BITCOIN VERSUS REGULATED PAYMENT SYSTEMS: WHAT GIVES?

Lawrence J. Trautman & Alvin C. Harrell†

TABLE OF CONTENTS

† Lawrence J. Trautman is Assistant Professor of Business Law and Ethics at Western Carolina University. B.A., The American University; M.B.A., The George Washington University; J.D., Oklahoma City University School of Law. He may be contacted at Lawrence.J.Trautman@gmail.com. Alvin C. Harrell is Professor of Law at Oklahoma City University School of Law, and Editor of the Consumer Finance Law Quarterly Report. B.S., J.D., and M.B.A., Oklahoma City University. LL.M., Southern Methodist University School of Law. He may be contacted at aharrell@okcu.edu.

I. INTRODUCTION

A. *Virtual Worlds*

The origin of modern virtual currencies is associated with the development of multiplayer online games and the "worlds" they create. The advent of synthetic or virtual "worlds" dates at least as far back as 1996, with each such world having a distinct economy, with assets, production, and commerce reflecting real life Earth economies.[1] Massively Multiplayer Online Games (MMOGs), such as *World of Warcraft* and its progeny,[2] and other virtual reality environments such as *Second Life*, *Everquest*, *Ultima Online*, and *Diablo III*, all contain elements of online currencies.[3] At least two "real world" banks are

1 *See generally* Thomas P. Novak, *Quality of Virtual Life*, *in* TRANSFORMATIVE CONSUMER RESEARCH FOR PERSONAL AND COLLECTIVE WELL-BEING 225 (David Glen Mick et al. eds., 2012); Viktor Mayer-Schönberger & John Crowley, *Napster's Second Life?: The Regulatory Challenges of Virtual Worlds*, 100 NW. U. L. REV. 1775 (2006); Edward Castronova, *On Virtual Economies* (CESifo, Working Paper No. 752, 2002), http://ssrn.com/abstract=338500; David A. Bray & Benn R. Konsynski, Virtual Worlds, Virtual Economies, Virtual Institutions (Nov. 1, 2006) (unpublished manuscript) (http://ssrn.com/abstract=962501); Brian E. Mennecke et al., Second Life and Other Virtual Worlds: A Roadmap for Research (Dec. 11, 2007) (unpublished manuscript) (http://ssrn.com/abstract=1021441).

2 *See* Lawrence J. Trautman, Avatar Capital and the Virtual Economy 15 (Oct. 30, 2016) (unpublished manuscript) (on file with author) (observing that the original Warcraft game, *Warcraft: Orcs & Humans*™, was followed in 1995 with an epic sequel, *Warcraft II: Tides of Darkness*™, 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*™ (2014)).

3 *See generally id. See also* Brian E. Mennecke et al., *It's Just a Game, Or Is It? Real Money, Real Income, and Real Taxes in Virtual Worlds*, 20 COMM. ASS'N INFO. SYSTEMS 134 (2007); Robert J. Bloomfield & Young Jun Cho, *Unregulated Stock Markets in Second Life* (Cornell Univ. Johnson Sch., Research Paper Series No. 15-2011, 2010), http://ssrn.com/abstract=1695057; Edward Castronova, *The Price of 'Man' and 'Woman': A Hedonic Pricing*

reported to have a real world presence in the hugely-popular *Second Life*.[4] These virtual worlds gave rise to virtual currencies for use in the games, and in time some of these "escaped" into real world usage. In a relatively short period of time, these virtual currencies have gained significant traction and became an economic reality in the real world, with Bitcoin being the most dominant among over 650 virtual currencies. Bitcoin and other virtual currencies present a particularly difficult and unique set of jurisdictional challenges to the existing transactional and regulatory framework and related enforcement mechanisms, e.g., "because of their ability to transcend national borders in the fraction of a second . . . and anonymity due to encryption."[5]

B. *Structure of this Article*

This Article addresses the legal and financial implications of virtual currencies, and is organized as follows. Part II presents a brief history describing the evolution and function of money and currencies. Part III describes the development of virtual currencies and Bitcoin in particular. Part IV discusses the application of traditional payment and regulatory systems. Part V looks at criminal law issues relating to currencies. Part VI considers the history of modern payment systems and regulation, currency stability issues, and the possible threat to financial order posed by virtual currencies. Part VII explores the future of regulation in this area of law. Implications for further research are then presented. The focus is the impact on payment systems of the rapidly developing use of virtual and cybercurrencies, especially bitcoins.

II. BRIEF HISTORY OF MONEY

A. *What Is Money?*

As human society has evolved, particularly since the development of modern contract law in the seventeenth and eighteenth centuries, so

Model of Avatar Attributes in a Synthethic World (CESifo, Working Paper Series No. 957, 2003), https://ssrn.com/abstract=415043.

4 *See* Savvas Papagiannidis, Michael Bourlakis & Michalis N. Vafopoulos, Banking in Second Life: Marketing Opportunities and Repercussions (Sept. 24, 2008) (unpublished manuscript) (http://ssrn.com/abstract=1887570).

5 *See* Lawrence Trautman, *Virtual Currencies; Bitcoin & What Now After Liberty Reserve, Silk Road, and Mt. Gox?*, 20 RICH. J.L. & TECH. 13, 1 (2014).

also has the concept of an instrument for the payment of money as a substitute for money itself. While a negotiable instrument is not money,[6] it can serve similar purposes and therefore is used as a substitute for money.[7] A functional approach to the definition of money is provided by Benton Gup, in observing that "[t]he three primary functions are (1) a means of exchange in terms of (2) a defined unit of account that is used as (3) a measure and store of value."[8] As noted below at Sections II.C and D, a negotiable instrument, created by private parties and therefore freeing them from the constraints imposed by the limited availability of coin and currency, can equally serve these purposes. Indeed, the progress of society from primitive to modern times has been marked by the movement from barter exchanges to money, and ultimately to the use of private instruments for the payment of money as a medium of exchange.[9]

B. *Barter*

Archaeological evidence reveals that before the use of money as we know it, the earliest peoples obtained goods which "have been unearthed that do not occur naturally in the area," indicating the practice of *barter*, "the exchange of goods and services for other goods and services."[10] Goods sourced from other, remote geographic areas are inherently scarce and therefore potentially valuable, leading to cross-border trade even in relatively primitive societies. For example, jewelry constructed from Atlantic coast seashells has been found among early

---

6 See, for example, the Uniform Commercial Code (UCC) definition of negotiable instrument § 3-104 (supplemented by definitions § 3-103). *Compare* U.C.C. § 1-201(b)(24) (AM. LAW INST. & NAT'L CONFERENCE OF COMM'RS ON UNIF. STATE LAWS 2016) (definition of "Money,"), *with id.* § 3-104 (definition of "Negotiable Instrument"). Essentially, money is a medium of exchange authorized by a government as legal tender (i.e., coin and currency), while an instrument is a private contract with legal enhancements designed to make it widely acceptable as a substitute for money. *See infra* note 7.

7 *See, e.g.*, Tami J. Hines, *MERS: Sometimes Agent, Sometimes Principal, Often Misconstrued*, 68 CONSUMER FIN. L.Q. REP. 98, 102 (2014); *see also infra* note 19.

8 *See* Benton E. Gup, What Is Money? From Commodities to Virtual Currencies/Bitcoin 2 (Mar. 14, 2014) (unpublished manuscript) (http://www.ssrn.com/abstract=2409172); *see also* Hilary J. Allen, $=€=*Bitcoin?* 10–12 (Suffolk Univ. Law Sch., Research Paper No. 15-33, 2016), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2645001.

9 The foundation for private instruments is contract law. *See* U.C.C. §§ 1-103, 3-104. As Sir Henry Sumner Maine famously observed: "[T]he movement of the progressive societies has hitherto been a movement *from Status to Contract*." SIR HENRY SUMNER MAINE, ANCIENT LAW 141 (1905); *see also infra* note 19 and Section IV.A.

10 Alexander Pierre Faure, Money Creation: Genesis 1: Before the Goldsmith-Bankers 4 (Apr. 4, 2013) (unpublished manuscript) (http://www.ssrn.com/abstract=2244998).

Swiss artifacts.[11] But the lack of a recognized monetary regime in early times created impediments to trade, due to the limits of a barter exchange. Citing the 1875 work of Jevons, Faure reports that an example of the disadvantages of barter is found in the example of:

> A French opera singer, Mademoiselle Zélie, [who] after a performance in the Society Islands during a world tour, was paid one-third of the take, which equalled [sic] three pigs, twenty-three turkeys, forty-four chickens, five thousand cocoa-nuts and many bananas, lemons and oranges. She could only consume a small portion of these perishable goods, and fed the livestock with the remainder.
>
> Mlle Zelie was obliged to donate what she had left [over] before departing. She had provided the audience with a wanted service, but received in return goods that did not match her wants. Jevons suggests that the goods received "might have brought four thousand francs, which would have been good remuneration for five songs," but the absence of a medium of exchange meant that the performer could not be properly remunerated.[12]

Faure further observed that yet another "disadvantage of the barter system is that it is difficult and costly to store value. For example, you can store value in a block of rare wood, but you will need to have a storage place . . . ."[13] The inconvenience and risk of maintaining value in this form includes "the added risk of a nest of woodborers adopting the block of wood as a home and pantry."[14] Clearly, something better was needed.

C. *Primitive Money Evolves*

The use of primitive money evolved over a long period of time, beginning as a specialized form of barter, utilizing commonly-valued goods as a form of payment, such as cattle, grain, jade, leather, oil, quartz, strings of beads, whales' teeth, etc. The acceptance of specialized goods as a medium of exchange, i.e., money, provided the following advantages:

- First, the use of money splits a single transaction into two separate transactions: a purchase and a sale. The seller's

---

11 *Id.*

12 *Id.* (quoting W. STANLEY JEVONS, MONEY AND THE MECHANISM OF EXCHANGE 1 (1875)). Obviously this would discourage the cross-border trade including the rendering of valuable services, thereby diminishing the quality of life. *Id.*

13 *Id.* at 5.

14 *Id.*

needs do not have to match the buyer's needs, except monetarily. The challenge of matching opposing wants is eliminated. This greatly expands the potential for beneficial trade.

- Second, money creates choices in terms of the timing and locations of the transactions: they can be separated in time and space. This facilitates trade, e.g., between remote parties who cannot meet to negotiate a barter transaction.
- Third, the speed of execution of transactions increases as a result of the portability of a medium of exchange. In a barter transaction, even if the parties are in close proximity, generally their goods will need to be transported to a point of exchange. The use of money permits payment without movement of goods by the buyer. Thus, the delivery of only one set of goods, not two, is required.
- Fourth, money serves as a store of value, a function not served by goods subject to a decline in conditions, e.g., goods that could perish before the sale or use thereof.[15]

The next stage in the progression and development of money was the use of precious metals (as a form of commodity money) by weight, thus facilitating "payments of debts by *count[ing]* . . . . Examples of paying by count in times of barter are two hens for a goose, two geese for a pig," etc.[16] Over the years, increasingly non-coin precious metals measured by weight were used as money; then came the practice of measuring the value of standard weight precious metals by crafting them into bars; then later, the minting of coins comprised of such metal was taken over by governments. In the seventh century B.C., precious metal coins were minted in Lydia (now the southern part of Turkey), and these are credited as being the earliest coins.[17]

Next came a series of even more fundamental changes. First, merchants issued paper backed by a right to redeem a stated quantity of precious metals or coins. Soon, paper issued by well-known merchants began to circulate as money, being passed by one party to another as a more convenient form of payment, without any intent to exercise the right of redemption. Ultimately, this *commodity-backed* private money was supplemented by *fiat* money, "any *legal tender* designated by and issued by a central government authority."[18] This government-issued money became legal tender by reason of government mandate.

---

15 *Id.* at 6–7.

16 *Id.* at 8.

17 *Id.* at 8–9.

18 *See, e.g.*, Gup, *supra* note 8, at 2 (emphasis added); Allen, *supra* note 8, at 12–15, 18–21.

However, this government-issued money never replaced the use of merchant's paper as a medium of exchange in commercial transactions. Merchants continued to use and accept their private instruments as a payment (and credit) mechanism outside the formal legal system. These private instruments were recognized pursuant to the custom of merchants, or "Law Merchant" as it became known in England. Ultimately, in one of the most consequential series of developments in history, the English common law courts effectuated the law of contracts with significant leadership from Lord Coke in 1602 and later Lord Mansfield who, upon becoming Chief Judge of the King's Bench in 1756, created the law of negotiable instruments by grafting the English "Law Merchant" (essentially, the law of merchants) onto the common law of contracts, thereby allowing British citizens to conduct transactions using private money.[19] The Industrial Revolution (and most of the progress in terms of the human condition) rapidly followed, clearly illustrating the points noted above at Sections II.A and B.

D. *Money in the United States*

Fiat money in the United States now means that U.S. Treasury "coins and currency (including Federal reserve notes and circulating notes of Federal reserve Banks and national banks) are legal tender for all debts, public charges, taxes, and dues. Foreign gold or silver coins are not legal tender for debts."[20] As the Federal Reserve Board (FRB) has explained:

---

19 *See, e.g.*, JOHN EDWARD MURRAY, JR., MURRAY ON CONTRACTS 4–11 (5th ed. 2011); S.F.C. MILSOM, HISTORICAL FOUNDATIONS OF THE COMMON LAW 244–315 (1969); GRANT GILMORE, THE DEATH OF CONTRACT 8–14 (1974); Alvin C. Harrell, *James Steven Rogers, The End of Negotiable Instruments*, 66 CONSUMER FIN. L.Q. REP. 220, 222, 256 (2012) [hereinafter Harrell, *The End of Negotiable Instruments*] (book review); *see also infra* Section IV.A. Several recent, significant works examine the history of negotiable instruments law and its relation to the UCC and modern payments law. *See, e.g.*, JAMES STEVEN ROGERS, THE END OF NEGOTIABLE INSTRUMENTS: BRINGING PAYMENT SYSTEMS LAW OUT OF THE PAST (2012); Mark Edwin Burge, *Apple Pay, Bitcoin, and Consumers: The ABCs of Future Public Payments Law*, 67 HASTINGS L.J. 1493, 1498–1500 (2016). On the latter, see Harrell, *The End of Negotiable Instruments*, *supra*, at 264–65, and *infra* Part IV. On the use and philosophy of private money, see Allen, *supra* note 8, at 21–28.

20 31 U.S.C. § 5103 (2012). National bank notes have not circulated as currency since the early 20th century. *See, e.g.*, ROGERS, *supra* note 19, at 34; Harrell, *The End of Negotiable Instruments*, *supra* note 19, at 222. It is, perhaps, ironic that some current and former officials (and scholars) now advocate restrictions on the use of legal tender. *See, e.g.*, John Carney & Joshua Zumbrun, *The Plot to Kill the $100 Bill*, WALL STREET J. (Feb. 16, 2016, 7:12 PM), http://www.wsj.com/articles/the-plot-to-kill-the-100-bill-1455667926?mg=id-wsj; Opinion, *Review & Outlook: The Political War on Cash*, WALL STREET J. (Feb. 17, 2016, 7:20 PM), http://www.wsj.com/articles/the-political-war-on-cash-1455754850.

> This statute means that all United States money . . . is a valid and legal offer of payment for debts when tendered to a creditor. There is, however, no Federal statute mandating that a private business, a person, or an organization must accept currency or coins as payment for goods or services. Private businesses are free to develop their own policies on whether to accept cash unless there is a state law which says otherwise.[21]

Since January 30, 1934, by virtue of Congress amending section 16 of the Federal Reserve Act, "Federal Reserve notes have not been redeemable in gold . . . . [and] Federal Reserve notes have not been redeemable in silver since the 1960s."[22] Moreover, "[i]n 1933, Congress changed the law so that all U.S. coins and currency (including Federal Reserve notes), regardless of when issued, constitute[d] 'legal tender' for all purposes. Federal and state courts since then have repeatedly held that Federal Reserve notes are also 'lawful money.'"[23] Therefore, "private money," such as that created and used as a medium of exchange via the execution of negotiable instruments,[24] is effective as a payment mechanism to the extent acceptable by the parties on a voluntary basis (as is commonly the case), but is not legal tender.

As noted above at Section II.A, the UCC defines "Money" at section 1-201(b)(24) as "a medium of exchange currently authorized or adopted by a domestic or foreign government. The term includes a monetary unit of account established by an intergovernmental organization or by agreement between two or more countries."[25] Therefore, a negotiable instrument or similar private instrument is not legal tender, and is not "money" under federal or state law.[26] However,

---

21 *Current FAQs: Is it Legal for a Business in the United States to Refuse Cash as a Form of Payment?*, BOARD GOVERNORS FED. RES. SYS., http://www.federalreserve.gov/faqs/currency_12772.htm (last updated June 17, 2011).

22 *Current FAQs: Is U.S. Currency Still Backed by Gold?*, BOARD GOVERNORS FED. RES. SYS., http://www.federalreserve.gov/faqs/currency_12770.htm (last updated Aug. 2, 2013); 12 U.S.C. § 411 (2012).

23 *Current FAQs: What Is Lawful Money? How Is it Different from Legal Tender?*, BOARD GOVERNORS FED. RES. SYS., http://www.federalreserve.gov/faqs/money_15197.htm (last updated Sept. 29, 2011); 12 U.S.C. § 411; *see also* Milam v. United States, 524 F.2d 629 (9th Cir. 1974).

24 *See, e.g.*, U.C.C. § 3-104 (AM. LAW INST. & NAT'L CONFERENCE OF COMM'RS ON UNIF. STATE LAWS 2002); Hines, *supra* note 7, at 100–03.

25 U.C.C. § 1-201(b)(24) (AM. LAW INST. & NAT'L CONFERENCE OF COMM'RS ON UNIF. STATE LAWS 2016); *see supra* text accompanying note 6; *see also supra* text accompanying note 18.

