

Bitcoin, Virtual Currencies, and the Struggle of Law and Regulation to Keep Pace

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BITCOIN, VIRTUAL CURRENCIES, AND THE STRUGGLE OF LAW AND REGULATION TO KEEP PACE

LAWRENCE J. TRAUTMAN*

At less than a decade old, Bitcoin and other virtual currencies have had a major societal impact, and proven to be a unique payment systems challenge for law enforcement, financial regulatory authorities worldwide, and the investment community. Rapid introduction and diffusion of technological changes throughout society, such as the blockchain that serves as Bitcoin's crypto-foundation, continue to exceed the ability of law and regulation to keep pace. During 2017 alone, the market price of Bitcoin rose 1,735%, from about \$970 to \$14,292, causing an investor feeding frenzy. As of September 11, 2018, a total of 1,935 cryptocurrencies are reported, having an approximate market capitalization of \$191.54 billion at that date. A brief history of the fast moving adoption of blockchain-based technology is provided, along with a look at the efforts of regulators to keep up with the staggering worldwide growth in the usage of virtual currencies.

In the United States, enforcement actions for violations of law involving virtual currencies are brought primarily by: The Commodity Futures Trading Commission (CFTC); The Securities and Exchange Commission (SEC); and The Department of The Treasury through the Financial Crimes Enforcement Network (FinCEN). This Article contributes to the literature and our understanding of the constant struggle of law and regulation to keep pace with rapid technological developments.

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I. OVERVIEW

At less than a decade old, Bitcoin and other virtual currencies have had a major impact and have proven to be a unique payment systems challenge for law enforcement, financial regulatory authorities worldwide, and the investment community. Rapid introduction and diffusion of technological changes throughout society, such as the blockchain that serves as Bitcoin's crypto-foundation, continue to exceed the ability of law and regulation to keep pace. During 2017 alone, the market price of Bitcoin rose 1,735%, from about \$970 to \$14,292, causing an investor feeding frenzy.¹

Elsewhere, with Alvin Harrell, I have presented a discussion of the history of money, barter, the evolution of primitive money, the development and regulatory schematic of money in the United States, and of modern payment

1. Paul Vigna, *For Bitcoin, a Year Like No Other*, WALL ST. J., Jan. 2, 2018, at R1; see *infra* Exhibits 1–2.

system and regulation.² I will not reproduce this information here. Rather, provided here is a brief history and update about the fast-moving adoption of blockchain-based technology and the efforts of regulators to keep up with the staggering worldwide growth in the usage of virtual currencies. In the United States, enforcement actions for violations of law involving virtual currencies are brought primarily by: The Commodity Futures Trading Commission (CFTC); The Securities and Exchange Commission (SEC); and the Department of the Treasury through the Financial Crimes Enforcement Network (FinCEN). This Article contributes to the literature and our understanding of the constant struggle of law and regulation to keep pace with rapid technological developments.

This Article addresses the financial and legal implications of Bitcoin and virtual currencies, and proceeds as follows: First, a description of the evolution of virtual currencies is provided along with a discussion of their technological foundation, the blockchain. The rapid adoption worldwide of digital currencies including Bitcoin, Ethereum, and Ripple is also noted. Second is a discussion of the rapid pace of technological change and the struggle of law and regulation to keep pace, with a recognition that the current inflection point of Internet-related technology may prove ultimately to be as significant as the advent of the Guttenberg printing press or the Industrial Revolution. Third is a look at the U.S. financial system—Federal Reserve and banking system, U.S. Department of the Treasury, CFTC, state regulation—and implications for virtual currencies. The ongoing debate about classification of virtual currencies as currency, security, or commodity is then reviewed, along with current determination for U.S. regulatory purposes. Fourth, I focus on the role of the SEC and their efforts to protect investors from fraud involving virtual currency scams. Topics covered here include: initial coin offerings (ICOs); the DAO; SEC enforcement actions; status of virtual currency Exchange Traded Funds (ETFs); the Winklevoss Registration Statement; SolidX Bitcoin Trust Registration Statement; and the cyber threat to industry, securities markets, and virtual currencies. Fifth is a discussion of the regulatory role of the CFTC, including enforcement. Sixth is a look at the present state of regulatory developments, including progress made with the Uniform Regulation of Virtual-Currency Businesses Act (URVCBA). And finally, I conclude.

2. See generally Lawrence J. Trautman & Alvin C. Harrell, *Bitcoin Versus Regulated Payment Systems: What Gives?*, 38 CARDOZO L. REV. 1041 (2017).

II. BITCOIN AND VIRTUAL CURRENCIES

Speaking broadly, cryptocurrencies purport to be items of inherent value (similar, for instance, to cash or gold) that are designed to enable purchases, sales and other financial transactions. Many are promoted as providing the same functions as long-established currencies such as the U.S. dollar but without the backing of a government or other body. While cryptocurrencies currently being marketed vary in different respects, proponents of cryptocurrencies often tout their novelty and other potential beneficial features, including the ability to make transfers without an intermediary and without geographic limitation and lower transaction costs compared to other forms of payment.³

Jay Clayton

Chairman, U.S. Securities and Exchange Commission

February 6, 2018

Virtual Currencies

The genesis of *virtual currencies* may date back to a 1982 cryptography journal article by David Chaum.⁴ An early experiment known as DigiCash was founded in 1990 by Mr. Chaum, but unfortunately, it failed in 1999.⁵ Next, the advent of virtual or synthetic worlds came about through multiplayer online games as early as at least 1996, “with each such world having a distinct economy, with assets, production, and commerce reflecting real life Earth economies.”⁶ Elements of online virtual currencies are found in early Massively

3. *Chairman’s Testimony on Virtual Currencies: The Roles of the SEC and CFTC: Before the S. Comm. on Banking, Housing, and Urban Affairs*, 115th Cong. (Feb 6, 2018) (statement of Jay Clayton, Chairman, Securities & Exch. Comm.).

4. See David Chaum, *Blind Signatures for Untraceable Payments*, in *ADVANCES IN CRYPTOLOGY: PROCEEDINGS OF CRYPTO 82*, at 199, 199 (David Chaum et al. eds., 1982).

5. See Trautman & Harrell, *supra* note 2, at 1051.

6. *Id.* at 1042 (citing Edward Castronova, *On Virtual Economies* (CESifo Working Paper Series No. 752, 2002), <http://ssrn.com/abstract=338500> [<https://perma.cc/67GD-QCY3>]); accord Thomas P. Novak, *Quality of Virtual Life*, in *TRANSFORMATIVE CONSUMER RESEARCH FOR PERSONAL AND COLLECTIVE WELL-BEING* 225, 225 (David Glen Mick et al. eds., 2012); BRIAN E. MENNECKE ET AL., *SECOND LIFE AND OTHER VIRTUAL WORLDS: A ROADMAP FOR RESEARCH*, 28TH INT’L CONF. ON INFO. SYSTEMS (2007), <http://ssrn.com/abstract=1021441> [<https://perma.cc/TQT9-ZAG8>]; see also DAVID A. BRAY & BENN R. KONSYNSKI, *VIRTUAL WORLDS, VIRTUAL ECONOMIES, VIRTUAL INSTITUTIONS, VIRTUAL WORLDS AND NEW REALITIES CONF. AT EMORY U.* (2008), <http://ssrn.com/abstract=962501> [<https://perma.cc/5FJ9-FWZT>]; Viktor Mayer-Schönberger & John Crowley, *Napster’s Second Life?: The Regulatory Challenges of Virtual Worlds*, 100 NW. U. L. REV. 1775, 1779–80 (2006).

Multiplayer Online Games (MMOGs) such as *Second Life*⁷ and *World of Warcraft* and its progeny.⁸ The U.S. Government Accountability Office (GAO) reports, “[t]here are no legal definitions for a virtual economy or currency”; the GAO also has stated that “[a] *virtual currency* is, generally, a digital unit of exchange that is not backed by a government-issued legal tender.”⁹ Inherent in this concept and definition is the fact that *virtual currency* lacks status as legal tender, and therefore depends for use and value upon a general acceptability in voluntary transactions. Subject to this limitation, however, “[v]irtual currencies can be used entirely within a virtual economy, or can be used in lieu of a government-issued currency to purchase goods and services in the real economy.”¹⁰ The FinCEN, a division of the U.S. Department of the Treasury, defines *virtual currency* as “those currencies that operate like a currency in some environments, but does not have legal tender status in any jurisdiction.”¹¹ A more comprehensive definition offered by The Financial Action Task Force is:

a digital representation of value that can be digitally traded and functions as (1) a medium of exchange; and/or (2) a unit of account; and/or (3) a store of value, but does not have legal tender status (i.e., when tendered to a creditor, is a valid and legal offer of payment) in any jurisdiction. It is not issued or

7. See SECOND LIFE, <http://secondlife.com/> [<https://perma.cc/YLE2-V5BW>] (last visited Oct. 15, 2018).

8. See Trautman & Harrell, *supra* note 2, at 1042 (citing Lawrence J. Trautman, Avatar Capital and the Virtual Economy (Oct. 30, 2016) (unpublished manuscript) (observing that the original Warcraft game, *Warcraft: Orcs & Humans*TM, was followed in 1995 with an epic sequel, *Warcraft II: Tides of Darkness*TM, and then *Warcraft III: Reign of Chaos*[®] (July 2002), along with its expansion, *Warcraft III: The Frozen Throne*[®] (July 2003), followed by a long succession of titles including *World of Warcraft: Warlords of Draenor*TM (2014)); see also Sukwon Thomas Kim, Why Bitcoin?: Structure and Efficiency of Markets for Online Game Currency (Dec. 18, 2013) (unpublished manuscript), <https://ssrn.com/abstract=2334000> [<https://perma.cc/8XL4-HQ8X>]; *Blizzard Timeline*, BLIZZARD ENT., <http://us.blizzard.com/en-us/company/about/b20/timeline.html> [<https://perma.cc/DB3Z-6XM8>] (last visited Oct. 20, 2018). Note titles and add-ons continue to be released, including *Battle for Azeroth* (2018).

9. See U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-13-516, VIRTUAL ECONOMIES AND CURRENCIES: ADDITIONAL IRS GUIDANCE COULD REDUCE TAX COMPLIANCE RISKS 3 (2013) (emphasis added).

10. *Id.*

11. Lawrence Trautman, *Virtual Currencies; Bitcoin & What Now After Liberty Reserve, Silk Road, and Mt. Gox?*, 20 RICH. J. L. & TECH. 1, 3 (2014) [hereinafter Trautman, *Virtual Currencies*] (citing *Beyond Silk Road: Potential Risks, Threats, and Promises of Virtual Currencies: Hearings Before the S. Comm. on Homeland Security & Governmental Affairs*, 113th Cong. 5–6 (2013) (statement of Jennifer Shasky Calvery, Director, Fin. Crimes Enforcement Network, U.S. Dep't of the Treasury)); accord DEP'T OF TREASURY, FIN. CRIMES ENF'T NETWORK, FIN-2013-G001, APPLICATION OF FINCEN'S REGULATIONS TO PERSONS ADMINISTERING, EXCHANGING, OR USING VIRTUAL CURRENCIES (2013) [hereinafter FIN-2013-G001].

guaranteed by any jurisdiction, and fulfils the above functions only by agreement within the community of users of the virtual currency. Virtual currency is distinguished from fiat currency (a.k.a. “real currency,” “real money,” or “national currency”), which is the coin and paper money of a country that is designated as its legal tender; circulates; and is customarily used and accepted as a medium of exchange in the issuing country. It is distinct from e-money, which is a digital representation of fiat currency used to electronically transfer value denominated in fiat currency.¹²

As of September 11, 2018, Coinmarketcap.com lists 1,935 different cryptocurrencies, having a total market capitalization of approximately \$191.54 billion.¹³ This contrasts with just 656 different cybercurrencies reported by Trautman and Harrell as of July 15, 2016, having a market capitalization approximating \$13.01 billion.¹⁴ Ranked by market capitalization at September 11, 2018, the top ten cybersecurities are: Bitcoin (\$109.0 billion); Ethereum (\$18.6 billion); Ripple (\$10.4 billion); Bitcoin Cash (\$7.55 billion); EOS (\$4.49 billion); Stellar (\$3.7 billion); Litecoin (\$3.0 billion); Tether (\$2.76 billion); Cardano (\$1.79 billion); and Monero (\$1.71 billion).¹⁵

Bitcoin

Historical Development

The creation of Bitcoin in 2009 is widely attributed to Satoshi Nakamoto, believed to be a pseudonymous hacker or hackers.¹⁶ Bitcoin has been defined

12. See FIN. ACTION TASK FORCE, VIRTUAL CURRENCIES: KEY DEFINITIONS AND POTENTIAL AML/CFT RISKS 4 (2014), <https://www.fatf-gafi.org/media/fatf/documents/reports/Virtual-currency-key-definitions-and-potential-aml-cft-risks.pdf> [<https://perma.cc/RL3T-9B42>].

13. *All Cryptocurrencies*, COINMARKETCAP, <https://coinmarketcap.com/all/views/all/> [<https://perma.cc/NKH4-Q88C>] (last visited Sept. 11, 2018). See generally Thomas Grove, *Farmer Banks on Cryptocurrency*, WALL ST. J., Apr. 23, 2018 at A9 (stating “Cryptocurrencies have sparked new interest in the possibilities of working outside the Russian financial system and the volatile ruble, which lost half of its value in 2014 amid a drop in oil prices”); Wilko Bolt & Maarten R.C. van Oordt, *On the Value of Virtual Currencies*, (Bank of Canada Working Paper No. 2016-42, 2016), <https://ssrn.com/abstract=2767609> [<https://perma.cc/G2NM-XEPE>].

14. See Trautman & Harrell, *supra* note 2, at 1053.

15. *All Cryptocurrencies*, *supra* note 13.

16. Lawrence J. Trautman, *Is Disruptive Blockchain Technology the Future of Financial Services?*, CONSUMER FIN. L.Q. REP. 232, 234 (2016) [hereinafter Trautman, *Disruptive Blockchain Technology*]; Simon Barber et al., *Bitter to Better—How to Make Bitcoin a Better Currency* (2012), <http://crypto.stanford.edu/~xb/fc12/bitcoin.pdf> [<https://perma.cc/S7S4-EWW7>]. But see *Bitcoin Creator Satoshi Nakamoto Found*, *Newsweek Says*, NBC NEWS (Mar. 6, 2014, 9:20 AM), <http://www.nbcnews.com/tech/tech-news/bitcoin-creator-satoshi-nakamoto-found-newsweek-says-n45871> [<https://perma.cc/AD38-53Z4>] (identifying a 64-year-old California resident as the author);

as “a popular virtual currency based on a decentralized peer-to-peer (‘P2P’) network, much like BitTorrent, the popular protocol for sharing files over the Internet such as music, games and video.”¹⁷ An outgrowth of concepts, “from b-money”¹⁸ and Hashcash,¹⁹ Bitcoin is a “cryptographic object represented as a chain of digital signatures over the transaction in which the coin was used” (the “*block chain*”).²⁰ “Bitcoin aims to be completely distributed, free of central authorities or points of control, and at least somewhat anonymous.”²¹

The Blockchain

At its heart, the core technology of the blockchain protocol “is widely acknowledged as a major breakthrough in fault-tolerant distributed computing,

Nathaniel Popper & Rachel Abrams, *Bitcoin’s Mysterious Creator Is Said to Be Identified*, N.Y. TIMES (Mar. 6, 2014, 3:51 PM) http://dealbook.nytimes.com/2014/03/06/newsweek-unmasks-bitcoin-founder-stirring-ire/?_php=true&_type=blogs&_r=0 [<https://perma.cc/G3AQ-G8WS>] (raising doubts about the Newsweek report); Paul Vigna, *Purported Architect of Bitcoin Pulls Back*, WALL ST. J., May 6, 2016, at C1 (reporting Craig Steven Wright apologizing for 2016 prior claim of being the Bitcoin creator).

17. Trautman & Harrell, *supra* note 2, at 1053–54 (citing EUROPEAN CENT. BANK, VIRTUAL CURRENCY SCHEMES 21 (2012), <http://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemes201210en.pdf> [<https://perma.cc/82MB-338E>]); *see also* Rostislav Skudnov, Bitcoin Clients (Apr. 6, 2012) (unpublished bachelor’s thesis, Turku University of Applied Sciences), http://publications.theseus.fi/bitstream/handle/10024/47166/Skudnov_Rostislav.pdf?sequence=1 [<https://perma.cc/QQ7V-2EE6>]; David Allen Bronleewe, Bitcoin NFC (Aug. 2011) (unpublished M.S. Engineering thesis, University of Texas at Austin), <http://repositories.lib.utexas.edu/bitstream/handle/2152/ETD-UT-2011-08-4150/BRONLEEWE-MASTERS-REPORT.pdf?sequence=1> [<https://perma.cc/UB3U-TYKK>].

18. Trautman, *Virtual Currencies*, *supra* note 11, at 42; JOSHUA A. KROLL, IAN C. DAVEY & EDWARD W. FELTEN, THE ECONOMICS OF BITCOIN MINING, OR BITCOIN IN THE PRESENCE OF ADVERSARIES 3 (2013); *see also* W. Dai, *b-money* (1998) <http://www.weidai.com/bmoney.txt> [<https://perma.cc/N2UZ-Y9SX>].

19. KROLL, DAVEY & FELTEN, *supra* note 18; *see* ADAM BACK, HASHCASH - A DENIAL OF SERVICE COUNTER-MEASURE 1 (Aug. 1, 2002), <http://www.hashcash.org/papers/hashcash.pdf> [<https://perma.cc/GZ22-NXKL>].

20. Trautman & Harrell, *supra* note 2, at 1054 (citing Trautman, *supra* note 16, at 234); Robert McMillan, *The Two Sides of Bitcoin*, WIRED, Apr. 2014; *see also* James P. Gerkis & Serafima Krikunova, *Bitcoin and Other Virtual Currencies: Approaching U.S. Regulatory Acceptance*, ADMIN. & REG. L. NEWS, Spring 2014, at 4; Stephen Middlebrook, Andrew J. Shipe & Sarah Jane Hughes, Presentation: Bitcoin Accepted Here: Virtual Currencies Explained (Mar. 28, 2014) (presentation available at www.americanbar.org (event code CEB4BAH)); HANNA HALABURDA & MIKLOS SARVARY, BEYOND BITCOIN: THE ECONOMICS OF DIGITAL CURRENCIES 105 (2015) (ebook); Bonnie McGeer, *Accept It: The Blockchain Will Be Part of Your Bank’s Business*, AM. BANKER (Jan. 6, 2016, 10:00 PM), <http://www.americanbanker.com/news/bank-technology/accept-it-the-blockchain-will-be-part-of-your-banks-business-1078557-1.html> [<https://perma.cc/933Q-VWHM>].

21. Trautman & Harrell, *supra* note 2 at 1054; KROLL, DAVEY & FELTEN, *supra* note 18; *see* McMillan, *supra* note 20; GARRICK HILEMAN & MICHEL RAUCHS, GLOBAL BLOCKCHAIN BENCHMARKING STUDY 13 (2017), <https://ssrn.com/abstract=3040224> [<https://perma.cc/WG29-YHM9>].

after decades of research in this field.”²² Aaron Wright and Primavera De Filippi state that “[t]he blockchain is a distributed, shared, encrypted-database that serves as an irreversible and incorruptible public repository of information. It enables, for the first time, unrelated people to reach consensus on the occurrence of a particular transaction or event without the need for a controlling authority.”²³ Marc Pilkington observes:

Blockchain technology ensures the elimination of the double-spend problem, with the help of public-key cryptography, whereby each agent is assigned a private key (kept secret like a password) and a public key shared with all other agents. A transaction is initiated when the future owner of the coins (or digital tokens) sends his/her public key to the original owner. The coins are transferred by the digital signature of a hash. Public keys are cryptographically generated addresses stored in the blockchain. Every coin is associated with an address, and a transaction in the crypto-economy is simply a trade of coins from one address to another. The striking feature of the blockchain is that public keys are never tied to a real-world identity. Transactions, although traceable, are enabled without disclosing one’s identity; this is a major difference with transactions in fiat currencies that, with the exception of (non-traceable) cash transactions, are related to specific economic agents endowed with legal personality (whether physical or juridical).²⁴

Marcella Atzori contends that the blockchain can be thought of “as a database that contains all the transactions ever executed in the Bitcoin network. It consists of a permanent, distributed, digital ledger, resistant to tampering and carried out collectively by all the nodes of the system.”²⁵ Technology writer Christopher Mims describes blockchain as “essentially a secure database, or ledger, spread across multiple computers. Everybody has the same record of

22. Marcella Atzori, *Blockchain Technology and Decentralized Governance: Is the State Still Necessary?* 2 (Dec. 1 2015) (unpublished manuscript), <http://ssrn.com/abstract=2709713> [<https://perma.cc/8KWX-65Y4>]; accord Adam J. Sulkowski, *Blockchain, Law, and Business Supply Chains: The Need for Governance and Legal Frameworks to Achieve Sustainability* (May 13, 2018) (unpublished manuscript), <https://ssrn.com/abstract=3205452> [<https://perma.cc/5DTD-VUQD>].

23. Aaron Wright & Primavera De Filippi, *Decentralized Blockchain Technology and the Rise of Lex Cryptographia* 2 (Mar. 20, 2015, revised July 25, 2017) (unpublished manuscript), <http://ssrn.com/abstract=2580664> [<https://perma.cc/4EKU-S9T2>].

24. Marc Pilkington, *Blockchain Technology: Principles and Applications*, in RESEARCH HANDBOOK ON DIGITAL TRANSFORMATIONS 225, 226 (F. Xavier Olleros & Majlinda Zhegu eds., 2016).

25. Atzori, *supra* note 22 (manuscript at 2).

all transactions, so tampering with one instance of it is pointless.”²⁶ In addition, “‘Crypto’ describes the cryptography that underlies it, which allows agents to securely interact—transfer assets, for example—while also guaranteeing that once a transaction has been made, the blockchain remains an immutable record of it.”²⁷

Extensive Use of Blockchain Expected

Blockchain technology is widely expected to disrupt many prior use technologies and receive significant rapid adoption.²⁸ For example, the *American Banker* reports a start-up blockchain network seeking to verify customer identity by virtue of data sharing between data providers and lenders.²⁹ Amendment No. 4 to the SolidX Bitcoin Trust registration statement dated January 5, 2018 depicts numerous positive uses for blockchain technology: “Development of the Bitcoin network’s usage for non-financial applications has become increasingly prominent, including applications such as: asset title transfer, secure timestamping, counterfeit and fraud detection systems, secure document and contract signing, distributed cloud storage and identity management.”³⁰ Swan and De Filippi write, “blockchain technology . . . provides the means to record and transmit digital goods over the Internet, while ensuring that these goods cannot be copied or multiplied (thereby addressing the double-spending problem that has been an issue with digital currencies).”³¹ The digital registry known as blockchain is useful “to record, transfer, and verify asset ownership (home, auto, stocks, bonds, mortgages, and insurance) as well as to preserve the integrity and authenticity of sensitive documents or records (such as passports, visas, driver’s licenses,

26. Christopher Mims, *Blockchain Has Power to Transform*, WALL ST. J., Mar. 12, 2018, at B4.

27. *Id.*

28. Trautman, *supra* note 16, at 239; see Campbell R. Harvey, *Cryptofinance 2* (May 17, 2014) (unpublished manuscript), <https://ssrn.com/abstract=2438299> [<https://perma.cc/ARP4-CNZH>]; see also Robert Donald Leonhard, *Forget Paris: Building a Carbon Market in the U.S. Using Blockchain-Based-Smart Contracts 7* (unpublished manuscript), <https://ssrn.com/abstract=3082450> [<https://perma.cc/TT4M-9ZSE>].

29. Bryan Yurcan, *Can Blockchain Ease Banks’ Digital-Identity Concerns?*, AM. BANKER, (Mar. 27, 2018, 2:38 PM), <https://www.americanbanker.com/news/can-blockchain-ease-banks-digital-identity-concerns> [<https://perma.cc/39J9-KSHK>].

30. SolidX Bitcoin Tr., Amendment No. 4 to Form S-1 (Form S-1), at 6 (Jan. 5, 2018), <https://www.sec.gov/Archives/edgar/data/1668039/000110465918000976/0001104659-18-000976-index.htm> [<https://perma.cc/96B3-5RRQ>]; see also Nir Kshetri, *Blockchain Could Be the Security Answer. Maybe.*, WALL ST. J., May 30, 2018, at R7 (discussing blockchain technology in cybersecurity).

31. Melanie Swan & Privavera De Filippi, Introduction, *Toward a Philosophy of Blockchain: A Symposium*, 48 METAPHILOSOPHY 603, 604 (2017).

birth and death certificates, voter registration, contracts, wills, patents, and medical records).³² This is possible once these instruments “have been digitized as ‘smart assets,’ the recording, search, purchase, sale, tracking, and logging of resources can be coordinated with a much higher degree of automation, speed, trackability, and assurance.”³³ Trautman has written:³⁴

The gathering of financial industry leaders at the 2016 World Economic Forum provided a number of startling predictions as to the near future of financial services. An apparent lesson is that global financial, economic, legal and political systems will need to adapt quickly to the resulting challenges and opportunities. Among the most interesting observations relating to these near-term scenarios were that: “cash in ten years probably won’t exist;” and blockchain technology will be used to collect taxes (also within ten years). Elsewhere, during early 2016 news reports indicated that “Andrey Sharov, a vice president at Russia’s Sberbank, said banks would disappear by 2026 due to the rising use of blockchain technology. ‘In 10 years, there will be no banks, I’m afraid,’ according to a translation of Sharov’s comments by the Coinfox bitcoin news website.”³⁵

Swan and De Filippi observe, “[e]ventually, as governments, corporations, and startups work toward the implementation of real-time payments, and also digital registration systems for the transfer and verification of digital assets and legal documents, a variety of legal, financial, and governmental services could be reengineered and readjusted for the Internet era.”³⁶ The registration statement for the Winklevoss Bitcoin Trust, Amendment No. 9 states that Bitcoin:

[I]s a digital asset that is not issued by any government, bank or central organization. Bitcoin is a digital asset (“Digital Asset”) based on the decentralized, open source protocol of the peer-to-peer Bitcoin computer network (the “Bitcoin Network” or “Bitcoin”) that hosts the decentralized public transaction ledger, known as the “Blockchain,” on which all bitcoin is recorded. The Bitcoin Network software source code includes

32. *Id.*; see also Peter Grant, *Knotel Builds Up War Chest*, WALL ST. J., Apr. 11, 2018, at B7 (planning to use blockchain to track real estate space listings); Katie Szilagyi, *A Bundle of Blockchains? Digitally Disrupting Property Law*, 48 CUMB. L. REV. 9, 12 (2017).

33. Swan & De Filippi, *supra* note 31, at 604.

34. Trautman, *supra* note 16, at 232.

35. *Id.* (citing Arjun Kharpal, *Blockchain Won’t Kill Banks: Brock Pierce*, CNBC (Apr. 11, 2016, 6:59 AM), <http://www.cnbc.com/2016/04/11/blockchain-wont-kill-banks-brock-pierce.html> [<https://perma.cc/N4RL-Z8XY>]) (internal citations omitted).

36. See Swan & De Filippi, *supra* note 31, at 604.

the protocols that govern the creation of bitcoin and the cryptographic system that secures and verifies Bitcoin transactions. The Blockchain is a canonical record of every bitcoin, every Bitcoin transaction (including the creation or “mining” of new bitcoin) and every Bitcoin address associated with a quantity of bitcoin. The Bitcoin Network and Bitcoin Network software programs can interpret the Blockchain to determine the exact bitcoin balance, if any, of any public Bitcoin address listed in the Blockchain which has taken part in a transaction on the Bitcoin Network. The Bitcoin Network utilizes the Blockchain to evidence the existence of bitcoin in any public Bitcoin address. A Bitcoin private key controls the transfer or “spending” of bitcoin from its associated public Bitcoin address. A Bitcoin “wallet” is a collection of private keys and their associated public Bitcoin addresses.³⁷

Exhibit 1 shows how Bitcoin has grown rapidly since 2009 from a mere idea to a legitimate currency by mid-2014, with the market capitalization of bitcoins in circulation of about \$255.85 billion as of April 1, 2018.³⁸ The price of Bitcoin, shown here in U.S. dollars, reached a high of \$19,783 per Bitcoin during 2017,³⁹ plummeted to about \$418 per Bitcoin following the demise of Mt. Gox during February 2014,⁴⁰ and has, despite significant volatility, opened at \$8,887.86 as of May 1, 2018.⁴¹ By May 2014, the Financial Industry Regulatory Authority (FINRA) issued its Bitcoin investor alert warning about “real abuses and criminal activity associated with it.”⁴² Observing that “[s]peculators have been drawn to [B]itcoin trading as a way to make a quick profit,” FINRA notes that prices for Bitcoin “have fluctuated widely, and

37. Winklevoss Bitcoin Tr., Amendment No. 9 to Form S-1 (Form S-1), at 8 (Feb. 8, 2017), <https://www.sec.gov/Archives/edgar/data/1579346/000119312517034708/d296375ds1a.htm> [<https://perma.cc/KJU3-F846>] [hereinafter Winklevoss S-1 Amendment No. 9].

