federal banking sector, and articulate mitigation procedures for such risks.<sup>101</sup>

Some feared the Office of Innovation could become a “gatekeeper that innovative companies must receive approval from to participate in the market.”<sup>102</sup> Fearing increased regulatory fragmentation, some companies asked the OCC to collaborate with

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<sup>97</sup> OFFICE OF THE COMPTROLLER OF THE CURRENCY, SUPPORTING RESPONSIBLE INNOVATION IN THE FEDERAL BANKING SYSTEM: AN OCC PERSPECTIVE 6 (2016).

<sup>98</sup> *Id.*

<sup>99</sup> *Id.*

<sup>100</sup> See George A. LeMaistre, *OCC Releases White Paper Discussing Plans for Understanding and Evaluating Financial Technology Innovations*, NAT’L L. REV. (Apr. 14, 2016), <http://www.natlawreview.com/article/occ-releases-white-paper-discussing-plans-understanding-and-evaluating-financial> [<https://perma.cc/4DKE-EVPX>].

<sup>101</sup> Juan Suarez, Counsel, Coinbase, Response Letter to Questions in Supporting Reasonable Innovation in the Federal Banking System: An OCC Perspective to Office of the Comptroller of the Currency (June 1, 2016), <https://www.occ.gov/topics/bank-operations/innovation/comment-coinbase-letter.pdf> [<https://perma.cc/5VEW-KJXY>].

<sup>102</sup> BRIAN KNIGHT, GEO. MASON U., REGULATING FINTECH: CREATING A REGULATORY REGIME THAT ENABLES INNOVATION WHILE PROVIDING APPROPRIATE CONSUMER PROTECTION 6 (2016), <https://www.mercatus.org/system/files/Knight-OCC-Comment-v1.pdf> [<https://perma.cc/F2Q3-QVEL>].

other regulatory agencies in the United States and abroad.<sup>103</sup> Others requested the OCC to ensure the new office keeps channels of communication open with nonbank innovators.<sup>104</sup>

On October 26, 2016, the OCC announced it would establish its proposed Office of Innovation and implement a formal regulatory framework for financial innovation companies.<sup>105</sup> The Office of Innovation's framework will fulfill five core functions: it will "(1) serve as a central point of contact and facilitate responses to inquiries and requests; (2) conduct outreach and provide technical assistance; (3) enhance awareness, culture and education; (4) monitor the evolving financial services landscape; and (5) collaborate with domestic and international regulators."<sup>106</sup>

In response to fears the office would "result[] in another regulatory hurdle or . . . silo" the OCC determined "a stand-alone office reporting directly to the Comptroller's Office would be the most effective option for implementing [its] framework."<sup>107</sup> Office of Innovation staff will be placed in New York, San Francisco, and Washington, D.C.<sup>108</sup> Occasional outreach events and "office hours" will take place in technology hubs like Austin, Raleigh-Durham, and Seattle.<sup>109</sup> In terms of concrete technical assistance offered, the new office will provide guidance on "regulatory principles, process, and expectations" and "design[] 'rules of the road' material for nonbanks."<sup>110</sup> The Office of Innovation has plans to leverage existing interagency channels with domestic regulators, like the Consumer Financial Protection Bureau, and international regulators, such as the

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<sup>103</sup> Suarez *supra* note 101, at 2.

<sup>104</sup> Charley Cooper, R3, Response Letter to Questions in Supporting Reasonable Innovation in the Federal Banking System: An OCC Perspective (May 31, 2016) <https://occ.gov/topics/bank-operations/innovation/r3-response-to-occ-responsible-innovation.pdf> [<https://perma.cc/NF3M-B78L>] ("The OCC and nonbank innovators should maintain an open dialogue so that both can evolve together.").

<sup>105</sup> See OFFICE OF THE COMPTROLLER OF THE CURRENCY, RECOMMENDATIONS AND DECISIONS FOR IMPLEMENTING A RESPONSIBLE INNOVATION FRAMEWORK (Oct. 26, 2016).

<sup>106</sup> See *id.* at 4.

<sup>107</sup> *Id.* at 5.

<sup>108</sup> *Id.* at 5.

<sup>109</sup> *Id.*

<sup>110</sup> *Id.* at 8.