26 *See* U.C.C. § 1-201(b)(24); *see also* Allen, *supra* note 8, at 18–21; *supra* text accompanying note 21. A negotiable instrument as defined in Article 3 § 3-104 becomes an "item" under Article 4 when deposited into the banking system. *See* U.C.C. § 4-104(a)(9). Interestingly, however, a negotiable instrument may be treated like "cash" for some purposes.

given the historical use of negotiable instruments as a form of private money, and the modern expansion of electronic equivalents (including virtual currencies), a realistic concept of money for transactional purposes is much broader than this technical definition would suggest; it should include, for example, all of the private money created by negotiable instruments and held in bank accounts pursuant to UCC Articles 3 and 4.[27] As noted above, one of the primary ways that money is created today is by execution of a negotiable instrument and/or entries being made with respect to bank accounts, e.g.,

> when a bank loan / credit is applied for and accommodated by a bank. When a borrower takes a loan from a bank [often by executing a negotiable promissory note], the bank can simply credit the current account of the borrower, thereby creating a new asset and liability for both the bank and the borrower.[28]

It is because of the widespread acceptance of negotiable instruments and transfers of bank deposits for the purchase of goods and services that these mechanisms effectively constitute money. In comparison, the use of legal tender—in the form of coin and currency—is very limited. Thus, Federal Reserve "[n]otes and coins, the other component of money, are also used to make payments, but bank deposits are overwhelmingly used in this modern age. A new bank deposit is new money created, and it springs from new bank loan extension."[29]

The logical next stage in this evolution of "money" (broadly defined) is the use of electronic payments. Predicting this during his September 19, 2000 testimony before Congress, financial analyst James Van Dyke addressed the likely evolution of internet payments, observing that "it's important to remember that money is nothing but a virtual commodity. Paper and coin [money] is merely a holder for the form or substance of the money itself. Major changes in portable, connected, and secure computing platforms will eventually allow money to move from physical to virtual form."[30] However, as attorney Thomas

---

For example, see U.C.C. § 3-310(a) (discharge of indebtedness), § 9-102(a)(9) (definition of "cash proceeds").

27 *See, e.g.*, Hines, *supra* note 7, at 101–03 (citing Harrell, *The End of Negotiable Instruments*, *supra* note 19, at 98 n.537) (noting the use of negotiable instruments as a form of "private money"). Economists commonly recognize a similarly broad concept of money when analyzing financial data. *See, e.g.*, JAMES D. GWARTNEY, ECONOMICS: PRIVATE AND PUBLIC CHOICE 184–202 (1976) (discussing "what is money?" in the context of fractional reserve banking and the deposit expansion multiplier).

28 Faure, *supra* note 10, at 2 (footnote omitted); *see also supra* note 27.

29 Faure, *supra* note 10, at 3.

30 *The Future of Electronic Payments: Roadblocks and Emerging Practices: Hearing Before the Subcomm. on Domestic & Int'l Monetary Policy, H. Comm. on Banking and Fin. Servs.*,

Vartanian also observed: "No payment instrument or system can work without the trust and confidence of its users. The money we have in our pockets is no more and no less than a symbol of a trusted system that works."[31] Therefore, any entrepreneur intent on creating a new form of money for use as a medium of exchange and a store of value or a novel mechanism for transmitting it, will confront "a variety of policy, operational, and legal considerations."[32] This challenge is a focus of the remainder of this Article.

III. CYBERCURRENCIES AND BITCOIN

A. *Introduction*

Virtual or cyber-currencies present particularly difficult transactional, regulatory, and law enforcement challenges because of such issues as: their anonymity due to encryption; their ability to transcend national borders in the fraction of a second; and their unique jurisdictional issues. Moreover, in contrast to negotiable instruments (which, like coin and currency, are based on the reification of legal rights in a unique, possessable object[33]), a virtual or cybercurrency is intangible and potentially ephemeral. Thus, along with the recent, rapid pace in the innovation and development of new currencies and technologies—such as mobile payment systems—has come ongoing challenges for users and regulators of the new technology alike.

106th Cong. 20 (2000) [hereinafter Van Dyke] (statement of James Van Dyke, Senior Analyst, Jupiter Communications); *see also* Allen, *supra* note 8, at 21–28.

31 *The Future of Electronic Payments: Roadblocks and Emerging Practices: Hearing Before the Subcomm. on Domestic & Int'l Monetary Policy, H. Comm. on Banking and Fin. Servs.*, 106th Cong. 9 (2000) [hereinafter Vartanian] (statement of Thomas P. Vartanian, Chairman of Electronic Commerce and Financial Services Transactions Group, Fried, Frank, Harris, Shriver and Jacobson, Washington, D.C.); *see also* Allen, *supra* note 8, at 28–41.

32 Vartanian, *supra* note 31, at 9. Note again that use as legal tender is not an achievable goal for private money. *See supra* text accompanying notes 18–29. On the other hand, so long as it is readily accepted as a substitute for legal tender, legal tender status is not needed. *Id.*; *supra* Section II.C; *see also* Allen, *supra* note 8, at 21–28.

33 *See, e.g.*, U.C.C. §§ 3-201, 3-301 (AM. LAW INST. & NAT'L CONFERENCE OF COMM'RS ON UNIF. STATE LAWS 2002) (reflecting the idea that "negotiation" of an instrument to a "holder" transfers the right to enforce the instrument, i.e., the legal rights attributable to the contract—embodying an obligation to pay—are merged into the instrument itself, hence the "merger doctrine"); *see also* U.C.C. §§ 3-302, 3-306 (the holder in due course doctrine); Harrell, *The End of Negotiable Instruments*, *supra* note 19, at 224–28.

B. *Virtual or Cybercurrencies*

While the U.S. Government Accountability Office (GAO) has observed that "[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."[34] As noted, inherent in this definition (and concept) is the fact that virtual currency is not legal tender, and therefore depends upon a general acceptability in voluntary transactions if it is to have any use or value; 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."[35]

Thus, the U.S. Financial Crimes Enforcement Network (FinCEN) defines virtual currency as "a medium of exchange that operates like a currency in some environments, but . . . does not have legal tender status in any jurisdiction."[36] Mythili Raman has similarly defined virtual currency as "a medium of exchange circulated over a network, typically the Internet, which is not backed by a government."[37] This concept is not as new as one might expect. Computer scientist David Chaum's 1982 paper may be considered the precursor to the concepts underlying today's virtual currency.[38] But this also suggests the risks to be overcome: Mr. Chaum founded DigiCash in 1990, which ultimately failed in 1999.[39]

---

34 *See* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-13-516, VIRTUAL ECONOMIES AND CURRENCIES: ADDITIONAL IRS GUIDANCE COULD REDUCE TAX COMPLIANCE RISKS 3 (2013) [hereinafter GAO-13-516]; *see also* Lawrence Parks, Opinion, *Bitcoin's Futile Quest to Be a Currency*, WALL STREET J., June 2, 2014, at A13. The terms "virtual currency" and "cybercurrency" are used interchangeably in this Article.

35 GAO-13-516, *supra* note 34, at 3; *see also supra* Section II.D; *infra* Part III.

36 DEP'T OF THE TREASURY FIN. CRIMES ENF'T NETWORK, GUIDANCE FIN-2013-G001, APPLICATION OF FINCEN'S REGULATIONS TO PERSONS ADMINISTERING, EXCHANGING, OR USING VIRTUAL CURRENCIES 1 (2013). *See generally infra* Part V.

37 *Beyond Silk Road: Potential Risks, Threats, and Promises of Virtual Currencies: Hearing Before the S. Comm. on Homeland Sec. and Governmental Affairs*, 113th Cong. 64 (2013) [hereinafter Raman] (statement of Mythili Raman, Acting Assistant Att'y Gen. of the United States, Crim. Division).

38 David Chaum, *Blind Signatures for Untraceable Payments*, *in* ADVANCES IN CRYPTOLOGY: PROCEEDINGS OF CRYPTO 82 199 (David Chaum, Ronald L. Rivest & Alan T. Sherman eds., 1983).

39 *See* Interview by Jens-Ingo Brodesser with David Chaum, Founder & CTO, DigiCash (July 5, 1999), http://journals.uic.edu/ojs/index.php/article/view/683/593; *see also* Allen, *supra* note 8, at 31–41.

As noted above at Part I, the popularity of online games provided a genesis for virtual currency.[40] Mythili Raman observed that:

> Early centralized models, where the currency is controlled by a single private entity, have expanded and now encompass a wide range of business concepts. Some centralized virtual currencies take the form of digital precious metals, such as e-Gold and Pecunix, where users exchange digital currency units ostensibly backed by gold bullion or other precious metals. Others exist within popular online games or virtual worlds, such as Farmville, Second Life, or World of Warcraft. Still others are online payment systems such as WebMoney and Liberty Reserve, which are available generally outside of specific online communities and denominate users' accounts in virtual currency rather than U.S. Dollars, Euros, or some other national currency. Decentralized systems such as Bitcoin, which have no centralized administrating authority and instead operate as peer-to-peer transaction networks, entered the scene relatively recently but are growing rapidly. A network of sites and services, including exchangers who buy and sell virtual currencies in exchange for national currencies or other mediums of value, have developed around virtual currency systems, as well.[41]

Of course, controlling a virtual currency in the closed world of an online game is very different from creating a broad-based, workable payment system, though obviously there are many who believe the

---

40 *See* Vili Lehdonvirta, *Real-Money Trade of Virtual Assets: New Strategies for Virtual World Operators*, *in* VIRTUAL WORLDS 113–137 (Mary Ipe ed., 2008), http://vili.lehdonvirta.com/wp-content/uploads/2015/08/Real-Money_Trade_of_Virtual_Assets_New_Strategies_for_Virtual_World_Operators_Proceedings_of_the_2005.pdf; David A. Bray & Benn R. Konsynski, *Virtual Worlds: Multi-Disciplinary Research Opportunities*, 38 DATA BASE FOR ADVANCES INFO. SYSTEMS 17 (2007); Vili Lehdonvirta, *Virtual Item Sales as a Revenue Model: Identifying Attributes That Drive Purchase Decisions*, 9 ELECTRONIC COM. RES. 97 (2009), http://vili.lehdonvirta.com/files/Lehdonvirta%202009%20Virtual%20Item%20Sales%20as%20a%20Revenue%20Model.pdf; Levent V. Orman, *Virtual Money in Electronic Markets and Communities* (Cornell Univ. Johnson Sch. Research Paper Series, Paper No. 27-2010, 2010), http://ssrn.com/abstract=1621725; Sulin Ba & Dan Ke, Optimal Pricing and Permissions Strategy for Virtual Good Creators in Second Life (Sept. 15, 2008) (unpublished manuscript) (http://ssrn.com/abstract=1271684); Matthew Elias, Bitcoin: Tempering the Digital Ring of Gyges or Implausible Pecuniary Privacy (Oct. 3, 2011) (unpublished manuscript) (http://ssrn.com/abstract=1937769); Jun-Sok Huhh, An Economic Analysis on Online Game Service (Aug. 28, 2009) (unpublished manuscript) (http://ssrn.com/abstract=1335120); Sukwon Thomas Kim, Why Bitcoin?: Structure and Efficiency of Markets for Online Game Currency (Dec. 18, 2013) (unpublished manuscript) (http://ssrn.com/abstract=2334000); Hiroshi Yamaguchi, An Analysis of Virtual Currencies in Online Games (Sept. 1, 2004) (unpublished manuscript) (http://ssrn.com/abstract=544422).

41 Raman, *supra* note 37, at 65; *see also Acting Assistant Attorney General Mythili Raman Testifies Before the Senate Committee on Homeland Security and Governmental Affairs*, U.S. DEP'T JUST. (Nov. 18, 2013), http://www.justice.gov/opa/speech/acting-assistant-attorney-general-mythili-raman-testifies-senate-committee-homeland.

project is worth the effort. As of July 15, 2016, Coinmarketcap.com listed 656 different cybercurrencies, having a total market capitalization of approximately $13.011 billion.[42] The top ten of these cybercurrencies ranked by market capitalization as of July 15, 2016 were: Bitcoin ($10.501 billion); Ethereum ($995 million); Steem ($322 million); Ripple ($228 million); Litecoin ($194 million); The DAO ($133 million); NEM ($72 million); Dash ($54 million); MaidSafeCoin ($35 million); and Lisk ($33 million).[43]

Regulators and law enforcement officials face difficult technical challenges in obtaining evidence for law enforcement purposes, e.g., relating to potential links between crime, sophisticated encryption, and virtual currency.[44] Virtual currencies typically lack a centralized authority for administration (such as a central bank or financial institution). Because the decentralized command and control functions of a cybercurrency typically rely on an encryption algorithm, "[t]hese encryption-based currencies, also known as cryptocurrencies, lack a central administering authority that might otherwise possess valuable evidence. In addition, users of these currencies often encrypt their digital wallets, complicating our efforts to seize and forfeit criminal proceeds."[45] However:

> [A] virtual currency is not necessarily synonymous with anonymity. A convertible virtual currency with appropriate anti-money laundering and know-your-customer controls, as required by U.S. law, can safeguard its system from exploitation by criminals and terrorists in the same way any other money services business could. As virtual currency systems develop, it is imperative to law enforcement interests that those systems comply with applicable anti-money laundering and know-your-customer controls.[46]

C. *Bitcoin*

Bitcoin is a popular virtual currency based on a decentralized peer-to-peer (P2P) network, much like BitTorrent, the popular protocol for

---

42 *Crypto-Currency Market Capitalizations*, COINMARKETCAP, http://coinmarketcap.com (last visited July 15, 2016).

43 *Id.*

44 *See, e.g.*, Marcus A. Asner, Andrew Joseph Shipe & Alexandra L. Mitter, *Taming the "Wild West": Regulators Take Aim at Unregulated Virtual Currencies*, 67 CONSUMER FIN. L.Q. REP. 397 (2013); Peter Swire & Kenesa Ahmad, *Encryption and Globalization*, 13 COLUM. SCI. & TECH. L. REV. 416 (2012).

45 Raman, *supra* note 37, at 69.

46 *Id.* at 66; *see also* Allen, *supra* note 8, at 28–41.

sharing files over the Internet such as music, games, and video.[47] Based on ideas from b-money[48] and Hashcash,[49] "Bitcoin is a fixed-value cryptographic object represented as a chain of digital signatures over the transactions in which the coin was used" (the "*block chain*").[50] Bitcoin "aims to be completely distributed, free of central authorities or points of control, and at least somewhat anonymous."[51] As discussed below at Part V, the motivations for holding bitcoins are numerous and may include:

> technology early adopters, privacy and cryptography enthusiasts, government-mistrusting "gold bugs," criminals, and speculators. A large number of online merchants accept bitcoins, catering to individuals with these interests, including web hosts, online casinos, illicit drug marketplaces, auction sites, technology consulting firms, and adult media and sex toy merchants.[52]

---

47 *See, e.g.*, EUROPEAN CENT. BANK, VIRTUAL CURRENCY SCHEMES 21 (2012) [hereinafter EUROPEAN CENT. BANK]; *see also* David Allen Bronleewe, Bitcoin NFC (Aug. 2011) (unpublished M.S. Engineering report, University of Texas at Austin) (https://repositories.lib.utexas.edu/bitstream/handle/2152/ETD-UT-2011-08-4150/BRONLEEWE-MASTERS-REPORT.pdf); Rostislav Skudnov, Bitcoin Clients (Apr. 6, 2012) (unpublished bachelor's thesis, Turku University of Applied Sciences) (https://publications.theseus.fi/bitstream/handle/10024/47166/Skudnov_Rostislav.pdf).

48 *See, e.g.*, Joshua A. Kroll et al., The Economics of Bitcoin Mining or Bitcoin in the Presence of Adversaries 3 (June 11–12, 2013) (unpublished manuscript) (http://www.econinfosec.org/archive/weis2013/papers/KrollDaveyFeltenWEIS2013.pdf).

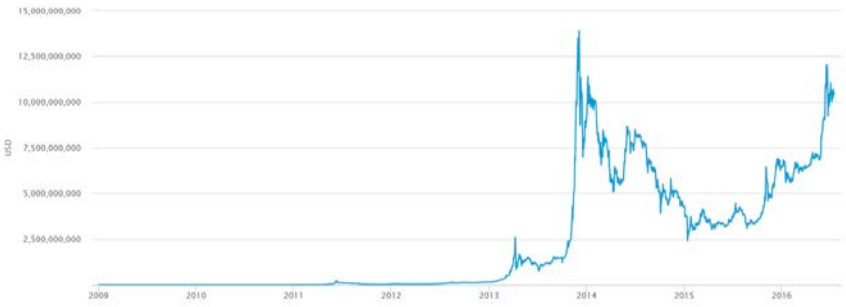
49 *See id.*

50 *Id.*; *see also* Robert McMillan, *The Fierce Battle for the Soul of Bitcoin*, WIRED (Mar. 26, 2014, 6:30 AM), https://www.wired.com/2014/03/what-is-bitcoin. *See generally* 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, *Bitcoin Accepted Here: Virtual Currencies and the Surrounding Issues*, 2014 A.B.A. BUS. L. SEC. & CTR. FOR PROF. DEV., http://www.americanbar.org (event code CEB4BAH); Lawrence J. Trautman, *Is Disruptive Blockchain Technology the Future of Financial Services?*, 69 CONSUMER FIN. L.Q. REP. 232 (2016), http://ssrn.com/abstract=2786186; Bonnie McGeer, *Accept it: The Blockchain Will Be Part of Your Bank's Business*, AM. BANKER (Jan. 6, 2016), http://www.americanbanker.com/news/bank-technology/accept-it-the-blockchain-will-be-part-of-your-banks-business-1078557-1.html.