38. See COINMARKETCAP (Apr. 1, 2018), <https://coinmarketcap.com/> [<https://perma.cc/885Y-XXGR>]; see also Robin Teigland, Zeynep Yetis & Tomas Larsson, *Breaking Out of the Bank in Europe: Exploring Collective Emergent Institutional Entrepreneurship Through Bitcoin* 3 (May 2013), <http://ssrn.com/abstract=2263707> [<https://perma.cc/BH9A-BGAX>].

39. David Z. Morris, *Bitcoin Hits a New Record High, But Stops Short of \$20,000*, FORTUNE (Dec. 17, 2017), <http://fortune.com/2017/12/17/bitcoin-record-high-short-of-20000/> [<https://perma.cc/BAK8-LX3H>].

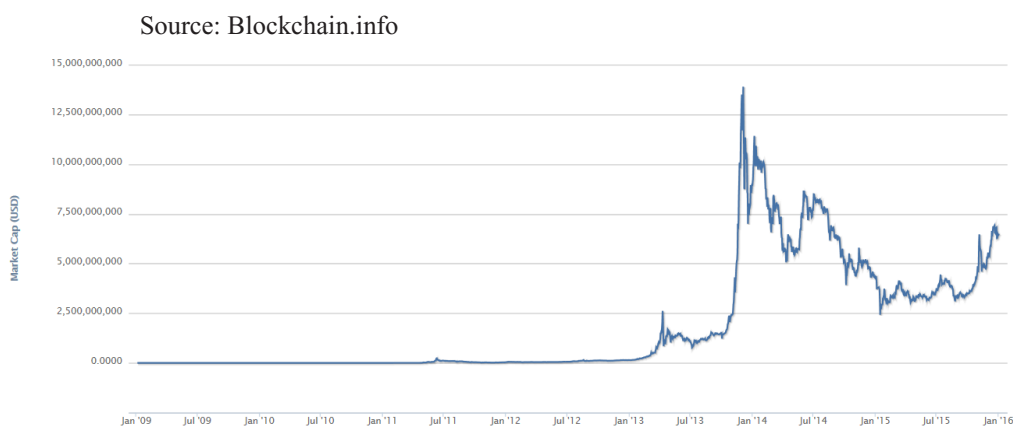
40. Andy Greenberg, *Bitcoin's Price Plummets As Mt. Gox Goes Dark, with Massive Hack Rumored*, FORBES (Feb. 24, 2014), <https://www.forbes.com/sites/andygreenberg/2014/02/25/bitcoins-price-plummets-as-mt-gox-goes-dark-with-massive-hack-rumored/#6cfc4a22ce1f> [<https://perma.cc/44YN-EZ6T>].

41. *Bitcoin (USD) Price*, COINDESK (May 1, 2018), <https://www.coindesk.com/price/> [<https://perma.cc/9L24-NDQC>].

42. *Bitcoin: More than a Bit Risky*, FIN. INDUSTRY REG. AUTHORITY (May 7, 2014), <http://www.finra.org/investors/alerts/bitcoin-more-bit-risky> [<https://perma.cc/2K7J-FM9W>].

wildly . . . for [various] reasons. . . . [B]itcoin prices plummeted following the Mt. Gox incident—and earlier when the Chinese central bank banned banks from accepting [B]itcoins. Other factors that affect digital currency prices include supply and demand, rumors and even where [B]itcoins are traded.”⁴³

Exhibit 1
Bitcoin Market Capitalization
January 2009 thru January 2018⁴⁴



Bitcoin Bubble?

In their year-end review and outlook published at the beginning of 2018, *The Wall Street Journal* writes that during “2017, bitcoin became one of the market’s greatest speculative crazes. . . . Even bitcoin’s supporters were surprised by how far the cryptocurrency rose. Starting the year at about \$970, it rose to nearly \$20,000 by December, a gain of about 2,000%.”⁴⁵ Dramatic volatility ensued, “punctuated by five selloffs of at least 30%, including a fierce selloff in December that drove prices down 45% before the currency recovered by Friday [December 29, 2017] to \$14,292, according to CoinDesk, up 1,375% on the year.”⁴⁶

43. *Id.*

44. *Market Capitalization*, BLOCKCHAIN.INFO, https://blockchain.info/charts/market-cap?timespan=all&showDataPoints=false&daysAverageString=1&show_header=true&scale=0&address=https://perma.cc/MWN6-DEGX (last visited Dec. 20, 2018).

45. Vigna, *supra* note 1, at R1.

46. *Id.*

As demonstrated in Exhibit 2, it can be argued that 2017 was the coming-of-age year for notoriously volatile Bitcoin, as Bitcoin encountered: an SEC denial of a Bitcoin EFT effort (March 10);⁴⁷ new Japanese rules promoting Bitcoin use (April 1);⁴⁸ a profit-taking selloff as price hit \$3,000 for the first time (June 11);⁴⁹ the CFTC approving Bitcoin options (July 24);⁵⁰ Bitcoin's price jumping past \$4,000 for the first time (August 13);⁵¹ China announcing a ban on ICOs and plans to close exchanges (September 4);⁵² a shutdown of China's second-largest digital currency exchange resulting in a 10% decline in Bitcoin price (September 14);⁵³ *The Wall Street Journal* reporting that Goldman Sachs considered Bitcoin trades (October 2);⁵⁴ Bitcoin's price jumping past \$7,000 for the first time (November 2);⁵⁵ SEC Chairman Clayton stating in middle-of-a-speech unscripted remarks that United States ICOs may need to register as securities offerings (November 8);⁵⁶ Bitcoin's price breaking through \$10,000, as heavy volume prompted exchange service problems (November 29);⁵⁷ the CFTC saying it will allow Bitcoin futures to launch on two exchanges (December 1);⁵⁸ accounting firm PricewaterhouseCoopers acknowledging receiving payment for services in digital currency (December 1);⁵⁹ Bitcoin's price appreciating 40% in 40 hours (December 7);⁶⁰ volatility soaring as Bitcoin futures launched in the United States (December 10);⁶¹ Chicago-based CME launching Bitcoin futures (December 17),⁶² and the

47. Paul Vigna & Steven Russolillo, *Bitcoin's Wildest Rise Yet: 40% in 40 Hours*, WALL ST. J., Dec. 8, 2017, at A1.

48. *Id.*

49. Steven Russolillo & Paul Vigna, *Bitcoin Loses 25% in Latest Wild Swing*, WALL ST. J., Nov. 14, 2017, at B10.

50. Vigna & Russolillo, *supra* note 47.

51. Paul Vigna, *Bitcoin Price Jumps Past \$4,000*, WALL ST. J., Aug. 14, 2017, at B1.

52. Russolillo & Vigna, *supra* note 49.

53. Paul Vigna & Chao Deng, *Bitcoin Prices Sink As Exchange to Shut*, WALL ST. J., Sept. 15, 2017, at B10.

54. Vigna & Russolillo, *supra* note 47.

55. Paul Vigna, *Bitcoin Price Exceeds \$7,000 for First Time*, WALL ST. J., Nov. 3, 2017, at B11.

56. Dave Michaels & Paul Vigna, *SEC Starts Talking Tough on Coin Offerings*, WALL ST. J., Nov. 10, 2017, at B1.

57. Vigna & Russolillo, *supra* note 47.

58. *Id.*; Alexander Osipovich, *Two Exchanges Are Cleared to Launch Bitcoin Futures*, WALL ST. J., Dec. 2–3, 2017, at B10.

59. *PwC Receives Its Payment in Bitcoin for the First Time*, WALL ST. J., Dec. 1, 2017, at B10.

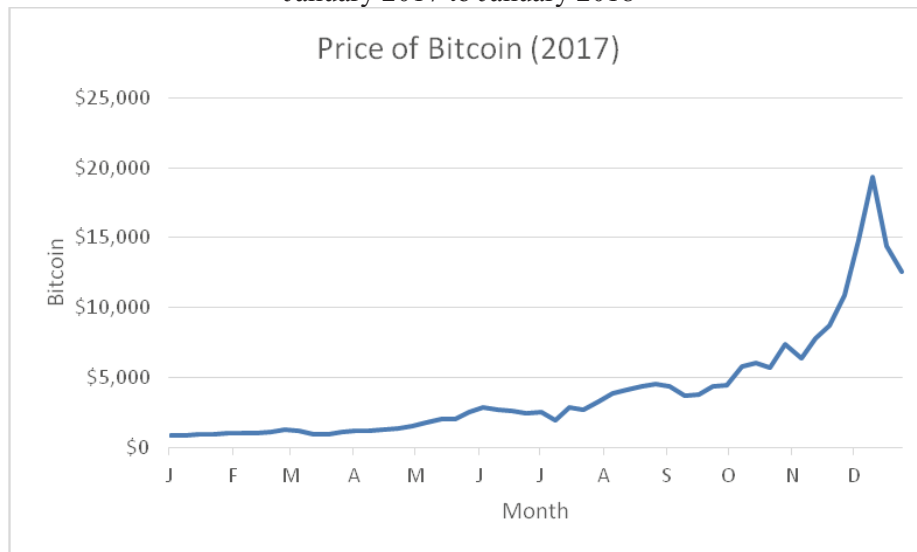
60. Vigna & Russolillo, *supra* note 47.

61. *See* Vigna, *supra* note 1; Alexander Osipovich et al., *Bitcoin Futures Start, Site Falts*, WALL ST. J., Dec. 11, 2017, at A1.

62. Alexander Osipovich & Gunjan Banerji, *CME Launches Bitcoin Futures*, WALL ST. J., Dec. 18, 2017, at B1.

market price of Bitcoin plunging 25% in one day (December 22).⁶³ And, “[w]ith a total value of almost \$300 billion as of Dec. 13, [2017], Bitcoin is now the sixth-largest currency in the world.”⁶⁴ Weekly Bitcoin price volatility is shown in Exhibit 3.

Exhibit 2
Price of Bitcoin
January 2017 to January 2018⁶⁵

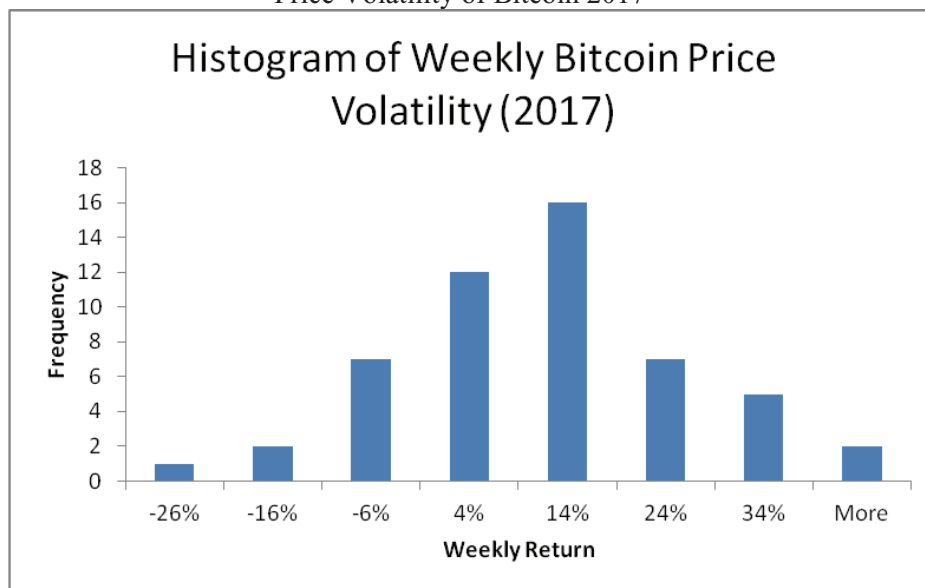


63. Steven Russolillo et al., *Bitcoin Plunges 25% Over a Day in Market Rout*, WALL ST. J., Dec. 23–24, 2017, at B1.

64. Dov Greenbaum, *What Bitcoin Needs is a Few Good Regulations*, WALL ST. J., Dec. 15, 2017, at A17.

65. See Lawrence J. Trautman & Taft Dorman, *Bitcoin as Asset Class* (July 22, 2018) (unpublished manuscript).

Exhibit 3
Price Volatility of Bitcoin 2017⁶⁶



Before this Article goes to press, 2018 has brought a series of significant developments in virtual currencies: a report that billionaire Peter Thiel’s Founders Fund “has amassed hundreds of millions of dollars of [Bitcoin]” (January 3);⁶⁷ Merrill Lynch blocking financial advisors and clients from buying Bitcoin (January 4);⁶⁸ widespread recognition that Bitcoin mining is very profitable at present price levels (February 22);⁶⁹ ICOs continuing to thrive (February 23);⁷⁰ the SEC launching a cryptocurrency probe (March 1);⁷¹ an additional Bitcoin derivatives market announced (March 13);⁷² a Presidential Executive Order prohibiting Americans and United States companies from owning Venezuela’s digital currency (March 19);⁷³ Twitter CEO Jack Dorsey

66. *See id.*

67. Rob Copeland, *Billionaire Wagers Millions on Bitcoin*, WALL ST. J., Jan. 3, 2018, at A1.

68. Lisa Beilfuss, *Merrill Widens its Ban on Bitcoin*, WALL ST. J., Jan. 4, 2018, at B1.

69. *See* Stephanie Yang, *Bitcoin Factories Spring into Action*, WALL ST. J., Feb. 22, 2018, at B1.

70. *See* Paul Vigna, *Bitcoin Dive Fails to Halt ‘ICO’ Boom*, WALL ST. J., Feb. 23, 2018, at A1.

71. Jean Eaglesham & Paul Vigna, *SEC Launches Cryptocurrency Probe*, WALL ST. J., Mar. 1, 2018, at B1.

72. Alexander Osipovich, *Startup Exchange to Offer Bitcoin Derivatives*, WALL ST. J., Mar. 13, 2018, at B10 (observing, “at least the sixth U.S. trading venue to jump into cryptocurrency derivatives in recent months”).

73. Exec. Order No. 13827, 83 Fed. Reg. 12469 (Mar. 19, 2018) (stating “[a]ll transactions related to . . . any digital currency, digital coin, or digital token, that was issued by, for, or on behalf of

predicting that Bitcoin will become the global universal currency within ten years or sooner (March 21);⁷⁴ by April, “Bitcoin’s nearly four-month bear market . . . coincid[ing] with slowing growth in the number of people opening new wallets online to store their cryptocurrencies, according to Blockchain.info;”⁷⁵ Bitcoin price tumbling as “South Korea’s crackdown has been accompanied by intensifying regulatory scrutiny of digital-currency exchanges in China, Japan and the U.S.” (May 12–13);⁷⁶ and approximately 8,300 people packing three floors of the New York Hilton for a cryptocurrency conference with ticket prices reportedly ranging from \$1,000 to \$3,000 (May 14).⁷⁷

Rapid Adoption Worldwide

Publishing preliminary results in February 2018, Professor Wulf Kaal examines the top twenty-five global Initial Coin Offering (ICO) jurisdictions, finding that the majority “permit ICO’s and cryptocurrencies or do not explicitly prohibit them. Of the entirety of countries considered, only a very small minority has banned ICO’s and cryptocurrencies altogether.”⁷⁸ China is the most notable exception, having banned ICO’s entirely.⁷⁹ Professor Kaal reports:

the general view of the world governments appears to be that they are using existing laws to regulate cryptocurrencies or wait to see how other countries react to the crypto evolution. Regulatory efforts can take several forms but appear to involve some of the following approaches or permutations thereof: regulating ICO’s, regulating cryptocurrencies, regulating DLT [distributed ledger technology], mandating compliance

the Government of Venezuela on or after January 9, 2018, are prohibited as of the effective date of this order”).

74. Alexandra Frean, *Bitcoin Will Become the World’s Single Currency, Tech Chief Says*, THE TIMES (United Kingdom) (Mar. 21, 2018) <https://www.thetimes.co.uk/article/bitcoin-will-become-the-worlds-single-currency-tech-chief-says-66slm0p6b> [<https://perma.cc/G35K-R9E3>]; Lucinda Shen, *Twitter CEO Jack Dorsey Says Bitcoin Will Be the World’s Universal Currency*, FORTUNE (Mar. 21, 2018) <http://fortune.com/2018/03/21/jack-dorsey-cryptocurrency-bitcoin-transactions/> [<https://perma.cc/6Z9H-37FN>].

75. Steven Russolillo, *Bitcoin Hype is Withering on the Blockchain*, WALL ST. J., Apr. 13, 2018, at B10.

76. Alexander Osipovich & Eun-Young Jeong, *Bitcoin Prices Fall After Raid on Exchange*, WALL ST. J., May 12–13, 2018, at B10.

77. Alison Sider & Ben Eisen, *Crypto Enthusiasts Mob Conference*, WALL ST. J., May 17, 2018, at B10.

78. Wulf A. Kaal, *Initial Coin Offerings: The Top 25 Jurisdictions and Their Comparative Regulatory Responses*, STAN. J. BLOCKCHAIN L. & POL’Y, 27–28 (2018).

79. *Id.* at 23.

programs, regulating exchanges, securities regulation, prohibition of exposed financial institutions, government suggestions to customers not to participate.⁸⁰

In discussing virtual currencies within an investment context, SEC Chairman Jay Clayton states, “these markets span national borders and that significant trading may occur on systems and platforms outside the United States.”⁸¹ As a result, “invested funds may quickly travel overseas without your knowledge. As a result, risks can be amplified, including the risk that market regulators, such as the SEC, may not be able to effectively pursue bad actors or recover funds.”⁸² As shown in Exhibit 4, according to The 2018 Report of the House Joint Economic Committee, “[a]t the beginning of 2017, the total value of all [B]itcoin in circulation was almost \$15.5 billion, but by year’s end it increased almost 14-fold to over \$216 billion.”⁸³ Similar gains are also reported for the same period of time by Ethereum, Ripple, and Litecoin.⁸⁴ The House Report further observes, “Ether’s total circulating value multiplied by 98 from just under \$700 million to over \$68 billion. Ripple’s market cap multiplied by an even larger 342 from \$237 million to over \$81 billion. Finally, Litecoin lost its position as the third-largest cryptocurrency in 2017.”⁸⁵ Litecoin reached \$11 billion in market cap by year-end, reflecting an increase of 55 times from its \$212 million beginning year number.⁸⁶

80. *Id.* at 28.

81. Jay Clayton, *Statement on Cryptocurrencies and Initial Coin Offerings*, U.S. SEC. EXCH. COMM’N (Dec. 11, 2017), <https://www.sec.gov/news/public-statement/statement-clayton-2017-12-11> [<https://perma.cc/G3KZ-BJV4>].

82. *Id.*

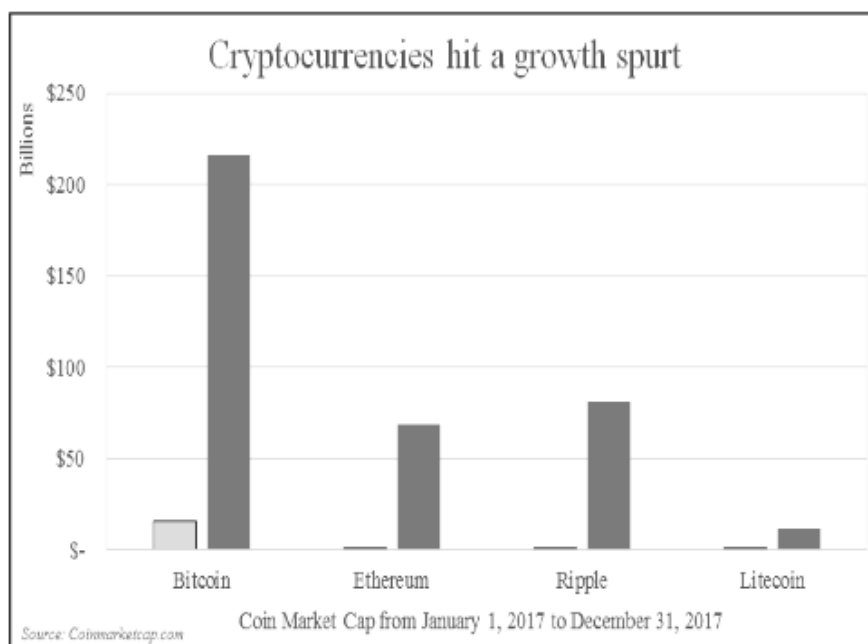
83. H.R. REP. NO. 115-596, at 204 (2018).

84. *Id.*

85. *Id.*

86. *Id.*

Exhibit 4
Coin Market Capitalization from
January 1, 2017 to December 31, 2017⁸⁷



Ethereum

Ethereum is a global project started in August 2014 as a Swiss non-profit.⁸⁸ The stated mission of the Ethereum Foundation “is to promote and support Ethereum platform and base layer research, development and education to bring decentralized protocols and tools to the world that empower developers to produce next generation decentralized applications [DAPPs], and together build a more globally accessible, more free and more trustworthy Internet.”⁸⁹ Professor Randolph Robinson explains, “[w]hereas the Bitcoin network was specifically built as a platform for cryptocurrency exchange, Ethereum is a general purpose public blockchain on which ‘[a]nyone can upload programs

87. *Id.* at 205.

88. See ETHEREUM, <https://www.ethereum.org/> [<https://perma.cc/SR8W-6A52>] (last visited Nov. 13, 2018).

89. *About the Ethereum Foundation*, ETHEREUM, <https://ethereum.org/foundation> [<https://perma.cc/92SQ-6WUT>] (last visited Oct. 18, 2018) (alteration added).

and data and execute any program deployed to it by anybody.”⁹⁰ These DAPPs mentioned above enable the “Ethereum blockchain to run decentralized software applications . . . that interact with one another through the use of self-executing and enforcing smart contracts.”⁹¹

Mehar et al., explain the platform known as Ethereum extends “transactions referred to as *smart contracts*. Ethereum is a platform where virtual miners work to earn Ethers, the native cryptocurrency token of Ethereum by maintaining the integrity of the ledger (i.e. mining).”⁹² When reduced to its most basic form, Ethereum can be thought of as “an open software platform based on Blockchain technology that enables developers to build and deploy decentralized applications Bitcoin was used to fund the initial creation of Ethereum.”⁹³ By May 2018, *The Wall Street Journal* reports that regulators of commodities and securities are questioning whether the 2014 capital raised by Ethereum qualified as an unregistered sale of securities, and therefore should have undergone a securities registration process.⁹⁴

90. Randolph A. Robinson II, *The New Digital Wild West: Regulating the Explosion of Initial Coin Offerings*, TENN. L. REV. (forthcoming 2018) (manuscript at 21–22), <https://ssrn.com/abstract=3087541> [<https://perma.cc/5DFG-TCZG>].

91. *Id.* (manuscript at 22) (citing Vitalik Buterin, *DAOs, DACs, DAs and More: An Incomplete Terminology Guide*, ETHEREUM BLOG (May 6, 2014), <https://blog.ethereum.org/2014/05/06/daos-dacs-das-and-more-an-incomplete-terminology-guide/> [<https://perma.cc/65TQ-ZYPE>]); see John M. Newman, *Innovation Policy for Cloud-Computing Contracts*, in RESEARCH HANDBOOK ON DIGITAL TRANSFORMATIONS, *supra* note 24, at 380, 393; Ying-Ying Hsieh & Jean-Philippe Vergne, *Bitcoin and the Rise of Decentralized Autonomous Organizations*, J. ORG. DESIGN (forthcoming) (manuscript at 10), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3082911 [<https://perma.cc/R7ET-JZKP>]; Max Raskin, *The Law and Legality of Smart Contracts*, 1 GEO. L. TECH. REV. 305, 306 (2017); Lauren Henry Scholz, *Algorithmic Contracts*, 20 STAN. TECH. L. REV. 128, 147 (2017); Kevin Werbach & Nicolas Cornell, *Contracts Ex Machina*, 67 DUKE L.J. 313, 332–33 (2017); Rebecca M. Bratspies, *Cryptocurrency and the Myth of the Trustless Transaction* 30 (Mar. 10, 2018) (unpublished manuscript), <https://ssrn.com/abstract=3141605> [<https://perma.cc/8UCX-L64T>]; Maria Letizia Perugini & Paolo Dal Checco, *Smart Contracts: A Preliminary Evaluation* 20 (unpublished manuscript), <https://ssrn.com/abstract=2729548> [<https://perma.cc/GQ24-WLY4>]; Craig Wright & Antoaneta Serguieva, *Investigation of the Potential for Using the Bitcoin Blockchain as the World’s Primary Infrastructure for Internet Commerce* (Nov. 16, 2017) (unpublished manuscript), <https://ssrn.com/abstract=3065857> [<https://perma.cc/59SN-VTAA>].

92. MUHAMMAD IZHAR MEHAR ET AL., UNDERSTANDING A REVOLUTIONARY AND FLAWED GRAND EXPERIMENT IN BLOCKCHAIN: THE DAO ATTACK (2017), <https://ssrn.com/abstract=3014782> [<https://perma.cc/AE8R-WVM9>].

93. *Id.*

94. Dave Michaels & Paul Vigna, *World’s Second Most Valuable Cryptocurrency Under Regulatory Scrutiny*, WALL ST. J. (May 1, 2018, 5:30 AM), <https://www.wsj.com/articles/worlds-second-most-valuable-cryptocurrency-under-regulatory-scrutiny-1525167000> [<https://perma.cc/L3KV-6LTN>].

Ripple

Through the use of blockchain technology, Ripple (RippleNet) describes itself as “a network of banks, payment providers and others” using Ripple’s distributed financial technology, which provides real-time messaging, clearing and settlement of financial transactions.⁹⁵ Financial institutions can benefit “[b]y joining Ripple’s growing, global network . . . [and] process their customer’s payments anywhere in the world instantly, reliably and cost-effectively. Banks and payment providers can use the digital asset XRP to further reduce their costs and access new markets.”⁹⁶ Ripple appears to be gaining rapid traction in adding significant new customers.⁹⁷ During late 2017, Ripple announced the addition to its board of directors of Benjamin Lawsky, the former New York superintendent of Financial Services.⁹⁸ Ripple’s international money-transfer service boasts adoption by about 100 banks as of early 2018, including Spain’s Banco Santander SA and Bank of America.⁹⁹

Criminal Application

By 2013, Bitcoin had gained widespread notoriety as an anonymous vehicle for the transmission of funds involved in illegal activities.¹⁰⁰ These illicit activities include: trade in illicit drugs,¹⁰¹ sales of armaments, often involving

95. RIPPLE, RIPPLENET 2, https://ripple.com/files/rippletnet_brochure.pdf [<https://perma.cc/HP6N-9L59>].

96. *Id.* at 16.

97. *See id.*; *see also* Paul Vigna & Peter Rudgegair, *MoneyGram Signs Deal to Work with Currency Startup Ripple; Money-Transfer Company will Run a Pilot Program Testing XRP, a Digital Currency*, WALL ST. J. (Jan 11, 2018, 6:24 PM), <https://www.wsj.com/articles/moneygram-signs-deal-to-work-with-currency-startup-ripple-1515679285> [<https://perma.cc/9R86-6KJ5>].

98. *See* Kelly Johnson, *Ripple Appoints Former New York State Superintendent of Financial Services Benjamin Lawsky to its Board and Ron Will as CFO*, RIPPLE (Nov. 21, 2017), https://ripple.com/ripple_press/ripple-appoints-former-new-york-state-superintendent-financial-services-benjamin-lawsky-board-ron-will-cfo/ [<https://perma.cc/7R36-VUCU>].

99. Paul Vigna, *Ripple Steals Some of Bitcoin’s Thunder*, WALL ST. J., Jan 6–7, 2018, at B1.

100. *See* Trautman, *Virtual Currencies*, *supra* note 11, at 6; *Beyond Silk Road: Potential Risks, Threats, and Promises of Virtual Currencies: Hearings Before the S. Comm. on Homeland Security & Governmental Affairs*, *supra* note 11, at 11 (statement of Edward Lowery III, Special Agent in Charge, Criminal Investigative Division, U.S. Secret Service) (citing FIN-2013-G001, *supra* note 11); Dan Awrey & Kristin van Zwieten, *The Shadow Payment System*, 43 J. CORP. L. (forthcoming), <https://ssrn.com/abstract=2843772> [<https://perma.cc/H5M8-AHCY>]; Annemarie Bridy, *Internet Payment Blockades*, 67 FLA. L. REV. 1523, 1564–65 (2015); Sean Foley et al., *Sex, Drugs, and Bitcoin: How Much Illegal Activity is Financed Through Cryptocurrencies?* 1 (unpublished manuscript), <https://ssrn.com/abstract=3102645> [<https://perma.cc/7JJY-8CCV>].