United Kingdom’s Prudential Regulatory Authority and Financial Conduct Authority.<sup>111</sup>

#### F. OCC FinTech Charter

On September 13, 2016, the OCC published a notice of proposed rulemaking and request for public comment to gauge interest in a federal charter system for FinTech companies.<sup>112</sup> Under the plan, the OCC would retain receivership power over a chartered FinTech company that fails.<sup>113</sup> Receivership power would allow the OCC to regulate nondepository financial institutions—especially nondepository DLT innovators—without requesting FDIC approval.<sup>114</sup>

FinTech firms have lobbied for a limited-purpose federal charter to avoid compliance with different regulatory regimes of every state in which they operate.<sup>115</sup> State regulators oppose the OCC’s proposed FinTech charter because “a federal charter could be seen as validating business models on a national basis before they have proven they can withstand a crisis.”<sup>116</sup> State regulators are also concerned a federal charter would preempt state “authority to enforce consumer protection and licensing laws.”<sup>117</sup> Governor Lael Brainard of the Federal Reserve has indicated “new business models associated with evolving financial technologies ha[ve] raised questions about the applicability of existing licenses and their adequacy to new business models.”<sup>118</sup>

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<sup>111</sup> *Id.* at 13–14.

<sup>112</sup> *See* OCC, Receiverships for Uninsured National Banks, 81 Fed. Reg. 62,835, 62,835 (Sept. 13, 2016).

<sup>113</sup> Lalita Clozel, *OCC Takes Big Step Toward Creation of Fintech Charter*, AM. BANKER (Sept. 13, 2016), <http://www.americanbanker.com/news/law-regulation/occ-takes-big-step-toward-creation-of-fintech-charter-1091298-1.html> [<https://perma.cc/6ZNC-74T4>].

<sup>114</sup> *Id.*

<sup>115</sup> Lalita Clozel, *State Regulators Balk at OCC Fintech Charter*, AM. BANKER (Aug. 19, 2016), <http://www.americanbanker.com/news/law-regulation/state-regulators-balk-at-occ-fintech-charter-1090823-1.html> [<https://perma.cc/V2Q6-3Q2R>].

<sup>116</sup> *Id.*

<sup>117</sup> *Id.* (“Massachusetts Commissioner of Banks David Cotney also said a federal charter could trump state consumer protection and licensing rules, which would be ‘the beginning of a race to the bottom.’”).

<sup>118</sup> Lael Brainard, Governor, Bd. Governor Fed. Res. Sys., At the Institute of International Finance Annual Meeting Panel on Blockchain, Washington,



In the October 26, 2016 press release approving of the creation of the Office of Innovation, the OCC explained there remains “no determination regarding chartering of [nonbank financial technology companies].”<sup>119</sup>

### G. Conclusion

Given the lack of any formalized regulatory structure in the federal government, it remains to be seen which approach to regulation will be the most effective. More research is needed to determine what substantive regulations will be best for balancing risk and innovation.<sup>120</sup> One area of potential interest will be the difference in regulation of private, public, and consortium DLTs, all which have varying degrees of privacy and decentralization.<sup>121</sup> This research must be done quickly. The United Kingdom has already implemented a sandbox approach to FinTech regulation.<sup>122</sup> New York needed two years to write and implement substantive regulations for virtual currencies.<sup>123</sup> The United States cannot wait two years if it wants to gain first mover advantage in developing a robust regulatory regime for DLT innovation.

Harold Primm<sup>124</sup>

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D.C.: Distributed Ledger Technology: Implications for Payments, Clearing, and Settlement (Oct. 7, 2016), <https://www.federalreserve.gov/newsevents/speech/brainard20161007a.htm> [<https://perma.cc/V99B-SDGZ>].

<sup>119</sup> Press Release, Office of the Comptroller of the Currency, OCC Issues Responsible Innovation Framework (Oct. 29, 2016), <https://www.occ.gov/news-issuances/news-releases/2016/nr-occ-2016-135.html> [<https://perma.cc/XQ24-RA4A>].

<sup>120</sup> The OCC stresses the need for improving its “ability to identify, understand, and respond to innovations, emerging trends, and related risks in the financial services industry.” OCC, *supra* note 105.

<sup>121</sup> See generally Buterin, *supra* note 28.

<sup>122</sup> See Witkowski, *supra* note 84.

<sup>123</sup> See Press Release, Governor’s Press Off., Governor Cuomo Announces Approval of First U.S.-Based Ethereum Exchange, Created and Operated in New York (May 4, 2016), <https://www.governor.ny.gov/news/governor-cuomo-announces-approval-first-us-based-ethereum-exchange-created-and-operated-new> [<https://perma.cc/2PME-N7TZ>].

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