51 Kroll et al., *supra* note 48, at 3; *see also* McMillan, *supra* note 50.

52 Reuben Grinberg, *Bitcoin: An Innovative Alternative Digital Currency*, 4 HASTINGS SCI. & TECH. L.J. 159, 165 (2011) (citing reubgr, *Poll: Why Do You Use Bitcoin?*, BITCOIN FORUM (Mar. 14, 2011, 10:27 PM), http://bitcointalk.org/index.php?topic=4465.0 (poll conducted by Reuben Grinberg on the main Bitcoin forum)); *see infra* Part V; *see also* Peter C. Tucker, Note, *The Digital Currency Doppelganger: Regulatory Challenge or Harbinger of the New Economy?*, 17 CARDOZO J. INT'L & COMP. L. 589, 603–08 (2009) (describing users generally interested in digital currencies); Chodpaba, *What if One Bitcoin Was Worth the Same as One Share Berkshire Hathaway?*, BITCOIN F. (Mar. 12, 2011, 12:43 AM), http://bitcointalk.org/index.php?topic=4390.0 (considering whether a single bitcoin would ever be equal in worth to a share of Berkshire Hathaway).

Figure 1
Bitcoin Market Capitalization



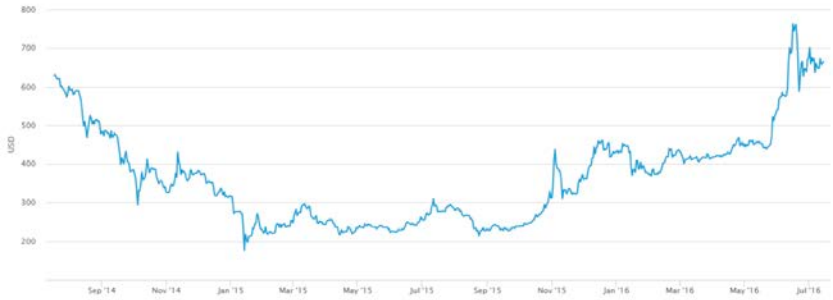
Source: Blockchain.info

Figure 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 $6 billion as of July 15, 2016.[53] Economists John Barrdear and Michael Kumhof report that as of 2016, Bitcoin is limited to between seven and ten transactions per second, or roughly 3,500 transactions per hour, perhaps sufficient to provide electronic payment services to a medium-sized town.[54]

53 *Market Capitalization*, BLOCKCHAIN.INFO, https://blockchain.info/charts/market-cap (last visited July 15, 2016). *See generally* Robin Teigland, Zeynep Yetis & Tomas Olov Larsson, Breaking Out of the Bank in Europe—Exploring Collective Emergent Institutional Entrepreneurship Through Bitcoin 3 (May 11, 2013) (unpublished manuscript) (http://ssrn.com/abstract=2263707).

54 *See* John Barrdear & Michael Kumhof, *The Macroeconomics of Central Bank Issued Digital Currencies* 7 (Bank of Eng., Staff Working Paper No. 605, 2016), http://www.bankofengland.co.uk/research/Documents/workingpapers/2016/swp605.pdf; *see also* Tomaso Aste, The Fair Cost of Bitcoin Proof of Work (June 27, 2016) (unpublished manuscript) (http://ssrn.com/abstract=2801048) (concluding that the large current cost of mining is of a justified order of magnitude for an anonymous system operating between untrusted parties).

Figure 2
Bitcoin Market Price
(0,000,000s omitted)



Source: Blockchain.info

Figure 2 illustrates Bitcoin market price volatility from July 2014 through July 15, 2016.[55] As Mark Williams has observed, "[b]ased on its volatile price behavior, Bitcoin is not a virtual currency but a high-risk virtual commodity, in a hyper-asset bubble that has begun to pop [and] Bitcoin the pseudo currency and Bitcoin the low-cost payment system are dependent on each other and inseparable."[56] Others have stated that: "Bitcoin assumes that the majority of nodes in its network are honest, and resorts to a majority vote mechanism for double spending

55 *Market Price (USD)*, BLOCKCHAIN.INFO, https://blockchain.info/charts/market-price?timespan=2year (last visited July 15, 2016).

56 *Hearing Regarding Virtual Currencies Before the N.Y. State Dep't of Fin. Servs.* 1 (2014) (statement of Mark T. Williams, Banking Specialist, Commodities & Risk Management Expert, Boston University Finance Department) ("Bitcoin is the equivalent of the locomotive while the payment system is the rails that allow it to move. If the engine does not work no matter how well built the rails, they won't be used."), http://www.dfs.ny.gov/about/hearings/vc_01282014/williams.pdf. *See generally* David Groshoff, *Kickstarter My Heart: Extraordinary Popular Delusions and the Madness of Crowdfunding Constraints and Bitcoin Bubbles*, 5 WM. & MARY BUS. L. REV. 489 (2014); Paul Vigna, *Bitcoin Frenzy Back As Epic Bust Fades; EU Decision to Define Bitcoin as Currency Helps Spur Buying*, WALL STREET J. (Nov. 4, 2015, 7:19 PM), http://www.wsj.com/articles/bitcoin-frenzy-back-as-epic-bust-fades-1446682772; Allen, *supra* note 8, at 28–41; Simon Trimborn & Wolfgang Karl Härdle, *CRIX an Index for Blockchain Based Currencies* (SFB 649 Economic Risk, Discussion Paper No. 2016-021, 2016), http://sfb649.wiwi.hu-berlin.de/papers/pdf/SFB649DP2016-021.pdf (proposing a market index benchmark enabling study of crypto market performance or that of a single virtual currency); Joseph C. Wang, *A Simple Macroeconomic Model of Bitcoin* (Bitquant Research Labs., Working Paper No. 1, 2014), http://ssrn.com/abstract=2394024; Panagiota Makrichoriti & Georgios Moratis, BitCoin's Roller Coaster: Systemic Risk and Market Sentiment (July 2016) (unpublished manuscript) (http://ssrn.com/abstract=2808096) (stressing the importance of investor sentiment in establishing Bitcoin market price); George Selgin, Synthetic Commodity Money (Apr. 10, 2013) (unpublished manuscript) (http://ssrn.com/abstract=2000118).

avoidance, and dispute resolution. In contrast, most e-cash schemes require a centralized bank who is trusted for purposes of e-cash issuance, and double-spending detection."[57] Detractors such as Hammad Siddiqi observe that the market for Bitcoin is a "complex system without a stable equilibrium."[58]

Believed by many to be a pseudonymous hacker or hackers, Satoshi Nakamoto is credited with creating Bitcoin in 2009.[59] Nakamoto is reported to have been inspired by Wei Dai's 1998 article proposing a schematic whereby:

> "[U]ntraceable pseudonymous entities . . . [could] cooperate with each other more efficiently, by providing them with a medium of exchange and a method of enforcing contracts." He sought to create a medium of exchange that avoided the need for intermediaries in electronic transactions, and one in which government involvement "[was] not [only] temporarily destroyed but permanently forbidden and permanently unnecessary." . . .
>
> Unlike traditional fiat currencies, whose value is determined by law and underwritten by the state, Bitcoin is not backed by a government or legal entity. Bitcoin . . . [has no system] central clearing house. Indeed, no traditional financial institutions are involved in Bitcoin

57 Simon Barber et al., Bitter to Better—How to Make Bitcoin a Better Currency, at the 16th International Conference on Financial Cryptography & Data Security 2 (2012) (unpublished manuscript) (http://elaineshi.com/docs/bitcoin.pdf).

58 Hammad Siddiqi, The Routes to Chaos in the Bitcoins Market 1 (Feb. 17, 2014) (unpublished manuscript) (http://ssrn.com/abstract=2396997); *see also* Paul Vigna, *Bitcoin Drifts Lower After Technical Milestone*, WALL STREET J. (July 10, 2016, 4:38 PM), http://www.wsj.com/articles/bitcoin-drifts-lower-after-technical-milestone-1468183130 (observing that on July 9, 2016, an internal code programming feature known as "the halving" occurred, an event that transpires only about every four years, where the monetary reward amount paid for processing transactions was cut in half); Paul Vigna, *Bitcoin 'Miners' Get Set for Another Pay Cut*, WALL STREET J. (July 8, 2016, 8:29 PM), http://www.wsj.com/articles/bitcoin-miners-get-set-for-another-pay-cut-1468024001 ("halving" may account for recent Bitcoin price appreciation).

59 *See, e.g.*, Barber et al., *supra* note 57, at 1. *But see* Julianne Pepitone, *Bitcoin Creator Satoshi Nakamoto Found, Newsweek Says*, NBC NEWS (Mar. 6, 2014, 10:50 AM), http://www.nbcnews.com/tech/tech-news/bitcoin-creator-satoshi-nakamoto-found-newsweek-says-n45871 (identifying sixty-four-year-old California resident as the inventor of Bitcoin); Nathaniel Popper & Rachel Abrams, *Bitcoin's Mysterious Creator Is Said to Be Identified*, N.Y. TIMES: DEALBOOK (Mar. 6, 2014, 3:51 PM), http://dealbook.nytimes.com/2014/03/06/newsweek-unmasks-bitcoin-founder-stirring-ire/?_r=0 (raising doubts about the Newsweek report); Andy Greenberg & Gwern Branwen, *Bitcoin's Creator Satoshi Nakamoto Is Probably This Unknown Australian Genius*, WIRED (Dec. 8, 2015, 4:25 PM), http://www.wired.com/2015/12/bitcoins-creator-satoshi-nakamoto-is-probably-this-unknown-australian-genius (contending that Craig Steven Wright either invented Bitcoin or wants us to believe he did).

> transactions. Instead, users perform all steps of a transaction themselves.[60]

New entrants appear almost daily in the Bitcoin ecosystem and include "exchanges, transaction services providers, market information and chart providers, escrow providers, joint mining operations[,] and so on. Absent from this ecosystem at present are futures markets and entities offering legitimate investment returns, such as fractional reserve banks, although some individuals have announced plans to build these."[61] Some of these entrants are well funded. For example, Coinbase was founded in June 2012 as "a [Bitcoin] wallet and platform where merchants and consumers can transact."[62] Led by venture capital firm Andreessen Horowitz, Coinbase received a validation of concept and an initial $25 million investment.[63] Coinbase lists contributed July 2016 capital of $1.06 million, and other metrics as: 3,200,000 users; 42,000 merchants; U.S. bank integration; 800,000 consumer wallets; and 8,000 developer applications.[64] Bitcoin ATM machines were available in

---

60 Nicholas A. Plassaras, Comment, *Regulating Digital Currencies: Bringing Bitcoin within the Reach of the IMF*, 14 CHI. J. INT'L L. 377, 383 (2013) (second, third, and fourth alterations in original) (footnotes omitted) (quoting Wei Dai, *B-Money*, WEIDAI.COM, http://www.weidai.com/bmoney.txt (last visited July 16, 2016)); *see also* J.P., *Virtual Currency: Bits and Bob*, ECONOMIST: BABBAGE (June 13, 2011, 8:30 PM), http://www.economist.com/blogs/babbage/2011/06/virtual-currency.

61 *See* Grinberg, *supra* note 52, at 165. *See generally* Sean Fieler, *Competition for the Fed's Money Monopoly*, WALL STREET J. (Nov. 1, 2015, 5:13 PM), http://www.wsj.com/articles/competition-for-the-feds-money-monopoly-1446416015 (noting the concept of "Bitgold" transactions); Bradley Hope, *Visa, Nasdaq, Others Invest $30 Million in Bitcoin-Related Startup*, WALL STREET J. (Sept. 9, 2015, 4:02 PM), http://www.wsj.com/articles/visa-nasdaq-others-invest-30-million-in-bitcoin-related-startup-1441827120; Peter Rudegeair, *Online Lenders Offer New Competition for Banks*, WALL STREET J. (June 28, 2015, 8:22 PM), http://www.wsj.com/articles/new-lenders-seek-to-eat-banks-lunch-1435520056 (noting the rise of "fintech" companies seeking to "displace banks"); Kaja Whitehouse, *Bitcoin Is Surging. Here's One Reason Why*, USA TODAY (Nov. 5, 2015, 6:33 PM), http://www.usatoday.com/story/money/2015/11/05/wall-street-betting-further-bitcoin-gains/75221568.

62 *About Coinbase*, COINBASE, https://coinbase.com/about (last visited July 16, 2016); *see also* Andy Kessler, *Angling to Be the MasterCard of Bitcoin*, WALL STREET J.: THE WEEKEND INTERVIEW (May 16, 2014, 6:07 PM), http://www.wsj.com/articles/SB10001424052702303987604579563951822782842; Sarah E. Needleman & Spencer E. Ante, *Bitcoin Startups Begin to Attract Real Cash: Venture Investors Pour in Millions, Adding Credibility to Internet Virtual Currency; Regulation Looms as a Concern*, WALL STREET J. (May 8, 2013, 3:34 PM), http://www.wsj.com/articles/SB10001424127887323687604578469012375269952.

63 *See, e.g.*, Jason Del Rey, *Bitcoin's Biggest Bet: Andreessen Horowitz Leads $25 Million Investment in Coinbase*, ALLTHINGSD (Dec. 12, 2013, 2:19 AM), http://allthingsd.com/20131212/bitcoins-biggest-bet-andreessen-horowitz-leads-25-million-investment-in-coinbase; Gregory Zuckerman, *Web Pioneer Keeps Faith, and Cash, in Bitcoin: Marc Andreessen Is Betting on Wide Adoption of Digital Currency Bitcoin*, WALL STREET J. (Mar. 21, 2014, 7:13 PM), http://www.wsj.com/articles/SB10001424052702304026304579453501821936252.

64 *See About Coinbase*, *supra* note 62.

Canada, London,[65] Seattle, Washington, and Austin, Texas as of early 2014,[66] and this availability had grown to 560 machines worldwide by early 2016, with 239 located in the United States.[67]

During July 2014, Xapo raised an additional $20 million from institutional venture capital investors, giving the company a valuation of more than $100 million.[68] By November 2016, Xapo has raised a total of $40 million in institutional venture capital.[69]

Additional Bitcoin-inspired or related projects include: the effort by Cameron and Tyler Winklevoss to launch a Bitcoin exchange-traded fund (ETF);[70] the Bitcoin Investment Trust; BitPagos; BitPremier; Coinsetter; CommitCoin; Gyft; itBit; Mave and MavePay; Korbit; and Ripple Labs.[71] Gambling sites, such as Satoshi Dice, "which allow punters to gamble in a weird, automated fashion," have also been reported.[72] During early 2014, "Overstock.com announced that it would begin accepting bitcoins as payment for consumer purchases. The company's announcement ma[de] Overstock.com the first major U.S. online retailer to accept bitcoins, albeit via a third-party payment

---

65 *See* Matthew Sparkes, *UK's First Bitcoin Cash Machine Launches in Shoreditch*, TELEGRAPH (U.K.) (Mar. 7, 2014, 12:45 PM), http://www.telegraph.co.uk/technology/10682842/UKs-first-Bitcoin-cash-machine-launches-in-Shoreditch.html.

66 *See* Saroj Kar, *Seattle and Austin Get the Crown of First US Cities to Pioneer Bitcoin ATMs*, SILICONANGLE (Feb. 24, 2014, 3:02 PM), http://siliconangle.com/blog/2014/02/24/seattle-and-austin-get-the-crown-of-first-us-cities-to-pioneer-bitcoin-atms.

67 *See, e.g.*, *Bitcoin ATMs by Country*, COIN ATM RADAR, http://coinatmradar.com/charts/#by-country (last visited July 16, 2016); *Number of Bitcoin ATM Installed Over Time*, COIN ATM RADAR, http://coinatmradar.com/charts/#growth (last visited July 16, 2016).

68 *See, e.g.*, Evelyn M. Rusli, *Bitcoin Startup Xapo Valued North of $100 Million*, WALL STREET J.: DIGITS (July 8, 2014, 11:10 AM), http://blogs.wsj.com/venturecapital/2014/07/08/bitcoin-startup-xapo-valued-north-of-100-million.

69 *See* About Xapo, https://xapo.com/about (last visited Jan. 21, 2016); *see also* Vinod Sreeharsha, *Start-Up Seeks to Capitalize on Security Concerns for Bitcoins*, N.Y. TIMES: DEALBOOK (Mar. 14, 2014, 4:20 PM), http://dealbook.nytimes.com/2014/03/14/start-up-seeks-to-capitalize-on-security-concerns-for-bitcoins/?_php=true&_type=blogs&_r=1.

70 *See, e.g.*, Christopher Condon, *Winkelvosses' Lawyer in Talks with SEC over Bitcoin ETF*, BLOOMBERG (Feb. 2, 2014, 6:09 PM), http://www.bloomberg.com/news/articles/2014-01-30/winklevosses-lawyer-in-talks-with-sec-over-bitcoin-etf; *see also* Winkelvoss Bitcoin Trust, Registration Statement (Form S-1) (June 29, 2016), https://www.sec.gov/Archives/edgar/data/1579346/000119312516636535/d68862ds1a.htm.

71 *See generally Hearing Regarding Virtual Currencies Before the N.Y. State Dep't of Fin. Servs.* (Jan. 28, 2014) (written testimony of Barry E. Silbert, Founder & CEO, Second Market & Founder, Bitcoin Investment Trust), http://www.dfs.ny.gov/about/hearings/vc_01282014/silbert.pdf; Jeremy Clark & Aleksander Essex, CommitCoin: Carbon Dating Commitments with Bitcoin (Dec. 14, 2011) (unpublished manuscript) (http://eprint.iacr.org/2011/677.pdf); Sergio Demian Lerner, MavePay, A New Lightweight Payment Scheme for Peer to Peer Currency Networks (Apr. 17, 2012) (unpublished manuscript) (http://bitslog.files.wordpress.com/2012/04/mavepay1.pdf).