101. *See* Trautman, *Virtual Currencies*, *supra* note 11, at 12.

terrorists;¹⁰² money laundering;¹⁰³ providing a marketplace for assassins;¹⁰⁴ attacks on businesses (ransomware);¹⁰⁵ child exploitation;¹⁰⁶ corporate espionage;¹⁰⁷ payment for fake IDs and passports;¹⁰⁸ sexual exploitation;¹⁰⁹ high yield investment schemes;¹¹⁰ stolen credit cards;¹¹¹ and any activities where masking the identities of parties to the transaction is involved.¹¹²

Observing in Congressional testimony that “cybercrime is big business,” James Andrew Lewis, Senior Vice President at the Center for Strategic and International Studies (CSIS) warns, “the last few years have shown that the Internet has a dark underside that is deeply troubling. The Internet has brought tremendous economic benefit, but this comes with the costs created by espionage and crime.”¹¹³ Mr. Lewis continues, “[t]he development of cryptocurrencies reduced risk and increased returns [to cybercriminals], by increasing the anonymity and ease of criminal transactions. The cybercrime monetization process is increasingly digitized, with criminals moving stolen funds rapidly among accounts with the goal of using it to buy cryptocurrencies in untraceable ways.”¹¹⁴

102. *See id.* at 6, 8; *see also* Alan Brill & Lonnie Keene, *Cryptocurrencies: The Next Generation of Terrorist Financing?*, 6 DEF. AGAINST TERRORISM REV. 7, 8 (2014).

103. Trautman, *Virtual Currencies*, *supra* note 11, at 6; *see also* Danton Bryans, *Bitcoin and Money Laundering: Mining for an Effective Solution*, 89 IND. L.J. 441, 444 (2014); Allison Caffarone & Meg Holzer, “Ev’ry American Experiment Sets a Precedent”: *Why One Florida State Court’s Bitcoin Opinion is Everyone’s Business*, 16 J. INT’L BUS. & L. 6, 6 (2016); Catherine Martin Christopher, *Whack-a-Mole: Why Prosecuting Digital Currency Exchanges Won’t Stop Online Laundering*, 18 LEWIS & CLARK L. REV. 1, 19 (2014).

104. Trautman, *Virtual Currencies*, *supra* note 11, at 8.

105. *Id.* at 9; *see also* Deborah R. Farringer, *Send Us the Bitcoin or Patients Will Die: Addressing the Risks of Ransomware Attacks on Hospitals*, 40 SEATTLE U. L. REV. 937, 953 (2017); Lawrence J. Trautman & Peter C. Ormerod, *Wannacry, Ransomware, and the Emerging Threat to Corporations*, TENN. L. REV. (forthcoming 2019), <http://ssrn.com/abstract=3238293> [<https://perma.cc/P5B9-C8RG>].

106. *See* Trautman, *Virtual Currencies*, *supra* note 11, at 9.

107. *Id.* at 11.

108. *Id.* at 13.

109. *Id.* at 14.

110. *Id.*

111. *Id.* at 15.

112. *Id.* at 7; *see also* John T. Holden, *Trifling and Gambling with Virtual Money*, 25 UCLA ENT. L. REV. 41, 54–55 (2018).

113. *After the Breach: The Monetization and Illicit Use of Stolen Data: Hearing Before the Subcomm. on Terrorism and Illicit Finance of the H. Comm. on Fin. Servs.*, 115th Cong. 2 (2018) (statement of James Andrew Lewis, Senior Vice President, Center for Strategic and International Studies (CSIS)) [hereinafter *After the Breach*]; *accord* Trautman, *Virtual Currencies*, *supra* note 11, at 8; *see also* Holden, *supra* note 112, at 41.

114. *After the Breach*, *supra* note 113, at 3.

Based on data collected from anonymous major online marketplaces between 2011 and 2017, researchers based at Carnegie Mellon and Delft Technical University in the Netherlands discovered:

First, the largest type of digital goods listings we observed (approximately 12,000 out of roughly 44,000 total offerings in the digital goods category) were “cash-out” schemes. These cashout schemes primarily include[:] 1) synthetic credit card numbers not associated with any real account, but that would pass rudimentary automated validity checks—those are usually not harmful to any specific individual, 2) “fullz,” that denote comprehensive records, pairing for instance stolen credit card numbers, with the associated CVV codes, and in some cases the social security number or date of birth of the legitimate owner, and 3) various types of guides, including money laundering tutorials (e.g., how to recruit money mules). A smaller number of listings were for[:] 4) bank and financial account credentials (e.g., PayPal logins) and 5) money laundering services (e.g., “Bitcoin deals,” or cash payouts, such as vendors offering cash in the mail in exchange for Bitcoin).¹¹⁵

Terrorism and Virtual Currencies

Observing that “Transnational criminal organizations (TCOs) pose a significant and growing threat to the United States financial system and our national security,” the House Terrorism and Illicit Finance Subcommittee held hearings about “Exploring the Financial Nexus of Terrorism, Drug Trafficking, and Organized Crime” on March 20, 2018.¹¹⁶ A memorandum from the Financial Services Committee staff states:

These organizations have an estimated value of \$3.6 to \$4.8 trillion, or seven percent of global Gross Domestic Product, and result in \$130 billion in lost revenue annually to the private sector. TCOs should be regarded as a national security threat that is undermining U.S. government efforts to combat illegal drugs, arms, human trafficking, terrorism, and other crimes to include money laundering, cybercrimes, fraud, and corruption. Given the profit potential, terrorist and insurgent groups have been steadily incorporating criminal activities into their

115. *Id.* (statement by Nicolas Christin, Assoc. Research Professor, School of Computer Science, Institute for Software Research, C. of Engineering, & Pub. Pol’y, Carnegie Mellon U.).

116. Exploring the Financial Nexus of Terrorism, Drug Trafficking, and Organized Crime, Staff Memorandum of the H. Terrorism and Illicit Fin. Subcomm., Mar. 15, 2018, 115th Cong. (2018).

business models, thus blurring the line between TCOs and terrorist organizations.¹¹⁷

Professor Louise Shelley testifies, “[b]usinesses, especially in new areas of technology, need to ensure that social media and online platforms are not facilitating corrupt, criminal and terrorist activity where there has been exponential growth of illicit activity in recent years.”¹¹⁸ Commenting about the Trump Administration’s recognition of the importance of the 2011 U.S. Strategy to Combat Transnational Organized Crime (CTOC), Professor Celina B. Realuyo echoes the document’s “official[] declar[ation of] transnational criminal organizations as a U.S. national security threat, undermining the legitimate economy, corrupting institutions and moving ‘bad people and bad products’ into the United States. Drugs, arms, and human trafficking, money laundering, cybercrime, and the nexus between terrorism and crime became top national security concerns.”¹¹⁹

III. INCREASING PACE OF TECHNOLOGICAL CHANGE

*We’re entering an age of acceleration. The models underlying society at every level, which are largely based on a linear model of change, are going to have to be redefined. Because of the explosive power of exponential growth, the twenty-first century will be equivalent to 20,000 years of progress at today’s rate of progress; organizations have to be able to redefine themselves at a faster and faster pace.*¹²⁰

*Ray Kurzweil
Director of Engineering at Google*

Today’s technological revolution, which was brought about in recent years due to widespread availability of the Internet (just before the year 2000) as well as rapid growth in computer chip processing speed along with the declining cost of processing capacity, may prove to be as significant for humanity as the impact of the Gutenberg press in the time of Leonardo DiVinci.¹²¹ In just the

117. *Id.*

118. *Exploring the Financial Nexus of Terrorism, Drug Trafficking, and Organized Crime: Hearing Before the Subcomm. on Terrorism and Illicit Finance of the H. Comm. on Fin. Servs.*, 115th Cong. (2018) (statement of Louise Shelley, University Professor and the Omer and Nancy Hirst Chair and Director, Terrorism, Transnational Crime and Corruption Center, Schar School of Pol’y and Govt. George Mason University).

119. *Id.* (statement of Celina B. Realuyo, Professor of Practice, William J. Perry Center for Hemispheric Defense Studies, Nat’l Defense University).

120. THOMAS L. FRIEDMAN, THANK YOU FOR BEING LATE: AN OPTIMIST’S GUIDE TO THRIVING IN THE AGE OF ACCELERATIONS 187 (2016).

121. *See* WALTER ISAACSON, LEONARDO DA VINCI, at xiv (2017).

last few years, “[t]he flows of knowledge, new ideas, medical advice, innovation, insults, rumors, collaboration, matchmaking, lending, banking, trading, friendship-forging, commerce, and learning now circulate globally at a speed and breadth we have never seen before.”¹²² In addition, “[t]hese digital flows carry the energy, services, and tools of the supernova all across the world, where anyone can plug into them to power a new business, participate in the global debate, acquire a new skill, or export their latest product or hobby.”¹²³

Consider how different our lives are today because of the availability and our use of the Internet. It is easy to overlook just how recently many of our daily conveniences have become available due to rapid technological advances.¹²⁴ In addition, the widespread availability and adoption of mobile

122. FRIEDMAN, *supra* note 120, at 87.

123. *Id.*; see also Apple Inc., Annual Report (Form 10-K), at 2 (Nov. 3, 2017), <https://www.sec.gov/Archives/edgar/data/320193/000032019317000070/a10-k20179302017.htm> [<https://perma.cc/5NK5-TDPS>].

124. Examples of recent technological advances include: Amazon (1994), Amazon.com, Inc., Annual Report (Form 10-K), at 2 (Jan. 25, 2017), <https://www.sec.gov/Archives/edgar/data/1018724/000101872417000011/amzn-20161231x10k.htm> [<https://perma.cc/69JF-DATQ>]; Google (1998), see Lawrence J. Trautman, *How Google Perceives Customer Privacy, Cyber, E-commerce, Political and Regulatory Compliance Risks*, 10 WM. & MARY BUS. L. REV. (forthcoming) (manuscript at 17), <https://ssrn.com/abstract=3067298> [<https://perma.cc/23UM-L4Z4>] (citing Alphabet Inc., Quarterly Report, (Form 10-Q), at 17 (Oct. 27, 2017), <https://www.sec.gov/Archives/edgar/data/1652044/000165204417000042/goog10-q32017.htm> [<https://perma.cc/Y92V-WX6X>]); PayPal (1998), see PayPal, Registration Statement (Form S-1), at 9 (June 12, 2002), <https://www.sec.gov/Archives/edgar/data/1103415/000091205702023923/a2082068zs-1.htm> [<https://perma.cc/7G9F-E8FL>]; see also Lawrence J. Trautman, *E-Commerce, Cyber, and Electronic Payment System Risks: Lessons from PayPal*, 17 U.C. DAVIS BUS. L.J. 261, 274–79 (2016) [hereinafter Trautman, *E-Commerce*]; Skype (2003), see Skype S.à r.l., Registration Statement (Form S-1), at 130 (Aug. 9, 2010), https://www.sec.gov/Archives/edgar/data/1498209/000119312510182561/ds1.htm#rom83085_12 [<https://perma.cc/T7CT-LZRK>]; Facebook (2004), see *About*, FACEBOOK, https://www.facebook.com/pg/facebook/about/?ref=page_internal [<https://perma.cc/GL98-9CKM>] (last visited Jan. 19, 2018); Pandora (2005), see Pandora Media, Inc., Amendment No. 5 to Registration Statement (Form S-1), at 1 (June 2, 2011), <https://www.sec.gov/Archives/edgar/data/1230276/000119312511157169/ds1a.htm> [<https://perma.cc/8STZ-ZEQM>]; Twitter (2007), see Twitter, Inc., Registration Statement (Form S-1), at 9 (Oct. 3, 2013), <https://www.sec.gov/Archives/edgar/data/1418091/000119312513390321/d564001ds1.htm> [<https://perma.cc/3XMS-N4SH>]; Apple iPhone (2007), see FRIEDMAN, *supra* note 120, at 19–20; Kindle (2007), *id.* at 20; Waze (2007), Rip Empson, *WTF is Waze and Why Did Google Just Pay a Billion+ for it?*, TECHCRUNCH (June 12, 2013), <https://techcrunch.com/2013/06/11/behind-the-maps-whats-in-a-waze-and-why-did-google-just-pay-a-billion-for-it/> [<https://perma.cc/SM4L-QDXZ>]; Airbnb (2008), see *About Us*, AIRBNB, <https://www.airbnb.com/about/about-us> [<https://perma.cc/4HM2-8ZZ7>] (last visited Jan. 19, 2018); GitHub (2008), see *Press*, GITHUB, <https://github.com/about/press> [<https://perma.cc/ML2M-QUTF>] (last visited Jan. 19, 2018); bitcoin, blockchain, and virtual currencies (2009), see Trautman, *Virtual Currencies*, *supra* note 11, at 43; Trautman, *Disruptive Blockchain Technology*, *supra* note 16, at 234; see also Trautman & Harrell,

technologies have had great influences on human behavior and bring novel ethical considerations.¹²⁵ There can be little doubt that our culture, behavior, ethics, and values have been changed by these new technological influences. As a result, in less than twenty years our culture and environment has been altered in ways that we likely do not fully yet understand. According to Thomas L. Friedman, the watershed year of dramatic change was 2007, when:

The price of sensing, generating, storing, and processing data collapsed just as the speed of uploading or downloading that data to or from the supernova soared, and just as Steve Jobs gave the world a mobile device with such an amazingly easy user interface, Internet connectivity, and rich software applications that a two-year-old could navigate it. When all those lines crossed—when connectivity became fast, free, easy for you, and ubiquitous and when handling complexity became fast, free, easy for you, and invisible—there was an energy

supra note 2, at 1055; Uber (2009), *see Company Info*, UBER, <https://www.uber.com/newsroom/company-info/> [<https://perma.cc/UDE2-9L54>] (last visited Jan. 19, 2018); WhatsApp (2009), Parmy Olson, *Exclusive: The Rags-to-Riches Tale of How Jan Koum Built WhatsApp Into Facebook's New \$19 Billion Baby*, FORBES (Feb. 19, 2014, 7:58 PM), <https://www.forbes.com/sites/parmyolson/2014/02/19/exclusive-inside-story-how-jan-koum-built-whatsapp-into-facebooks-new-19-billion-baby/> [<https://perma.cc/ZRM5-22WM>]; Instagram (2010), *see Our Story*, INSTAGRAM, <https://instagram-press.com/our-story/> [<https://perma.cc/2C57-DEVX>] (last visited Jan. 19, 2018); Pinterest (2010), *see Company: A Brief History*, PINTEREST, <https://about.pinterest.com/en/press/press> [<https://perma.cc/7W53-LNZU>] (last visited Jan. 19, 2018); SnapChat (2011), *see Snap Inc., Registration Statement (Form S-1)* (Feb. 2, 2017), <https://www.sec.gov/Archives/edgar/data/1564408/000119312517029199/d270216ds1.htm> [<https://perma.cc/BZ9H-5QJ4>]; Lyft (2012), *see Matt Lynley, Meet Lyft, A Startup Trying to Change San Francisco's Decades-Old Transportation System*, BUSINESS INSIDER (Sept. 7, 2012, 10:15 AM), <http://www.businessinsider.com/lyft-ride-sharing-john-zimmer-2012-9> [<https://perma.cc/K6CF-7FYT>]; gene splice technology/CRISPR (2014), *see What Are Genome Editing and CRISPR-Cas9?*, U.S. NAT'L LIBR. MED., <https://ghr.nlm.nih.gov/primer/genomicresearch/genomeediting> [<https://perma.cc/Q4WQ-Z7Q9>] (last visited Dec. 22, 2018); *Genome Editing*, NAT'L HUM. GENOME RES. INST., <https://www.genome.gov/27569227/whats-happening-in-genome-editing-right-now/> [<https://perma.cc/TYA6-MZ24>] (last visited Dec. 22, 2018); David Cyranoski, *CRISPR Gene-Editing Tested in a Person for the First Time*, NATURE (Nov. 15, 2016), <http://www.nature.com/news/crispr-gene-editing-tested-in-a-person-for-the-first-time-1.20988> [<https://perma.cc/3PWJ-WHVS>]; Sara Reardon, *Leukaemia Success Heralds Wave of Gene-Editing Therapies*, NATURE (Nov. 5, 2015), <https://www.nature.com/news/leukaemia-success-heralds-wave-of-gene-editing-therapies-1.18737> [<https://perma.cc/P5QD-GBVU>]; Heidi Ledford, *Where in the World Could the First CRISPR Baby Be Born?*, NATURE (Oct. 13, 2015), <https://www.nature.com/news/where-in-the-world-could-the-first-crispr-baby-be-born-1.18542> [<https://perma.cc/G37Z-GAU4>]; and self-driving cars (2016), *see Gwyn Topham, Look Ma, No Hands: What Will it Mean When All Cars Can Drive Themselves?*, GUARDIAN (United Kingdom) (Nov. 25, 2017), <https://www.theguardian.com/business/2017/nov/25/autonomous-vehicles-when-all-cars-drive-themselves-what-will-it-mean> [<https://perma.cc/8XRJ-3KNT>].

125. *See* Lawrence J. Trautman, Kenneth J. Sanney, Eric D. Yordy, Tammy W. Cowart & Destynie Sewell, *Beginning to Think About Ethics and Values in an Age of Rapid Technological Change* 10 (Aug. 21, 2018) (unpublished manuscript), <https://ssrn.com/abstract=3102552> [<https://perma.cc/9JZS-WJN8>].

release into the hands of humans and machines the likes of which we have never seen and are only beginning to understand.¹²⁶

IV. U.S. FINANCIAL SYSTEM

Bitcoin is an attempt to replace fiat currency and evade regulation and government intervention. I don't think that's going to be a success

. . . .
*Eventually governments will take any action they need to prevent [a rival to traditional government-controlled money].*¹²⁷

Ben Bernanke
Former Head U.S. Federal Reserve System

The Regulatory Challenge

By the start of 2018, the challenge of regulating Bitcoin and other virtual currencies is widely recognized. Yale professor and director of the Zvi Meitar Institute for Legal Implications of Emerging Technologies Dov Greenbaum writes, “until governments figure out a coherent response to this technology, each regulatory agency will tend to move independently and inconsistently.”¹²⁸ *The Wall Street Journal* observes, “[f]urious trading in crypto-currencies is testing many in the Trump administration who are eager to embrace financial

126. FRIEDMAN, *supra* note 120, at 93; *see also* Lee W. McKnight et al., *Commodifying Trust: Trusted Commerce Policy Intersecting Blockchain and Internet of Things* 5 (Mar. 31, 2017) (unpublished manuscript), <https://ssrn.com/abstract=2944466> [<https://perma.cc/AV3V-GDK9>]; Michel Rauchs, *Cryptocurrencies Meeting Business Ecosystems: The Case of Bitcoin* (Sept. 1, 2016) (unpublished manuscript), <https://ssrn.com/abstract=3095875> [<https://perma.cc/P8V2-JR7E>].

127. Jeff John Roberts, *Bernanke Thinks Bitcoin Will Fail (But He Likes Blockchain)*, *FORTUNE* (Oct. 16, 2017), <http://fortune.com/2017/10/16/bitcoin-bernanke/> [<https://perma.cc/37SL-JFRL>].

128. Greenbaum, *supra* note 64; *accord* William J. Magnuson, *Financial Regulation in the Bitcoin Era*, 23 *STAN. J.L. BUS. & FIN.* (forthcoming 2018) (manuscript at 2), <https://ssrn.com/abstract=3148036> [<https://perma.cc/28WH-C8AM>]; Stephen T. Middlebrook & Sarah Jane Hughes, *Substitutes for Legal Tender: Lessons from History for the Regulation of Virtual Currencies*, in *RESEARCH HANDBOOK ON ELECTRONIC COMMERCE LAW* 37, 53–61 (John A. Rothchild ed., 2016); Stephen T. Middlebrook & Sarah Jane Hughes, *Virtual Uncertainty: Developments in the Law of Electronic Payments and Financial Services*, 69 *BUS. LAW.* 263, 263 (2013); Melanie L. Fein, *Bitcoin: How is it Regulated?* 2 (Feb. 1, 2018) (unpublished manuscript), <https://ssrn.com/abstract=3166894> [<https://perma.cc/SC7A-PCVY>]; Jason Gordon et al., *The Case for the Regulation of Bitcoin Mining as a Security* (unpublished manuscript), <https://ssrn.com/abstract=2559769> [<https://perma.cc/3F9B-HCU8>].

innovation, after nearly a decade of tighter clamps on risk-taking put in place after the 2008 financial crisis.”¹²⁹

SEC Commissioner Hester M. Peirce observes, “[i]nnovation is always a challenge for regulators. We are used to the way things have been done. Our rules have grown up in response to past technologies. Figuring out whether and how they apply to new ideas is difficult.”¹³⁰ Professor Greenbaum cautions that “[w]hat’s needed is an intelligent, coherent national policy to provide certainty

129. Dave Michaels & Gabriel T. Rubin, *Bitcoin Catches U.S. Regulators Off Guard*, WALL ST. J., Dec. 26, 2017, at B1.

130. Hester M. Peirce, Comm’r, U.S. Sec. and Exch. Comm’n, *Beaches and Bitcoin: Remarks Before the Medici Conf.*, Los Angeles, Cal. (May 2, 2018), <https://www.sec.gov/news/speech/speech-peirce-050218> [<https://perma.cc/F2N2-N5KN>]; accord Michael Abramowicz, *Cryptocurrency-Based Law*, 58 ARIZ. L. REV. 359, 360 (2016); Shawn Bayern, *Dynamic Common Law and Technological Change: The Classification of Bitcoin*, 71 WASH. & LEE L. REV. ONLINE 22, 23 (2014); Jerry Brito, Houman Shadab & Andrea Castillo, *Bitcoin Financial Regulation: Securities, Derivatives, Prediction Markets, and Gambling*, 16 COLUM. SCI. & TECH. L. REV. 144, 146 (2014); Chris Brummer & Yesha Yadav, *Fintech and the Innovation Trilemma*, GEO. L.J. (forthcoming 2018) (manuscript at 2), <https://ssrn.com/abstract=3054770> [<https://perma.cc/AMN6-MX9E>]; Mark Edwin Burge, *Apple Pay, Bitcoin, and Consumers: The ABCs of Future Public Payments Law*, 67 HASTINGS L.J. 1493, 1495 (2016); Omri Marian, *A Conceptual Framework for the Regulation of Cryptocurrencies*, 82 U. CHI. L. REV. ONLINE 53, 57 (2015); Hossein Nabilou & André Prüm, *Ignorance, Debt and Cryptocurrencies: The Old and the New in the Law and Economics of Concurrent Currencies*, J. FIN. REG. (forthcoming) (manuscript at 2), <https://ssrn.com/abstract=3121918> [<https://perma.cc/6WY6-JWYV>]; Seth C. Oranburg, *Hyperfunding: Regulating Financial Innovations*, 89 U. COLO. L. REV. 1033, 1034 (2018); Carla L. Reyes, *Moving Beyond Bitcoin to an Endogenous Theory of Decentralized Ledger Technology Regulation: An Initial Proposal*, 61 VILL. L. REV. 191, 193 (2016); Carla L. Reyes, *Conceptualizing Cryptolaw*, 96 NEB. L. REV. 384, 399 (2017); Usha Rodrigues, *Law and the Blockchain*, 104 IOWA L. REV. (forthcoming 2018) (manuscript at 50), <https://ssrn.com/abstract=3127782> [<https://perma.cc/LX3C-2J64>]; Scott Shackelford & Steve Myers, *Block-by-Block: Leveraging the Power of Blockchain Technology to Build Trust and Promote Cyber Peace*, 19 YALE J.L. & TECH. 335, 366 (2017); Anton Badev & Matthew Chen, *Bitcoin: Technical Background and Data Analysis* (Fin. Econ. Discussion Series, Working Paper No. 2014-104, 2014), <https://ssrn.com/abstract=2544331> [<https://perma.cc/85DV-SME3>]; John Michael Grant, *Is Bitcoin Money?: Implications for Bitcoin Derivatives Regulation and Security Interest Treatment of Bitcoins Under Article 9 of the Uniform Commercial Code 14–15* (Dec. 17, 2014) (unpublished note), <https://ssrn.com/abstract=2619457> [<https://perma.cc/W7R4-CRMB>]; Saman Jafari, Tien Vo-Huu, Bahruz Jabiyev, Alejandro Mera & Reza Mirzazade farkhani, *Cryptocurrency: A Challenge to Legal System 4* (May 2, 2018) (unpublished manuscript), <https://ssrn.com/abstract=3172489> [<https://perma.cc/D36Q-XVB7>]; Robert Donald Leonhard, *Corporate Governance on Ethereum’s Blockchain 20* (May 30, 2017) (unpublished manuscript), <https://ssrn.com/abstract=2977522> [<https://perma.cc/Y6K4-V5X9>]; Gabriel J. Michael, *Anarchy and Property Rights in the Virtual World: How Disruptive Technologies Undermine the State and Ensure That the Virtual World Remains a ‘Wild West’ 21* (Mar. 1, 2013) (unpublished manuscript), <https://ssrn.com/abstract=2233374> [<https://perma.cc/6XW3-4XK3>]; Jeanne L. Schroeder, *Bitcoin and the Uniform Commercial Code 4* (Aug. 22, 2015) (unpublished manuscript), <https://ssrn.com/abstract=2649441> [<https://perma.cc/5PDR-XX2L>]; David Yermack, *Is Bitcoin a Real Currency? An Economic Appraisal* (Apr. 1, 2014) (unpublished manuscript), <https://ssrn.com/abstract=2361599> [<https://perma.cc/ZF6G-WWQX>].

for the next wave of blockchain innovations.”¹³¹ Professor Greenbaum believes that it is necessary to:

Consider the repercussions if blockchain technology becomes widely adopted: Financially disenfranchised people, those without access to banks or credit cards, will be able to buy and sell online. Information on deeds, titles, professional credentials and even simple identification will be easily obtainable, transparent, reliable and free from error. The costs associated with many transactions will fall as middlemen are cut out and cumbersome government regulation is avoided.

Mass use of virtual currencies will reduce the ability of central banks to set and enforce monetary policy. Regulations meant to protect investors will be circumvented by tools such as ICOs. Trust in institutions will continue to fall as millions of people shift to better verification methods via blockchains. Not surprisingly, those same institutions—governments, banks, insurance companies—are already racing to find ways of using blockchain to reduce costs and create efficiencies.¹³²

To a considerable extent, the market for Bitcoin and virtual currencies is worldwide. Although subject to change at any moment, many developing countries appear to have embraced Bitcoin.¹³³ Several industrialized countries such as Germany¹³⁴ and Japan¹³⁵ have welcomed Bitcoin. However, many nation state financial market regulators are sounding alarm, such as Canada,¹³⁶ China,¹³⁷ and South Korea.¹³⁸ Regarding recent technological innovations, SEC Commissioner Hester M. Peirce states, “if these concepts were free to develop in whatever way the market dictated, without being . . . [labeled] as ‘security’ or, as ‘commodity,’ ‘currency,’ ‘asset,’ ‘forward contract,’ there

131. Greenbaum, *supra* note 64.

132. *Id.*

133. See Matina Stevis-Gridneff & Georgi Kantchev, *Developing Countries Embrace Bitcoin*, WALL ST. J., Jan. 5, 2018, at B8.

134. See Zeke Turner, *Cash-Loving Germany Embraces Bitcoin*, WALL ST. J., Jan. 9, 2018, at B10.

135. See Paul Vigna & Gregor Stuart Hunter, *Bitcoin Wins in Japan, Loses in South Korea*, WALL ST. J., Sept. 30–Oct. 1, 2017, at B9.

136. See Paul Vieira, *Bitcoin Alarms Canadian Official*, WALL ST. J., Dec. 15, 2017, at B14.

137. See Chao Deng & Paul Vigna, *China Cracks Down on Bitcoin*, WALL ST. J., Sept. 12, 2017, at A1; Chao Deng, *Beijing Draws a Bead on Virtual Currency*, WALL ST. J., Sept. 19, 2017, at B1; Steven Russolillo & Eun-Young Jeong, *Bitcoin Lures Asia Investors*, WALL ST. J., Dec. 13, 2017, at B1.

138. See Vigna & Hunter, *supra* note 135; Steven Russolillo & Kwanwoo Jun, *Seoul Acts Tough on Bitcoin*, WALL ST. J., Dec. 29, 2017, at B11; Eun-Young Jeong, *Korea Gets Tougher on Digital Currencies*, WALL ST. J., Jan. 9, 2018, at B10.

comes a point where regulatory uncertainty is a greater roadblock than confinement within a particular regulatory regime.”¹³⁹ So; for regulatory purposes, What exactly are virtual or cybercurrencies?

Currency, Security, or Commodity?

Alvin Harrell and I have previously presented a brief history of money, barter, the primitive evolution of money, money in the United States, and the evolution of cybercurrencies.¹⁴⁰ From a regulatory perspective, the threshold question seems to be, Is a virtual currency to be regulated as a currency, security, or commodity? The simple answer appears to be yes. Money is more than just crumpled bills still carried around by some. As SEC Commissioner Hester Peirce observes, “it also means any number of ways of storing and redeeming value. It’s money not because of its form, but because of its function.”¹⁴¹ SEC Commissioner Peirce continues:

139. Peirce, *supra* note 130 (citing *Modernizing Regulation to Encourage Fintech Innovation: Hearing Before the Subcomm. on Fin. Inst. and Consumer Credit Examining Opportunities and Challenges in the Financial Technology (“Fintech”) Marketplace of the H. Comm. on Fin. Servs.*, 115th Cong. (2018) (statement by Brian Knight, Director, Program on Fin. Reg., Mercatus Center at George Mason University) (discussing the challenges presented when firms face uncertainty among federal financial regulators).