72 Paul Ford, *Marginally Useful*, MIT TECH. REV. (Feb. 18, 2014), https://www.technologyreview.com/s/524691/marginally-useful.

processor."[73] By mid-year 2014, at least 65,000 global companies had announced acceptance of bitcoins, including Dish Network,[74] online travel site Expedia, Inc., and Dell, Inc., which alone had nearly $57 billion in 2013 sales.[75]

D. *How Bitcoin Works*

Bitcoin can be described as a "Proof-of-Work (PoW) based currency that allows users to generate digital coins by performing computations."[76] This is designed to limit the replication of bitcoins so as to preserve their value. Dorit Ron and Adi Shamir report that "[p]articipants begin using bitcoin by first acquiring a program called a Bitcoin wallet and one or more Bitcoin addresses."[77] Stored on a computer's hard drive as electronic files, bitcoins "can be accumulated or transferred just like an e-mail. Software algorithms embedded in the online Bitcoin network protect against fraud and ensure that the files are not counterfeited."[78] By using a peer-to-peer network to distribute a

---

73 Jared Ho, *Are User Identification Networks the Future of Commercial Bitcoin Transactions?*, FREEDOM TO TINKER (Feb. 13, 2014), https://freedom-to-tinker.com/author/jaredho.

74 *See* Michael J. Casey, *Dish Network to Accept Bitcoin Payments*, WALL STREET J. (May 29, 2014, 9:19 PM), http://www.wsj.com/articles/dish-network-to-accept-bitcoin-payments-1401363621.

75 *See* Paul Vigna, *Dell Begins Accepting Bitcoin on its Website*, WALL STREET J.: MONEYBEAT (July 18, 2014, 1:22 PM), http://blogs.wsj.com/moneybeat/2014/07/18/dell-begins-accepting-bitcoin-on-its-website; *see also* Paolo Tasca, Shaowen Liu & Adam S. Hayes, The Evolution of the Bitcoin Economy: Extracting and Analyzing the Network of Payment Relationships 1 (July 2016) (unpublished manuscript) (http://ssrn.com/abstract=2808762) (describing the evolution of the Bitcoin economy "from an early prototype stage; to a second growth stage populated in large part with 'sin' enterprise (i.e., gambling, black markets); to a third stage marked by a sharp progression away from 'sin' and toward legitimate enterprises"). *But see* Jacob Davidson, *No, Big Companies Aren't Really Accepting Bitcoin*, TIME: MONEY (Jan. 9, 2015) http://time.com/money/3658361/dell-microsoft-expedia-bitcoin (observing that almost none of the businesses such as Dell, Expedia, PayPal, and Microsoft "technically accept bitcoin"; rather "they partner with a middleman—generally either Coinbase or BitPay—who takes a customer's bitcoin, immediately converts it into cash, and then deposits the cash in the company's bank account").

76 Elli Androulaki et al., Evaluating User Privacy in Bitcoin 1 (2012) (unpublished manuscript) (http://eprint.iacr.org/2012/596.pdf) (revised and published in FINANCIAL CRYPTOGRAPHY AND DATA SECURITY: 17TH INTERNATIONAL CONFERENCE, OKINAWA, JAPAN, REVISED AND SELECTED PAPERS 34, 34 (Ahmad-Reza Sadeghi ed., 2013)).

77 Dorit Ron & Adi Shamir, Quantitative Analysis of the Full Bitcoin Transaction Graph 3 (2013) (unpublished manuscript) (http://eprint.iacr.org/2012/584.pdf) (revised and published in FINANCIAL CRYPTOGRAPHY AND DATA SECURITY: 17TH INTERNATIONAL CONFERENCE, OKINAWA, JAPAN, REVISED AND SELECTED PAPERS 6, 8 (Ahmad-Reza Sadeghi ed., 2013)).

78 Plassaras, *supra* note 60, at 379 (footnote omitted). *See generally* Jörg Becker et al., Can We Afford Integrity by Proof-of-Work? Scenarios Inspired by the Bitcoin Currency (Feb. 24, 2012) (unpublished manuscript) (http://ssrn.com/abstract=2041492); Sarah Jeong, The Bitcoin

master transparent public ledger called the blockchain, each bitcoin transaction is registered for all to see. The blockchain is used to verify that the identical bitcoins haven't been used in a previous transaction, thereby preventing "double-spending" of the same bitcoins.[79] As Brito and Castillo observed:

> [T]ransactions on the Bitcoin network are not denominated in dollars or euros or yen as they are on PayPal, but are instead denominated in bitcoins. This makes it a virtual currency in addition to a decentralized payments network. The value of the currency is not derived from gold or government fiat, but from the value that people assign to it. The dollar value of a bitcoin is determined on an open market, just as is the exchange rate between different world currencies.[80]

Worldwide in scope, bitcoins "can be used as a currency for all kinds of transactions (for both virtual and real goods and services), thereby competing with official currencies . . . . [however,] it does not have a central clearing house, nor are there any financial or other institutions involved in the transactions."[81] Bitcoins exist without a "central authority in charge of the money supply . . . . [whereby] the money supply is determined by a specific type of [data] 'mining' activity. It depends on the amount of resources (electricity and CPU time) that 'miners' devote to solving specific mathematical problems."[82] The bitcoin *mining process* "involves repeatedly running a computationally intensive mathematical function (called a cryptographic hash function) on a set of randomly seeded inputs until a specific pattern pops up. . . . The results are publicized on the Internet for the rest of the Bitcoin network."[83] As of July 2016, the Bitcoin network hash rate (total number of hashes per second made by all players) is estimated to be in the neighborhood of 1,432,000 trillion hashes per second (1,432,000

Protocol as Law, and the Politics of a Stateless Currency (May 8, 2013) (unpublished manuscript) (http://ssrn.com/abstract=2294124).

79 *See* JERRY BRITO & ANDREA CASTILLO, BITCOIN: A PRIMER FOR POLICYMAKERS 4 (2013). *But see* Nicolas Houy, *It Will Cost You Nothing to 'Kill' a Proof-of-Stake Crypto-Currency* (Groupe d'Analyse et de Théorie Économique Lyon–St Étienne, Working Paper No. 1404, 2014), http://ssrn.com/abstract=2393940. *See generally* Androulaki et al., *supra* note 76, at 13 (describing several authors who contend that double-spending attacks can be successful).

80 *See* BRITO & CASTILLO, *supra* note 79, at 4; *see also* Dean Fantazzini et al., *Everything You Always Wanted to Know About Bitcoin Modelling but Were Afraid to Ask*, APPLIED ECONOMETRICS (forthcoming 2016), http://ssrn.com/abstract=2794622.

81 EUROPEAN CENT. BANK, *supra* note 47, at 21; *see also* Marc Pilkington, *Bitcoin Through the Lenses of Complexity Theory: Some Non-Orthodox Implications for Economic Theorizing*, *in* HANDBOOK ON THE GEOGRAPHIES OF MONEY AND FINANCE (Ron Martin & Jane Pollard eds., forthcoming 2017), http://ssrn.com/abstract=2340007.

82 EUROPEAN CENT. BANK, *supra* note 47, at 21.

83 Ford, *supra* note 72.

Thash/s), contrasted with the 2014 rate of approximately 30,000 trillion hashes per second (30,000 Thash/s), increasing at an astonishing rate due to "more efficient specialized mining hardware . . . now available on the market."[84] At this rate, Bitcoin has become one of the largest distributed computational efforts ever. By way of comparison, with a hash rate of less than one percent the current rate, Kroll, Davey, and Felten stated that, "taken as a whole, the Bitcoin transaction verification network is more powerful than the combined computing power of the top 500 supercomputers in the world, giving pause to anyone concerned about whether the costs of transaction verification in Bitcoin are acceptable."[85] Elsewhere, one of your authors has observed that "[a]ny discussion of virtual currencies must acknowledge that any such mathematically devised protocol is vulnerable to superior future cryptography advances that trump our present understanding of the boundaries of cybersecurity."[86] The discussion in this Article is intended to be readable by those not possessing an advanced degree in computer science. Nonetheless, while minimal math is presented here, a wealth of cryptographic research is available elsewhere.[87] Babaioff, Dobzinski, Oren, and Zohar present the following explanatory account:

---

84 E-mail from Edward W. Felten, Robert E. Kahn Professor of Computer Sci. & Pub. Affairs, Dir., Ctr. for Info. Tech. Policy, Princeton Univ., to Lawrence Trautman, Assistant Professor of Law & Ethics, W. Carolina Univ. (Mar. 6, 2014) (on file with authors); *see also Hash Rate*, BLOCKCHAIN.INFO, http://blockchain.info/charts/hash-rate (last visited Oct. 6, 2016).

85 Kroll et al., *supra* note 48, at 8.

86 *See* Trautman, *supra* note 5, at 56–57 (discussing particular Bitcoin vulnerabilities including "(1) the 51% attack, (2) The Goldfinger attack, (3) privacy concerns, and (4) loss of confidence due to a significant decline in the price of Bitcoin resulting in a disincentive to mine," and noting that "[m]any other potential threats exist such as: a deflationary spiral; denial-of-service attacks; or hoarding of Bitcoin[s] due to its appreciation potential"); *see also* Nathaniel Popper, *How China Took Center Stage in Bitcoin's Civil War*, N.Y. TIMES: DEALBOOK (June 29, 2016), http://www.nytimes.com/2016/07/03/business/dealbook/bitcoin-china.html (reporting that recently over seventy percent of the Bitcoin network transactions are "going through just four Chinese companies, known as Bitcoin mining pools—and most flowed through just two of those companies"); Gregor Stuart Hunter & Chao Deng, *China Buying Sparks Bitcoin Surge*, WALL STREET J. (May 30, 2016, 8:09 PM), http://www.wsj.com/articles/china-buying-sparks-bitcoin-surge-1464608221 (reporting that two Chinese exchanges, Huobi and OKCoin, "now collectively account for some 92% of global trading in [B]itcoin").

87 *See generally* Moshe Babaioff et al., *On Bitcoin and Red Balloons, in* PROCEEDINGS OF THE 13TH ACM CONFERENCE ON ELECTRONIC COMMERCE 56 (Boi Faltings et al. eds., 2012); Androulaki et al., *supra* note 76; Marcin Andrychowicz et al., Secure Multiparty Computations on Bitcoin (2013) (unpublished manuscript) (http://eprint.iacr.org/2013/784) (presented at the 35th IEEE Symposium on Security & Privacy); Marcin Andrychowicz et al., Fair Two-Party Computations via Bitcoin Deposits (2013) (unpublished manuscript) (http://eprint.iacr.org/2013/837) (presented at at the Workshop on Bitcoin Research); Marcin Andrychowicz et al., How to Deal with Malleability of BitCoin Transactions (Dec. 11, 2013) (unpublished manuscript) (on file with Cornell University Library), http://arxiv.org/abs/1312.3230; Alex Coventry, NooShare: A Decentralized Ledger of Shared Computational Resources (Apr. 25,

> The basic setup of electronic transactions relies on public key cryptography. When Alice wants to transfer 50 coins to Bob, she signs a transaction using her private key. Hence, everyone can verify that Alice herself initiated this transaction (and not someone else). Bob, in turn, is identified as the target of the transfer using his public key. For the money to be actually transferred from Alice's account to Bob's account, some entity has to keep track of the latest owner of the coins, and to mark Bob as the new owner. Otherwise, Alice could "double spend" her money—first transfer the coins to Bob, then transfer the same coins again to Charlie. Traditionally, this role was fulfilled by banks. In return, banks tended to charge high fees, for example in international transfers.[88]

Because "[b]itcoins are divisible to eight decimal places enabling their use in any kind of transaction, regardless of the value. . . . transactions are carried out faster and more cheaply than with traditional means of payment. Transaction fees, if any, are very low and no bank account fee is charged."[89] Others have noted that, as a cryptocurrency, Bitcoin "functions as a public record-keeping device. As such, it serves as an alternative to historically accepted monies while enabling transactions in much the same way."[90] And Teigland, Yetis, and Larsson reported that "[a] deal in December 2012 with French financial firms Aqoba and Credit Mutuel led to Bitcoin-Central, a currency exchange, being awarded an International Bank ID number and becoming a Payment Services Provider equal to services such as PayPal."[91]

2012) (unpublished manuscript) (on file with Massachusetts Institute of Technology), http://web.mit.edu/alex_c/www/nooshare.pdf; Ittay Eyal & Emin Gün Sirer, Majority Is Not Enough: Bitcoin Mining Is Vulnerable (2013) (unpublished manuscript) (https://www.cs.cornell.edu/~ie53/publications/btcProcFC.pdf) (revised and published in FINANCIAL CRYPTOGRAPHY AND DATA SECURITY: 18TH INTERNATIONAL CONFERENCE, CHRIST CHURCH, BARBADOS, REVISED AND SELECTED PAPERS 34 (Nicolas Christin & Reihaneh Safavi-Naini eds., 2014)); Ilja Gerhardt & Timo Hanke, Homomorphic Payment Addresses and the Pay-to-Contract Protocol (Dec. 13, 2012) (unpublished manuscript) (on file with Cornell University Library), http://arxiv.org/abs/1212.3257; Fergal Reid & Martin Harrigan, An Analysis of Anonymity in the Bitcoin System (May 7, 2012) (unpublished manuscript) (on file with Cornell University Library), http://arxiv.org/abs/1107.4524; Ron & Shamir, *supra* note 77; Meni Rosenfeld, Analysis of Hashrate-Based Double Spending (Feb. 9, 2014) (unpublished manuscript) (on file with Cornell University Library), http://arxiv.org/abs/1402.2009; Emily Shen, Elaine Shi & Brent Waters, Predicate Privacy in Encryption Systems (Dec. 24, 2008) (unpublished manuscript) (http://elaineshi.com/docs/sympredenc.pdf).

88 *See* Babaioff et al., *supra* note 87, app. at 16–17.

89 EUROPEAN CENT. BANK, *supra* note 47, at 21.

90 William J. Luther & Josiah Olson, *Bitcoin Is Memory*, 3 J. PRICES & MARKETS 22, 23 (2015).

91 Teigland, Yetis & Larsson, *supra* note 53, at 3; *see also* Carl Kaminski, *Online Peer-to-Peer Payments: PayPal Primes the Pump, Will Banks Follow*, 7 N.C. BANKING INST. 375, 378–79 (2003); Lawrence J. Trautman, *E-Commerce, Cyber, and Electronic Payment System Risks:*

E. *Theoretical Foundation, Open-Source Communities, Mobile Payments, and Bitcoin*

The European Central Bank has reported that the theoretical foundation of Bitcoin "can be found in the Austrian school of economics and its criticism of the current fiat money system and interventions undertaken by governments and other agencies, which, in their view, result in exacerbated business cycles and massive inflation."[92] According to the European Central Bank:

> [an] area in which Austrian economists have been very active is monetary theory. One of the foremost names in this field is Friedrich A. Hayek. He wrote some very influential publications, such as *Denationalisation of Money* (1976), in which he posits that governments should not have a monopoly over the issuance of money. He instead suggests that private banks should be allowed to issue non-interest-bearing certificates based on their own registered trademarks. These certificates (i.e. currencies) should be open to competition and would be traded at variable exchange rates. Any currencies able to guarantee a stable purchasing power would eliminate other less stable currencies from the market. The result of this process of competition and profit maximisation would be a highly efficient monetary system where only stable currencies would coexist.[93]

From this, it appears that some of the following ideas are generally shared by Bitcoin and many of its supporters:

- "Bitcoin as a good starting point to end the monopoly central banks have in the issuance of money";
- there are inherent deficiencies in the current central bank regulation of a fiat currency that is dependent entirely on political institutions, "whereby banks can extend their credit above their actual reserves and, simultaneously, depositors [are guaranteed by the government a right to] withdraw the funds in their current bank accounts at any time[,]" with safety and soundness dependent on comprehensive regulation of these transactions; and
- a better alternative can be "inspired by the former gold standard."[94]

Lessons from PayPal, 16 U.C. DAVIS BUS. L.J. 261 (2016).

92 EUROPEAN CENT. BANK, *supra* note 47, at 22.

93 *Id.* (footnote omitted); *see also* Allen, *supra* note 8, at 21–28.

94 EUROPEAN CENT. BANK, *supra* note 47, at 22–23.

> Although the theoretical roots of the [Bitcoin] scheme can be found in the Austrian School of economics, Bitcoin has raised serious concerns among some of today's Austrian economists. Their criticism covers two general aspects: a) Bitcoins have no intrinsic value like gold; they are mere bits stored in a computer; and b) the [Bitcoin] system fails to satisfy the "Misean Regression Theorem," which explains that money becomes accepted not because of a government decree or social convention, but because it has its roots in a commodity expressing a certain purchasing power.[95]

"Hayek argued that traditional government-backed currencies are prone to a number of weaknesses, particularly susceptibility to inflation and political corruption[,] [while p]rivate currencies . . . are more stable than traditional currencies because they do not share these weaknesses."[96] On the other hand, François Velde argues that Hayek was misguided in his thesis that the production of money should be within the domain of the private sector and not remain a monopoly of the state. Moreover, Velde argues that Bitcoin is far from what Hayek could have imagined, in that Bitcoin fails to be disciplined by market forces to maintain the stability of its value.[97] According to Velde, "[t]he Bitcoin network is an automaton, issuing currency at a predictable rate, perfectly incapable of providing 'good money' in Hayek's sense, i.e., a currency of stable value."[98] In addition, by virtue of its first-mover advantage, Bitcoin has laid claim to quasi-monopoly status, "and Hayek did not address whether currency is a natural monopoly."[99] Moreover, as Luther has observed, Bitcoin use currently benefits from the fact that "[s]uccessive rounds of quantitative easing in the United States have been met with opposition, as some users of the dollar fear the currency will be worth significantly less in the future. Similarly, instability in Europe prompts fears of the devaluation or outright collapse of the euro."[100]

---

95 EUROPEAN CENT. BANK, *supra* note 47, at 23 (footnote omitted); *see also* Nicolás Cachanosky & Alexander W. Salter, *The View from Vienna: An Analysis of the Renewed Interest in the Mises-Hayek Theory of the Business Cycle*, REV. AUSTRIAN ECON. (forthcoming 2016), http://ssrn.com/abstract=2363560.

96 *See* Plassaras, *supra* note 60, at 382 (footnotes omitted).

97 *See* François R. Velde, *Bitcoin: A Primer*, CHI. FED LETTER (Fed. Reserve Bank of Chi., Chicago, Ill.), Dec. 2013. Of course, Hayek could not have envisioned or predicted Bitcoin, and was likely contemplating something like a private regime of negotiable instruments tied to a finite commodity such as gold or silver. Bitcoin relies on a computer algorithm to simulate this kind of economic and legal environment. *See supra* Section III.D.

98 *See* Velde, *supra* note 97.

99 *Id.*

100 William J. Luther, *Cryptocurrencies, Network Effects, and Switching Costs*, 34 CONTEMP. ECON. POL'Y 553, 553 (2015); *see also* Sara Schaefer Muñoz & Jeannette Neumann, *U.K. Exit Fears Hit Banks*, WALL STREET J., June 16, 2016, at C1; Maria Gelman, Axel Jochem & Stefan

Bitcoin appears to have as its basis an open-source community. According to Teigland, Yetis, and Larsson: "Open source communities emerge when strangers from across the globe come together online to self-organize around a shared interest and to create value through sharing knowledge and innovating. Some scholars propose that these communities are challenging the firm-based approach to knowledge creation as the primary mechanism for innovation."[101] Kroll, Davey, and Felten argue that "Bitcoin will require the emergence of governance structures, contrary to the commonly held view in the Bitcoin community that the currency is ungovernable."[102] Teigland, Yetis, and Larsson describe the Bitcoin community's formal governance as follows:

> The Bitcoin Foundation was founded by seven of the community's most instrumental individuals, such as Gavin Andresen—a core Bitcoin developer. The Bitcoin Foundation has been registered under section 501c of the US Internal Revenue Code in Washington, D.C., and its bylaws were effective as of July 23, 2012. The Foundation is governed by a board with five seats split by membership class. Two seats elected by the Individual member class (annual membership costs .23 BTC), two seats by the Corporate member class (five different levels from 9.4 BTC for companies younger than two years and with less than 25 employees to 935.4 BTC for Platinum companies), and one seat by the Founding member class. The Individual member class currently has 426 members (of which 68 are anonymous) while the Corporate member class comprises two platinum and eight silver members. The Board has established the following requirements for its board members: 1) an Individual member in good standing, 2) any business is conducted openly using their real identity, and 3) they pass a background check for felony conviction.[103]

F. *Bitcoin, World Poverty, Remittances, and the Ethics of Peace*

The challenges of addressing world poverty ultimately are tied to issues involving the facilitating of consensual transactions and reducing transaction costs, along with related issues such as the threat of

Reitz, *Transmission of Global Financial Shocks to EMU Member States: The Role of Monetary Policy and National Factors* (Deutsche Bundesbank, Discussion Paper No. 23/2016, 2016), http://ssrn.com/abstract=2807294.

101 Teigland, Yetis & Larsson, *supra* note 53, at 5.

102 Kroll et al., *supra* note 48, at 1.

103 Teigland, Yetis & Larsson, *supra* note 53, at 10 (footnotes omitted) (citations to tables and graphics omitted).

capital/currency controls.[104] In turn, the propensity for outbreaks of terrorism and civil war are likely related to issues of global poverty.[105] Bracking and Sachikonye observe that:

> [R]emittances are critical to household wellbeing in Zimbabwe . . . . Indeed, it has become a commonplace in the research area of migration and development, and its subfield of poverty reduction and remittance studies, that international migration can have a positive impact on poverty reduction through the generation of migrant remittances, and, for the vast majority of researchers, that remittances are positively associated with economic growth. Within international development, much hope has been invested that remittances provide an accessible pathway out of poverty, and an alternative to inter-governmental and official systems of development assistance.[106]

In this regard, Brito and Castillo have issued an excellent report titled *Bitcoin: A Primer for Policymakers*, which highlights the many ways in which bitcoins may be used to "improve the quality of life for the world's poorest. Improving access to basic financial services is a promising antipoverty technique."[107] As these authors note: "To better understand why people might want to use Bitcoin, it helps to think of it, not necessarily as a replacement for traditional currencies, but rather as a new payments system."[108] They point out that the lower cost of Bitcoin transactions: assists individuals and small businesses with an alternative to expensive credit cards; enables migrants to make cheaper remittances of payments to their families in developing countries; facilitates a multitude of micropayment services; helps to protect individuals from

---

104 *See, e.g.*, Robert L. Hutchings & Bart M.J. Szewczyk, *The Global Future and its Policy Implications: Views from Leading Thinkers on Five Continents*, ATLANTIC COUNCIL U.S. (2009), http://ssrn.com/abstract=1881953. *See generally* Michael S. Barr, *Banking the Poor*, 21 YALE J. REG. 121 (2004). In the United States, the Bureau of Consumer Financial Protection (CFPB) has issued a report on the impact of mobile financial services on underserved consumers, including low-income, unbanked, and vulnerable persons. The report notes the potential benefits as well as consumer protection risks. *See* CONSUMER FIN. PROT. BUREAU, MOBILE FINANCIAL SERVICES: A SUMMARY OF COMMENTS FROM THE PUBLIC ON OPPORTUNITIES, CHALLENGES, AND RISKS FOR THE UNDERSERVED (2015), http://files.consumerfinance.gov/f/201511_cfpb_mobile-financial-services.pdf.

105 *See generally* Susan E. Rice, Corinne Graff & Janet Lewis, *Poverty and Civil War: What Policymakers Need to Know* (Brookings Glob. Econ. & Dev., Working Paper No. 2, 2006), https://www.brookings.edu/wp-content/uploads/2016/06/poverty_civilwar.pdf.

106 Sarah Bracking & Lloyd Sachikonye, *Remittances, Poverty Reduction and Informalisation in Zimbabwe 2005-6: A Political Economy of Dispossession?* 1 (Univ. Manchester, Brooks World Poverty Inst., Working Paper No. 28, 2008) (citations omitted), http://ssrn.com/abstract=1265516.

107 BRITO & CASTILLO, *supra* note 79, at 14 (citing MUHAMMAD YUNUS, BANKER TO THE POOR: MICRO-LENDING AND THE BATTLE AGAINST WORLD POVERTY (2003)).

108 *Id.* at 10.

censorship and capital controls; provides oppressed groups with financial privacy; and facilitates innovation and micropayments.[109]

Bitcoin transactions may provide a major benefit in the marketplace for remittances sent by immigrants in developed countries (where the best jobs are) to their families back home in developing countries. The World Bank estimates that such remittances totaled $582 billion in 2015, of which $432 billion went to developing countries, involving some 232 million migrants.[110] By 2016, data shows that world remittances have grown to more than $601 billion, "with developing countries receiving over $440 billion."[111] The reasons usually given for high remittance transaction costs include "underdeveloped financial infrastructure in some countries, limited competition, regulatory obstacles, lack of access to the banking sector by remittance senders and/or receivers, and difficulties for migrants to obtain the necessary identification documentation to enter the financial mainstream."[112] A lack of market transparency also results in price comparison difficulties for consumers because "[p]rices for remittances are frequently made up of a fee charged for sending a certain amount, a margin taken on the exchange rate when remittances are paid and received in different currencies, and, at times, a fee charged to the recipient of the funds."[113] Conventional regulation has, if anything, imposed burdens that reduce competition and increase the transaction costs.

The average cost of remitting funds during the fourth quarter of 2015 was 7.37%.[114] The cost of using post offices stands at 5.88% for the same time period; cash products are among the least expensive averaging 6.54%; and account-to-account products are among the most expensive, with an average cost of 10.86%;[115] however, "the cost of transferring money within the same bank or to a partner bank is

---

109 *Id.* at 10–19.

110 *About Remittance Prices Worldwide*, WORLD BANK, http://remittanceprices. worldbank .org/en/about-remittance-prices-worldwide (last visited Jan. 6, 2017) [hereinafter *About Remittance Prices*].

111 Michael Kent, *Remittance Reality: Getting to 3% and Beyond*, WORLD BANK (Jan. 11, 2016), http://blogs.worldbank.org/peoplemove/remittance-reality-getting-3-and-beyond.

112 *About Remittance Prices Worldwide*, *supra* note 110; *see also* sources cited *infra* note 113.

113 *About Remittance Prices Worldwide*, *supra* note 110. Traditional U.S. remittance transfer systems have become much more heavily-regulated under the Dodd-Frank Act, and this may have reduced their availability or utility and raised their cost in some instances. *See, e.g.*, Alvin C. Harrell, *Remittance Transfers Under Dodd-Frank: The Final Rules and Their Far-Reaching Implications*, 67 CONSUMER FIN. L.Q. REP. 26 (2013); Rachel Louise Ensign, Emily Glazer & Amy Guthrie, *U.S. Banks Cut Mexico Ties*, WALL STREET J., Jan. 25, 2016, at C1.

114 WORLD BANK, REMITTANCE PRICES WORLDWIDE 1 (2015) [hereinafter WORLD BANK REPORT 2015], https://remittanceprices.worldbank.org/sites/default/files/rpw_report_ december_2015.pdf.

115 *Id.*

significantly lower."[116] The cost of remitting funds varies widely from country to country, with the average cost of sending money from the G8 countries falling below six percent for the first time.[117] The market for remittances is most troubling in Sub-Saharan Africa, where the costs are the most expensive in the world for sending money, at just under ten percent.[118] Bitcoin offers the potential to ameliorate these problems.

The future of Bitcoin and other virtual payment systems is tied to considerations of censorship, regulation, human rights, and financial privacy. "Repressive regimes see the Internet as a threat[,]"[119] and the Bitcoin system is likely to be treated similarly. According to Jack Balkin, "the most important decisions affecting the future of freedom of speech will not occur in constitutional law; they will be decisions about technological design, legislative and administrative regulations, the formation of new business models, and the collective activities of end-users."[120] Currency and financial crises also remain a threat in much of the world.[121] Bitcoin transactions already have proven useful to those

116 WORLD BANK, REMITTANCE PRICES WORLDWIDE 2 (2013), https://remittanceprices.worldbank.org/sites/default/files/RPW_Report_Dec2013.pdf.

117 WORLD BANK REPORT 2015, *supra* note 114, at 4.

118 *Id.* at 6.

119 Ramesh Subramanian, *The Growth of Global Internet Censorship and Circumvention: A Survey*, 11 COMM. INT'L INFO. MGMT. ASS'N, no. 2, 2011, at 69, 69; *see also* Derek E. Bambauer, *Cybersieves*, 59 DUKE L.J. 377, 381–86 (2009).

120 Jack M. Balkin, *The Future of Free Expression in a Digital Age*, 36 PEPP. L. REV. 427, 427 (2009).

121 *See generally* Graham Bird & Ramkishen S. Rajan, *Restraining International Capital Movements: What Does It Mean?* (Comparative & Int'l Educ. Soc'y, Working Paper No. 14, 2000), http://ssrn.com/abstract=231207; Pablo Bustelo, *Capital Flows and Financial Crises: A Comparative Analysis of East Asia (1997–98) and Argentina (2001–02)* (Complutense Univ. of Madrid Econ., Working Paper No. 2004-017, 2004), http://ssrn.com/abstract=612784; Guillermo A. Calvo & Ernesto Talvi, *Sudden Stop, Financial Factors and Economic Collpase in Latin America: Learning from Argentina and Chile* (Nat'l Bureau Econ. Research, Working Paper No. w11153, 2005), http://ssrn.com/abstract=669452; Benedict Clements & Herman Kamil, *Are Capital Controls Effective in the 21st Century? The Recent Experience of Colombia* (Int'l Monetary Fund, Working Paper No. 09/30, 2009), http://ssrn.com/abstract=1356459; Kristin J. Forbes & Michael W. Klein, *Pick Your Poison: The Choices and Consequences of Policy Responses to Crises* (Mass. Inst. Tech. Sloan Sch. of Mgmt., Working Paper No. 5062-13, 2013), http://ssrn.com/abstract=2364457; Michael M. Hutchison & Reuven Glick, *Capital Controls and Exchange Rate Instability in Developing Economies* (Univ. Cal. Santa Cruz Dep't of Econ., Working Paper No. 489, 2000), http://ssrn.com/abstract=288843; Hiro Ito, *Is Financial Openness a Bad Thing? An Analysis on the Correlation Between Financial Liberalization and the Output Performance of Crisis-Hit Economies* (Univ. Cal. Santa Cruz Int'l Econ., Working Paper No. 04-23, 2004), http://ssrn.com/abstract=621801; Graciela L. Kaminsky, *Varieties of Currency Crises* 1 (Nat'l Bureau Econ. Research, Working Paper No. w10193, 2003), http://ssrn.com/abstract=483124; Wei Li, *Dealing with Capital Flows: Thailand in 2006* (Univ. of Va., Darden Sch. Found., Case No. UVA-BP-0511, 2007), http://ssrn.com/abstract=1276570; Carmen Reinhart & Kenneth Rogoff, *Financial and Sovereign Debt Crises: Some Lessons Learned and Those Forgotten* (Int'l Monetary Fund, Working Paper No. 13/266, 2013), http://ssrn.com/abstract=2387533; Zlatko Nikoloski, Impact of Financial Crises on Poverty in Developing

living in countries with strict restrictions on the movement of capital, but this future is not assured.

As always, financial market innovation is likely to offer benefits not now envisioned for developing as well as developed countries. The potential for reducing world poverty seems credible. In developing countries, the lack of a user-friendly banking system and contracts/commercial law regime (such as provided by contract law and the UCC in the United States) has been a serious impediment to economic growth and development; however, in recent years, rapid technological change has produced a significant increase in the use of mobile payments in these countries.[122] This is essential in societies that have failed to create the contract law structure needed for a modern banking and payment system. William Luther has observed that "the widespread adoption of smartphones has made it easier to make and receive payments in person with electronic bank accounts and digital wallets."[123] More recently, "the development of inexpensive card-reading devices has enabled virtually anyone to accept electronic payments."[124] In effect, mobile payments may allow consumers and

World: An Empirical Approach (Nov. 2, 2010) (unpublished manuscript) (http://ssrn.com/abstract=1701894) (contending that currency crises, rather than banking or sovereign debt crises, are mostly responsible for exacerbating the depth and incidence of poverty).

122 *See* Kevin V. Tu, *Regulating the New Cashless World*, 65 ALA. L. REV. 77 (2013); Marc Bourreau & Marianne Verdier, *Cooperation for Innovation in Payment Systems: The Case of Mobile Payments* (Commc'ns & Strategies, Working Paper No. 79, 2010), http://ssrn.com/abstract=1810892. *See generally* Silvia Monica Elaluf-Calderwood, Jonathan Liebenau & Patrik Karrberg, *Privacy, Identity and Security Concerns: Enterprise Strategic Decision Making and Business Model Development for Mobile Payments in NFC* (TPRC Research Conference on Commc'ns, Info. & Internet Policy, Conference Paper, 2012), http://ssrn.com/abstract=2014205.

123 Luther, *supra* note 100, at 553; *see also* Ignacio Mas & David Porteous, *Pathways to Smarter Digital Financial Inclusion*, CAPCO INST. J. FIN. TRANSFORMATION, Oct. 2015, at 47; Dhanya Pramod & Ramakrishnan Raman, *A Study on the User Perception and Awareness of Smartphone Security*, 9 INT'L J. APPLIED ENGINEERING RES. 19133 (2014); Vinita Godinho & Supriya Singh, *Technology Enabled Financial Inclusion and Evidence-Based Policy for the Underbanked: A Study of Remote Indigenous Australia* (CPRsouth8/CPRafrica2013 Conference, Conference Paper, 2013), http://ssrn.com/abstract=2331884; Massimo Morini, Inv/Sav Wallets and the Role of Financial Intermediaries in a Digital Currency (July 21, 2014) (unpublished manuscript) (http://ssrn.com/abstract=2458890).

124 *See* Luther, *supra* note 100, at 553; *see, e.g.*, SQUARE INC., https://squareup.com (last visited Jan. 7, 2017) ("Square [is a] magstripe reader to swipe credit cards anywhere."). One result has been a blossoming of commerce and increased prosperity in many countries that were previously underdeveloped. *See, e.g.*, Mark Moyar, *The End of the Third World: The Rapid Rise of China Seems to Contradict the Author's Assertion that Democracy Is Better than Autocracy at Facilitating Rapid Economic Growth*, WALL STREET J.: BOOKSHELF (Feb. 11, 2016, 7:11 PM), http://www.wsj.com/articles/the-end-of-the-third-world-1455235869 (reviewing STEVEN RADELET, THE GREAT SURGE (2016)) (describing the recent "Great Surge" in living conditions in some "Third World" countries, and attributing it to increased liberal democracy and capitalism following the end of the Soviet Empire).

businesses to bypass the failure of governments to provide an adequate legal system for payment transactions. If so, this would mean an unprecedented advancement in economic conditions. As early as 2000, James Van Dyke observed that

> there are places around the world today where, rather than dig for pocket change to buy a soda, you take our [sic] your mobile phone, dial the number that's on the outside of the soda machine and the soda pops out and another dollar or so ends up on your mobile phone bill.[125]

Widespread extension of these opportunities to developing countries constitutes an extraordinary achievement. Turnbull has noted that "[i]n 2002 cell phone technology developed to a degree that allowed Africans in regions with few land lines a [sic] fewer banks to spontaneously use simple cell phone airtime as a proxy for money."[126] Moreover, "[s]ince 2007 a number of governments in developing countries have allowed cell phones to distribute their official currencies both domestically and internationally."[127] Somewhat surprisingly, while only about half of the globe's population has bank accounts, "[t]oday there are as many cell phones in the world as men, women, and children."[128] As Jon Garon has noted, the consequences of this trend may be dramatic:

> Particularly in the area of payment systems, the implications of network effects will have a highly disintermediating impact. One particular payment system will become more readily used than the others, and as more objects can be purchased using that system, it will become more valuable and disrupt other systems. . . . .
>
> Two competing networks drive network effects: the network of consumers and the network of merchants. The cost, convenience, social relevance, and network for the merchant may have quite a different value proposition than for the consumer. Merchants struggling to reduce the fees they pay to current credit card companies are motivated to find less expensive alternatives, so some are promoting competition. . . . In short, the battle over payment systems will decide the future of the Fortune 100.[129]

---

125 Van Dyke, *supra* note 30, at 21.

126 Shann Turnbull, Might Supplementary Tethered Currencies Reduce Financial System Risks? 5 (Jan. 15, 2015) (unpublished manuscript) (http://ssrn.com/abstract=2417826).