140. See Trautman & Harrell, *supra* note 2, at 1043–71.

141. Peirce, *supra* note 130 (citing David Beckworth, *Macro Musings 86: William A. Barnett on Divisia Aggregates and Measuring Money in the Economy*, MERCATUS CTR. (Dec. 4, 2017), <https://www.mercatus.org/%5Bnode%3A%5D/podcasts/12042017/macro-musings-86-william-barnett-divisia-aggregates-and-measuring-money> [<https://perma.cc/AVJ2-24ZF>]); see also Robleh Ali, John Barrdear, Roger Clews & James Southgate, *Innovations in Payment Technologies and the Emergence of Digital Currencies*, BANK OF ENG. Q. BULL., Q3 2014, at 262, 264; Rainer Böhme, Nicolas Christin, Benjamin Edelman & Tyler Moore, *Bitcoin: Economics, Technology, and Governance*, 29 J. ECON. PERSP. 213, 215 (2015); Adam Chodorow, *Bitcoin and the Definition of Foreign Currency*, 19 FLA. TAX REV. 365, 378 (2016); Abeer ElBahrawy, Laura Alessandretti, Anne Kandler, Romualdo Pastor-Satorras & Andrea Baronchelli, *Evolutionary Dynamics of the Cryptocurrency Market*, ROYAL SOC’Y OPEN SCI., Nov. 2017, at 1, 7; Florian Glaser, Kai Zimmermann, Martin Haferkorn, Moritz Christian Weber & Michael Siering, *Bitcoin—Asset or Currency? Revealing Users’ Hidden Intentions*, in TWENTY SECOND EUROPEAN CONFERENCE ON INFORMATION SYSTEMS (Tel Aviv) (2014); Gary E. Kalbaugh, *Virtual Currency, Not a Currency?*, 16 J. INT’L BUS. & L. 26, 26 (2016); William J. Luther & Lawrence H. White, *Can Bitcoin Become a Major Currency?* 6–7 (Geo. Mason U. Dep’t Econ. Working Paper No. 14-17); Ronald J. Balvers & Bill McDonald, *Designing a Global Digital Currency 1* (Oct. 6, 2017) (unpublished manuscript), <https://ssrn.com/abstract=3049000> [<https://perma.cc/8D8N-5W25>]; Vavrinec Cermak, *Can Bitcoin Become a Viable Alternative to Fiat Currencies? An Empirical Analysis of Bitcoin’s Volatility Based on a GARCH Model 12–15* (May 2, 2017) (unpublished manuscript), <https://ssrn.com/abstract=2961405> [<https://perma.cc/7WJJ-2CJJ>]; Engin Iyidogan, *Economic Model of Blockchain Based Cryptocurrencies 1* (Mar. 2018) (unpublished manuscript), <https://ssrn.com/abstract=3152803> [<https://perma.cc/6PVU-LQHT>]; Maria Letizia Perugini & Cesare Maioli, *Bitcoin: Between Digital Currency and Financial Commodity 1* (Nov. 17, 2014) (unpublished manuscript), <https://ssrn.com/abstract=2526472> [<https://perma.cc/7E6C-DPTD>]; George Selgin, *Synthetic Commodity Money 1* (Apr. 10, 2013) (unpublished manuscript), <https://ssrn.com/abstract=2000118> [<https://perma.cc/G2XK-SNA6>].

The idea that a thing can have many forms but still represent the same function, and therefore be subject to the same regulation, is just the beginning. The inverse is also true in the financial world. A thing might seemingly have one form but in fact support many functions, each requiring a different regulatory regime. A mortgage can be a loan, but also an income stream to be used to fund a collateralized debt obligation. Gold is an asset, but gold futures are derivatives. Creating and deploying new ways of holding and trading assets and their attendant risks is the creative heart of the financial world. Given our federal system's considerable array of financial regulators, defining the function of a product or transaction is always essential to determining its proper regulatory regime.

Such an analytical approach—defining an instrument by its function not its form—can be useful when we're confronted with something that seems entirely new and difficult to categorize. Like, for example, tokens. . . . The tokens we're all so interested in these days aren't metal and don't clink. Instead they are . . . what, exactly? In metaphysical terms, they are sometimes talked about as if they are the gateway to a future that challenges well-established past norms. In physical terms they're a set of code. In functional terms, well, it depends. And that's the challenge.

There are, for example, cryptocurrencies like bitcoin. These function perhaps like money. Some of their creators and certainly some of their early adopters may have intended them to function that way, even though technological and regulatory barriers can make it tough for cryptocurrencies to serve as currency. They may be currency, commodities, or something else, but it is unlikely that, on their own, they're actually securities.¹⁴²

As described more fully later, various aspects of virtual currencies appear to fall under the jurisdiction of numerous regulatory agencies.¹⁴³ The Registration Statement Amendment No. 9 to the Winklevoss Bitcoin Trust, dated February 8, 2017, states that “[t]he regulatory uncertainty surrounding

142. Peirce, *supra* note 130 (citing Brian Knight, *Federalism and Federalization on the Fintech Frontier*, 20 VAND. J. ENT. & TECH. L. 129 (2017) (discussing the various applications of crypto and distributed ledger technology and the regulatory barriers such innovations face).

143. See Winklevoss S-1 Amendment No. 9, *supra* note 37, at 6.

the treatment of Bitcoin creates risks for the Trust and its Shares.”¹⁴⁴ Accordingly:

Bitcoin has been characterized as a virtual commodity, digital asset, digital currency and virtual currency by other international regulatory bodies. Since December 2013, regulators in jurisdictions including the United States, the United Kingdom and Switzerland have provided greater regulatory clarity, while Chinese, Russian, Icelandic and Vietnamese government officials have taken steps to limit the participation of their respective financial services sectors from directly interacting with the Bitcoin ecosystem, creating additional regulatory uncertainty in those countries. In May 2014, the Central Bank of Bolivia banned the use as currency of digital assets including bitcoin, while the government of Ecuador took steps to limit the use of bitcoin in advance of the issuance of a proposed state-backed Digital Asset. In April 2015, the Japanese Cabinet approved proposed legal changes that would reportedly treat bitcoin and other Digital Assets as included in the definition of currency. These regulations would, among other things, require market participants, including exchanges, to meet certain compliance requirements and be subject to oversight by the Financial Services Agency, a Japanese regulator. These changes were approved by the Japanese Diet in May 2016 and are expected to be effective beginning in 2017. In July 2016, the European Commission released a draft directive that proposed applying counter-terrorism and anti-money laundering regulations to virtual currencies, and, in September 2016, the European Banking authority advised the European Commission to institute new regulation specific to virtual currencies, with amendments to existing regulation as a stopgap measure.¹⁴⁵

Cyber Threat to U.S. Capital Markets

A pervasive threat to all nation states both in the developed world and in lesser developed economies is the threat of cyberattack.¹⁴⁶ This omnipresent

144. *Id.*

145. *See id.* at 6 (citing European Commission, *Proposal for Amending Directive 2015/849/EU on the Prevention of the Use of the Financial System for the Purposes of Money Laundering or Terrorist Financing and Amending Directive 2009/101/EC*, Directive 2016/0208 (July 5, 2016)); *Opinion of the European Banking Authority, Opinion on the EU Commission's Proposal to Bring Virtual Currencies into the Scope of Directive (EU) 2015/849/EU, (4AMLD)*, EBA Opinion 2016-07 (Aug. 11, 2016).

146. *See* Lawrence J. Trautman & Peter C. Ormerod, *Corporate Directors' and Officers' Cybersecurity Standard of Care: The Yahoo Data Breach*, 66 AM. U. L. REV. 1231, 1234 (2017).

technological development threatens the critical infrastructure, military and national security institutions, and financial markets and institutions. For example, in their 2017 annual report, the Financial Stability Oversight Council (FSOC) states:

As the financial system relies more heavily on technology, the risk that significant cybersecurity incidents targeting this technology can prevent the financial sector from delivering services and impact U.S. financial stability increases. Through collaboration and partnership, substantial gains have been made by both government and industry in response to cybersecurity risks, in part by refining their shared understanding of potential vulnerabilities within the financial sector. It is important that this work continue and include greater emphasis on understanding and mitigating the risk that significant cybersecurity incidents have business and systemic implications.¹⁴⁷

Among other suggestions, the FSOC “recommended the creation of a private-sector council composed of senior executives in the financial industry that would correspond with regulators on cybersecurity issues, suggesting the financial industry should be allowed to handle those vulnerabilities with less government involvement.”¹⁴⁸ In addition, the report states, “This council could help identify specific vulnerabilities in the sector’s ability to provide critical products and services and propose standards for cybersecurity and operational resilience.”¹⁴⁹ Other proposals from the FSOC include “allowing market regulators—the Securities and Exchange Commission and the Commodity Futures Trading Commission—to examine information technology contractors working for private-sector companies.”¹⁵⁰

Numerous cases of cyber attacks on cryptocurrencies, usually exchanges, are reported,¹⁵¹ including a Christmas Eve 2017 attack attributed to a North Korean university.¹⁵² According to U.S. cybersecurity firm AlienVault, “[t]he malware . . . instructs an infected computer to mine for Monero, a bitcoin

147 FIN. STABILITY OVERSIGHT COUNCIL, 2017 ANNUAL REPORT 4 (2017), https://www.treasury.gov/initiatives/fsoc//studies-reports/Documents/FSOC_2017_annual_report.pdf [<https://perma.cc/JE9Q-S6LK>].

148. Lalita Clozel, *Financial Regulators Warn on Cybersecurity*, WALL ST. J., Dec. 15, 2017, at B14.

149. *Id.*

150. *Id.*

151. See, e.g., Paul Vigna, *Exchanges Pose Cryptocurrency Risk*, WALL ST. J., Mar. 5, 2018, at B8.

152. See Timothy W. Martin, *Pyongyang Hacks Cryptocurrency*, WALL ST. J., Jan. 9, 2018, at A6.

alternative The unearthed funds then automatically flow to a server domain at Kim Il Sung University. . . . It is unclear where the virus was planted or how much Monero was extracted.”¹⁵³ In the following pages we examine the following U.S. regulatory actors as they seek to deal with Bitcoin: Federal Reserve and the banking system; Treasury Department; SEC; CFTC; and various state regulators.

Federal Reserve, U.S., and International Banking System

As recently as 2014, Fed Chair Janet Yellen stated that the Federal Reserve “simply does not have authority to supervise or regulate bitcoin in any way.”¹⁵⁴ The House 2018 Joint Economic Report states, “Federal Reserve Chair Janet Yellen considered Bitcoin a ‘highly speculative asset’ that is not considered legal tender.”¹⁵⁵ The Report also singles out transaction processing time and fee as limiting factors “render[ing] Bitcoin uneconomical for common purchase [based on the logic that] transaction fees averaged \$28 in December 2017 and processing time reached an average of 19.8 hours. This was at the height of Bitcoin’s popularity in 2017 and highlighted the limitations of the underlying protocol.”¹⁵⁶ The House Committee Report states, “Extreme volatility in the dollar price of cryptocurrencies also impairs their use as money because people price goods and services in dollars and thus their purchasing power fluctuates wildly. . . . [T]o value items in terms of bitcoin, ether, or ripple, the dollar exchange values . . . would have to stabilize.”¹⁵⁷

With a market capitalization of approximately \$0.14 trillion as of May 19, 2018¹⁵⁸ the flow of Bitcoin across international borders does not seem to currently be viewed as representing a threat to nation state money supply

153. *Id.*

154. Greenbaum, *supra* note 64; see also Christian Beer & Beat Weber, *Bitcoin—The Promise and Limits of Private Innovation in Monetary and Payment Systems*, MONETARY POL’Y & ECON., Q4 2014, at 53, 63; Catherine Martin Christopher, *The Bridging Model: Exploring the Roles of Trust and Enforcement in Banking, Bitcoin, and the Blockchain*, 17 NEV. L.J. 139, 142 (2016); G.C. Pieters, *The Potential Impact of Decentralized Virtual Currency on Monetary Policy*, FED. GLOBALIZATION & MONETARY POL’Y INST. 2016 ANNUAL REPORT 20, 22 (2016); Jesús Fernández-Villaverde & Daniel R. Sanches, *Can Currency Competition Work?* 2 (Apr. 3, 2016) (Penn Inst. for Econ. Res., Working Paper No. 16-008, 2016), <https://ssrn.com/abstract=2760415> [<https://perma.cc/N3B6-CUCE>]; Shaen Corbet, Charles Larkin, Brian Lucey, Andrew Meegan & Larisa Yarovaya, *Cryptocurrency Reaction to FOMC Announcements: Evidence of Heterogeneity Based on Blockchain Stack Position 3* (Nov. 18, 2017) (unpublished manuscript), <https://ssrn.com/abstract=3073727> [<https://perma.cc/D22S-UK6P>].

155. H.R. REP. NO. 115-596, at 208 (2018).

156. *Id.*

157. *Id.*

158. *Bitcoin (USD) Price*, COINDESK (May 19, 2018), <https://www.coindesk.com/price/> [<https://perma.cc/4SXJ-KTXL>].

management. Andrew Haldane, while Bank of England's Executive Director for Financial Stability during 2011, "identified a 'doom loop' from banks creating credit to lend to each other."¹⁵⁹ This is important because:

Modern currencies have become a belief system based on an ideology that markets are "free" and independent of human manipulation. However, the purpose of central banks is to control the volume of money created and its interest cost. The monopoly control of official forms of money means that central banking policies are applied throughout an economy. Like command and control economies the opportunity for variety is denied.¹⁶⁰

The International Monetary Fund (IMF) was created following the end of World War II as a specialized agency of the United Nations for the purpose of: "(1) '[O]verseeing the international monetary system to ensure exchange rate stability'; and (2) 'encouraging members to eliminate exchange restrictions that hinder trade.'"¹⁶¹ Attorney Nicholas Plassaras warns that under certain circumstances virtual currencies may pose a threat scenario to international economic stability:

Because Bitcoin is not formally backed by a country's government, it is not bound by the IMF's guidelines. As a result, Bitcoin poses a serious threat to the economic stability of the foreign currency exchange market if it continues to grow in both value and usage. Any other digital currency that enters widespread use would pose similar problems. Because private digital currencies like Bitcoin fall outside the IMF's legal framework, the IMF is unable to obtain those currencies directly. . . . If Bitcoin—or digital currency like it—becomes an important currency in international commerce, its use in speculative attacks could cause serious economic harms unless the IMF develops a way to counter [them] [T]he longer the IMF takes to bring Bitcoin within its control, the more difficult controlling Bitcoin will become. Bitcoins are generated through computer software which is programmed to halt the production of new Bitcoins by approximately 2025. Once Bitcoins can no longer be generated, their supply

159. See Trautman & Harrell, *supra* note 2, at 1091 (citing Shann Turnbull, Might Supplementary Tethered Currencies Reduce Financial System Risks?, Presentation to the International Finance & Banking Society Conference (IFABS), Lisbon, Portugal, at 2 (Jan. 15, 2015), <http://ssrn.com/abstract=2417826> [<https://perma.cc/74LQ-6QD3>]); see also Hilary J. Allen, *Is Bitcoin? Bitcoin?*, 76 MD. L. REV. 877, 883 (2017).

160. Trautman & Harrell, *supra* note 2, at 1091–92.

161. *Id.* at 1092.

becomes finite and their value can be expected to increase. As their value increases, so does the expense that the IMF has to incur in order to obtain them. Because having a supply of Bitcoins is necessary to effectively counter a speculative attack, the sooner the IMF can acquire a supply of Bitcoins, the cheaper counteracting such an attack will be.¹⁶²

Therefore, it is possible that the total of all virtual currencies in circulation could grow at some point to become a threat to the central bank's ability to manage their money supply. By mid-2018, *The Wall Street Journal* reports, "Coinbase Inc. and another cryptocurrency firm talked to U.S. regulators [officials at the U.S. Office of the Comptroller of the Currency] about the possibility of obtaining banking licenses, a move that would allow the startups to broaden the types of products they offer."¹⁶³

Treasury Department

The FinCEN is a bureau of the U.S. Treasury Department and reports directly to the Office of Terrorism and Financial Intelligence. Consisting of only approximately 340 employees during 2013:

FinCEN's "mission is to safeguard the financial system from illicit use, combat money laundering and promote national security through the collection, analysis, and dissemination of financial intelligence and the strategic use of financial authorities."¹⁶⁴ Among FinCEN's responsibilities is to issue regulations and administer the Bank Secrecy Act (BSA).¹⁶⁵ The BSA requires that a wide range of financial institutions assist FinCEN by having effective anti-money-laundering (AML) programs and by filing periodic reports with FinCEN and by maintaining appropriate records. Examples of these financial institutions include: securities and futures broker/dealers, insurance companies, banks, casinos, other money services businesses, and certain trades or businesses such as automobile dealers.¹⁶⁶

162. Nicholas A. Plassaras, *Regulating Digital Currencies: Bringing Bitcoin Within the Reach of the IMF*, 14 CHI. J. INT'L L. 377, 380–81 (2013).

163. Ryan Tracy, *Crypto Startups Prospect Banking*, WALL ST. J., May 19–20, 2018, at B1.

164. See Trautman, *Virtual Currencies*, *supra* note 11, at 31 (citing *Beyond Silk Road: Potential Risks, Threats, and Promises of Virtual Currencies: Hearings Before the S. Comm. on Homeland Security & Governmental Affairs*, *supra* note 11, at 5 (statement of Jennifer Shasky Calvery, Director, Fin. Crimes Enforcement Network, U.S. Dep't. of the Treasury)).

165. *Id.*

166. *Id.* (citing Jennifer Shasky Calvery, Director, Fin. Crimes Enforcement Network, Remarks at the Independent Armored Car Operators Association Cash in Transit Networking Conf. (May 18, 2014)).

Director Calvery states:

FinCEN's guidance explains that administrators or exchangers of virtual currencies have registration requirements and a broad range of AML program, recordkeeping, and reporting responsibilities. Those offering virtual currencies must comply with these regulatory requirements, and if they do so, they have nothing to fear from Treasury.

The guidance explains how FinCEN's "money transmitter" definition applies to certain exchangers and system administrators of virtual currencies depending on the facts and circumstances of that activity. "Those who use virtual currencies exclusively for common personal transactions like buying goods or services online" are not affected by this guidance.

Those who are intermediaries in the transfer of virtual currencies from one person to another person, or to another location, are money transmitters that must register with FinCEN as MSB [money service business], unless an exception applies. Some virtual currency exchangers have already registered with FinCEN as MSBs, though they have not necessarily identified themselves as money transmitters.¹⁶⁷

On March 19, 2018, the U.S. Treasury division responsible for the enforcement of economic sanctions, the Office of Foreign Assets Control (OFAC), issued guidance in the form of a digital currency-related FAQ providing that digital currency addresses may be subject to inclusion as a match against OFAC's Specially Designated Nationals list.¹⁶⁸ In related virtual currency enforcement, an Executive Order was signed by President Trump on March 19, 2018, described by Secretary Mnuchin as prohibiting U.S. persons and others subject to U.S. jurisdiction from engaging in "[a]ll transactions related to, provision of financing for, and other dealings in . . . any digital currency, digital coin, or digital token that was issued by, for, or on behalf of the Government of Venezuela after January 9, 2018."¹⁶⁹

167. *Id.* at 32.

168. See U.S. DEP'T OF THE TREASURY, *Assessing OFAC Name Matches*, https://www.treasury.gov/resource-center/faqs/Sanctions/Pages/faq_compliance.aspx [<https://perma.cc/HLJ7-VRZD>] (last updated July 17, 2018); see also Christopher L. Boone, Andrew E. Bigart & D.E. (Ed) Wilson, Jr., *Cryptocurrency Addresses on OFAC Sanctions List*, VENABLE LLP (Mar. 27, 2018), <https://www.venable.com/cryptocurrency-addresses-on-ofac-sanctions-list-03-27-2018/> [<https://perma.cc/4SXM-SHBQ>].

169. Exec. Order No. 12469 (Mar. 19, 2018); see also *Treasury Sanctions Four Current or Former Venezuelan Officials Associated with Economic Mismanagement and Corruption*, U.S. DEP'T TREASURY (Mar. 19, 2018), <https://home.treasury.gov/news/press-releases/sm0318> [<https://perma.cc/GU2V-FEWN>].

Anti-money laundering (AML) responsibilities of the Treasury Department's FinCEN division include "targeting human rights abusers and the corrupt through authorities like the Global Magnitsky Human Rights Accountability Act. Simply put, the United States will not allow our financial system to be compromised by human rights abusers and corrupt actors who exploit innocent people around the world."¹⁷⁰ Sigal Mandelker, Under Secretary for Terrorism and Financial Intelligence of the U.S. Department of the Treasury states, "Transnational criminal organizations, drug kingpins, cyber criminals and others likewise seek out vulnerabilities in the global financial system, including by looking to use emerging technologies such as virtual currencies to launder their ill-gotten gains and advance their malicious enterprises."¹⁷¹ Because "[t]hese and other malign actors cannot operate without funding[,] . . . [c]utting off their access to the financial system requires calibrating our economic tools in strategic and complementary ways."¹⁷² Under Secretary Mandelker states:

we aggressively pursue virtual currency exchangers and others who do not take these obligations seriously. In July 2017, for example, FinCEN assessed a \$110 million fine against BTC-e, an Internet-based, foreign-located money transmitter that exchanges fiat currency as well as the convertible virtual currencies Bitcoin, Litecoin, Namecoin, Novacoin, Peercoin, Ethereum, and Dash. At the time of our action, it was one of the largest virtual currency exchanges by volume in the world and facilitated transactions involving ransomware, computer hacking, identity theft, tax refund fraud schemes, public corruption, and drug trafficking. FinCEN also assessed a fine against Russian national Alexander Vinnik, one of the operators of BTC-e, for his role in the violations.

This action sends a very powerful message that we will hold accountable virtual currency exchangers that violate our AML laws, wherever they are located. We will do so in conjunction with our law enforcement partners and foreign counterparts.¹⁷³

170. *Combating Money Laundering and Other Forms of Illicit Finance: Administration Perspectives on Reforming and Strengthening BSA Enforcement: Hearing Before the S. Comm. on Banking, Housing & Urban Affairs*, 115th Cong. 1 (2018) (statement of Sigal Mandelker, Under Secretary, Terrorism and Fin. Intelligence, U.S. Dep't of the Treas.).

171. *Id.*

172. *Id.*

173. *Id.* at 7.

State Regulation

A comprehensive review of state virtual currency regulation to date is beyond the scope of this Article. However, a brief discussion of some of the important issues encountered by a number of state regulators is presented below. While little more than an appetizer of state virtual currency regulatory encounters, I believe this coverage presents a roadmap for those who desire more information. A Brookings paper observes, “Now U.S. state governments have recognized the [blockchain] technology’s potential for the delivery of public services, and are at various stages of implementation. For blockchain to emerge as the technological imperative for public services, states will have to change existing regulations.”¹⁷⁴ Known or suspected obstacles to widespread adoption of blockchain technology include that “[t]hey must address concerns about scalability, the difficulty of removing and editing data once uploaded, and investment in the new technology.”¹⁷⁵ Desouza et al., “found that the vast majority of US states have taken at least some form of regulatory stance concerning cryptocurrencies and blockchain technology. However, many state legislatures have only introduced or passed regulations to clarify cryptocurrency exchange vis-à-vis existing money transmission laws.”¹⁷⁶ While “[t]here was a clear wave of over 20 states enacting cryptocurrency related regulations starting in 2014[,] [a]round the same time, government officials from over ten states (e.g. California, New Mexico) issued public warnings about investing in cryptocurrencies.”¹⁷⁷

While some jurisdictions such as New York have responded with cybercurrency legislation,¹⁷⁸ many states find that their virtual currency regulation primarily takes the form of investor protection securities law enforcement.¹⁷⁹ Readers should be aware that virtual currency enforcement under the guise of state securities law violations is a relatively new phenomenon at the time of this writing.

174. Kevin C. Desouza, Chen Ye & Kiran Kabtta Somvanshi, *Blockchain and U.S. State Governments: An Initial Assessment*, BROOKINGS (April 17, 2018), <https://www.brookings.edu/blog/techtank/2018/04/17/blockchain-and-u-s-state-governments-an-initial-assessment/> [<https://perma.cc/DF3R-NY85>]; see also Joanna Caytas, *Blockchain in the U.S. Regulatory Setting: Evidentiary Use in Vermont, Delaware, and Elsewhere*, COLUM. SCI. & TECH. L. REV. (May 30, 2017), <http://stlr.org/2017/05/30/blockchain-in-the-u-s-regulatory-setting-evidentiary-use-in-vermont-delaware-and-elsewhere/> [<https://perma.cc/ZT3Y-LXWL>].

175. Desouza, Ye & Somvanshi, *supra* note 174.

176. *Id.*

177. *Id.*

178. See Caytas, *supra* note 174.

179. See Desouza, Ye, & Somvanshi, *supra* note 174.

Delaware

Observing that “Delaware hosts over 60 percent of the Fortune 500 companies and numerous startups,” the 2017 announcement of the Delaware Blockchain Initiative by the state of Delaware is considered a major development by the blockchain community.¹⁸⁰ Envisioned as “a comprehensive program intended to spur adoption and development of blockchain and smart contract technologies in both private and public sectors,” Desouza et al., report:

[t]hen governor Jack Markell noted that “Smart contracts offer a powerful and innovative way to streamline cumbersome back-office procedures, lower transactional costs for consumers and businesses, and manage and reduce risk,” and suggested that the state will “lead the way in promoting blockchain technology and its growing role in digital commerce.”¹⁸¹

Attorneys Stromberg, Negre, Reinhardt, and Peleg state that this amendment to the Delaware General Corporation Law “among other things, make[s] it explicitly legal for entities incorporated in Delaware to use distributed ledger technology, including blockchain, for record-keeping and administration of stock ledgers . . . and using blockchain technology in the corporate context could revolutionize corporate record-keeping, governance and finance.”¹⁸² For example, “[a]dministering stock on a blockchain would also allow shareholders to vote their shares directly on that blockchain, rather than relying on the current complex proxy voting process and the inherent risk of mistakes that comes with it.”¹⁸³

New York

The New York State Superintendent of Financial Services announced an inquiry during August 2013 designed to ascertain the appropriate regulatory framework for virtual currencies.¹⁸⁴ During January 2014, public hearings were held followed by the Department of Financial Services announcement of consideration of “formal proposals and applications for the establishment of

180. *Id.*

181. *Id.*

182. G. Thomas Stromberg, Jolene Negre, Mark Reinhardt & Michelle Peleg, *Are Headwinds Hampering Delaware’s Blockchain Initiative?*, LAW360 (Mar. 23, 2018, 12:11 PM), <https://www.law360.com/articles/1024206> [<https://perma.cc/F7EK-DL5J>].

183. *Id.*

184. *NY DFS Releases Proposed BitLicense Regulatory Framework for Virtual Currency Firms*, N.Y. ST. DEP’T FIN. SERVS. (July 17, 2014), <https://www.dfs.ny.gov/about/press/pr1407171.htm> [<https://perma.cc/A4RW-YEZH>].

regulated virtual currency exchanges operating in New York.”¹⁸⁵ First published in the July 23, 2014 edition of the *New York State Register*¹⁸⁶ (a revised proposal was published February 25, 2015),¹⁸⁷ a series of comment periods resulted.¹⁸⁸ The final DFS rule was published in the *New York State Register*’s June 24, 2015 edition.¹⁸⁹ Accordingly, entities conducting any of the following virtual currency activities are subject to the requirements of a “Bitlicense:”¹⁹⁰

- receiving or transmitting virtual currency on behalf of consumers;
- securing, storing, or maintaining custody or control of such virtual currency on the behalf of customers;
- performing retail conversion services, including the conversion or exchange of Fiat Currency or other value into Virtual Currency, the conversion or exchange of Virtual Currency into Fiat Currency or other value, or the conversion or exchange of one form of Virtual Currency into another form of Virtual Currency;
- buying and selling Virtual Currency as a customer business (as distinct from personal use); or
- controlling, administering, or issuing a Virtual Currency. (Note: This does not refer to virtual currency miners).¹⁹¹

On April 17, 2018, the “Virtual Markets Integrity Initiative” was announced by the Attorney General of New York, Eric T. Schneiderman, describing it as “a fact-finding inquiry into the policies and practices of platforms used by consumers to trade virtual or ‘crypto’ currencies like Bitcoin and ether.”¹⁹² This inquiry solicits information from “thirteen major virtual currency trading platforms requesting key information on their operations, internal controls, and safeguards to protect customer assets . . . seek[ing] to

185. *Id.*

186. *See BitLicense Regulatory Framework*, N.Y. ST. DEP’T FIN. SERVS http://www.dfs.ny.gov/legal/regulations/bitlicense_reg_framework.htm [<https://perma.cc/CU8S-82HT>] (last visited Dec. 26, 2018).

187. *Id.*

188. *See id.*

189. *Id.*

190. *See id.*

191. *See id.*

192. *A.G. Schneiderman Launches Inquiry Into Cryptocurrency “Exchanges”*, N.Y. ST. OFF. ATT’Y GEN. (Apr. 17, 2018), <https://ag.ny.gov/press-release/ag-schneiderman-launches-inquiry-cryptocurrency-exchanges> [<https://perma.cc/SCS6-SS57>].

increase transparency and accountability as it relates to the platforms retail investors rely on to trade virtual currency, and better inform enforcement agencies, investors, and consumers.”¹⁹³ Attorney General Schneiderman states:

Ensuring that enforcement agencies, investors, and consumers have the information they need to understand the practices and the risks on these platforms is critical, given reports of the theft of vast sums of virtual currency from customer accounts, sudden and poorly explained trading outages, possible market manipulation, and difficulties when withdrawing funds from accounts. Often, the platforms lack the basic market protections of traditional investing platforms. Moreover, the extent of disclosures to customers about trading rules, internal controls, and other basic practices varies from platform-to-platform, making it difficult or impossible for prospective users to evaluate the actual risks of trading on a particular platform.

....

The questionnaires ask the platforms to disclose information falling within six major topic areas, including (1) Ownership and Control, (2) Basic Operation and Fees, (3) Trading Policies and Procedures, (4) Outages and Other Suspensions of Trading, (5) Internal Controls, and (6) Privacy and Money Laundering. Among other areas of interest, the questionnaires request that platforms describe their approach to combating suspicious trading and market manipulation; their policies on the operation of bots; their limitations on the use of and access to non-public trading information; and the safeguards they have in place to protect customer funds from theft, fraud, and other risks.

....

As the State’s chief law enforcement agency, OAG is responsible for protecting consumers and investors from these bad actors and ensuring the fairness and integrity of New York’s financial markets.

....

As with other emerging sectors, the challenge with virtual currency is to prevent fraud and other abuses, safeguard market integrity, and protect individual investors—without stifling legitimate market activity or innovation. OAG’s Virtual Markets Integrity Initiative seeks to advance these objectives

193. *Id.*

by promoting meaningful transparency, accountability, and the opportunity for government agencies, consumer advocates, and investors to compare the policies, procedures, and protections of virtual currency platforms. Sophisticated investors routinely require privately owned trading venues on which they are considering trading to furnish robust disclosures about their operations, policies, and internal controls so that they can evaluate the risks of trading on a given platform.¹⁹⁴

New Jersey

In many cases, state regulatory authorities are dealing with virtual currency regulation largely within a framework of securities law violations and enforcement. For example, law firm Riker Danzig reports, “The New Jersey Bureau of Securities has ordered two cryptocurrency-related investment entities, Bitcoin 2nd Generation (B2G) and Bitstrade, to stop offering unregistered securities in the state.”¹⁹⁵

Massachusetts

Massachusetts has also been active in the regulation of ICO offerings. For example, on March 27, 2018, William Francis Galvin, Secretary of the Commonwealth of Massachusetts, addressed alleged violations of the Massachusetts Uniform Securities Act by five company issuers using unregistered securities to promote ICOs.¹⁹⁶ The five companies—18moons; Across Platforms; Mattervest; Pink Ribbon; and Sparkco—“which conduct business in Massachusetts, offered the ICOs via websites, including social media platforms. Under the terms of the consent orders, the companies are prohibited from selling unregistered or non-exempt securities in the state and are censured by the Division.”¹⁹⁷

194. *Id.* (citing, e.g., N.Y. EXEC. LAW § 63(12) (McKinney 2014)); N.Y. GEN. BUS. LAW § 349 (McKinney 2014); *Id.* § 352.

195. Robert G. Frucht, Jason D. Navarino, Robert C. Daleo & Ronald Leibman, *Cryptocurrency Investment Companies Violate N.J. State Securities Law*, RIKER DANZIG SCHERER HYLAND & PERRETTI LLP (Mar. 29, 2018), <http://riker.com/publications/cryptocurrency-investment-companies-violate-n-j-state-securities-law> [<https://perma.cc/VT82-38PT>] (alteration in original).

196. *See Secretary Galvin Issues Orders in Connection with ICO Cryptocurrency Sweep*, SECRETARY COMMONWEALTH MASSACHUSETTS (Mar. 27, 2018), <https://www.sec.state.ma.us/sct/current/sctcryptocurrency/cryptocurrencyidx.htm> [<https://perma.cc/M96Y-GYRR>].

197. *Massachusetts Securities Division Halts Five Initial Coin Offerings*, BUCKLEY SANDLER (Mar. 30, 2018), <https://buckleysandler.com/blog/2018-03-30/massachusetts-securities-division-halts-five-initial-coin-offerings> [<https://perma.cc/7GUE-4DF7>].

Texas

The Texas State Securities Board claims to be “the first state to issue an administrative order on cryptocurrency investments. The Securities Commissioner on Dec. 20[, 2017] entered an Emergency Cease and Desist Order against USI-Tech Limited, a Dubai-based firm selling investments tied to Bitcoin mining.”¹⁹⁸ The Texas State Securities Board warns potential cryptocurrency investors that “[i]nvesting in cryptocurrencies . . . carries significant risk because of regulatory and legal actions, competition from other cryptocurrencies, and the extreme volatility in the price of many cryptocurrencies.”¹⁹⁹ Accordingly:

BitConnect is soliciting investors for cryptocurrency-based programs that the company claims will deliver annualized returns of 100% or more, according to the order entered Jan. 4 by Securities Commissioner Travis J. Iles.

BitConnect, based in England, issues its own currency, called BitConnect Coins. The company says it has placed 9.4 million of the coins into the online cryptocurrency marketplace, representing a market value of \$4.1 billion as of Jan. 3. The company has said it will issue a maximum of 28 million coins.

The company requires individuals to use Bitcoin, a more established cryptocurrency, to invest in various BitConnect programs. In one investment called the BitConnect Lending Program, investors purchase BitConnect Coins, which are provided to a “BitConnect Trading Bot” to generate returns as high as 40% a month.

The Securities Commissioner found that the BitConnect investments are securities, but were not registered as required by the Texas Securities Act and State Securities Board Rules and Regulations. In addition, the company is not registered to sell securities in Texas.

Under state law, BitConnect can contest the order at the State Office of Administrative Hearings.²⁰⁰

198. *\$4 Billion Crypto-Promoter Ordered to Halt Fraudulent Sales*, TEX. ST. SEC. BOARD (Jan. 4, 2018), <https://www.ssb.texas.gov/news-publications/4-billion-crypto-promoter-ordered-halt-fraudulent-sales> [<https://perma.cc/94JN-XTLC>].

199. *Id.*

200. *Id.*

Other States

Much like the Delaware example discussed above, during 2017 the Illinois Blockchain Initiative was announced by the state of Illinois and called for county and state agencies to cooperate and, “collaborate to explore innovations presented by Blockchain and distributed ledger technology’ . . . to ‘transform the delivery of public and private services, redefine the relationship between government and the citizen in terms of data sharing, transparency and trust, and make a leading contribution to the State’s digital transformation.’”²⁰¹ It is also reported that mobile voting utilizing blockchain technology will be tested during the 2018 election by West Virginia.²⁰² The author believes it seems highly probable that these non-currency applications and adoption of blockchain technology may pave the way in assisting legislators toward a greater understanding and comfort level with blockchain in general, and virtual currencies in particular.

V. SECURITIES AND EXCHANGE COMMISSION

The world’s social media platforms and financial markets are abuzz about cryptocurrencies and “initial coin offerings” (ICOs).

. . . .

A number of concerns have been raised regarding the cryptocurrency and ICO markets, including that, as they are currently operating, there is substantially less investor protection than in our traditional securities markets, with correspondingly greater opportunities for fraud and manipulation.

*. . . [T]o date no initial coin offerings have been registered with the SEC. The SEC also has not to date approved for listing and trading any exchange-traded products (such as EFTs) holding cryptocurrencies or other assets related to cryptocurrencies.*²⁰³

*Jay Clayton
Chairman, U.S. Securities and Exchange Commission
December 11, 2017*

Advent of the Internet creates new and unique technological challenges for the SEC in their efforts to keep America’s financial markets safe and secure

201. Desouza, Ye, & Somvanshi, *supra* note 174.

202. *Id.*

203. Clayton, *supra* note 81.

and to protect investors.²⁰⁴ As SEC Chairman Jay Clayton observes, “The cryptocurrency and ICO markets have grown rapidly. These markets are local, national, and international, and include an ever-broadening range of products and participants. They also present investors and other market participants with many questions, some new and some old (but in a new form).”²⁰⁵

Initial Coin Offerings (ICOs)

The 2018 House Joint Economic Report observes, “[a] new market formed around blockchain startups, called Initial Coin Offerings (ICO). An ICO allows developers to raise funds for a project by issuing tokens to use on that project.”²⁰⁶ It appears that approximately \$5.6 billion was raised by ICOs during 2017,²⁰⁷ and over \$1 billion during the first two months of 2018.²⁰⁸ On May 30, 2018, *The Wall Street Journal* reported that a startup known as block.one, “based in the Cayman Islands[,] is on track to raise more than \$4 billion through a yearlong sale of digital tokens, the largest fundraising of its

204. See Lawrence J. Trautman & George P. Michaely, Jr., *The SEC and the Internet: Regulating the Web of Deceit*, 68 CONSUMER FIN. L.Q. REP. 262, 262 (2014).

205. Clayton, *supra* note 81. See generally J. Scott Colesanti, *Trotting out the White Horse: How the S.E.C. Can Handle Bitcoin’s Threat to American Investors*, 65 SYRACUSE L. REV. 1 (2014).

206. H.R. REP. NO. 115-596, at 209 (2018); accord Yan Chen, *Blockchain Tokens and the Potential Democratization of Entrepreneurship and Innovation*, 61 BUS. HORIZONS, 567, 568 (2018); see also David Lee Kuo Chuen, *Decentralization and Distributed Innovation: Fintech, Bitcoin and ICO’s*, in STANFORD ASIA-PACIFIC INNOVATION CONFERENCE (Oct. 25, 2017); Marco Dell’Erba, Note, *Initial Coin Offerings: The Response of Regulatory Authorities*, 14 N.Y.U. J.L. & BUS. 1109, 1110 (2018); Dirk A. Zetsche, Ross P. Buckley, Douglas W. Arner & Linus Föhr, *The ICO Gold Rush: It’s a Scam, it’s a Bubble, it’s a Super Challenge for Regulators*, 63 HARV. J. INT’L L. (forthcoming 2019) (manuscript at 6–7), <https://ssrn.com/abstract=3072298> [<https://perma.cc/SGT7-2AMV>]; John Flood & Lachlan Robb, *Trust, Anarcho-Capitalism, Blockchain and Initial Coin Offerings* 10 (Griffith Law School Research Paper No. 17-23), <https://ssrn.com/abstract=3074263> [<https://perma.cc/DSM3-5MPX>]; Philipp Hacker & Chris Thomale, *Crypto-Securities Regulation: ICOs, Token Sales and Cryptocurrencies under EU Financial Law 5* (Nov. 22, 2017) (unpublished manuscript), <https://ssrn.com/abstract=3075820> [<https://perma.cc/5KVW-Y2G3>]; John Hargrave, Navroop Sahdev & Olga Feldmeier, *How Value is Created in Tokenized Assets* (Feb. 28, 2018) (unpublished manuscript), <https://ssrn.com/abstract=3146191> [<https://perma.cc/H94X-RAXJ>]; Paul P. Momtaz, *Initial Coin Offerings 7* (July 7, 2018) (unpublished manuscript), <https://ssrn.com/abstract=3166709> [<https://perma.cc/VV5T-FWH9>]; Jonathan Rohr & Aaron Wright, *Blockchain-Based Token Sales, Initial Coin Offerings, and the Democratization of Public Capital Markets 4* (Oct. 4, 2017) (unpublished manuscript), <https://ssrn.com/abstract=3048104> [<https://perma.cc/Z5F9-CLYG>].

207. Oscar Williams-Grut, *Only 48% of ICOs Were Successful Last Year—but Startups Still Managed to Raise \$5.6 Billion*, BUS. INSIDER (Jan. 31, 2018, 1:44 AM), <http://www.businessinsider.com/how-much-raised-icos-2017-tokendata-2017-2018-1> [<https://perma.cc/S2BE-D4RP>].

208. Allen Scott, *ICOs Raised Over \$1 Billion in 2018, and it’s Only February*, BITCOINIST (Feb. 26, 2018, 5:30 PM), <http://bitcoinist.com/icos-raised-1-billion-2018-february/> [<https://perma.cc/9JGW-DKPJ>].

kind.”²⁰⁹ The House Joint Economic Report presents a theoretical example whereby “if a group of economists wants to exchange papers, research, analysis, and review or editing services, developers would create an online platform to allow each person to have an account for conducting these activities.”²¹⁰ Payment transaction processing systems such as Visa or PayPal were required before blockchain technology—“but in this example users could transact with hypothetical scarce tokens called EconoCoins.”²¹¹ Through utilization of a *smart contract*:

a program enforces the contract built into the code. Using the EconoCoin example above, if economist A wants economist B to edit her paper, economist B agrees and both create a smart contract that will reward economist B with EconoCoins from economist A’s wallet upon delivery of edits. The network will enforce the contract without a third party, but the two economists can also build in a provision that would enlist others in the network to resolve disputes for a fee.

The developers and economists in this example do not need an influx of outside capital to begin the project. With an ICO, the creators explain the concept to potential users and offer for purchase initial coins that can be used in the network. Platform users would utilize the coins on the network to obtain the services or goods listed above.

An ICO consolidates two important elements of building a new economic ecosystem, obtaining funding and creating a network. ICOs do not offer equity and are much less expensive than an Initial Public Offering (IPO). PricewaterhouseCoopers estimated that an IPO costs companies between four to seven percent of the capital raised and an additional \$4.2 million in accounting costs. Further, after surveying chief financial officers, PricewaterhouseCoopers found that companies spend between \$1 million and \$2 million annually on maintaining their status as a publicly listed entity. These costs help explain why only the largest of companies go public.

In contrast, developer Merunas Grincalaitis estimated that an ICO would take three months and cost approximately \$60,000. A third of this cost comes from legal fees to ensure the ICO complies with relevant laws. Once up and running, these platforms continue to raise funding for upgrades and maintenance through either transaction fees for verification,

209. Paul Vigna, *Investors Flood Digital-Token Offering*, WALL ST. J., May 30, 2018, at B7.

210. H.R. REP. NO. 115-596 at, 209–10.

211. *Id.* at 210.

appreciation of the tokens, or donations. During 2017, developers launched hundreds of ICOs and investors realized their potential. Most new tokens utilized the Ethereum blockchain to launch their tokens and execute their code.²¹²

Professors Christian Catalini and Joshua S. Gans state, “[t]hrough an ICO[] a venture offers a stock of specialized crypto tokens for sale with the promise that those tokens will operate as the medium of exchange when accessing services on a digital platform developed by the venture.”²¹³ Capital required for digital platform development is achieved through the sale of tokens, “although no commitment is made as to the price of future services (in tokens or otherwise).”²¹⁴ In addition:

Since 2017, blockchain startups have raised over \$7B through initial coin offerings compared to \$1B through traditional venture capital flowing into the space. Approximately one third of all ICO funding went to US-based teams, and more than 200 ICOs raised above \$10M. Among the largest offerings, Tezos raised \$232M for developing a smart contracts and decentralized governance platform; Filecoin \$205M from over 2,100 accredited investors to deploy a decentralized file storage network; Kin \$98M to build a decentralized social network and communication platform; Blockstack \$52M towards a decentralized browser, identity and application ecosystem; BAT \$35M to develop a blockchain-based digital advertising ecosystem.²¹⁵

Professor Wulf Kaal points to the unprecedented efficiency from minimal transaction costs and superior liquidity as major benefits of ICOs.²¹⁶ During early 2016, an entity called The Decentralized Autonomous Organization (The DAO), registered nowhere as a business association under any laws of any jurisdiction, “became one of the most successful crowdfunded entities in

212. *Id.* at 210–11.

213. Christian Catalini & Joshua S. Gans, *Initial Coin Offerings and the Value of Crypto Tokens* (MIT Sloan School Working Paper No. 5347-18, 2018), <https://ssrn.com/abstract=3137213> [<https://perma.cc/T32F-R6XT>]; Ajay Agrawal, Christian Catalini & Avi Goldfarb, *Some Simple Economics of Crowdfunding*, 14 INNOVATION POL’Y & ECON. 63, 63 n.2 (2013) (observing that “[i]n this respect, token sales have a pre-sale aspect similar to crowdfunding, but differ in that there is no pre-sale price commitment to token holders”).

214. Catalini & Gans, *supra* note 213 (manuscript at 1); *id.* (manuscript at 2 n.3) (“To place this number into perspective, crowdfunding platform Kickstarter, over the course of 9 years, allocated a total of \$3.5B to entrepreneurial and artistic projects. Equity crowdfunding AngelList, through its syndicated model, facilitated approximately \$700M in online, early stage equity investments since 2013.”).

215. Catalini & Gans, *supra* note 213 (manuscript at 1) (citations omitted).

216. *See* Kaal, *supra* note 78, at 2.

history, raising over \$160 million in less than thirty days.”²¹⁷ Professor Randolph Robinson highlights several success stories, including, “Brave [late May 2017], a company developing a decentralized web browser, [which] raised an astonishing \$35 million in less than 30 seconds . . . [and] Block.one [June 2017], a company building an enterprise blockchain platform, [which] raised \$185 million over just five days.”²¹⁸ In addition, “[w]hile ICO’s have historically allowed primarily crypto start-ups, financial technology start-ups, and the crypto community to raise funds, in 2018, legacy businesses with established businesses and products increasingly used ICO fundraising to finance their business activities.”²¹⁹ During May 2018, messaging app “Telegram Group Inc. has pulled in \$1.7 billion by selling newly created cryptocurrency to fewer than 200 private investors,” thereby cancelling its contemplated sale to a larger group of investors.²²⁰

The DAO

Cyber breach remains a major challenge for all institutions in society.²²¹ Because of its significant role in the development of ICOs, a brief description of the impact of The DAO is presented here. As Mehar et al., explain:

The mission of The DAO was to act as a self-directed venture capital fund, with contributors voting directly on proposed projects, and votes being allocated proportionately based on

217. Robinson, *supra* note 90 (manuscript at 3) (citing Dino Mark, Vlad Zamfir & Emin Gün Sirer, A Call for a Temporary Moratorium on “The DAO” 1 (May 26, 2016) (unpublished manuscript); see Christoph Jentzsch, Decentralized Autonomous Organizations to Automate Governance 1–2 (unpublished manuscript), <https://download.slock.it/public/DAO/WhitePaper.pdf> [<https://perma.cc/PW2G-VYTA>] (describing basic structure of decentralized autonomous organizations); see also Christoph Jentzsch, *The History of the DAO and Lessons Learned*, SLOCK.IT BLOG (Aug. 24, 2016), <https://blog.slock.it/the-history-of-the-dao-andlessons-learned-d06740f8cfa5> [<https://perma.cc/U5NL-3AP4>] (“We wanted to go even further and create a ‘true’ DAO one that would be the only and direct recipient of funds, and would represent the creation of an organization similar to a company, with potentially thousands of Founders.”).

218. Robinson, *supra* note 90 (manuscript at 4).

219. Kaal, *supra* note 78, at 2.

220. Paul Vigna, *Startup Scraps Digital Coin Sale*, WALL ST. J., May 3, 2018, at B1.

221. See Lawrence J. Trautman, *Is Cyberattack the Next Pearl Harbor?*, 18 N.C. J.L. & TECH. 233, 235 (2016); Lawrence J. Trautman, *Managing Cyberthreat*, 33 SANTA CLARA HIGH TECH. L.J. 230, 232 (2016); Lawrence J. Trautman, *Congressional Cybersecurity Oversight: Who’s Who & How it Works*, 5 J.L. & CYBER WARFARE 147, 150 (2016); Lawrence J. Trautman, *Cybersecurity: What About U.S. Policy?*, 2015 U. ILL. J.L., TECH. & POL’Y 341, 344–45; Lawrence J. Trautman & Kara Altenbaumer-Price, *The Board’s Responsibility for Information Technology Governance*, 28 J. MARSHALL J. COMPUTER & INFO. L. 313, 313 (2011); OFFICE N.Y. ST. ATT’Y GEN. ERIC T. SCHNEIDERMAN, INFORMATION EXPOSED: 2017 DATA BREACHES IN NEW YORK STATE (2017), https://ag.ny.gov/sites/default/files/data_breach_report_2017.pdf [<https://perma.cc/3K9X-724C>]; Lawrence J. Trautman, Jason Triche & James C. Wetherbe, *Corporate Information Technology Governance Under Fire*, 8 J. STRATEGIC & INT’L STUD. 105, 105 (2013).

contributed capital (DuPont, 2018). In other words, investors would exchange Ethers, the native cryptocurrency associated with the Ethereum platform, for tokens during an Initial Coin Offering (ICO), and then projects would receive approval or rejection in a democratic fashion as directed by the votes of token holders. By the end of May 2016, \$168 million USD worth of Ether had been raised by The DAO through the most successful crowdfunding campaign up to that point in history. By June 13th, 2016, an attacker had used a mechanism intended to splinter off “child” DAOs to syphon over one third of the invested Ether into a child DAO under control of the attacker. Since the child DAO was based on the same code as the original, the funds were inaccessible for 28 days (the length of the original funding window).²²²

At this point in time, June 2016, the DAO/Ethereum community finds itself facing a decision about how to handle the situation and minimize future repercussions if the platform is to survive the negative impact of the breach. According to Mehar et al., three basic proposals emerge for consideration:

1. Do nothing and allow the hacker to appropriate the stolen funds after the 28-day holding period;
2. Build a blacklist into the Ethereum code, effectively freezing the syphoned Ethers in the child DAO (the *soft fork* proposal);
- or
3. Unwind the hack entirely, returning all syphoned Ethers to The DAO and reimbursing investors (the hard fork proposal).

The potential legal implications of each of option were numerous, as was the potential impact of trust in the network. For example, if the community decided to do nothing, they opened themselves to liability from investors of The DAO who lost over \$50 million USD of Ethers. On the other hand, if the hard fork proposal received approval by the Ethereum community, confidence in the network’s system of transactions and smart contracts having ultimate transactional authority—i.e. the immutability of the ledger—would be destroyed. This would be analogous to taxpayers bailing out failing financial institutions.

In the end, the Ethereum Foundation moved forward with the hard fork, and the funds were returned to The DAO investors. The minority who disagreed with this action however continued maintaining the original Blockchain under the moniker of Ethereum Classic (Reyes, Packin, and Edwards,

222. MEHAR ET. AL., *supra* note 92.

2017). With Ethereum Classic, miners continue to use the old Blockchain from before the funds were returned to The DAO investors, regarding the bailout as a corruption of the immutable ledger. Today, Ethereum Classic operates as a parallel version of the Blockchain where the precedent of “code is law” and the immutability of the Blockchain continue to be paramount.²²³

On July 25, 2017, a report was issued regarding an investigation by the SEC’s Division of Enforcement as to “whether The DAO, an unincorporated organization; Slock.it UG (‘Slock.it’), a German corporation; Slock.it’s co-founders; and intermediaries may have violated the federal securities laws.”²²⁴ The SEC’s report discloses, “The DAO is one example of a Decentralized Autonomous Organization, which is a term used to describe a ‘virtual’ organization embodied in computer code and executed on a distributed ledger or blockchain.”²²⁵ In addition, according to the SEC:

The DAO was created by Slock.it and Slock.it’s co-founders, with the objective of operating as a for-profit entity that would create and hold a corpus of assets through the sale of DAO Tokens to investors, which assets would then be used to fund “projects.” The holders of DAO Tokens stood to share in the anticipated earnings from these projects as a return on their investment in DAO Tokens. In addition, DAO Token holders could monetize their investments in DAO Tokens by re-selling DAO Tokens on a number of web-based platforms (“Platforms”) that supported secondary trading in the DAO Tokens.

After DAO Tokens were sold, but before The DAO was able to commence funding projects, an attacker used a flaw in The DAO’s code to steal approximately one-third of The DAO’s assets. Slock.it’s co-founders and others responded by creating a work-around whereby DAO Token holders could opt to have their investment returned to them²²⁶

223. *Id.*

224. *See* Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO, SEC Release No. 81207, at 1 (July 25, 2017), <https://www.sec.gov/litigation/investreport/34-81207.pdf> [<https://perma.cc/JS52-RSXT>].

225. *Id.*

226. *Id.*

SEC Enforcement

Starting in 2013, the SEC started to issue investor alerts about Ponzi schemes incorporating virtual currencies.²²⁷ Recently, U.S. Senator Mike Crapo, Chairman of the Senate Committee on Banking, Housing, and Urban Affairs observed, “the SEC has put forth many statements and guideposts to help the markets and investors.”²²⁸ In particular, the Commission has “issued investor bulletins on initial coin offerings; issued an investigative report on what characteristics make an ICO a security offering; issued several statements by Chairman Clayton on the issue; brought enforcement actions against fraudsters; and issued joint statements with the CFTC about enforcement of virtual currency related products.”²²⁹ In 2014 the SEC issued an investor alert on the subject of virtual currencies.²³⁰ On May 18, 2018, *The Wall Street Journal* ran a front page story captioned, “Hundreds of Cryptocurrencies Show Hallmarks of Fraud: Analysis Reveals Plagiarism, Fake Executives in Offering Documents,” stating, “In a review of documents produced for 1,450 digital coin offerings, *The Wall Street Journal* has found 271 with red flags that include plagiarized investor documents, promises of guaranteed returns and missing or fake executive teams.”²³¹

SEC Enforcement Actions

Numerous virtual currency-related enforcement actions have been brought by the SEC.²³² Due to space limitations, coverage here is limited to a brief mention of the following recent examples: PlexCorps; Munchee Inc.; AriseBank; Three Issuers Claiming Involvement in Cryptocurrencies; BitFunder; and Centra Tech. Inc. The Commission’s statements regarding these actions, in relevant part, are reproduced below:

227. E.g., *Investor Alert: Ponzi Schemes Using Virtual Currencies*, U.S. SEC. & EXCH. COMM., OFF. INV. EDUC. AND ADVOC. (July 2013), https://www.sec.gov/investor/alerts/ia_virtualcurrencies.pdf [<https://perma.cc/5RVV-RQLY>].

228. *Crapo Statement at Hearing on Virtual Currency: Hearing Before the S. Comm. on Banking, Housing & Urban Affairs*, 115th Cong. (2018) (statement of Sen. Mike Crapo, Chairman, S. Comm. on Banking, Housing, and Urban Affairs).

229. *Id.*

230. *Investor Alert: Bitcoin and Other Virtual Currency-Related Investments*, INVESTOR.GOV (May 7, 2014), <https://www.investor.gov/additional-resources/news-alerts/alerts-bulletins/investor-alert-bitcoin-other-virtual-currency> [<https://perma.cc/U3HZ-TR9X>].

231. Shane Shifflett & Coulter Jones, *Hundreds of Cryptocurrencies Show Hallmarks of Fraud*, WALL ST. J., May 18, 2018, at A1.

232. E.g., *Statement on Potentially Unlawful Online Platforms for Trading Digital Assets*, U.S. SEC. & EXCH. COMMISSION (Mar. 7, 2018), <https://www.sec.gov/news/public-statement/enforcement-tm-statement-potentially-unlawful-online-platforms-trading> [<https://perma.cc/48NR-H5K4>]; *Investor Alert: Public Companies Making ICO-Related Claims*, U.S. SEC. & EXCH. COMMISSION (Aug. 28, 2017), https://www.sec.gov/oiea/investor-alerts-and-bulletins/ia_icorelatedclaims [<https://perma.cc/JJ3B-NEU4>].

PlexCorps

The following press release dated December 4, 2017 describes the first case brought by the SEC's new cyber unit:

SEC Emergency Action Halts ICO Scam

12/04/2017

FOR IMMEDIATE RELEASE

2017-219

Washington D.C.—The Securities and Exchange Commission today announced it obtained an emergency asset freeze to halt a fast-moving Initial Coin Offering (ICO) fraud that raised up to \$15 million from thousands of investors since August by falsely promising a 13-fold profit in less than a month.

The SEC filed charges against a recidivist Quebec securities law violator, Dominic Lacroix, and his company, PlexCorps. The Commission's complaint, filed in federal court in Brooklyn, New York, alleges that Lacroix and PlexCorps marketed and sold securities called PlexCoin on the internet to investors in the U.S. and elsewhere, claiming that investments in PlexCoin would yield a 1,354% profit in less than 29 days. The SEC also charged Lacroix's partner, Sabrina Paradis-Royer, in connection with the scheme.