127 *Id.*

128 *Id.*

129 Jon M. Garon, *Mortgaging the Meme: Financing and Managing Disruptive Innovation*, 10 NW. J. TECH. & INTELL. PROP. 441, 457 (2012) (footnotes omitted).

IV. TRADITIONAL PAYMENT SYSTEMS AND REGULATION

A. *Introduction—The History of Modern Payment Systems and Regulation*

As suggested above, traditional regulation of the payment system in the United States has followed a path of evolution that reflects the common law foundation of negotiable instruments law as the substantive law basis for payment transactions.[130] The path of this evolution, and its common law substantive foundation, reflect an extraordinary (even unique) series of historical developments that are responsible in significant measure for the vast economic progress of the past 250 years and yet are under unprecedented pressure today from a combination of technology and regulation.[131] Thus, the transition from a paper-based common law system (essentially a branch of contract law[132]) to a new electronic payment paradigm that is independent of the paper-based antecedents (though still, hopefully, based on contract law[133]) potentially represents a major decision point in the history of commercial and consumer transactions.

The development of the common law of negotiable instruments, as the foundation for twentieth century payments and banking law, has been well-recounted elsewhere.[134] Suffice it to say that in each of the past three centuries there was at least one signal development in the law that supported, or even created, opportunities for increased party autonomy,

---

130 As embodied primarily in UCC Articles 3, 4 and 4A. *See* FRED H. MILLER & ALVIN C. HARRELL, THE LAW OF MODERN PAYMENT SYSTEMS AND NOTES 287–507 (2003); *supra* Section II.C; *supra* notes 25–30 and accompanying text; *see also* Burge, *supra* note 19; sources cited *infra* note 131.

131 *See, e.g.*, Burge, *supra* note 19, at 1497 ("[The] growth of [electronic] private-law governance of payments has coincided with a general marginalization of the original UCC regime."); *see also id.* at 1498 n.17 ("[F]inding a 'puzzling persistence' of the antiquated law of bills and notes in modern commerce." (quoting ROGERS, *supra* note 19, at 19)); Neil B. Cohen, *The Calamitous Law of Notes*, 68 OHIO ST. L.J. 161, 161 (2007) ("The law of negotiable instruments is hemmed in on one side by its own antiquity and on the other by the emergence of electronic communications."). While recognizing the issues examined by these authorities, and the need for an updated approach to govern electronic payments, your authors remain somewhat puzzled at the willingness of some to jettison a common law payments model that has made a significant contribution to human progress over the past two-and-a-half centuries. *See, e.g.*, Harrell, *The End of Negotiable Instruments*, *supra* note 19. *See generally* Alvin C. Harrell, *The Importance of Contract Law: A Historical Perspective*, 41 OKLA. CITY U. L. REV. 1 (2016) [hereinafter Harrell, *The Importance of Contract Law*].

132 *See, e.g.*, *supra* note 19 and accompanying text; sources cited *supra* notes 130–31; *infra* notes 138–42.

133 *See supra* Section II.D (noting the development of paper-based money in the United States); *cf. supra* Part III (describing virtual currencies).

134 *See supra* notes 130–33 and accompanying text; *see also supra* Sections II.C–II.D.

i.e., for private parties (e.g., merchants and ultimately consumers) to conduct and fund private economic transactions using private money in the form of negotiable instruments (namely: contract law, the American banking system, and the UCC). Since these opportunities did not previously exist, at least on a wide scale, but became more broadly available as a result of each of these legal developments, it is not surprising that each of these three developments was followed by a quantum increase in private economic transactions and resulted in improvements in society and human conditions.[135] Much of the human progress that today we take for granted can be traced to these three legal developments, as noted below.[136] Moreover, as noted above in Section III.A, to some extent all of these developments depended on the reification of legal rights in a paper instrument, a factor that highlights the challenges for those seeking to create an electronic equivalent.

The first of these developments was the eighteenth century implementation of contract law (and one of its most important branches, the law of negotiable instruments).[137] While the foundations for this development can be traced to Magna Carta in 1215,[138] it was left to the seventeenth and eighteenth century common law judges to give effect to the principle of party autonomy based on the rule of law, on which modern society is based.[139] The "bookends" of this extraordinary

---

135 *See, e.g.*, Opinion, *Notable & Quotable*, WALL STREET J. (Mar. 13, 2015, 6:34 PM), http://www.wsj.com/articles/notable-quotable-1426286058 ("The most astonishing thing about the extraordinary outpouring of growth and innovation that the United States and other economies have achieved over the past two centuries is that it does not astonish us [despite the amazing improvements in the human condition that resulted]." (excerpted from WILLIAM J. BAUMOL, ROBERT E. LITAN & CARL J. SCHRAMM, GOOD CAPITALISM, BAD CAPITALISM, AND THE ECONOMICS OF GROWTH AND PROSPERITY (2007))). *See generally supra* Part II (on the history of money); *infra* notes 137–44.

136 *See supra* note 135; *supra* note 19 and accompanying text.

137 *See supra* note 19 and accompanying text. Contracts law and negotiable instruments law have long been closely intertwined. In effect, Lord Mansfield and his fellow judges of the English King's Bench brought contract law to fruition by bringing the Law Merchant rules on sales of goods and negotiable instruments into the common law of England. *See supra* note 19 and accompanying text.

138 Magna Carta, which was celebrated for its 800th anniversary in 2015, laid the foundation for a legal system based on the rule of law (as an alternative to an essentially arbitrary authoritarianism), obviously a necessity for a payment system based on contract law. *See, e.g.*, Daniel Hannan, *Magna Carta: Eight Centuries of Liberty*, WALL STREET J. (May 29, 2015, 11:07 AM), http://www.wsj.com/articles/magna-carta-eight-centuries-of-liberty-1432912022; Nicholas Vincent, *The Amazing Legacy of Magna Carta*, BBC HIST. MAG., Feb. 2015, at 28. The United States of America was founded on these principles. *See infra* note 144.

139 *See, e.g.*, IAIN MCDANIEL, ADAM FERGUSON IN THE SCOTTISH ENLIGHTENMENT: THE ROMAN PAST AND EUROPE'S FUTURE (2013); NORMAN S. POSER, LORD MANSFIELD: JUSTICE IN THE AGE OF REASON (2013); Harrell, *The Importance of Contract Law*, *supra* note 131; *see also supra* notes 19, 135, 138 and accompanying text. The law of contracts was, undoubtedly, a signal development in the creation of the common law, dramatically affecting the history of human relations and personal freedom. *See, e.g.*, Daniel Hannan, *The World of English*

series of developments can be viewed as Lord Coke's decision in *Slade's Case* in 1603 and Lord Mansfield's recognition of the special rights of a bona fide purchaser of a negotiable instrument (i.e., a holder in due course[140]) in *Peacock v. Rhodes*.[141] This series of developments, occurring over a period of more than 150 years and due, at least in part, to a historically unique series of political and economic factors and events,[142] permitted many millions (and later, in the twentieth century, billions) of people to be lifted out of poverty and serfdom by providing a legal framework for voluntary private transactions.[143] Thus did the English serfs become entrepreneurs and consumers, unleashing the Industrial Revolution in Britain and ultimately extending it elsewhere (in part by reason of the British Empire and American Revolution[144]). Not surprisingly, once private citizens were permitted to use contract law to conduct economic transactions, they did so on a broad scale—trade and commerce increased, and the world changed dramatically.

The nineteenth century development in this series was concentrated in the western United States (though with similar effects on a more narrow scale in Britain and elsewhere), where the common law took firm root and was allowed to blossom fully.[145] As a result of

---

Freedoms WALL STREET J. (Nov. 15, 2013, 6:17 PM), http://www.wsj.com/articles/SB10001424052702303289904579195922823363280.

140 *See, e.g.*, U.C.C. §§ 3-302, 3-305, 3-306 (AM. LAW. INST. & NAT'L CONF. OF COMM'RS ON UNIF. STATE LAWS 2002).

141 Slade's Case (1602) 76 Eng. Rep. 1074; 4 Co. Rep. 92 b; Peacock v. Rhodes (1781), 99 Eng. Rep. 402; 2 Doug. 633. *See generally* ROGERS, *supra* note 19, at 19–44; Harrell, *The Importance of Contract* Law, *supra* note 131; Harrell, *The End of Negotiable Instruments*, *supra* note 19, at 221–29; Hines, *supra* note 7, at 100–03; *supra* Part II.

142 Events that contributed to the development of contract law include: the break between the English crown and Roman authorities, which extended to a rejection of Roman civil law and created pressures for a separate English common law; and the apparent desire of the English common law judges of the King's Bench to accommodate this pressure in ways that included expansion of their jurisdiction beyond relatively unremunerative criminal law issues, by absorbing the more lucrative business of the Law Merchant. Thus was the common law of contracts created, with consequences in terms of human advancement that surely no one could have anticipated. *Cf., e.g.*, *supra* notes 19, 131, 135, 138–41.

143 *See, e.g.*, *Notable & Quotable*, *supra* note 135; *cf., e.g.*, *supra* notes 19, 131–33, 138–41.

144 The American Revolution was fought, not to reject the English common law, but to embrace it for the American colonies, so as to secure for the colonists "the absolute rights of Englishmen." SAMUEL ADAMS, THE RIGHTS OF THE COLONISTS: THE REPORT OF THE COMMITTEE OF CORRESPONDENCE TO THE BOSTON TOWN MEETING (1772), http://www.constitution.org/bcp/right_col.htm; *see also* Hannan, *supra* note 138 ("The American Revolutionaries weren't rejecting their identity as Englishmen; they were asserting it."). In effect, the American Revolutionaries "were very clear that they were fighting for the privileges bestowed on them by Magna Carta." *Id.*

145 In this regard, the United States was fertile soil in part because our system of federalism and constitutional government allowed the common law to flourish in the states, largely free of federal interference, permitting "free banking" in order to provide financial services to fund the western migrations and settlement of the frontier. *See, e.g.*, MARGARET G. MYERS, A FINANCIAL

"free banking," permitted under state contracts law, a decentralized financial system was allowed to arise and expand based on contracts and negotiable instruments law; thus, the benefits of negotiable instruments as a form of "private money" were extended to ordinary citizens who otherwise would not have been able to fund their activities and enterprises.[146] While the purest form of free banking did not survive the nineteenth century, it lived on (and to some extent lives on today) in the form of private financial intermediaries, including state-chartered banks. These survived Civil War-era efforts by the federal government to supplant them with a system of national banks,[147] in the process creating the modern checking account in the latter half of the nineteenth century.[148] Thus, the creation of the unique American banking and payment system based on contract and negotiable instruments law—which extended credit, deposit, and payment services to fund commercial activities in the most remote areas and facilitated the industrialization of America—was a signal legal and economic development of the nineteenth century.[149] Though banking services

---

HISTORY OF THE UNITED STATES 121–128 (1970); *see also infra* note 149 and accompanying text. *See generally* Daniel Hannan, *The World of English Freedoms*, WALL STREET J. (Nov. 15, 2013, 6:17 PM), http://www.wsj.com/articles/SB10001424052702303289904579195922823363280 ("The American is the Englishman left to himself." (quoting Alexis de Tocqueville)). Of course, a full account of early contract law must include reference to the toxic mix of the common law (contracts and property law) with the widespread practice of slavery, which permitted commercial transactions in furtherance of the most odious of social structures. *See, e.g.*, Fergus M. Bordewich, *The Children of Manifest Destiny*, WALL STREET J. (Jan. 22, 2016, 1:21 PM), http://www.wsj.com/articles/the-children-of-manifest-destiny-1453486907 (reviewing NED SUBLETTE & CONSTANCE SUBLETTE, THE AMERICAN SLAVE COAST (2015)). Although the common law did not create slavery, and indeed English and American law arguably did more to end it than any other single factor, for a historically brief period contracts law became associated with the slave trade, a significant blot on the history of western law. No one should ever claim that the industrial revolution came without its human costs. For a balanced view on the latter issue, see, for example, Rosalind Crone, *Was Victorian Life Really So Grim?*, BBC HIST. MAG., Nov. 25, 2015, at 50.

146 This was part of the lure of the American western frontier. *See, e.g.*, sources cited *supra* note 19 and accompanying text; *see also* Hines, *supra* note 7, at 103 (noting the importance of negotiable instruments as a means to create "private money"); *supra* Section II.D.

147 *See, e.g.*, Harrell, *The End of Negotiable Instruments*, *supra* note 19, at 256–57.

148 *Id.*

149 A result was the "largest voluntary land migration in human history—the westering of the American people." Gregory Crouch, *Go Your Own Way*, WALL STREET J. (July 31, 2015, 4:47 PM), http://www.wsj.com/articles/go-your-own-way-1438375631. Of course, the Homestead Act created new property interests and this also played a role (e.g., by providing security for loans). *See, e.g.*, Fergus M. Bordewich, *How the West Was Really Won*, WALL STREET J. (May 18, 2012, 6:54 PM), http://www.wsj.com/articles/SB10001424052702303448045774078008499858 34. In addition, the need to exchange and collect checks between banks over these distances led to the development of a Bank Collection Code, which ultimately evolved into Article 4 of the UCC. Burge, *supra* note 19, at 1501–02.

were not universally available,[150] commercial financial services were more widely available than at any time in history, and it was largely based on the common law of contracts and negotiable instruments as implemented in the decentralized American system of federalism.

It was left to the twentieth century to see the ultimate fulfillment of the potential for negotiable instruments law as a payment system. Beginning in the 1890s, there was a codification of commercial laws under the aegis of the National Conference of Commissioners on Uniform State Laws (NCCUSL),[151] later joined by the American Law Institute (ALI) in the penultimate achievement of modern commercial law: the UCC.[152] The enactment of the UCC, beginning in the early 1950s, modernized, clarified, and simplified commercial law to an extent never before known in human history, extending the benefits of Lord Mansfield's legal masterpiece to ordinary citizens on an unprecedented scale and unleashing an expansion of banking and financial services transactions (and general prosperity) that ushered in the modern world (and ultimately spread the benefits almost world-wide), lifting billions out of servitude and poverty.[153]

Thus, in each of the past three centuries there has been a signal legal development that advanced the principle of party autonomy in the context of payments law, based on the common law of contracts: (1) negotiable instruments law, essentially created by Lord Mansfield following his appointment to the King's Bench in 1756; (2) the American bank collection and payments system, built on the foundation of contract and negotiable instruments law in the 1800s; and (3) the codification and simplification of these rules in the twentieth century, culminating in the UCC.[154] Each of these developments further advanced the principle of party autonomy, helping to realize for the first time the aspirations expressed in the Magna Carta some 800 years ago

150 That ideal was very nearly achieved in the late twentieth century, thanks to the UCC in conjunction with the savings and loan industry, credit unions, and an expansion of national and state-chartered banks, as noted below.

151 Formed in 1892, and adopting the Uniform Negotiable Instruments Law in 1896 and the Uniform Sales Act in 1906. *See* JAMES J. WHITE & ROBERT S. SUMMERS, UNIFORM COMMERCIAL CODE 1–6 (2d ed. 1980); *About the ULC*, UNIFORM L. COMMISSON: THE NAT'L CONF. OF COMMISSIONERS ON UNIFORM ST. LAWS, http://www.uniformlaws.org/Narrative.aspx?title=About%20the%20ULC (last visited Jan. 7, 2017). These American codification projects followed in the footsteps of earlier codification efforts in England, namely the English Bills of Exchange Act of 1882, and the Sale of Goods Act of 1893. *See, e.g.*, DOUGLAS J. WHALEY & STEPHEN M. MCJOHN, PROBLEMS AND MATERIALS ON PAYMENT LAW 2 (10th ed. 2016) (citing the British Negotiable Instruct Act of 1881 as the "statutory forerunner" of American codifications in their area of law).

152 *See, e.g.*, *supra* Section II.D and sources cited *supra* note 151.

153 *See Notable & Quotable*, *supra* note 135.

154 *See supra* Section IV.A.

and in *Slade's Case* in 1602; each development was followed by a then-unprecedented explosion of economic growth and prosperity, leading ultimately to our modern world. But, as noted, this foundational legal structure has come under considerable pressure from technological changes and regulatory constraints,[155] to the extent that the future direction of payments law is now very much in doubt. It remains to be seen whether the twenty-first century will see yet another expansion of party autonomy, perhaps with the aid of electronic payments systems and virtual currencies, or a reversal of this trend, in which the benefits of private alternatives to legal tender (such as negotiable instruments and bitcoins) become subject to new legal and regulatory constraints.

B. *The Future of Traditional Payment Law and Regulation*

Some of the answers to questions about the future of payment law depend on the nature and direction of federal regulation. Traditional regulation has developed largely as an adjunct to the substantive law framework noted above, based on the common law and its codification. As such, it has focused on the protection of end-users without extensive, direct preemption of the state substantive law (primarily contract law and the UCC) foundation that is essential to party autonomy.[156] There is authoritative support for a continuation of this basic approach in the context of electronic payments and virtual currencies.[157]

However, the significant factors that characterize the paper-based law of negotiable instruments (e.g., based on the merger doctrine[158]) and the bank collection system that was necessary to process these instruments,[159] as compared to the very different world of virtual currencies,[160] mean that an extension of the traditional legal and

155 *See* sources cited *supra* notes 130–31 and accompanying text; *see also* Burge, *supra* note 19, at 1503–11.

156 *See* Burge, *supra* note 19, at 1495. Examples of federal preemption cited by Burge, *supra* note 19, include the Truth in Lending Act (TILA) and Electronic Fund Transfer Act (EFTA). *Id.* at 1496; *see also* THE LAW OF TRUTH IN LENDING chs. 7, 9–10 (Alvin C. Harrell ed., 2014) [hereinafter TRUTH IN LENDING] (noting the preemptive effect of TILA). Another example is the Expedited Funds Availability Act (EFAA). EFAA, 12 U.S.C. §§ 4001–4010 (2012); 12 C.F.R. §§ 210.1–210.15 (2016). *See generally* MILLER & HARRELL, *supra* note 130.

157 *See, e.g.*, Burge, *supra* note 19, at 1496–97.

158 For example, the reification of legal rights in a tangible piece of paper. *See* U.C.C. §§ 3-201, 3-301(AM. LAW INST. & NAT'L CONFERENCE OF COMM'RS ON UNIF. STATE LAWS 2002) (reflecting the idea that "negotiation" of an instrument to a "holder" transfers the right to enforce the instrument, i.e., the legal rights attributable to the contract—embodying an obligation to pay—are merged into the instrument itself, hence the "merger doctrine").

159 *See supra* notes 145–50 and accompanying text.

160 *See supra* Part III.

regulatory approach is far from assured. Among other things, the traditional regulatory approach is facilitated by the necessity to collect paper instruments through a regulated banking system, a feature consciously avoided in systems like Bitcoin.[161]

As the reach of federal regulatory authorities has expanded exponentially in recent years—with a strong emphasis on substantive consumer protections that restrain party autonomy[162]—the bank payments system has been largely preserved by a unique public-private cooperation that includes the Federal Reserve Board (FRB), with its broad authority and responsibility to protect the payments system, and private organizations such as NCCUSL and the ALI, whose legal prestige has made them valuable partners in this cooperative effort. The result has been an exceptional degree of coordination between federal regulatory authorities and the vast underlying foundation of state substantive law. As a result, for example, the FRB has participated in uniform law revision efforts (UCC Articles 3, 4, and 4A, and to some extent Article 9) and in turn some federal regulations essentially incorporate parts of the UCC (e.g., FRB Regulation J).[163] In other cases, such as the Check Truncation Act (Check 21) and the EFAA,[164] where federal law expressly overrides the UCC, the FRB has been cognizant of the need to integrate state and federal law and avoid the usual preemption problems that plague many other areas of law.[165]

It remains to be seen whether this constructive approach will even survive, much less translate to the world of virtual currencies.[166] An alternative approach is that illustrated by the law of credit (and debit)

---

161 *See* sources cited *supra* note 156; *see also* Benjamin Geva, *From Paper to Electronic Order: The Digitalization of the Check in the USA*, 4 PENN. ST. J.L. & INT'L AFF. 96 (2015).

162 The poster child being the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, Pub. L. No. 111–203, 124 Stat. 1376 (codified as amended in scattered sections of 12 U.S.C.), and its almost unlimited grant of authority to the new Bureau of Consumer Financial Protection (CFPB). *See, e.g.*, John L. Ropiequet, Christopher S. Naveja & Jason B. Hirsh, *The Dodd-Frank Act Changes the Consumer Finance Landscape*, 64 CONSUMER FIN. L.Q. REP. 284 (2010); Yuka Hayashi, *Case Fuels Fight on Consumer Watchdog*, WALL STREET J., Jan. 25, 2016, at C1.

163 12 C.F.R. § 210 (2016). *See generally* sources cited *supra* note 156 and accompanying text.

164 *See* 12 U.S.C. §§ 5001–5018 (2012); 12 C.F.R. § 229 (2016); 12 U.S.C. §§ 4001–4010; FRED H. MILLER & ALVIN C. HARRELL, THE LAW OF MODERN PAYMENT SYSTEMS AND NOTES ¶ 8.04 (2000 & 2008 Suppl.).

165 *See, e.g.*, Roland E. Brandel & Jeremy R. Mandell, *Preemption Under the Consumer Financial Protection Act of 2010*, 64 CONSUMER FIN. L.Q. REP. 307 (2010) (describing the impact of the Dodd-Frank Act); Debra Lee Hovatter, *Preemption Analysis Under the National Bank Act: Then and Now*, 67 CONSUMER FIN. L.Q. REP. 5, 6 (2013) (describing common state-federal conflicts of law issues). In the payment system context, see, for example, the discussion of state law and federal preemption issues in Fred H. Miller, *UCC Study Committee on Payment Systems Postponed*, 65 CONSUMER FIN. L.Q. REP. 437, 438, 443–44 (2011).

166 *See supra* note 131 and accompanying text.

cards, essentially uncodified contract law but with a heavy (and ever-increasing) overlay of substantive consumer protection law and regulation.[167] While this approach can also be regarded as a success,[168] one likely reason is that the FRB previously exercised exclusive authority in this area of law and generally followed the traditional approach noted above (in respect to the UCC), facilitating a federal-state coordination that has avoided some uncertainties and disruptions based on federal preemption.[169] As electronic payment system issues become increasingly separated from the UCC framework, e.g., with respect to virtual currencies, and FRB jurisdiction yields to CFPB regulation as regards consumer issues, there is an obvious risk that this cooperative approach and stable legal framework may be lost.[170]

Professor Burge cites with approval yet a third approach: the public-private partnership that governs the automated clearing house (ACH) system.[171] The ACH system operates primarily under the rules of the National Automated Clearing House Association (NACHA), a private association formed by four regional ACH associations (originally as a part of the American Bankers Association) that again functions in cooperation with the FRB.[172] The NACHA rules apply by reason of contracts between participating banks and merchants; the success and growth of this system has been dramatic[173] and has surprised nearly everyone. The ACH system must be regarded as a major success for modern policy-making, based partly on legislative and regulatory restraint, and may offer a hopeful prospect for future payment system regulation.[174]

On the other hand, the ACH system is essentially the common law of contracts tied to a structure that originated as part of negotiable instruments law and the check collection process, so it is not quite so

---

167 Including TILA, the EFTA, and the CARD Act. *See* TRUTH IN LENDING, *supra* note 156, ¶ 15.10; Burge, *supra* note 19, at 1504–12. *See generally* MILLER & HARRELL, *supra* note 164, ¶ 11.02.

168 *See* Burge, *supra* note 19, at 1511–12.

169 *See* sources cited *supra* note 165. Despite its arguable success, the credit card approach depends heavily on TILA, and this has required extensive litigation, at considerable cost to those involved. *See, e.g.*, TRUTH IN LENDING, *supra* note 156, ¶ 1.04[3] & ch. 15.

170 The CFPB may well favor an approach that differs from that of the FRB. *See, e.g.*, Hayashi, *supra* note 162. Although the CFPB is formally under the umbrella of the FRB, it is functionally and financially independent and has primary authority over many consumer issues.

171 *See* Burge, *supra* note 19, at 1512–17.

172 *Id.* at 1513.

173 *Id.* at 1514.

174 *Id.* at 1517 (noting the flexibility and accommodation of new technologies permitted by this non-statutory approach).

alien to the UCC and traditional bank collections as one might think.[175] While there are differences between a statutory system like the UCC and a more purely contracts-based structure like the ACH system,[176] it can be noted that UCC Articles 3, 4, and 4A essentially provide a stable framework for a contracts-based system,[177] and in turn basic UCC concepts (e.g., as embodied in UCC Article 4A) form a basis for some non-UCC payment transactions.[178]

So, the basic common law structure for contracts and negotiable instruments, and its progeny in the bank collection system as ultimately codified in the UCC, remains a basis for the law and regulation of checks, and to some extent credit and debit cards and ACH transactions, pursuant to a unique state-federal relationship that has recognized state law as the primary substantive basis for payment transactions under the benevolent eye of a restrained FRB. And an emerging issue for the twentieth century is whether and to what extent this structure can survive and be adapted to the new world of electronic payments and virtual currencies.

That being said, as Professor Burge notes, efforts to extend the UCC structure to electronic payments, in a comprehensive Uniform New Payments Code, failed in the 1970s and 1980s and were abandoned,[179] thus demonstrating the difficulty of translating the UCC structure into the seemingly chaotic (and, in some ways, fundamentally different) world of virtual currencies.[180] Thus, a significant question arises: How will virtual currencies and other payment systems be governed or regulated in the twenty-first century?[181] While the overall

---

175 *Id.* at 1518.

176 *Id.* at 1517–18.

177 *See, e.g.*, U.C.C. § 1-103 (AM LAW INST. & NAT'L CONFERENCE OF COMM'RS ON UNIF. STATE LAWS 2016).

178 *See, e.g.*, MILLER & HARRELL, *supra* note 164, ¶¶ 10.10–10.13 (impact of Regulation J) & ch. 11 (non-UCC payment systems).

179 *See* Burge, *supra* note 19, at 1517–22. In the early twenty-first century, yet another, similar effort was undertaken, then "postponed." Miller, *supra* note 165, at 445; *see also infra* Section IV.D.

180 *See, e.g.*, *supra* note 131 and accompanying text; *infra* note 181; *see also* Zachary Karabell, *The Uberization of Money*, WALL STREET J. (Nov. 6, 2015, 1:38 PM), http://www.wsj.com/articles/the-uberization-of-finance-1446835102 ("The familiar middlemen of 20th-century banking and investing are giving way to something very different. Are we ready for the opportunities—and the risks?"). At this writing, a uniform law project has separately tackled virtual currencies. *See infra* Section IV.D.

181 Today's alternative payment mechanisms broadly comprise a multi-faceted array of options, some (but not all) derived to a degree from traditional common law devices. These are, to varying degrees, subjected to traditional legal standards as embodied in the UCC. *See supra* Section IV.B. The alternatives include: proprietary systems such as Western Union (governed largely by contract law and federal rules on remittance transfers); checks and other forms of drafts (governed largely by UCC Articles 3 and 4, with some federal law overlay); "wholesale" funds transfers between banks (UCC Article 4A); ACH transfers (NACHA rules); debit cards

issue is obviously quite young, as noted above some tentative steps already have been taken. There are additional issues and developments that illustrate how the challenges are being addressed, as noted further immediately below and elsewhere in the remainder of this Article.[182]

C. *New York Issues Bitlicense for Virtual Currency Firms*

As Benjamin M. Lawsky, New York Superintendent of Financial Services, has observed: "This is a critical and exciting time in the broader evolution of the payments system. Virtual currency is a novel field for regulators and everyone . . . must be willing to take a hard look at how these new rules are working when they are put into practice."[183] In August 2013, the New York State Department of Financial Services (DFS) "announced its inquiry into the appropriate regulatory guidelines for virtual currencies."[184] Public hearings were held during January 2014 and a public order was issued by the DFS during March 2014 "announcing it [would] be considering formal proposals and applications for the establishment of regulated virtual currency

(Regulation E); credit cards (TILA); electronic checks; stored value cards; internet payment systems (e.g., paypal); and (of course) virtual currencies. Some of the resulting legal issues are far from new. *See, e.g.*, Damon Darlin, *Try E-banking*, FORBES (Jan. 13, 1997, 12:00 AM), http://www.forbes.com/forbes/1997/0113/5901068a.html; Brian Grow et al., *Gold Rush*, BLOOMBERG (Jan. 9, 2006, 12:00 AM), http://www.bloomberg.com/news/articles/2006-01-08/gold-rush ("Online payment systems . . . are becoming the currency of choice for cybercrooks."). For updates on these and related issues, see, for example, Sarah Jane Hughes & Stephen T. Middlebrook, *Developments in the Law Affecting Electronic Payments and Financial Services*, 71 BUS. LAW. 361 (Winter 2015–2016) [hereinafter Hughes & Middlebrook, *Electronic Payments and Financial Services*]; Sarah Jane Hughes & Stephen T. Middlebrook, *Advancing a Framework for Regulating Cryptocurrency Payments Intermediaries*, 32 YALE J. REG. 495 (2015).

182 *See* sources cited *supra* notes 179–80; *infra* Sections IV.C, IV.D. In addition, see generally Anjani Trivedi, *Singapore to Regulate Bitcoin Dealers; Will Require They Verify Customers' Identities, Report Suspicious Transactions*, WALL STREET J. (Mar. 13, 2014, 8:06 AM), http://www.wsj.com/articles/SB10001424052702304914904579436822925484050 ("The Monetary Authority of Singapore became the first Asian regulator to bring bitcoin dealers under its purview, as regulators across the world grow wary."). However, this authority is focused on the identification of criminal and suspicious transactions, and "does not extend to the safety and soundness of virtual currency intermediaries nor the proper functioning of virtual-currency transactions." *Id.* (quoting the Monetary Authority of Singapore); *see also* Ryan Tracy, *Authorities See Worth of Bitcoin*, WALL STREET J. (Nov. 18, 2013, 11:56 PM), http://www.wsj.com/articles/SB10001424052702304439804579205740125297358 ("Senior U.S. law-enforcement and regulatory officials said they see benefits in digital forms of money and are making progress in tackling its risks.").

183 Benjamin M. Lawsky, Superintendent of Fin. Servs., State of N.Y., Remarks at the BITS Emerging Payments Forum, Washington, D.C. 5 (June 3, 2015), https://media.scmagazine.com/documents/127/speech_-_june_3,_2015__nydfs_a_31558.pdf.

184 Press Release, N.Y. State Dep't of Fin. Servs., NY DFS Releases Proposed Bitlicense Regulatory Framework for Virtual Currency Firms (July 17, 2014), http://www.dfs.ny.gov/about/press/pr1407171.htm.

exchanges operating in New York."[185] The proposal, first published in the July 23, 2014 edition of the *New York State Register* (a revised proposal was published February 25, 2015), triggered a series of comment periods. The final DFS rule was published in the *New York State Register*'s June 24, 2015 edition.[186] The rule contemplates the requirement of "Bitlicenses" for firms conducting any of the following virtual currency activities:

- 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).[187]

The New York "Bitlicense" is not required for merchants or consumers utilizing a virtual currency solely for the purchase or sale of goods or services; nor is it required for those firms chartered under the New York Banking Law to conduct exchange services and approved by the DFS to engage in virtual currency business activities.[188]

The DFS rule may be summarized as including requirements that relate to: anti-money laundering issues; consumer protection concerns; and cyber security rules; plus requirements and provisions for: Safeguarding Consumer Assets; Virtual Currency Receipts; Consumer Complaint Policies; Consumer Disclosures; Anti-Money Laundering Compliance (Verification of Account holders and the Reporting of Suspected Fraud and Illicit Activity); a Cyber Security Program; a Chief Information Security Officer; Independent DFS Examinations; Books and Records; Reports and Financial Disclosures; Audit Requirements; Capital Requirements; a Compliance Officer; Business Continuity and

185 *Id.*

186 *See Final BitLicense Regulatory Framework*, N.Y. STATE DEP'T OF FIN. SERVICES, http://www.dfs.ny.gov/legal/regulations/bitlicense_reg_framework.htm (last visited Dec. 27, 2016).

187 N.Y. COMP. CODES R. & REGS. tit. 23, § 200.2(q) (2016); *see also* sources cited *supra* notes 183–84.

188 *See* sources cited *supra* notes 183–87 and accompanying text.

Disaster Recovery; Notification of Emergencies or Disruptions; and provisions for a Transitional Period.[189]

Following release of the rule, outlining the final DFS BitLicense requirements, the DFS announced approval of the first BitLicense application on September 22, 2015.[190] Apparently contemplating this, New York Superintendent Lawsky remarked in June 2015 that:

> Financial regulators and policymakers need to recognize that when it comes to digital currencies and other new payments technology—the genie is already out of the bottle. . . . [and] setting the exact contours of the new rules . . . is extraordinarily difficult. Regulators are not always going to get the balance precisely right. . . . Over the next 5, 10, 15 years, and beyond—you are going to see, I think, a fine-tuning and shaking out of digital currency regulation across the country and across the globe. . .
>
> Attempting to force novel technologies and business models into existing regulatory boxes—simply because "that is the way it has always been done"—may not be a sensible approach. We need, at times, to be more creative than that as regulators—even if it takes us outside our comfort zone. Similarly, regulators also need to realize their own limitations; recognize what they do not know; and keep an open mind when approaching new technologies. . . . I hadn't even heard the word Bitcoin until early 2013 in the context of the banking crisis that occurred in Cyprus. . . . Frankly, we do not know what digital currency is going to look like in five or ten years—and there are a lot of interesting possibilities. There might be—at the very least—a kernel of something here that has a profound impact on the future of payments technology and the financial system. Regulators are not always the experts on such matters, but my gut now is that it's likely. . . . as a regulator . . . it is important that we keep an open mind. . . . Regulators should not simply ban or dismiss technology that they find unfamiliar. Or work to protect entrenched incumbent companies—which is the very definition of regulatory capture.[191]

On October 5, 2015, the DFS announced the granting of a charter under the rule to Gemini Trust Company, L.L.C.—a Bitcoin exchange

---

189 *See* N.Y. COMP. CODES R. & REGS. tit. 23, §§ 200.1–200.22. *See generally* Marcus A. Asner et al., *New York State Adopts "BitLicenses" and Comprehensive Rules for Virtual Currency Firms*, ARNOLD & PORTER ADVISORY (June 17, 2015), http://www.apks.com/en/perspectives/publications/2015/06/new-york-state-adopts-bitlicenses-and-comprehens__.

190 Press Release, N.Y. State Dep't of Fin. Servs., NYDFS Announces Approval of First BitLicense Application from a Virtual Currency Firm (Sept. 22, 2015), http://www.dfs.ny.gov/about/press/pr1509221.htm.