Today's charges are the first filed by the SEC's new Cyber Unit. The unit was created in September to focus the Enforcement Division's cyber-related expertise on misconduct involving distributed ledger technology and initial coin offerings, the spread of false information through electronic and social media, hacking and threats to trading platforms.

"This first Cyber Unit case hits all of the characteristics of a full-fledged cyber scam and is exactly the kind of misconduct the unit will be pursuing," said Robert Cohen, Chief of the Cyber Unit. "We acted quickly to protect retail investors from this initial coin offering's false promises."

Based on its filing, the SEC obtained an emergency court order to freeze the assets of PlexCorps, Lacroix, and Paradis-Royer.

The SEC's complaint charges Lacroix, Paradis-Royer and PlexCorps with violating the anti-fraud provisions, and Lacroix and PlexCorps with violating the registration provision, of the U.S. federal securities laws. The complaint seeks permanent injunctions, disgorgement plus interest and penalties. For Lacroix, the SEC also seeks an officer-and-director bar and a bar from offering digital securities against

Lacroix and Paradis-Royer.²³³

Munchee Inc.

On December 11, 2017 the SEC announced the halt to an ongoing initial coin offering undertaken by Munchee Inc. as described below:

Company Halts ICO After SEC Raises Registration Concerns
12/11/2017

FOR IMMEDIATE RELEASE
2017-227

Washington D.C.—A California-based company selling digital tokens to investors to raise capital for its blockchain-based food review service halted its initial coin offering (ICO) after being contacted by the Securities and Exchange Commission, and agreed to an order in which the Commission found that its conduct constituted unregistered securities offers and sales.

According to the SEC’s order, before any tokens were delivered to investors, Munchee Inc. refunded investor proceeds after the SEC intervened. Munchee was seeking \$15 million in capital to improve an existing iPhone app centered on restaurant meal reviews and create an “ecosystem” in which Munchee and others would buy and sell goods and services using the tokens. The company communicated through its website, a white paper, and other means that it would use the proceeds to create the ecosystem, including eventually paying users in tokens for writing food reviews and selling both advertising to restaurants and “in-app” purchases to app users in exchange for tokens.

According to the order, in the course of the offering, the company and other promoters emphasized that investors could expect that efforts by the company and others would lead to an increase in value of the tokens. The company also emphasized it would take steps to create and support a secondary market for the tokens. Because of these and other company activities, investors would have had a reasonable belief that their investment in tokens could generate a return on their investment. As the SEC has said in the DAO Report of Investigation, a token can be a security based on the long-standing facts and circumstances test that includes assessing

233. SEC Press Release 2017-219, SEC Emergency Action Halts ICO Scam (Dec. 4, 2017), <https://www.investor.gov/additional-resources/news-alerts/press-releases/sec-emergency-action-halts-ico-scam> [<https://perma.cc/2Q4D-JUPK>].

whether investors' profits are to be derived from the managerial and entrepreneurial efforts of others.

"We will continue to scrutinize the market vigilantly for improper offerings that seek to sell securities to the general public without the required registration or exemption," said Stephanie Avakian, Co-Director of the SEC's Enforcement Division. "In deciding not to impose a penalty, the Commission recognized that the company stopped the ICO quickly, immediately returned the proceeds before issuing tokens, and cooperated with the investigation."

"Our primary focus remains investor protection and making sure that investors are being offered investment opportunities with all the information and disclosures required under the federal securities laws," said Steven Peikin, Co-Director of the SEC's Enforcement Division.

Munchee consented to the SEC's cease-and-desist order without admitting or denying the findings.

The SEC's new Cyber Unit is focused on misconduct involving distributed ledger technology and initial coin offerings, the spread of false information through electronic and social media, brokerage account takeovers, hacking to obtain nonpublic information, and threats to trading platforms. The SEC also has a Distributed Ledger Technology Working Group that focuses on various emerging applications of distributed ledger technology in the financial industry.²³⁴

AriseBank

On January 25, 2017 the SEC took action against parties including co-founders of Dallas-based AriseBank by obtaining a court order halting activities involving an allegedly fraudulent initial coin offering. The SEC's press release, in relevant part, follows:

SEC Halts Alleged Initial Coin Offering Scam

01/30/2018

FOR IMMEDIATE RELEASE

2018-8

Washington D.C.—The Securities and Exchange Commission obtained a court order halting an allegedly fraudulent initial coin offering (ICO) that targeted retail investors to fund what it claimed to be the world's first "decentralized bank."

234. SEC Press Release 2017-227, *Company Halts ICO After SEC Raises Registration Concerns* (Dec. 11, 2017), <https://www.investor.gov/additional-resources/news-alerts/press-releases/company-halts-ico-after-sec-raises-registration> [<https://perma.cc/S236-FPGB>].

According to the SEC's complaint, filed in federal district court in Dallas on Jan. 25 and unsealed late yesterday, Dallas-based AriseBank used social media, a celebrity endorsement, and other wide dissemination tactics to raise what it claims to be \$600 million of its \$1 billion goal in just two months.

AriseBank and its co-founders Jared Rice Sr. and Stanley Ford allegedly offered and sold unregistered investments in their purported "AriseCoin" cryptocurrency by depicting AriseBank as a first-of-its-kind decentralized bank offering a variety of consumer-facing banking products and services using more than 700 different virtual currencies. AriseBank's sales pitch claimed that it developed an algorithmic trading application that automatically trades in various cryptocurrencies.

The SEC alleges that AriseBank falsely stated that it purchased an FDIC-insured bank which enabled it to offer customers FDIC-insured accounts and that it also offered customers the ability to obtain an AriseBank-branded VISA card to spend any of the 700-plus cryptocurrencies. AriseBank also allegedly omitted to disclose the criminal background of key executives.

"We allege that AriseBank and its principals sought to raise hundreds of millions from investors by misrepresenting the company as a first-of-its-kind decentralized bank offering its own cryptocurrency to be used for a broad range of customer products and services. We sought emergency relief to prevent investors from being victimized by what we allege to be an outright scam," said Stephanie Avakian, Co-Director of the SEC's Enforcement Division.

"This is the first time the Commission has sought the appointment of a receiver in connection with an ICO fraud. We will use all of our tools and remedies to protect investors from those who engage in fraudulent conduct in the emerging digital securities marketplace," said Steven Peikin, Co-Director of the SEC's Enforcement Division.

Shamoil T. Shipchandler, Director of the SEC's Fort Worth Regional Office, said, "Attempting to conceal what we allege to be fraudulent securities offerings under the veneer of technological terms like 'ICO' or 'cryptocurrency' will not escape the Commission's oversight or its efforts to protect investors."

The court approved an emergency asset freeze over AriseBank, Rice, and Ford and appointed a receiver over AriseBank, including over its digital assets. The SEC

intervened to protect the digital assets before they could be dissipated, enabling the receiver to immediately secure various cryptocurrencies held by AriseBank including Bitcoin, Litecoin, Bitshares, Dogecoin, and BitUSD. AriseCoin's public sale began around Dec. 26, 2017, and was originally scheduled to conclude on Jan. 27, 2018, with distribution to investors on Feb. 10, 2018. The SEC seeks preliminary and permanent injunctions, disgorgement of ill-gotten gains plus interest and penalties, and bars against Rice and Ford to prohibit them from serving as officers or directors of a public company or offering digital securities again in the future.²³⁵

Three Issuers Claiming Involvement in Cryptocurrencies

On February 16, 2018, the SEC announced a trading suspension of three companies "amid questions surrounding . . . statements they made about the acquisition of cryptocurrency and blockchain technology-related assets."²³⁶

SEC Suspends Trading in Three Issuers Claiming Involvement
in Cryptocurrency and Blockchain Technology
02/16/2018
FOR IMMEDIATE RELEASE
2018-20

Washington D.C.—The Securities and Exchange Commission today suspended trading in three companies amid questions surrounding similar statements they made about the acquisition of cryptocurrency and blockchain technology-related assets.

The SEC's trading suspension orders state that recent press releases issued by Cherubim Interests Inc. (CHIT), PDX Partners Inc. (PDXP), and Victura Construction Group Inc. (VICT) claimed that CHIT, PDXP, and VICT acquired AAA-rated assets from a subsidiary of a private equity investor in cryptocurrency and blockchain technology among other things. According to the SEC order regarding CHIT, it also announced the execution of a financing commitment to launch an initial coin offering.

According to the SEC's orders, there are questions regarding the nature of the companies' business operations and

235. SEC Press Release 2018-8, SEC Halts Alleged Initial Coin Offering Scam (Jan. 30, 2018), <https://www.investor.gov/additional-resources/news-alerts/press-releases/sec-halts-alleged-initial-coin-offering-scam-0> [<https://perma.cc/P223-6XXJ>].

236. SEC Press Release 2018-20, SEC Suspends Trading in Three Issuers Claiming Involvement in Cryptocurrency and Blockchain Technology (Feb. 16, 2018), <https://www.investor.gov/additional-resources/news-alerts/press-releases/sec-suspends-trading-three-issuers-claiming> [<https://perma.cc/E249-NY5F>].

the value of their assets, including in press releases issued beginning in early January 2018. Additionally, the Commission suspended trading in the securities of CHIT because of its delinquency in filing annual and quarterly reports.

In August 2017, the SEC warned investors to be on alert for companies that may publicly announce ICO or coin/token related events to affect the price of the company's common stock.

"This is a reminder that investors should give heightened scrutiny to penny stock companies that have switched their focus to the latest business trend, such as cryptocurrency, blockchain technology, or initial coin offerings," said Michele Wein Layne, Director of the Los Angeles Regional Office.²³⁷

BitFunder

On February 21, 2018 the SEC brought charges against the operator of a former bitcoin-denominated platform, and the entity itself, "with operating an unregistered securities exchange and defrauding users of that exchange [in addition to] . . . making false and misleading statements in connection with an unregistered offering of securities."²³⁸

SEC Charges Former Bitcoin-Denominated Exchange and Operator With Fraud
02/21/2018
FOR IMMEDIATE RELEASE
2018-23

Washington D.C.—The Securities and Exchange Commission today charged a former bitcoin-denominated platform and its operator with operating an unregistered securities exchange and defrauding users of that exchange. The SEC also charged the operator with making false and misleading statements in connection with an unregistered offering of securities.

The SEC alleges that BitFunder and its founder Jon E. Montroll operated BitFunder as an unregistered online securities exchange and defrauded exchange users by misappropriating their bitcoins and failing to disclose a cyberattack on BitFunder's system that resulted in the theft of more than 6,000 bitcoins. The SEC also alleges that Montroll

237. *Id.*

238. SEC Press Release 2018-23, SEC Charges Former Bitcoin-Denominated Exchange and Operator with Fraud (Feb. 21, 2018), <https://www.investor.gov/additional-resources/news-alerts/press-releases/sec-charges-former-bitcoin-denominated-exchange> [https://perma.cc/L543-FVRQ].

sold unregistered securities that purported to be investments in the exchange and misappropriated funds from that investment as well.

“We allege that BitFunder operated unlawfully as an unregistered securities exchange. Platforms that engage in the activity of a national securities exchange, regardless of whether that activity involves digital assets, tokens, or coins, must register with the SEC or operate pursuant to an exemption. We will continue to focus on these types of platforms to protect investors and ensure compliance with the securities laws,” said Marc Berger, Director of the SEC’s New York Regional Office.

“As alleged in the complaint, Montroll defrauded exchange users by misappropriating their bitcoins and failing to disclose a cyberattack on the exchange’s system and the resulting bitcoin theft. We will continue to vigorously police conduct involving distributed ledger technology and ensure that bad actors who commit fraud in this space are held accountable,” said Lara S. Mehraban, Associate Regional Director of the SEC’s New York Regional Office.

The SEC’s complaint, filed in federal district court in Manhattan, charges BitFunder and Montroll with violations of the anti-fraud and registration provisions of the federal securities laws. The complaint seeks permanent injunctions and disgorgement plus interest and penalties.²³⁹

Centra Tech. Inc.

On April 2, 2018, the SEC brought a complaint against Centra Tech. Inc. and its two co-founders “with orchestrating a fraudulent initial coin offering (ICO) that raised more than \$32 million from thousands of investors”²⁴⁰ The Commission’s announcement, in relevant part, is reproduced below:

SEC Halts Fraudulent Scheme Involving Unregistered ICO
FOR IMMEDIATE RELEASE
2018-53

239. *Id.*

240. SEC Press Release 2018-53, SEC Halts Fraudulent Scheme Involving Unregistered ICO (Apr. 2, 2018), <https://www.sec.gov/news/press-release/2018-53> [<https://perma.cc/KKV9-WFSL>].

Washington D.C., April 2, 2018—The Securities and Exchange Commission today charged two co-founders of a purported financial services start-up with orchestrating a fraudulent initial coin offering (ICO) that raised more than \$32 million from thousands of investors last year. Criminal authorities separately charged and arrested both defendants.

The SEC's complaint alleges that Sohrab "Sam" Sharma and Robert Farkas, co-founders of Centra Tech. Inc., masterminded a fraudulent ICO in which Centra offered and sold unregistered investments through a "CTR Token." Sharma and Farkas allegedly claimed that funds raised in the ICO would help build a suite of financial products. They claimed, for example, to offer a debit card backed by Visa and MasterCard that would allow users to instantly convert hard-to-spend cryptocurrencies into U.S. dollars or other legal tender. In reality, the SEC alleges, Centra had no relationships with Visa or MasterCard. The SEC also alleges that to promote the ICO, Sharma and Farkas created fictional executives with impressive biographies, posted false or misleading marketing materials to Centra's website, and paid celebrities to tout the ICO on social media.

According to the complaint, Farkas made flight reservations to leave the country, but was arrested before he was able to board his flight. Criminal authorities also arrested Sharma.

"We allege that Centra sold investors on the promise of new digital technologies by using a sophisticated marketing campaign to spin a web of lies about their supposed partnerships with legitimate businesses," said Stephanie Avakian, Co-Director of the SEC's Division of Enforcement. "As the complaint alleges, these and other claims were simply false."

"As we allege, the defendants relied heavily on celebrity endorsements and social media to market their scheme," said Steve Peikin, Co-Director of the SEC's Division of Enforcement. "Endorsements and glossy marketing materials are no substitute for the SEC's registration and disclosure requirements as well as diligence by investors."

The SEC's complaint, filed in federal court in the Southern District of New York, charges Sharma and Farkas with violating the anti-fraud and registration provisions of the federal securities laws. The complaint seeks permanent injunctions, return of allegedly ill-gotten gains plus interest and penalties, as well as bars against Sharma and Farkas

serving as public company officers or directors and from participating in any offering of digital or other securities. In a parallel action, the U.S. Attorney's Office for the Southern District of New York today announced criminal charges against Sharma and Farkas.²⁴¹

The Winklevoss 2013 Registration Statement

It appears that the SEC's first highly visible need to deal with the question of virtual currencies may be traced to the July 1, 2013 filing by the Winklevoss twins, Cameron and Tyler, of a registration statement on Form S-1 for the Winklevoss Bitcoin Trust, having an investment objective "for the Shares to reflect the performance of the Blended Bitcoin Price of Bitcoins, less the expenses of the Trust's operations. The Shares are designed for investors seeking a cost-effective and convenient means to gain exposure to Bitcoins with minimal credit risk."²⁴² During the next several years, Winklevoss efforts would continue without regulatory approval, culminating with the most recent Amendment to the Form S-1 Registration Statement (Amendment No. 9) dated February 8, 2017.²⁴³

Exchange Traded Fund (ETF) Organizational Schematic

Registration Statement Amendment No. 9 provides that the Bitcoin ETF with proposed trading symbol "COIN," has the following organizational structure:

The Winklevoss Bitcoin Trust (the "Trust") is a Delaware statutory trust formed on December 30, 2014 and operates pursuant to the Amended and Restated Declaration of Trust and Trust Agreement (the "Trust Agreement") between Digital Asset Services, LLC, formerly Math-Based Asset Services, LLC (the "Sponsor"), and Delaware Trust Company (the "Trustee"). The Trust will issue Winklevoss Bitcoin Shares (the "Shares"), which represent units of fractional undivided beneficial interest in and ownership of the Trust. The Trust's purpose is to hold bitcoin, which is a digital asset ("Digital Asset"). The Trust is initially expected to issue or redeem Shares from time to time only in one or more whole blocks of 100,000 Shares (each block of 100,000 Shares is a "Basket").

241. *Id.*

242. *See* Winklevoss Bitcoin Tr., Registration Statement filed with the U.S. Securities and Exchange Commission on Form S-1 (Form S-1), at 2 (July 1, 2013), <https://www.sec.gov/Archives/edgar/data/1579346/000119312513279830/d562329ds1.htm> [<https://perma.cc/9WDX-NGZK>].

243. *See* Winklevoss S-1 Amendment No. 9, *supra* note 37.

The Trust will issue and redeem the Shares in Baskets only to certain authorized firms (“Authorized Participants” or “APs”) on an ongoing basis. On a creation, Baskets will be distributed to the Authorized Participants by the Trust in exchange for the delivery to the Trust of the appropriate number of bitcoin (i.e., bitcoin equal in value to the net asset value per Share of the Trust (“NAV”) multiplied by the number of Shares in the Basket). On a redemption, the Trust will distribute bitcoin equal in value to the NAV multiplied by the number of Shares in the Basket to the redeeming Authorized Participant in exchange for the delivery to the Trust of one or more Baskets. On each Business Day, the value of each Basket accepted by the Transfer Agent in a creation or redemption transaction will be the same (i.e., each Basket will initially consist of 100,000 Shares and the value of the Basket will be equal to the value of 100,000 Shares (or such other amount as determined by the Trust from time to time) at their net asset value per Share on that day). The Trust will not issue or redeem fractions of a Basket.

The Sponsor is a Delaware limited liability company whose sole member is Winklevoss Capital Fund, LLC. The Sponsor is responsible for, among other things, overseeing the performance of the Trustee and the Trust’s principal service providers. State Street Bank and Trust Company (the “Administrator”) performs certain day-to-day administrative functions for the Trust.²⁴⁴

Perceived Risk Factors

Articulated risk factors for the Winklevoss Bitcoin Trust consume twenty-seven pages of small print in the registration statement on Form S-1 for the Winklevoss Bitcoin Trust and may be summarized into five basic categories: risk factors related to the Bitcoin Network and Bitcoin; risk factors related to the Bitcoin exchange market; risk factors related to the Trust and Shares; risk factors related to the regulation of the Trust and the Shares; and risk factors related to potential conflicts of interest (herein omitted), as follows:

Network and Bitcoin Risk Factors

The most recent Amendment to the Winklevoss Bitcoin Trust Form S-1 Registration Statement (Amendment No. 9) dated February 8, 2017, sets forth the following risk factors to be considered by potential investors:

244. *Id.* at F-7; see also Henry T.C. Hu & John Morley, *A Regulatory Framework for Exchange-Traded Funds*, 91 S. CAL. L. REV. 839 (2018).

The loss or destruction of a private key required to transfer the Trust's bitcoin may be irreversible. The Custodian's loss of access to a private key associated with a public Bitcoin address that holds the Trust's funds could adversely affect an investment in the Shares.

....

The further development and acceptance of the Bitcoin Network and other Digital Asset systems, which represent a new and rapidly changing industry, are subject to a variety of factors that are difficult to evaluate. The slowing or stopping of the development or acceptance of the Bitcoin Network may adversely affect an investment in the Shares.

A Digital Asset such as bitcoin may be used, among other things, to buy and sell goods and services. The Bitcoin Network and other Digital Asset networks are a new and rapidly evolving industry of which the Bitcoin Network is a prominent, but not unique, part. The growth of the Digital Asset industry in general, and the Bitcoin Network in particular, is subject to a high degree of uncertainty. The factors affecting the further development of the Digital Asset industry, as well as the Bitcoin Network, include:

- continued worldwide growth in the adoption and use of bitcoin and other Digital Assets;
- government and quasi-government regulation of bitcoin and other Digital Assets and their use, or restrictions on or regulation of access to and operation of the Bitcoin Network or similar Digital Asset systems;
- the maintenance and development of the open-source software protocol of the Bitcoin Network;
- changes in consumer demographics and public tastes and preferences;
- the availability and popularity of other forms or methods of buying and selling goods and services, including new means of using fiat currencies; and
- general economic conditions and the regulatory environment relating to Digital Assets.

Currently, there is relatively limited use of bitcoin in the retail and commercial marketplace in comparison to relatively extensive use by speculators, thus contributing to price volatility that could adversely affect an investment in the Shares.

....

Significant Bitcoin Network contributors could propose amendments to the Bitcoin Network's protocols and software that, if accepted and authorized by the Bitcoin Network, could adversely affect an investment in the Shares.

....

The open-source structure of the Bitcoin Network protocol means that the contributors to the protocol are generally not directly compensated for their contributions in maintaining and developing the protocol. A failure to properly monitor and upgrade the protocol could damage the Bitcoin Network and an investment in the Shares.

....

If a malicious actor obtains control in excess of fifty (50) percent of the processing power (or aggregate hashrate) active on the Bitcoin Network, it is possible that such actor could manipulate the Blockchain in a manner that adversely affects an investment in the Shares or the ability of the Trust to operate.

....

If the award of bitcoin for solving blocks and transaction fees for recording transactions are not sufficiently high to incentivize miners, miners may cease expending hashrate to solve blocks and confirmations of transactions on the Blockchain could be slowed temporarily. A reduction in the hashrate expended by miners on the Bitcoin Network could increase the likelihood of a malicious actor obtaining control in excess of fifty (50) percent of the aggregate hashrate active on the Bitcoin Network or the Blockchain, potentially permitting such actor to manipulate the Blockchain in a manner that adversely affects an investment in the Shares or the ability of the Trust to operate.

....

As the number of bitcoin awarded for solving a block in the Blockchain decreases, the incentive for miners to continue to contribute hashrate to the Bitcoin Network will transition from a set reward to transaction fees. Either the requirement from miners of higher transaction fees in exchange for recording transactions in the Blockchain or a software upgrade that automatically charges fees for all transactions may decrease demand for bitcoin and prevent the expansion of the Bitcoin Network to retail merchants and commercial businesses, resulting in a reduction in the price of bitcoin that could adversely impact an investment in the Shares.

....

To the extent that the profit margins of Bitcoin mining operations are low, operators of Bitcoin mining operations are more likely to immediately sell bitcoin earned by mining in the Bitcoin Exchange Market (defined below), resulting in a reduction in the price of bitcoin that could adversely impact an investment in the Shares.

....

To the extent that any miners cease to record transactions in solved blocks, transactions that do not include the payment of a transaction fee will not be recorded on the Blockchain until a block is solved by a miner who does not require the payment of transaction fees. Any widespread delays in the recording of transactions could result in a loss of confidence in the Bitcoin Network, which could adversely impact an investment in the Shares.

....

The acceptance of Bitcoin Network software patches or upgrades by a significant, but not overwhelming, percentage of the users and miners in the Bitcoin Network could result in a “hard fork” in the Blockchain, resulting in the operation of two separate and incompatible networks until such time as the forked Blockchains are merged, if ever. The temporary or permanent existence of forked Blockchains could adversely impact an investment in the Shares.

....

Intellectual property rights claims may adversely affect the operation of the Bitcoin Network.²⁴⁵

Exchange Market Risk Factors

Bitcoin Exchange Market risk factors are described in the Winklevoss Bitcoin Trust S-1 Registration Statement (Amendment No. 9) dated February 8, 2017, as follows:

The value of the Shares relates directly to the value of the bitcoin held by the Trust and fluctuations in the price of bitcoin could adversely affect an investment in the Shares.

The Shares are designed to track as closely as possible the price of bitcoin, as measured at 4:00 p.m. Eastern Time using the Gemini Exchange Auction Price on each Business Day, less the Trust’s liabilities (which include accrued but unpaid fees and expenses). The value of the Shares is directly related to the value of bitcoin held by the Trust. The price of bitcoin

245. Winklevoss S-1 Amendment No. 9, *supra* note 37, at 15–20.

has fluctuated widely over the past three (3) years. Several factors may affect the Gemini Exchange Auction Price, including, but not limited to:

- Total bitcoin in existence;
- Global bitcoin demand, which is influenced by the growth of retail merchants' and commercial businesses' acceptance of bitcoin as payment for goods and services, the security of online Bitcoin exchanges and public Bitcoin addresses that hold bitcoin, the perception that the use and holding of bitcoin is safe and secure, the lack of regulatory restrictions on their use, and the reputation regarding the use of bitcoin for illicit purposes;
- Global bitcoin supply which is influenced by similar factors as global bitcoin demand, in addition to fiat currency needs by miners and taxpayers who may liquidate bitcoin holdings to meet tax obligations;
- Investors' expectations with respect to the rate of inflation of fiat currencies;
- Investors' expectations with respect to bitcoin's rate of deflation;
- Interest rates;
- Currency exchange rates, including the rates at which bitcoin may be exchanged for fiat currencies;
- Fiat currency withdrawal and deposit policies of the Gemini Exchange and liquidity on the Gemini Exchange;
- Interruptions in service from or failures of the Gemini Exchange (interruptions or failures at other Bitcoin Exchanges may also have an indirect affect);
- Theft, or news of such theft, of bitcoin from individuals or bitcoin retail and service providers, including companies that buy, sell, process payments or store bitcoin;
- Investment and trading activities of large investors, including private and registered funds, that may directly or indirectly invest in bitcoin;
- Monetary policies of governments, trade restrictions, currency devaluations and revaluations;
- Regulatory measures, if any, that restrict the use of bitcoin as a form of payment or the purchase of bitcoin on the Bitcoin Market;
- The availability of companies providing bitcoin-

- related services;
- The maintenance and development of the open-source software protocol of the Bitcoin Network;
 - Increased competition from other forms of Digital Assets or means of payments;
 - Global or regional political, economic or financial events and situations;
 - Expectations among Bitcoin economy participants that the value of bitcoin will soon change; and
 - Fees, including miners' fees, associated with processing bitcoin transactions.

In addition, investors should be aware that there is no assurance that bitcoin will maintain its long-term value in terms of purchasing power in the future or that the acceptance of bitcoin for payments by mainstream retail merchants and commercial businesses will continue to grow. In the event that the price of bitcoin declines, the Sponsor expects the value of an investment in the Shares to decline proportionately.

The Gemini Exchange Auction Price may be subject to momentum pricing, which may lead to greater volatility and adversely affect an investment in the Shares.

....

Pricing on the Gemini Exchange can be volatile and can adversely affect an investment in the Shares.

....

The Bitcoin Exchanges on which bitcoin trades are relatively new and, in most cases, largely unregulated and, therefore, may be more exposed to fraud and failure than established, regulated exchanges for other products. To the extent that the Bitcoin Exchanges representing a substantial portion of the volume in bitcoin trading are involved in fraud or experience security failures or other operational issues, such Bitcoin Exchanges' failures may result in a reduction in the Gemini Exchange Auction Price and can adversely affect an investment in the Shares.²⁴⁶

....

Since there is no limit on the number of bitcoin that the Trust may acquire (other than the overall limit on the number of bitcoin in existence established by the original bitcoin

246. See, e.g., Lawrence J. Trautman & Peter C. Ormerod, *Industrial Cyber Vulnerabilities: Lessons from Stuxnet and the Internet of Things*, 72 U. MIAMI L. REV. 761, 763 (2018); Trautman, *E-Commerce*, *supra* note 124, at 282; Trautman & Michaely, *supra* note 204, at 278–81 (describing cyber breaches).

protocol), the Trust itself, as it grows, may have an impact on the supply and demand of bitcoin that ultimately may affect the price of the Shares in a manner unrelated to other factors affecting the global market for bitcoin.

....

The Shares may trade at a discount or premium in the trading price relative to the NAV as a result of non-concurrent trading hours between Bats and the Bitcoin Exchange Market.

....

To the extent that bitcoin prices on the Bitcoin Exchange Market move negatively during hours when U.S. equity markets are closed, trading prices of the Shares may “gap” down at market open.

....

A possible “short squeeze” due to a sudden increase in demand for the Shares that largely exceeds supply may lead to price volatility in the Shares.

....

Purchasing activity in the Bitcoin Exchange Market associated with Basket creation or selling activity following Basket redemption may affect the Gemini Exchange Auction Price and Share trading prices. These price changes may adversely affect an investment in the Shares.

....

An investment in the Shares may be adversely affected by competition from other methods of investing in bitcoin or from other Digital Assets.

....

The Gemini Exchange Auction Price may be affected by the sale of other Digital Asset ETPs or other financial instruments tracking the price of bitcoin.

....

Political or economic crises may motivate large-scale sales of bitcoin, which could result in a reduction in the Gemini Exchange Auction Price and adversely affect an investment in the Shares.

....

Demand for bitcoin is driven, in part, by its status as the most prominent and secure Digital Asset. It is possible that a Digital Asset other than bitcoin could have features that make it more desirable to a material portion of the Digital Asset user and investor base, resulting in a reduction in demand for bitcoin, which could have a negative impact on the price of

bitcoin and adversely affect an investment in the Shares.²⁴⁷

Trust and Shares Risk Factors

The Winklevoss Bitcoin Trust Form S-1 Registration Statement (Amendment No. 9) dated February 8, 2017, sets forth the following Trust and Shares risk factors to be considered by potential investors:

As the Sponsor and its management have no history of operating an investment vehicle like the Trust, their experience may be inadequate or unsuitable to manage the Trust.

....

The Trust invests solely in bitcoin.

....

The value of the Shares could decrease if unanticipated operational or trading problems arise.

....

The Shares may trade at a price which is at, above or below the NAV and any discount or premium in the trading price relative to the NAV may widen as a result of non-concurrent trading hours.

....

If Authorized Participants are able to purchase or sell large quantities of bitcoin in the open market at prices that are different than the Gemini Exchange Auction Price, the arbitrage mechanism intended to keep the price of the Shares closely linked to the Gemini Exchange Auction Price may not function properly and the Shares may trade at a discount or premium to the NAV.

....

If the processes of creation and redemption of Baskets encounter any unanticipated difficulties, the opportunities for arbitrage transactions intended to keep the price of the Shares closely linked to the Gemini Exchange Auction Price may not exist and, as a result, the price of the Shares may fall.

....

The postponement, suspension or rejection of Creation Basket orders or Redemption Basket orders, as permitted in certain circumstances under the Transfer Agency and Services Agreement, may adversely affect an investment in the Shares.

The Trust could experience unforeseen difficulties in operating and maintaining key elements of its technical

247. Winklevoss S-1 Amendment No. 9, *supra* note 37, at 15–20.

infrastructure.

....

The Trust's internal systems rely on a Cold Storage System that is highly technical, and if such system contains undetected errors, the value of the Shares could be adversely affected.

....

The Trust's ability to adapt technology in response to changing security needs or trends poses a challenge to the safekeeping of the Trust's bitcoin.

....

Security threats to the Cold Storage System could result in the halting of Trust operations, the suspension of redemptions, a loss of Trust assets, or damage to the reputation and brand of the Trust, each of which could result in a reduction in the price of the Shares.

....

A loss of confidence in the Cold Storage System and the Trust's security and technology policies, or a breach of the Cold Storage System, may adversely affect the Trust and the value of an investment in the Shares.

....

Bitcoin transactions are irrevocable and stolen or incorrectly transferred bitcoin may be irretrievable. As a result, any incorrectly executed Bitcoin transactions could adversely affect an investment in the Shares.

....

The Trust's bitcoin may be subject to loss, damage, theft or restriction on access.

....

Shareholders' limited rights of legal recourse against the Trust, Trustee, Sponsor, Administrator, Transfer Agent and Custodian and the Trust's lack of insurance protection expose the Trust and its Shareholders to the risk of loss of the Trust's bitcoin for which no person is liable.

....

Bitcoin held by the Trust are not subject to FDIC or SIPC protections.

....

No Insurance.

....

The Custodian's limited liability under the Trust Custody Agreement may impair the ability of the Trust to recover losses relating to its bitcoin and any recovery may be limited, even in

the event of fraud, to the market value of the bitcoin lost or damaged at the time the fraud is discovered.

....

Risks relating to reliance on third party service providers.

....

The Trust may not have adequate sources of recovery if its bitcoin is lost, stolen or destroyed.

....

The liquidity of the Shares may also be affected by the withdrawal from participation of one or more Authorized Participants.

....

As a new fund, there is no guarantee that an active trading market for the Shares will develop. To the extent that no active trading market develops and the assets of the Trust do not reach a viable size, the liquidity of the Shares may be limited or the Trust may be terminated at the option of the Sponsor.

....

Bats may halt trading in the Shares, which would adversely impact investors' ability to sell the Shares.

....

The Trust may be required to terminate and liquidate at a time that is disadvantageous to Shareholders.

....

Shareholders will not have the rights enjoyed by investors in certain other vehicles.

....

The Trust Custody Account will be administered using computer hardware and software owned by the Custodian and used by Custodian on behalf of the Trust.

....

The Sponsor is solely responsible for selecting the method of determining the price of the Trust's bitcoin, and any errors, discontinuance or changes in such valuation calculations by the Administrator may have an adverse effect on the value of the Shares.

....

Extraordinary expenses resulting from unanticipated events may become payable by the Trust, adversely affecting an investment in the Shares.

....

The Trust's transfer or sale of bitcoin to pay expenses or other operations of the Trust could result in Shareholders

incurring tax liability without an associated distribution from the Trust.

....

The sale of the Trust's bitcoin to pay expenses not assumed by the Sponsor at a time of low bitcoin prices could adversely affect the value of the Shares.

....

The value of the Shares will be adversely affected if the Trust is required to indemnify the Trustee, the Administrator, the Transfer Agent or the Custodian under the Trust Documents.

....

Intellectual property rights claims may adversely affect the Trust and an investment in the Shares.²⁴⁸

Regulation Risk Factors

Regulation risk factors set forth in the Winklevoss Bitcoin Trust Form S-1 Registration Statement (Amendment No. 9) dated February 8, 2017, are:²⁴⁹

Shareholders will not have the protections associated with ownership of shares in an investment company registered under the Investment Company Act or the protections afforded by the CEA.

....

Regulatory changes or actions may alter the nature of an investment in the Shares or restrict the use of bitcoin or the operation of the Bitcoin Network in a manner that adversely affects an investment in the Shares.

....

It may be illegal now, or in the future, to acquire, own, hold, sell or use bitcoin in one or more countries, and ownership of, holding or trading in the Shares may also be considered illegal and subject to sanction.

....

If regulatory changes or interpretations of the Trust's activities require the registration of the Trust as a MSB under the regulations promulgated by FinCEN under the authority of the U.S. Bank Secrecy Act, the Trust may be required to register and comply with such regulations. If regulatory changes or interpretations of the Trust's activities require the licensing or other registration of the Trust as a money transmitter (or equivalent designation) under state law in any

248. *Id.* at 26–34.

249. *Id.* at 34–38.

state in which the Trust operates, the Trust may be required to seek licensure or otherwise register and comply with such state law. In the event of any such requirement, to the extent that Sponsor decides to continue the Trust, the required registrations, licensure and regulatory compliance steps may result in extraordinary, non-recurring expenses to the Trust. The Sponsor may also decide to terminate the Trust. Any termination of the Trust in response to the changed regulatory circumstances may be at a time that is disadvantageous to investors.

....
 If regulatory changes or interpretations require the regulation of bitcoin under the CEA by the CFTC and/or under the Securities Act and Investment Company Act by the SEC, the Trust and the Sponsor may be required to register and comply with such regulations. To the extent that the Sponsor decides to continue the Trust, the required registrations and regulatory compliance steps may result in extraordinary, non-recurring expenses to the Trust. The Sponsor may also decide to terminate the Trust. Any termination of the Trust in response to the changed regulatory circumstances may be at a time that is disadvantageous to investors.

....
 If federal or state legislatures or agencies initiate or release tax determinations that change the classification of bitcoin as property for tax purposes (in the context of when such bitcoin is held as an investment), such determination could have negative tax consequences for the Trust or its Shareholders.

SolidX Bitcoin Trust Registration Statement

On March 10, 2016 a registration statement for SolidX Bitcoin Trust was filed with the SEC “to provide shareholders with exposure to the daily change in the U.S. dollar price of bitcoin”²⁵⁰ On January 5, 2018, Amendment No. 4 to the SolidX Bitcoin Trust registration statement was filed and is the most recent at the time of this writing.²⁵¹ Amendment No. 4 discloses, “The Trust will buy and sell bitcoin with a view to causing the performance of the Trust to track that of the TradeBlock Bitcoin Index (‘XBX’), over time

250. See SolidX Bitcoin Tr., Draft Registration Statement filed with the U.S. Securities and Exchange Commission on Form S-1 (Form S-1), at 3 (Mar. 10, 2016), <https://www.sec.gov/Archives/edgar/data/1668039/000095012316015352/filename1.htm> [<https://perma.cc/42D9-34G4>].

251. See SolidX Bitcoin Tr., Amendment No. 4 to Form S-1, *supra* note 30.

The Shares provide shareholders with the opportunity to access the bitcoin market through a traditional brokerage account.”²⁵² The SolidX Bitcoin Trust registration Statement is a particularly useful document for those desiring more detailed information about: the offering; risks; use of proceeds; bitcoin and the bitcoin industry; security of bitcoin holdings; description of the XBX; business of the Trust; creation and redemption of shares; plan of distribution; description of the Trust; description of the Shares; the sponsor; the trustee; and the administrator.²⁵³

Status of U.S. Bitcoin-Oriented Exchange Traded Funds (ETFs)

On March 10, 2017, the SEC rejected a proposed rule change that would have resulted in the listing and trading of Shares to be issued by the Winklevoss Bitcoin Trust.²⁵⁴ In considering this commodity-trust exchange-traded product, the SEC explains:

252. *Id.* at 1.

253. *Id.* at Table of Contents.

254. Self-Regulatory Organizations; Bats BZX Exchange, Inc.; Order Disapproving a Proposed Rule Change, as Modified by Amendments No. 1 and 2, to BZX Rule 14.11(e)(4), Commodity-Based Trust Shares, to List and Trade Shares Issued by the Winklevoss Bitcoin Trust, Exchange Act Release No. 34-80206; File No. SR-BatsBZX-2016-30 (Mar. 10, 2017), <https://www.sec.gov/rules/sro/batsbzx/2017/34-80206.pdf> [https://perma.cc/WSW7-PTYB], observing,

The Exchange filed notice of the proposed rule change on June 30, 2016, and the Commission published the notice in the Federal Register on July 14, 2016. *See* Exchange Act Release No. 78262 (July 8, 2016), 81 FR 45554 (July 14, 2016) (“Notice”). On August 23, 2016, the Commission designated a longer period within which to act on the proposed rule change. *See* Exchange Act Release No. 78653 (Aug. 23, 2016), 81 FR 59256 (Aug. 29, 2016). On October 12, 2016, the Commission instituted proceedings under Section 19(b)(2)(B) of the Securities Exchange Act of 1934 (“Exchange Act”), 15 U.S.C. 78s(b)(2)(B), to determine whether to approve or disapprove the proposed rule change. *See* Exchange Act Release No. 79084 (Oct. 12, 2016), 81 FR 71778 (Oct. 18, 2016). On October 20, 2016, the Exchange filed Amendment No. 1 to the proposed rule change, replacing the original filing in its entirety, and Amendment No. 1 was published for comment in the Federal Register on November 3, 2016. *See* Exchange Act Release No. 79183 (Oct. 28, 2016), 81 FR 76650 (Nov. 3, 2016) (“Amendment No. 1”). On January 4, 2017, the Commission designated a longer period for Commission action on the proposed rule change. *See* Exchange Act Release No. 79725 (Jan. 4, 2017), 82 FR 2425 (Jan. 9, 2017) (designating March 11, 2017, as the date by which the Commission must either approve or disapprove the proposed rule change). On February 22, 2017, the Exchange filed Amendment No. 2 to the proposed rule change (“Amendment No. 2”). Amendment No. 2 further modified the Exchange’s proposal by (a) changing the size of a creation and redemption basket from 10,000 shares to 100,000 shares, (b) changing the bitcoin value of a share from 0.1 bitcoin to 0.01 bitcoin, and (c) changing the Exchange’s representation about the number of shares outstanding at the commencement of trading from 100,000 shares to 500,000 shares. Because

The Commission has, in past approvals of commodity-trust ETPs, emphasized the importance of surveillance-sharing agreements between the national securities exchange listing and trading the ETP, and significant markets relating to the underlying asset. Such agreements, which are a necessary tool to enable the ETP-listing exchange to detect and deter manipulative conduct, enable the exchange to meet its obligation under Section 6(b)(5) of the Exchange Act to have rules that are designed to prevent fraudulent and manipulative acts and practices and to protect investors and the public interest.

As described above, the Exchange has not entered into a surveillance-sharing agreement with a significant, regulated, bitcoin-related market. The Commission also does not believe, as discussed above, that the proposal supports a finding that the significant markets for bitcoin or derivatives on bitcoin are regulated markets with which the Exchange can enter into such an agreement. Therefore, as the Exchange has not entered into, and would currently be unable to enter into, the type of surveillance-sharing agreement that has been in place with respect to all previously approved commodity-trust ETPs, the Commission does not find the proposed rule change to be consistent with the Exchange Act and, accordingly, disapproves the proposed rule change.

The Commission notes that bitcoin is still in the relatively early stages of its development and that, over time, regulated bitcoin-related markets of significant size may develop. Should such markets develop, the Commission could consider whether a bitcoin ETP would, based on the facts and circumstances then presented, be consistent with the requirements of the Exchange Act.²⁵⁵

Amendment No. 2 does not materially alter the substance of the proposed rule change, as Modified by Amendments No. 1 and 2, to BZX Rule 14.11(e)(4), Commodity-Based Trust Shares, to List and Trade Shares Issued by the Winklevoss Bitcoin Trust, Exchange Act Release No. 34-80206; File No. SR-BatsBZX-2016-30, 37-38 (Mar. 10, 2017), <https://www.sec.gov/rules/sro/batsbzx/2017/34-80206.pdf> [https://perma.cc/9NNM-CYK4].

See also Dave Michaels & Paul Vigna, *SEC Rejects Application for Bitcoin Trading Fund*, WALL ST. J., Mar. 11–12, 2017, at B9.

255. Self-Regulatory Organizations; Bats BZX Exchange, Inc.; Order Disapproving a Proposed Rule Change, as Modified by Amendments No. 1 and 2, to BZX Rule 14.11(e)(4), Commodity-Based Trust Shares, to List and Trade Shares Issued by the Winklevoss Bitcoin Trust, Exchange Act Release No. 34-80206; File No. SR-BatsBZX-2016-30, 37-38 (Mar. 10, 2017), <https://www.sec.gov/rules/sro/batsbzx/2017/34-80206.pdf> [https://perma.cc/9NNM-CYK4].

On March 28, 2017, the registration statement for SolidX Bitcoin Trust ETF as filed with the SEC was rejected.²⁵⁶ This development left “a third proposed bitcoin ETF, the Bitcoin Investment Trust from Grayscale Investments LLC. That ETF is in a slightly different position, in that it already trades publicly over the counter under alternative reporting standards, which puts it outside SEC regulations,” according to *The Wall Street Journal*.²⁵⁷ Vigna and Osipovich further report, “The proposal is to bring it under SEC rules and have it trade on NYSE Arca.”²⁵⁸

The SEC received numerous comments in response to their proposed rule change relating to the listing and trading shares of the Bitcoin Investment Trust (BIT) under NYSE Arca Equities Rule 8.201.²⁵⁹ Among the comments in support of the proposed rule change is that of Arthur Levitt, who served previously as: President of the American Stock Exchange; Chairman of the New York City Economic Development Corporation; and Chairman of the U.S. Securities & Exchange Commission from 1993 through 2001. Mr. Levitt states, “The challenge in any form of prudential regulation—which is the system created by multiple regulatory schemes and agencies—is this: How quickly does it respond to failures in the market system?”²⁶⁰ Moreover, “When there is a bad actor committing fraud, do traditional regulatory agencies and actors catch it in time? The sad truth is that they lag. Other efforts to close that gap have proven wanting. Self-regulation doesn’t always work in some cases but litigation presents a powerful disincentive to fraud”²⁶¹ Bitcoin offers the promise “of the ability for anyone, anywhere in the world to view and research the public ledger of all Bitcoin transactions. As more transactions become digital, the kind of transparency enabled by the blockchain has the potential to amplify the market’s ability to self-correct bad actors and inefficiencies.”²⁶² Mr. Levitt writes:

In short, the Bitcoin economy is an open and organic system for correction and fraud detection.

In addition to its potential benefits, there is robust interest in bitcoin as an investable asset from the investment

256. See Paul Vigna & Alexander Osipovich, *SEC Gives Second Bitcoin Fund a Thumbs-Down*, WALL ST. J., Mar. 29, 2017, at B15.

257. *Id.*

258. *Id.*

259. See Comments on NYSE Arca Rulemaking, Exchange Act Release No. 34-79955; File No. SR-NYSEArca-2017-06 (Sept. 26, 2017), <https://www.sec.gov/comments/sr-nysearca-2017-06/nysearca201706.htm> [<https://perma.cc/7V5D-LKEF>].

260. *Id.* Submitted Comment of Arthur Levitt, Fmr. Chair. U.S. Sec. & Exch. Comm. (July 5, 2017), <https://www.sec.gov/comments/sr-nysearca-2017-06/nysearca201706-1838297-154864.pdf> [<https://perma.cc/T7RW-X46N>].

261. *Id.*

262. *Id.*

community, spanning individuals and institutions. As such, I believe at this stage a Bitcoin ETF, such as the Bitcoin Investment Trust, is worthy of support, particularly as the Bitcoin economy continues to grow and take shape. . . .

Today, the SEC has before it the ability to provide investors with access to Bitcoin through a regulated investment vehicle. I view this as a similar opportunity to the approval and introduction of the SPDR Gold ETF (symbol: LD) in 2004, when for the first time, investors could add regulated exposure to gold into their portfolios. Similarly, approving the Bitcoin Investment Trust (symbol: GBTC), which already has hundreds of millions of dollars in assets under management, will give investors a regulated exchange-traded product that will track the bitcoin price more effectively. The Bitcoin Investment Trust has a strong operational track record, but should be held to the even higher standard that accompanies ETF listings on the NYSE Arca.²⁶³

In their comment letter regarding the BIT, professors Campbell R. Harvey, Patrick Murck, James J. Angel, Joshua Fairfield, Aaron Wright, Chris Wilmer, and Charles Evans observe that currently, “investors are forced to take substantial, and in our view unnecessary risks, in order to gain exposure to bitcoin due to (1) the willful absence of a regulatory scheme and (2) the absence of a regulated investment vehicle that can provide passive exposure to bitcoin price movements as intended.”²⁶⁴ Unlike prior disapproved bitcoin ETF proposals, Harvey et al., state:

the Bitcoin Investment Trust (Symbol: GBTC) is already available for trading on the OTCQX market by anyone with a brokerage account at a substantial premium to its net asset value. Since the Bitcoin Investment Trust first began trading on the OTCQX market on May 4, 2015, the top tier of three marketplaces for trading over-the-counter securities, it has traded at an average of a 40% premium to its net asset value. More recently, the market price of GBTC has traded in excess of a 130% premium. In its current form, investors that desire passive exposure to bitcoin through the Bitcoin Investment Trust, a vehicle solely invested in bitcoins, are forced to overpay for the assets that they hold. . . .

263. *Id.*

264. See Campbell R. Harvey, Patrick Murck, James J. Angel, Joshua Fairfield, Aaron Wright, Chris Wilmer & Charles Evans, Comments on NYSE Arca Rulemaking, Exchange Act Release No. 34-79955; File No. SR-NYSEArca-2017-06 (Aug. 21, 2017), <https://www.sec.gov/comments/sr-nysearca-2017-06/nysearca201706-2247534-160907.pdf> [<https://perma.cc/H5C7-P8DT>].

As an ETP, the Bitcoin Investment Trust would allow investors to passively gain exposure to the bitcoin market price at net asset value, through a reliable and secure investment vehicle.²⁶⁵

In addition, the Harvey, et al. comment letter contends that approval of the BIT will likely “increase the number of market participants, dollar-denominated liquidity, and other competitive forces that would lead to more efficient price discovery than currently exists in a semi-fragmented, global bitcoin spot market that lacks a regulated, centralized trading venue or order book.”²⁶⁶ And of major significance, “as an ETP on the NYSE Arca, the Bitcoin Investment Trust could serve as a liquid and regulated conduit for capital formation within the bitcoin ecosystem, enhancing the growth and development of this transformative technology as well as the applications built on top of it.”²⁶⁷

Cyber Threat to Industry and Virtual Currencies

Losses due to cyber breach have become a daily occurrence to all consumers, industry, government, and any participants connected in any way to the Internet. In prepared remarks delivered February 6, 2018 before the Senate Committee on Banking, Housing, and Urban Affairs, SEC Chairman Jay Clayton warns about “the loss of investment and personal information due to hacks of online trading platforms and individual digital asset ‘wallets.’ A recent study estimated that more than 10% of proceeds generated by ICOs—or almost \$400 million—has been lost to such attacks.”²⁶⁸ Just days before Chairman Clayton’s testimony, “a Japanese cryptocurrency market lost over \$500 million in an apparent hack of its systems.”²⁶⁹

265. *Id.*

266. *Id.*

267. *Id.*

268. *Chairman’s Testimony on Virtual Currencies: The Roles of the SEC and CFTC: Before the S. Comm. on Banking, Housing, and Urban Affairs, supra note 3* (citing EY Research: Initial Coin Offerings (ICOs) (Dec. 2017), <http://www.ey.com/Publication/vwLUAssets/ey-research-initial-coin-offerings-icos/%24File/ey-research-initial-coin-offerings-icos.pdf> [<https://perma.cc/ZS5V-CNGW>]).

269. *Id.* (citing Taiga Uranaka & Thomas Wilson, *Japan Raps Coincheck, Orders Broader Checks after \$530 Million Cryptocurrency Theft*, REUTERS (Jan. 28, 2018), <https://www.reuters.com/article/us-japan-cryptocurrency/japan-raps-coincheck-orders-broader-checks-after-530-million-cryptocurrency-theft-idUSKBN1F106S> [<https://perma.cc/86FT-9P52>]); accord Paul Vigna, *Crypto Exchanges Pushed for Greater Clarity*, WALL ST. J., Apr. 18, 2018, at B12.

Cryptocurrency Exchanges

By mid-2018, over 194 cryptocurrency exchanges exist, having a market cap approaching \$400 billion, and “total 24-h[our] volume of \$4.30 billion on 6841 trading pairs.”²⁷⁰ Prominent among these exchanges in the United States is Gemini, founded by Cameron and Tyler Winklevoss, who announced an agreement with Nasdaq whereby “Gemini will use Nasdaq’s surveillance software, called Smarts, to monitor its markets for potentially abusive trading practices.”²⁷¹ In addition, Gemini will conduct an auction daily “at 4 p.m. ET to determine a daily benchmark price for bitcoin . . . Gemini’s auction price is used to underpin bitcoin futures offered by Cboe Global Markets Inc.”²⁷²

VI. COMMODITY FUTURES TRADING COMMISSION

*In the past several weeks the CFTC has filed a series of civil enforcement actions against perpetrators of fraud and market abuse involving virtual currency. These actions and others to follow confirm that the CFTC, working closely with the Security and Exchange Commission (SEC) and other fellow financial enforcement agencies, will aggressively prosecute those who engage in fraud and manipulation of US markets for virtual currency.*²⁷³

J. Christopher Giancarlo

Chairman, U.S. Commodity Futures Trading Commission

March 7, 2018

The CFTC claims regulatory authority over digital assets (virtual currencies) under a theory that the CFTC’s authority over futures and other derivatives extends to virtual currencies as commodities as defined in Section 1a(9) of the Commodity Exchange Act.²⁷⁴ Based on the important characteristics of digital assets such as bitcoin, these assets, like commodities, “are units of commerce that are interchangeable, traded in markets where

270. *Cryptocurrency Exchanges/Markets List*, COIN.MARKET, <https://cryptocoincharts.info/markets/info> [<https://perma.cc/ZWF5-JBLZ>] (last visited May 21, 2018).

271. Alexander Osipovich, *Crypto Exchange Gets Nasdaq Help*, WALL ST. J., Apr. 26, 2018, at B10.

272. *Id.* (alteration omitted); see also Margaret Ryznar, *The Future of Bitcoin Futures*, HOUS. L. REV. (forthcoming), <https://ssrn.com/abstract=3127327> [<https://perma.cc/XT3M-DNJR>].

273. See *Chairman’s Testimony: Before the H. Comm. on Appropriations Subcomm. on Agriculture, Rural Development, and Related Agencies*, 115th Cong. (Mar. 7, 2018) (statement of J. Christopher Giancarlo, Chairman, U.S. Commodity Futures Trading Commission), <https://www.cftc.gov/PressRoom/SpeechesTestimony/opagiancarlo39> [<https://perma.cc/3BZS-2C3V>].

274. See 7 U.S.C. § 1a(9) (2012); see also Coinflip, Inc., CFTC No. 15-29 (Sept. 17, 2015); BFXNA Inc., CFTC No. 16-19 (June 2, 2016).

customers are not readily identifiable, and are immediately marketable at quoted prices. Further, like gold bullion and other commodities, bitcoin come into supply only when they are mined or extracted and are a limited resource.”²⁷⁵ The Winklevoss S-1 Amendment No. 9 states:

Additional clarity was obtained on September 17, 2015, when, in the *Coinflip* case, the CFTC instituted and settled administrative proceedings that involved a bitcoin derivatives trading platform and its chief executive officer. The *Coinflip* order found that the respondents (i) conducted activity related to commodity options transactions without complying with the provisions of the Commodity Exchange Act of 1936, as amended (“CEA”) and CFTC regulations, and (ii) operated a facility for the trading of swaps without registering the facility as a swap execution facility (“SEF”) or designated contract market (“DCM”). The *Coinflip* order was significant as it is the first time the CFTC determined that bitcoin is properly defined as a commodity under the CEA. Based on this determination, the CFTC applied CEA provisions and CFTC regulations that apply to transactions in commodity options and swaps to the conduct of the bitcoin derivatives trading platform. Also of significance, is that the CFTC appears to have taken the position that bitcoin is not encompassed by the definition of currency under the CEA and CFTC regulations. In *Coinflip*, the CFTC defined bitcoin and other “virtual currencies” (also known as Digital Assets) as “a digital representation of value that functions as a medium of exchange, a unit of account, and/or a store of value, but does not have legal tender status in any jurisdiction. Bitcoin and other virtual currencies are distinct from ‘real’ currencies, which are the coin and paper money of the United States or another country that are designated as legal tender, circulate, and are customarily used and accepted as a medium of exchange in the country of issuance.” The CFTC affirmed its approach to the regulation of bitcoin and bitcoin-related enterprises on June 2, 2016, when the CFTC settled charges against Bitfinex, a Bitcoin Exchange based in Hong Kong. In its Order, the CFTC found that Bitfinex engaged in “illegal, off-exchange commodity transactions and failed to register as a futures commission merchant” when it facilitated borrowing transactions among its users to permit the trading of bitcoin on a “leveraged, margined or financed basis” without first

275. See Winklevoss S-1 Amendment No. 9, *supra* note 37, at 4, F-8.

registering with the CFTC.²⁷⁶

Under the theory that virtual currencies are commodities, the U.S. agency appearing to have the closest oversight authority over bitcoin trading, the CFTC, “began the year by launching an in-house lab to encourage advances in blockchain, the technology that underpins digital currencies. Yet the regulator recently sounded an alarm on bitcoin itself, noting most exchanges are completely unregulated while the cryptocurrency is prone to wild swings and potential flash crashes.”²⁷⁷ However, just as with other commodities, the CFTC “mostly lacks jurisdiction over the primary market As a result, bitcoin exchanges don’t have to tell participants how they operate, such as whether they offer preferential access to certain traders.”²⁷⁸

Mike Crapo, Chairman of the Senate Committee on Banking, Housing, and Urban Affairs states, “The CFTC has also been helping inform the markets by: launching a dedicated website on virtual currencies to educate investors; bringing enforcement actions against individuals involved in cryptocurrency related scams; issuing several statements by Chairman Giancarlo and other Commissioners on the issue; and scheduling hearings on the topics.”²⁷⁹

The CFTC states, “FinTech is driving innovation in financial markets across the globe. New technologies are wide-ranging in scope, from cloud computing and algorithmic trading to distributed ledgers to artificial intelligence and machine learning to network cartography, and many others.”²⁸⁰ The CFTC provides significant educational resources to those engaged in the virtual currency marketplace, consumers, or those just desiring to know more about the subject in recognition of the recent rise in prominence and significant interest in virtual currencies, specifically bitcoin.²⁸¹ Examples of these resources include: CFTC Backgrounder on Oversight of and Approach to

276. *See id.* at 4–5 (citing Complaint and Demand for Jury Trial, SEC v. Garza, No. 3:15-cv-01760 (D. Conn. Dec. 1, 2015)) (The Commission brought charges in connection with a bitcoin-related Ponzi scheme); Erik T. Voorhees, SEC No. 9592 (June 3, 2014) (The Commission brought an administrative action in connection with the offering of unregistered securities of two bitcoin-related entities); BTC Trading, Corp. and Ethan Burnside, SEC No. 9685 (Dec. 8, 2014) (The Commission brought an administrative action in connection with the operation and offering of securities of two online exchanges, neither of which were registered with the Commission, that accepted payment in bitcoin and primarily listed virtual currency-related companies); Sand Hill Exchange, Gerrit Hall, and Elaine Ou, SEC No. 9809 (June 17, 2015) (The Commission took legal action against an online exchange that accepted payment in bitcoin in connection with disseminating fraudulent information, among other matters); *see also* BFXNA Inc., CFTC No. 16-19 (June 2, 2016).

277. Michaels & Rubin, *supra* note 129, at B1.

278. *Id.*

279. *See Statement of Senator Mike Crapo, supra* note 228.

280. Bitcoin, U.S. COMMODITY FUTURES TRADING COMMISSION, <https://www.cftc.gov/Bitcoin/index.htm> [<https://perma.cc/A285-4AA7>].

281. *See id.*

Virtual Currency Futures Markets;²⁸² Bitcoin Basics;²⁸³ An Introduction to Virtual Currency;²⁸⁴ Customer Advisory: Beware of Virtual Currency Pump-and-Dump Schemes;²⁸⁵ Virtual Currency Primer;²⁸⁶ and Customer Advisory: Understand the Risks of Virtual Currency Trading,²⁸⁷ just to name several. However, as CFTC regulatory responsibilities increase corresponding with the growth of cryptocurrencies, *The Wall Street Journal* reports, “The CFTC under Republican and Democratic leaders has repeatedly asked for funding increases to keep up with market changes but has been rebuffed by Congress.”²⁸⁸

CFTC Enforcement

The CFTC has also brought numerous virtual currency-related enforcement actions. Due to space limitations, coverage here is limited to a brief mention of the following recent examples: (1) In the matter of CFTC Charges Patrick K. McDonnell and His Company CabbageTech, Corp. d/b/a/ Coin Drop Markets with Engaging in Fraudulent Virtual Currency Scheme;²⁸⁹ and (2) CFTC Charges Colorado Resident Dillon Michael Dean and His Company, The

282. *CFTC Backgrounder on Oversight of and Approach to Virtual Currency Futures Markets*, U.S. COMMODITY FUTURES TRADING COMMISSION (Jan. 4, 2018), https://www.cftc.gov/sites/default/files/idc/groups/public/%40customerprotection/documents/file/backgrounder_virtualcurrency01.pdf [<https://perma.cc/96DW-ZHRF>].

283. *Bitcoin Basics*, U.S. COMMODITY FUTURES TRADING COMMISSION, https://www.cftc.gov/sites/default/files/idc/groups/public/%40customerprotection/documents/file/oco_bitcoinbasics0218.pdf [<https://perma.cc/8F8D-FBLU>].

284. *An Introduction to Virtual Currency*, U.S. COMMODITY FUTURES TRADING COMMISSION, https://www.cftc.gov/sites/default/files/idc/groups/public/%40customerprotection/documents/file/oco_aivc0218.pdf [<https://perma.cc/RP8F-XHKM>].

285. *Customer Advisory: Beware Virtual Currency Pump-and-Dump Schemes*, U.S. COMMODITY FUTURES TRADING COMMISSION (Feb. 15, 2018), https://www.cftc.gov/sites/default/files/idc/groups/public/%40customerprotection/documents/file/cus_tomeradvisory_pumpdump0218.pdf [<https://perma.cc/HPL4-8F4T>] (last visited Dec. 27, 2018).

286. *A CFTC Primer on Virtual Currencies*, U.S. COMMODITY FUTURES TRADING COMMISSION (Oct. 17, 2017), https://www.cftc.gov/sites/default/files/idc/groups/public/%40customerprotection/documents/file/lab_cftc_primercurrencies100417.pdf [<https://perma.cc/8YC4-EPZX>].

287. *Customer Advisory: Understand the Risks of Virtual Currency Trading*, U.S. COMMODITY FUTURES TRADING COMMISSION (Dec. 15, 2017), https://www.cftc.gov/sites/default/files/idc/groups/public/@customerprotection/documents/file/cus_tomeradvisory_urvct121517.pdf [<https://perma.cc/QH85-EA3U>].

288. Gabriel T. Rubin, *U.S. Markets Regulator Considers Buyouts, Extension of Hiring Freeze*, WALL ST. J., May 8, 2018, at B11.

289. CFTC Press Release, CFTC Charges Patrick K. McDonnell and his Company CabbageTech, Corp. d/b/a/ Coin Drop Markets with Engaging in Fraudulent Virtual Currency Scheme (Jan. 19, 2018), <https://www.cftc.gov/PressRoom/PressReleases/pr7675-18> [<https://perma.cc/92P4-ERWX>].

Entrepreneurs Headquarters Limited, with Engaging in a Bitcoin and Binary Options Fraud Scheme.²⁹⁰

CabbageTech, Corp. d/b/a Coin Drop Markets.

RELEASE Number

7675-18

January 19, 2018

CFTC Charges Patrick K. McDonnell and His Company CabbageTech, Corp. d/b/a Coin Drop Markets with Engaging in Fraudulent Virtual Currency Scheme

Washington, DC—The Commodity Futures Trading Commission (CFTC) on January 18, 2018, filed a federal civil enforcement action in the U.S. District Court for the Eastern District of New York against Defendants Patrick K. McDonnell, of Staten Island, New York, and CabbageTech, Corp. d/b/a Coin Drop Markets (CDM), a New York corporation, charging them with fraud and misappropriation in connection with purchases and trading of Bitcoin and Litecoin.

CFTC’s Director of Enforcement Comments

James McDonald, the CFTC’s Director of Enforcement, commented: “This action is among the latest examples of the CFTC’s continuing commitment to act aggressively and assertively to root out fraud and bad actors involved in virtual currencies. As alleged, the Defendants here preyed on customers interested in Bitcoin and Litecoin, promising them the opportunity to get the inside scoop on the next new thing and to benefit from the trading acumen of a supposed expert. In reality, as alleged, customers only bought into the Defendants’ fraudulent scheme. We will continue to work hard to identify and remove bad actors from these markets.”

Defendants Allegedly Engaged in a Deceptive, Fraudulent Virtual Currency Scheme

The CFTC Complaint alleges that from approximately January 2017 to the present, McDonnell and CDM engaged in a deceptive and fraudulent virtual currency scheme to induce customers to send money and virtual currencies to CDM, purportedly in exchange for real-time virtual currency trading advice and for virtual currency purchasing and trading on behalf of the customers under McDonnell’s direction. In fact, as charged in the CFTC Complaint, the

290. CFTC Press Release, CFTC Charges Colorado Resident Dillon Michael Dean and his Company, The Entrepreneurs Headquarters Limited, with Engaging in a Bitcoin and Binary Options Fraud Scheme (Jan. 19, 2018), <https://www.cftc.gov/PressRoom/PressReleases/pr7674-18> [<https://perma.cc/NUH6-5YAT>].

supposedly expert, real-time virtual currency advice was never provided, and customers who provided funds to McDonnell and CDM to purchase or trade on their behalf never saw those funds again. In short, McDonnell and CDM used their fraudulent solicitations to obtain and then simply misappropriate customer funds.

The CFTC Complaint further alleges that to conceal their scheme, soon after obtaining customer funds, Defendants removed the website and social media materials from the Internet and ceased communicating with CDM Customers, who lost most if not all of their invested funds due to Defendants' fraud and misappropriation. The CFTC Complaint also alleges that neither Defendant has ever been registered with the CFTC in any capacity.

In its continuing civil litigation, the CFTC seeks, among other relief, restitution to defrauded customers, disgorgement of benefits from violations of the Commodity Exchange Act and CFTC Regulations, civil monetary penalties, trading bans, and a permanent injunction against future violations of federal commodities laws, as charged.²⁹¹

The Entrepreneurs Headquarters Limited

RELEASE Number

7674-18

January 19, 2018

CFTC Charges Colorado Resident Dillon Michael Dean and His Company, The Entrepreneurs Headquarters Limited, with Engaging in a Bitcoin and Binary Options Fraud Scheme

Washington, DC—The Commodity Futures Trading Commission (CFTC) on January 18, 2018 filed a civil enforcement action in the U.S. District Court for the Eastern District of New York against Defendants Dillon Michael Dean of Longmont, Colorado, and his company The Entrepreneurs Headquarters Limited, a UK-registered company. The CFTC Complaint charges the Defendants with engaging in a fraudulent scheme to solicit Bitcoin from members of the public, misrepresenting that customers' funds would be pooled and invested in products including binary options, making Ponzi-style payments to commodity pool participants from other participants' funds, misappropriating pool participants' funds, and failing to register with the CFTC as a Commodity Pool Operator (CPO) and Associated Person of a CPO, as required.

291. CFTC Press Release, CFTC Charges Patrick K. McDonnell and his Company CabbageTech, Corp. d/b/a/ Coin Drop Markets with Engaging in Fraudulent Virtual Currency Scheme, *supra* note 289.

CFTC's Director of Enforcement Comments

James McDonald, the CFTC's Director of Enforcement, commented: "Increased public interest in Bitcoin and other virtual currencies has provided new opportunities for bad actors. As alleged in the Complaint, Defendants sought to take advantage of that public interest, offering retail customers the chance to use Bitcoin to invest in binary options, when in reality they were only buying into a Ponzi scheme. As this case shows, the CFTC will continue to take swift action to stop such fraudulent schemes and to hold fraudsters accountable for their misconduct."

Specifically, the Complaint alleges that, from approximately April 2017 through the present, Defendants, who have never been registered with the CFTC in any capacity, have engaged in a fraudulent scheme, through which they solicited at least \$1.1 million worth of Bitcoin from more than 600 members of the public. Defendants allegedly promised to convert this Bitcoin into fiat currency to invest on the customers' behalf in a pooled investment vehicle for trading commodity interests, including trading binary options on an online exchange designated as a contract market by the CFTC. Potential pool participants were solicited to invest with Defendants by false claims of trading expertise and promises of high rates of return. The Complaint further alleges that, rather than convert customers' Bitcoin to fiat currency to invest in binary options contracts, as promised, Defendants misappropriated their customers' funds, including by using the funds to pay other customers, in the manner of a Ponzi scheme.

The Complaint alleges that Defendants solicited customer deposits using company websites, YouTube videos, and Facebook posts, where Defendants claimed that customers' funds would be pooled and invested in commodity options on behalf of customers, that Dean had "strong skills" in options trading, and that Defendants were generating high rates of return through trading commodity options, among other false claims. But, as alleged, Defendants were not actually engaged in trading on behalf of their customers, and Defendants' purported trading profits were fictitious. As alleged in the Complaint, Defendants stopped making payments to their customers, having misappropriated over \$1 million in customers' funds, while Dean has launched another similar purported trading venture under the name Real Trade Profits, using a website to solicit customers to deposit Bitcoin for a pooled investment in binary options trading and promising high rates of return. In its ongoing litigation, the CFTC seeks restitution to defrauded persons, disgorgement of ill-gotten gains, civil monetary penalties, permanent trading and registration bans, and a permanent injunction against further violations of the Commodity

Exchange Act and CFTC Regulations, as charged. The CFTC thanks and acknowledges the assistance of the British Columbia Securities Commission.²⁹²

VII. PAYMENT SYSTEM IMPLICATIONS AND REGULATORY UPDATE

*Emerging financial technologies are taking us into a new chapter of economic history. They are impacting trading, markets and the entire financial landscape with far ranging implications for capital formation and risk transfer. These emerging technologies include machine learning and artificial intelligence, algorithm-based trading, data analytics, “smart” contracts, and distributed ledger technologies. Over time, these technologies may come to challenge traditional market infrastructure. They are transforming the world around us, and it is no surprise that these technologies are having an equally transformative impact on U.S. capital and derivatives markets.*²⁹³

*J. Christopher Giancarlo
Chairman, U.S. Commodity Futures Trading Commission
February 15, 2018*

Recent Developments

In the United States, as Trautman and Harrell have previously reported, “In January 2014 the Uniform Law Commission (ULC) (also known as the National Conference of Commissioners on Uniform State Laws, or NCCUSL) created a Study Committee on Alternative and Mobile Payments (the Study Committee).”²⁹⁴ The ULC observes, “The interest in virtual currency arises because it is allegedly safer from hacking, often cheaper and faster, and has finality of payment. Virtual currencies have legitimate purposes and can be purchased, sold, and exchanged with other types of virtual currencies or real

292. CFTC Press Release, CFTC Charges Colorado Resident Dillon Michael Dean and his Company, The Entrepreneurs Headquarters Limited, with Engaging in a Bitcoin and Binary Options Fraud Scheme, *supra* note 290.

293. *See Before the S. Comm. on Agriculture, Nutrition, and Forestry Comm.*, 115th Cong. (Feb. 15, 2018) (statement of J. Christopher Giancarlo, Chairman, Commodity Futures Trading Comm.), <https://www.cftc.gov/PressRoom/SpeechesTestimony/opagiancarlo38> [https://perma.cc/85UM-UWB5].

294. Trautman & Harrell, *supra* note 2, at 1084 (citing UNIF. LAW COMM’N, FINAL STUDY COMMITTEE ON ALTERNATE AND MOBILE PAYMENT SYSTEMS REPORT (Dec. 19, 2014), <http://www.uniformlaws.org/shared/docs/Alternative%20and%20Mobile%20Payments/AMPS%20Final%20Study%20Committee%20Report%202012-19-14.pdf> [https://perma.cc/R3MZ-NRQQ]). The Chair is Professor Fred H. Miller; the Reporter is Professor Sarah Jane Hughes.

currencies.”²⁹⁵ The goal of the Study Committee (later renamed as a Drafting Committee), “is to devise an optimal licensing system for intermediaries that perform financial services for third parties relating to digital or virtual currencies.”²⁹⁶ Trautman and Harrell report that extensive input was received by the committee from various sources, including:

The American Bankers Association (the same report also was submitted to the Emerging Payments Task Force of the Conference of State Bank Supervisors (CSBS)); The Clearing House;²⁹⁷ the European Central Bank; the Senate of Canada, Standing Committee on Banking, Trade and Commerce (a report entitled “Digital Currency: You Can’t Flip this Coin!”); and the Bureau of Consumer Financial Protection (CFPB) (a report entitled “Consumer Protection Principles,” regarding new payment systems).²⁹⁸

Reflecting the October 2015 Meeting Draft, “The Study Committee concluded that the New York regulatory framework for virtual currencies (the New York ‘BitLicense’ rule) is ‘well drafted,’ and (with some changes) could serve as a beginning template for a uniform law.”²⁹⁹ The October 2015 draft also adopts this approach and “to some extent follows additional guidance provided by the CSBS, reflecting the usual uniform law effort to achieve both

295. *Committees: Regulation of Virtual Currency Businesses Act*, UNIFORM LAW COMMISSION, <http://www.uniformlaws.org/Committee.aspx?title=Regulation%20of%20Virtual%20Currency%20Businesses%20Act> [<https://perma.cc/2HS7-JVTE>] (last visited May 17, 2018).

296. Trautman & Harrell, *supra* note 2, at 1084 (citing REGULATION OF VIRTUAL CURRENCIES ACT 1 (NAT’L CONFERENCE OF COMM’RS ON UNIF. STATE LAWS, discussion draft 2015), http://www.uniformlaws.org/shared/docs/regulation%20of%20virtual%20currencies/2015oct_RVCA_Mtg%20Draft.pdf [<https://perma.cc/GWV5-BAQP>]): “This initial working draft envisions that any person or entity that operates as a trusted intermediary in the performance of services or offering of products to third parties, whether consumers or not, should be licensed.” This includes:

digital currency payments intermediaries[;] digital currency converters and exchanges[;] providers of web wallet services and products[;] digital currency gateways[;] digital cash platforms[;] and digital currency ATMs, and is intended to cover any form of business that handles, stores, maintains, or transfers or engages in the exchange or delivery of digital currency for money or real currency or of one form of digital currency for another

Id. The Reporter’s Preliminary Note indicates that the Drafting Committee had yet to determine whether to refer to the subject matter as “digital currency” or “virtual currency.” *Id.* at 2.

297. Trautman & Harrell, *supra* note 2, at 1085 (citing THE CLEARING HOUSE, <https://www.theclearinghouse.org/> [<https://perma.cc/9L6Y-LLR8>].)

298. *Id.* at 1085 (citing *Consumer Protection Principles: CFPB’s Vision of Consumer Protection in New Faster Payment Systems*, CONSUMER FIN. PROTECTION BUREAU (July 9, 2015) http://files.consumerfinance.gov/f/201507_cfpb_consumer-protection-principles.pdf [<https://perma.cc/9RYG-P2XD>]) (internal citations omitted).

299. *Id.*

consensus and a rational approach.”³⁰⁰ The ULC Committee continues its work recognizing the void created due to the lack of “an overarching federal payments regulatory framework, [recognizing that] these state laws need to be harmonized to the extent possible.”³⁰¹ The Drafting Committee states that it “will consider the need for and feasibility of drafting state legislation on the regulation of virtual currencies, and will examine issues such as licensing requirements; reciprocity; consumer protection; cybersecurity; anti-money laundering; and supervision of licensees.”³⁰² After several years of hard work, the committee’s efforts resulted in the following Uniform Act, described below.

Uniform Regulation of Virtual-Currency Businesses Act (URVCBA)

After several years, the NCCUSL Study Committee on Alternative and Mobile Payments (now known as the Committee on Regulation of Virtual Currency Businesses Act, Fred Miller, Chair), produces the URVCBA, which:

provides a statutory framework for the regulation of companies engaging in “virtual-currency business activity.” Virtual-currency business activity means exchanging, transferring, or storing virtual currency; holding electronic precious metals or certificates of electronic precious metals; or exchanging digital representations of value within online games for virtual currency or legal tender. The URVCBA’s unique, three-tiered structure clarifies whether an individual or company engaging in virtual currency business activity is (1) exempt from the act; (2) must register; or (3) must obtain a license. The URVCBA also contains numerous consumer protections.³⁰³

As this Article goes to press, The URVCBA has been introduced for legislative action in three states: Connecticut; Hawaii; and Nebraska.³⁰⁴ In addition, the commercial law companion act to the URVCBA may become complete by October 2018.³⁰⁵

300. *Id.* (citing *e.g.*, U.C.C. § 1-103 (AM. LAW INST. & UNIF. LAW COMM’N 1997)).

301. *Committees: Regulation of Virtual Currency Businesses Act*, *supra* note 295.

302. *Id.*

303. *Acts: Regulation of Virtual Currency Businesses Act*, UNIFORM LAW COMMISSION, <http://www.uniformlaws.org/Act.aspx?title=Regulation%20of%20Virtual-Currency%20Businesses%20Act> [<https://perma.cc/T8NQ-8MS8>] (last visited May 17, 2018).

304. *Id.*

305. Email from Sarah Jane Hughes, Reporter to the Study Committee, to Lawrence J. Trautman (Apr. 9, 2018) (on file with author).

Financial Innovation and Regulatory Sandboxes

SEC Commissioner Hester Peirce reports, “[a] number of forward-looking regulators, both here and abroad, have created regulatory sandboxes . . . [where] in a sense [the regulators] sit[] in the sandbox with the innovators. Not only is she right there to make sure that nobody gets hurt, but she has a front-row seat on the innovative process.”³⁰⁶ For example, “the Commodity Futures Trading Commission—has launched Lab CFTC, which ‘is designed to be the hub for the agency’s engagement with the FinTech innovation community.’”³⁰⁷ Arizona is credited with launching “the first state-level regulatory sandbox for FinTech with the objective of allowing people ‘to test innovative products, services, business models, and delivery mechanisms in the real market without incurring the regulatory costs and burdens that would otherwise be imposed.’”³⁰⁸

In the United Kingdom, “the Financial Conduct Authority operates a regulatory sandbox that ‘allows businesses to test innovative products, services, business models and delivery mechanisms in the real market, with real consumers.’”³⁰⁹ During late 2016, RegLab was launched in Abu Dhabi providing a platform for innovators “to develop and test its FinTech proposition in a safe environment while not putting undue regulatory burden on the participant.”³¹⁰ SEC Commissioner Peirce states, “The Monetary Authority of Singapore similarly is using a sandbox to ‘encourage[e] more FinTech experimentation so that promising innovations can be tested in the market and have a chance for wider adoption, in Singapore and abroad.’”³¹¹ Recent international regulatory developments are covered more fully below.

Global Regulation

As might be expected given the recent meteoric rise in prominence of virtual currencies, worldwide regulation is a hodgepodge of emerging

306. Peirce, *supra* note 130.

307. *Id.* (citing *LabCFTC*, U.S. COMMODITY FUTURES TRADING COMMISSION, <https://www.cftc.gov/LabCFTC/index.htm> [<https://perma.cc/6EWE-4P7D>]).

308. *Id.* (citing *Arizona Becomes First State in U.S. to Offer FinTech Regulatory Sandbox*, ARIZ. ATT’Y GEN (Mar. 22, 2018), <https://www.azag.gov/press-release/arizona-becomes-first-state-us-offer-fintech-regulatory-sandbox> [<https://perma.cc/9NQP-93N7>]).

309. *Id.* (citing *Regulatory Sandbox*, FIN. CONDUCT AUTHORITY (Nov. 5, 2015, updated Feb. 14, 2018), <https://www.fca.org.uk/firms/regulatory-sandbox> [<https://perma.cc/M4V8-4HPB>]).

310. *Id.* (citing *ADGH Launches its FinTech RegLab*, ABU DHABI GLOBAL MKT. (Nov. 2, 2016), <https://www.adgm.com/mediacentre/press-releases/adgm-launches-its-fintech-reglab> [<https://perma.cc/H9WX-LZNF>]).

311. *Id.* (citing *FinTech Regulatory Sandbox*, MONETARY AUTHORITY OF SINGAPORE (Jan. 9, 2017), <http://www.mas.gov.sg/Singapore-Financial-Centre/Smart-Financial-Centre/FinTech-Regulatory-Sandbox.aspx> [<https://perma.cc/9CNP-7A2S>]).

activity.³¹² Sigal Mandelker, Under Secretary, Terrorism and Financial Intelligence, U.S. Department of the Treasury, stated in early 2018 Congressional testimony, “[w]e understand that the EU is finalizing its amendments to its anti-money laundering directive, which will put in place a requirement for EU members to regulate virtual currency exchangers, a significant step.”³¹³ However, Under Secretary Mandelker warns, “[e]ven with these advancements, there is still a major gap in regulating these entities globally and we are actively engaged with other countries, bilaterally and multilaterally, to encourage them to apply international AML/CFT standards to virtual currency payments.”³¹⁴ Professor Wulf Kaal presents an overview of the regulation for the largest twenty-five ICO jurisdictions ranked by market capitalization as of January 2018.³¹⁵ Professor Usman Chohan reports, “[o]n

312. See Joanna Caytas, *Developing Blockchain Real-Time Clearing and Settlement in the EU, U.S., and Globally*, COLUM. J. EUR. L.: PRELIMINARY REFERENCE (June 22, 2016), <http://cjel.law.columbia.edu/preliminary-reference/2016/developing-blockchain-real-time-clearing-and-settlement-in-the-eu-u-s-and-globally-2/> [<https://perma.cc/3RM6-W48W>]; Cameron Harwick, *Cryptocurrency and the Problem of Intermediation*, 20 INDEP. REV. 569, 569 (2016); Robert C. Hockett & Saule T. Omarova, *The Finance Franchise*, 102 CORNELL L. REV. 1143, 1201–02 (2017); Stephen T. Middlebrook & Sarah Jane Hughes, *Regulating Cryptocurrencies in the United States: Current Issues and Future Directions*, 40 WM. MITCHELL L. REV. 813, 814–15 (2014); Philipp Paech, *The Governance of Blockchain Financial Networks*, 80 MODERN L. REV. 1073, 1073 (2017); Matthew P. Ponsford, *A Comparative Analysis of Bitcoin and Other Decentralised Virtual Currencies: Legal Regulation in the People’s Republic of China, Canada, and the United States*, 9 H.K. J. LEGAL STUD. 29, 30 (2015); Paolo Tasca, Adam Hayes & Shaowen Liu, *The Evolution of the Bitcoin Economy: Extracting and Analyzing the Network of Payment Relationships*, 19 J. RISK FIN. 94, 95 (2018); Kevin V. Tu & Michael W. Meredith, *Rethinking Virtual Currency Regulation in the Bitcoin Age*, 90 WASH. L. REV. 271, 274 (2015); Angela Walch, *The Path of the Blockchain Lexicon (and the Law)*, 36 REV. BANKING & FIN. L. 713, 716–17 (2017); Emanuele Borgonovo et al., *Between Cash, Deposit and Bitcoin: Would we Like a Central Bank Digital Currency? Money Demand and Experimental Economics 2–3* (Bocconi, Working Paper No. 75, 2018), <https://ssrn.com/abstract=3160752> [<https://perma.cc/B6G4-W7TF>]; KiHoon Hong et al., *Crowding Out in a Dual Currency Regime? Digital versus Fiat Currency 1* (Bank of Korea, Working Paper No. 2017-13, 2017), <https://ssrn.com/abstract=2962770> [<https://perma.cc/7DC5-YAJG>]; Gur Huberman et al., *Monopoly Without a Monopolist: An Economic Analysis of the Bitcoin Payment System 2* (Columbia Bus. Sch. Res. Paper No. 17-92, 2017), <https://ssrn.com/abstract=3025604> [<https://perma.cc/UL6E-XGZA>]; Jill Carlson, *Cryptocurrency and Capital Controls* (June 2, 2016) (unpublished manuscript), <https://ssrn.com/abstract=3046954> [<https://perma.cc/E5HV-XGEB>]; Cameron Harwick, *Helicopters and the Neutrality of Money 18* (Aug. 21, 2017) (unpublished manuscript), <https://ssrn.com/abstract=2545488> [<https://perma.cc/U5VK-SJKB>].

313. *Combating Money Laundering and Other Forms of Illicit Finance: Administration Perspectives on Reforming and Strengthening BSA Enforcement Before S. Comm Bkng, Housing & Urban Affairs*, 115th Cong. (2018) (statement of Sigal Mandelker, Under Secretary, Terrorism and Financial Intelligence, U.S. Department of the Treasury), <https://www.banking.senate.gov/hearings/executive-session-and-combating-money-laundering-and-other-forms-of-illicit-finance-administration-perspectives-on-reforming-and-strengthening-bsa-enforcement> [<https://perma.cc/5GBK-95VK>].

314. *Id.*

315. See generally Kaal, *supra* note 78.

April 3, 2018, Interpol announced that it had convened the first working group (WG) on DarkNet and Cryptocurrencies, in the Global Complex for Innovation in Singapore, with cooperation from the Bavarian Ministry of Justice (German). The WG had 39 participants representing 18 member countries and Europol.³¹⁶ In addition, Interpol's Working Group "had identified the rise of Altcoins as an 'emerging threat' to law enforcement practice. . . . The threat is increased by the challenges that are posed by cryptocurrency mixers, anonymisation techniques, lack of altcoin tracing tools and decentralized escrow services."³¹⁷ Professor Chohan observes, "[s]uch international law enforcement responses to cryptocurrency accountability mark an important first step in developing the oversight mechanisms and the accountability architecture necessary to create an environment in which the innovations of cryptocurrencies are not offset by nefarious elements."³¹⁸ Taxation of virtual currencies is beyond the scope of this paper and has been treated to a considerable extent elsewhere.³¹⁹

VII. CONCLUSION

There are moments in history when mankind takes quantum leaps in technological advancement. Examples of these significant inflection points include: the discovery of fire; domestication of wild animals; Marconi's advent of radio broadcasting technology; the Gutenberg press; steam power enabling the industrial revolution; invention of the integrated circuit allowing for the rapid processing of digital information; and the creation of the Internet. Blockchain technology represents one of these pivotal moments in the history of the human saga that is likely to produce a highly disruptive quantum leap forward in the way highly complex tasks are performed. We are now in the very early stages of recognizing the vast potential of this new discovery. Virtual currencies represent just one powerful use for secure distributed ledger technology. If virtual currencies become widely utilized as a medium of

316. Usman W. Chohan, *International Law Enforcement Responses to Cryptocurrency Accountability: Interpol Working Group*, in DISCUSSION PAPER SERIES: NOTES ON THE 21ST CENTURY (2018).

317. *Id.*

318. *Id.*

319. See, e.g., Sami Ahmed, *Cryptocurrency & Robots: How to Tax and Pay Tax on Them*, 69 S.C. L. REV. 697 (2018); Richard T. Ainsworth & Ville Viitasaari, *Payroll Tax & the Blockchain*, TAX NOTES INT'L 1007 (2017); Benjamin W. Akins, Jennifer L. Chapman & Jason M. Gordon, *A Whole New World: Income Tax Considerations of the Bitcoin Economy*, 12 PITT. TAX REV. 25 (2014); Nika Antonikova, *Real Taxes on Virtual Currencies: What Does the IRS Say?*, 34 VA. TAX REV. 433 (2014); Elizabeth R. Carter, *Estate Planning for Digital Assets: Assigning Tax Basis and Value to Digital Assets*, in LSU 46TH ANNUAL ESTATE PLANNING SEMINAR (Oct. 27–28, 2016); Adam Chodorow, *Rethinking Basis in the Age of Virtual Currencies*, 36 VA. TAX REV. 371 (2017); Aleksandra Bal, *Should Virtual Currency Be Subject to Income Tax?* (Apr. 24, 2014) (unpublished manuscript), <https://ssrn.com/abstract=2438451> [<https://perma.cc/TD2H-RUSG>]. See generally THE ETHICS OF TAX EVASION: PERSPECTIVES IN THEORY AND PRACTICE (Robert W. McGee ed., 2012).

exchange, the highly disruptive impact on the economics of financial institutions and the ability of global central banking systems is immediately evident.