191 *See* Lawsky, *supra* note 183.

that is based in New York City.[192] Moreover: "In May 2015, DFS granted the first charter to a New York virtual currency firm, itBit Trust Company. In September, 2015 DFS granted the first BitLicense application to a virtual currency firm, Circle Internet Financial. [As of October 5, 2015], NYDFS ha[d] received 25 BitLicense applications."[193]

D. *Uniform Law Commission Study Committee on Alternative and Mobile Payments*

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).[194] The focus of the Study Committee (subsequently designated 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.[195] The Study Committee (and subsequent Drafting Committee) received extensive input from a variety of sources, including: the American Bankers Association (the same report also was submitted to the Emerging Payments Task Force of the Conference of State Bank

192 Press Release, N.Y. State Dep't of Fin. Servs., NYDFS Grants Charter to "Gemini" Bitcoin Exchange Founded by Cameron and Tyler Winklevoss (Oct. 5, 2015), http://www.dfs.ny.gov/about/press/pr1510051.htm.

193 *Id.*; *see also* Press Release, N.Y. State Dep't of Fin. Servs., Governor Cuomo Announces Approval of First U.S.-Based Ethereum Exchange, Created and Operated in New York (May 5, 2016), http://www.dfs.ny.gov/about/press/pr1605051.htm.

194 *See* NAT'L CONFERENCE OF COMM'RS ON UNIF. STATE LAWS, FINAL STUDY COMMITTEE ON ALTERNATE AND MOBILE PAYMENT SYSTEMS REPORT (2014) [hereinafter FINAL REPORT], http://www.uniformlaws.org/shared/docs/Alternative%20and%20Mobile%20Payments/AMPS%20Final%20Study%20Committee%20Report%2012-19-14.pdf.

195 *See* NAT'L CONFERENCE OF COMM'RS ON UNIF. STATE LAWS, REGULATION OF VIRTUAL CURRENCIES ACT, OCT. 9–11, 2015 DRAFTING COMMITTEE MEETING 1 (2015), http://www.uniformlaws.org/shared/docs/regulation%20of%20virtual%20currencies/2015oct_RVCA_Mtg%20Draft.pdf. "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." *Id.* 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.

Supervisors (CSBS));[196] The Clearing House;[197] the European Central Bank;[198] the Senate of Canada, Standing Committee on Banking, Trade, and Commerce (a report entitled "Digital Currency: You Can't Flip this Coin!");[199] and the Bureau of Consumer Financial Protection (CFPB) (a report entitled "Consumer Protection Principles," regarding new payment systems).[200]

The Study Committee concluded that the New York regulatory framework for virtual currencies (the New York "BitLicense" rule)[201] is "well drafted," and (with some changes) could serve as a beginning template for a uniform law.[202] The October 2015 Meeting Draft reflects this approach and also to some extent follows additional guidance provided by the CSBS,[203] reflecting the usual uniform law effort to achieve both consensus and a rational approach.[204]

The October 2015 Meeting Draft proposes extensive provisions to govern: the licensing of digital currency businesses (Article 2); reports by and examinations of such businesses (Article 6); permissible investments (Article 7); enforcement (Article 8); administrative procedures (Article 9); disclosures (Article 10); and Compliance (Article 11).[205] The Reporter's Preliminary Note recognizes differences between the CSBS regulatory framework and the New York "BitLicense" rule, and the need to reconcile these differences in a proposed uniform law.[206]

---

196 *See* CONF. ST. BANK SUPERVISORS, https://www.csbs.org/Pages/default.aspx (last visited Oct. 9, 2016). Comments received by the CSBS are available at http://www.csbs.org/regulatory/ep/Pages/framework.aspx (last visited Oct. 9, 2016); *see also* Letter from Robert A. Morgan, Dir. of Emerging Techs., Ctr. for Payments & Cybersecurity Policy, to Emerging Payments Task Force (Feb. 16, 2016), https://www.csbs.org/regulatory/ep/Documents/ABA%20Framework%20Comment.pdf.

197 *See* CLEARING HOUSE, https://www.theclearinghouse.org (last visited Oct. 9, 2016).

198 *See* EUROPEAN CENT. BANK, https://www.ecb.europa.eu/home/html/index.en.html (last visited Oct. 9, 2016); *see also EBA Opinion on 'Virtual Currencies'*, EUROPEAN BANKING AUTHORITY (July 4, 2014), http://www.eba.europa.eu/documents/10180/657547/EBA-Op-2014-08+Opinion+on+Virtual+Currencies.pdf.

199 *See* IRVING R. GERSTEIN & CELINE HERVIEUX-PAYETTE, CAN. STANDING SENATE COMM. ON BANKING, TRADE & COMMERCE, DIGITAL CURRENCY: YOU CAN'T FLIP THIS COIN! (2015), http://www.parl.gc.ca/Content/SEN/Committee/412/banc/rep/rep12jun15-e.pdf.

200 CONSUMER FIN. PROTECTION BUREAU, CONSUMER PROTECTION PRINCIPLES: CFPB'S VISION OF CONSUMER PROTECTION IN NEW FASTER PAYMENT SYSTEMS (2015), http://files.consumerfinance.gov/f/201507_cfpb_consumer-protection-principles.pdf.

201 *See* Final NYDFS BitLicense Rule *supra* note 186; *supra* Section IV.C.

202 *See* E-mail from Fred Miller, Chair of the Study Comm., to Sarah Jane Hughes, Reporter to the Study Comm. (July 25, 2014) (on file with authors).

203 *See* NAT'L CONFERENCE OF COMM'RS ON UNIF. STATE LAWS, *supra* note 195, at 2 (noting the September 15, 2015 release of the final CSBS Model Regulatory framework).

204 *See, e.g.*, U.C.C. § 1-103 (AM LAW INST. & NAT'L CONFERENCE OF COMM'RS ON UNIF. STATE LAWS 2016).

205 *See* NAT'L CONFERENCE OF COMM'RS ON UNIF. STATE LAWS, *supra* note 195; *see also* FINAL REPORT, *supra* note 194.

206 NAT'L CONFERENCE OF COMM'RS ON UNIF. STATE LAWS, *supra* note 195.

Examples of these differences include issues relating to: "conditional licenses"; "reciprocal licensing" between states; "permissible investments"; anti-money laundering requirements; and disclosures.[207] On the other hand, the October 2015 Meeting Draft follows almost verbatim (though in different order) many of the New York "BitLicense" Regulations.[208]

As of this writing, a remaining significant issue is the extent to which a proposed uniform law should go beyond the licensing, compliance, and enforcement issues common to the CSBS regulatory framework and the New York "BitLicense" rule, to cover substantive commercial transaction issues as in the UCC.[209] The latest draft is the May 31, 2016 annual meeting draft for the NCCUSL meeting of July 8–14, 2016.[210] The reporter's memo to Fred Miller of May 31, 2016 highlights the following issues, "in their relative order of significance":

1. The definition of the term "virtual currency,"
2. The definition of the term "virtual currency business activity,"
3. The scope of the draft and of exemptions from its coverage,
4. The treatment of start-up providers through a less form of state regulation to be called "provisional registration"—also referred to colloquially as an "on-ramp,"
5. The requirements for security and net worth, and,
6. The encouragement of and model for reciprocal licensing arrangements among participating states.[211]

Thus, while (as of this writing) many issues remain unresolved, this uniform law drafting project offers an excellent prospect for reconciling divergent views in this area of law, and bringing some needed clarity

---

207 *Id.* at 3–4.

208 *Id.* at 4.

209 *Id.*; *see also* H.B. 289, 2016 Gen. Assemb., Reg. Sess. (N.C. 2016) (codified as 16B. N.C. GEN. STAT. §§ 53-208.41–53-208.64) (revisions signed into law June 30, 2016 to the North Carolina Money Transmitters Act, amending Chap. 53, N.C. GEN. STAT. to add Article 16B. Money Transmitters Act); *supra* notes 186–89 and accompanying text (describing the New York Bitlicense requirements). At this stage, the proposed uniform law addresses what may be considered largely regulatory issues (e.g., registration and licensing issues) rather than substantive laws to govern the conduct of transactions as is traditional in contract law and the UCC. This is consistent with existing state laws on virtual currencies.

210 NAT'L CONFERENCE OF COMM'RS ON UNIF. STATE LAWS, REGULATION OF VIRTUAL CURRENCY BUSINESSES ACT, JULY 8–14, 2016, DRAFTING COMMITTEE MEETING (2016), http://www.uniformlaws.org/shared/docs/regulation%20of%20virtual%20currencies/2016AM_VirtualCurrencyBusinesses_Draft.pdf.

211 Memorandum from Sarah Jane Hughes, Reporter for the Unif. Law Comm'rs Serving on the Unif. Regulation of Virtual Currency Bus. Act Drafting Comm. to Chairman Fred Miller 1 (May 31, 2016), http://www.uniformlaws.org/shared/docs/regulation%20of%20virtual%20currencies/2016AM_VirtualCurrencyBusinesses_Issues%20memo.pdf.

and uniformity to an otherwise uncertain (and ever chaotic) legal environment for virtual currencies.

V. CRIMINAL INTERESTS IN CURRENCIES

Partly because of their anonymous characteristics, the evolution of virtual currencies has suffered from a highly visible connection to criminal activities including: attacks on businesses and corporate extortion; child exploitation (and pornography); corporate espionage; illicit drug distribution; commerce in fake identifications (IDs) and passports; investment fraud; sexual exploitation; stolen credit cards; terrorism; and trafficking in weapons.[212] Among the reasons the U.S. Secret Service believes that digital currencies are preferred by criminals are: anonymity for both users and transactions; ability to quickly and confidently move illicit proceeds from one country to another; widespread adoption in the criminal underground; and trustworthiness.[213] Mythili Raman, in her 2013 testimony before the U.S. Senate Committee on Homeland Security and Governmental Affairs, stated that the Department of Justice's (DOJ's) two primary law enforcement interests presented by virtual currencies are:

1. "deterring and prosecuting criminals using virtual currency systems to move or hide money that is used to facilitate, or is derived from, criminal or terrorist acts, i.e., money laundering"; and
2. "investigating and prosecuting those virtual currency services that themselves violate laws aimed at illegal money transmission and money laundering."[214]

---

212 *See, e.g.*, *Beyond Silk Road: Potential Risks, Threats, and Promises of Virtual Currencies: Hearings Before the S. Comm. on Homeland Sec. & Governmental Affairs*, 113th Cong. (2013) (statement of Ernie Allen, President & CEO, The International Centre for Missing & Exploited Children); Asner, Shipe & Mitter, *supra* note 44; Hughes & Middlebrook, *Electronic Payments and Financial Services*, *supra* note 181; Trautman, *supra* note 5; Allen, *supra* note 8, at 28–41; *see also* Christopher Bronk, Cody Monk & John Villasenor, *The Dark Side of Cyber Finance*, SURVIVAL, Apr.–May 2012, at 129; William Hett, *Digital Currencies and the Financing of Terrorism*, 15 RICH. J.L. & TECH. 4 (2008); Fernando M. Pinguelo & Bradford W. Muller, *Virtual Crimes, Real Damages: A Primer on Cybercrimes in the United States and Efforts to Combat Cybercriminals*, 16 VA. J.L. & TECH. 116, 119 (2011); Malte Möser, Rainer Böhme & Dominic Breuker, An Inquiry into Money Laundering Tools in the Bitcoin Ecosystem (2013) (pre-publication manuscript) (revised and published in the Proceedings of the 2013 IEEE eCrime Researchers Summit), http://maltemoeser.de/paper/money-laundering.pdf; *supra* notes 44–52 and accompanying text.

213 *See, e.g.*, *Hearings Before the S. Comm. on Homeland Sec. & Governmental Affairs*, *supra* note 212, at 2 (statement of Edward Lowery III, Special Agent in Charge, Criminal Investigative Division, U.S. Secret Service).

214 Raman, *supra* note 37, at 64.

Because of its close alliance with worldwide terrorist groups, drug trafficking now constitutes an increased threat to private citizens and nation states.[215] For example, the commercial growth of poppy production for illegal opium in Burma, Afghanistan, and Colombia likely accounts for a substantial source of funds for the terrorist organizations located in nearby areas.[216] Described often as the "Amazon.com of Drugs,"[217] Silk Road is credited with responsibility for major volumes of illicit drug sales.[218] Another major digital currency, Liberty Reserve, "allegedly laundered more than $6 billion in suspected proceeds of crimes."[219] The DOJ reported that, before its operations were shut down in May 2013, "Liberty Reserve had more than one million users worldwide, including more than 200,000 users in the United States, who conducted approximately 55 million transactions through its system and allegedly laundered more than $6 billion in suspected proceeds of crimes, including . . . narcotics trafficking."[220] Silk Road is just one of several anonymous networks that became possible with the advent of relatively easy-to-use browser interfaces, such as the "Tor browser bundle."[221]

Sites dealing in illicit goods and services such as Silk Road "use Bitcoins because they can be exchanged and accumulated like cash without any third party recording [these] transactions. . . . [U]nlike PayPal or other ways of sending money online, [bitcoins] are untraceable since they do not require a particular identity to be attached

---

215 *See generally* Joshua Aston, Narco-Terrorism—A Critical Study (Jan. 29, 2013) (unpublished manuscript) (http://ssrn.com/abstract=2221590) (observing that transnational organized crime is considered one of the major threats to human security, impeding the political, social, economic, and cultural development of societies worldwide).

216 *See generally Opium Poppy: Production & Distribution*, U.S. DRUG ENFORCEMENT MUSEUM, http://www.deamuseum.org/ccp/opium/production-distribution.html.

217 *Justice News: Deputy U.S. Attorney Richard Zabel Delivers Cybersecurity Keynote at Thomson Reuters Forum*, U.S. DEP'T JUST. (Dec. 11, 2014), https://www.justice.gov/usao-sdny/speech/deputy-us-attorney-richard-zabel-delivers-cybersecurity-keynote-thomson-reuters.

218 *See* sources cited *supra* notes 213–15.

219 Press Release, Dep't of Justice, Co-Founder of Liberty Reserve Pleads Guilty to Money Laundering in Manhattan Federal Court (Oct. 31, 2013) [hereinafter DOJ Press Release], http://www.justice.gov/opa/pr/2013/October/13-crm-1163.html; *see also*: Asner, Shipe & Mitter, *supra* note 44; Hughes & Middlebrook, *Electronic Payments and Financial Services supra* note 181 (noting related prosecutions).

220 *See* DOJ Press Release, *supra* note 219; *see also* Kelsey L. Penrose, Note, *Banking on Bitcoin: Applying Anti-Money Laundering and Money Transmitter Laws*, 18 N.C. BANKING INST. 529 (2014).

221 *See, e.g.*, Nicolas Christin, *Traveling the Silk Road: A Measurement Analysis of a Large Anonymous Online Marketplace* 2 (Carnegie Mellon Univ., Working Paper No. 12-018, 2012), http://www.cylab.cmu.edu/files/pdfs/tech_reports/CMUCyLab12018.pdf.

to them."[222] Dorit Ron and Adi Shamir report that "Silk Road also used a so-called 'tumbler' which, as the site explained, 'sent all payments through a complex, semi-random series of dummy transactions making it nearly impossible to link your payment with any coins leaving the site.'"[223] The indictment of Ross William Ulbricht, a/k/a "Dread Pirate Roberts," a/k/a "Silk Road," announced on February 4, 2014 in Manhattan federal court, stated that:

> ULBRICHT sought to anonymize transactions on Silk Road in two principal ways. First, ULBRICHT operated Silk Road on what is known as "The Onion Router," or "Tor" network, a special network of computers on the Internet, distributed around the world, designed to conceal the true IP addresses of the computers on the network and thereby the identities of the networks' users. Second, ULBRICHT designed Silk Road to include a Bitcoin-based payment system that served to facilitate the illegal commerce conducted on the site, including by concealing the identities and locations of the users transmitting and receiving funds through the site.[224]

The October 25, 2013 complaint and civil forfeiture action filed in Manhattan federal court alleged that Ross William Ulbricht had owned and operated, since about January 2011, an "underground website known as Silk Road, which emerged as the most sophisticated and extensive criminal marketplace on the internet."[225] This complaint further alleged that Silk Road

> served as a sprawling black-market bazaar where unlawful goods and services, including illegal drugs of virtually every variety, were bought and sold regularly by the site's users. . . . [and] was used by

---

222 Timothy Bauman, Commerce and Reputation in Online Illegal Drug Markets 17 (Apr. 3, 2013) (unpublished Senior Thesis, Princeton University Woodrow Wilson School of Public and International Affairs) (on file with author).

223 Dorit Ron & Adi Shamir, How Did Dread Pirate Roberts Acquire and Protect His Bitcoin Wealth? 2 (2013) (unpublished manuscript) (https://eprint.iacr.org/2013/782.pdf) (quoting Press Release, FBI & U.S. Attorney's Office for the S. Dist. of N.Y., Manhattan U.S. Attorney Announces Seizure of Additional $28 Million Worth of Bitcoins Belonging to Ross William Ulbricht, Owner and Operator of "Silk Road" Website (Oct. 25, 2013) [hereinafter FBI & SDNY Press Release], https://archives.fbi.gov/archives/newyork/press-releases/2013/manhattan-u.s.-attorney-announces-seizure-of-additional-28-million-worth-of-bitcoins-belonging-to-ross-william-ulbricht-alleged-owner-and-operator-of-silk-road-website).

224 Press Release, U.S. Attorney's Office for the S. Dist. of N.Y., Manhattan U.S. Attorney Announces the Indictment of Ross Ulbricht, The Creator And Owner of The "Silk Road" Website (Feb. 4, 2014) [herein after U.S. Attorney's Office Press Release], http://www.justice.gov/usao/nys/pressreleases/February14/RossUlbrichtIndictmentPR.php; *see also* Hughes & Middlebrook, *Electronic Payments and Financial Services, supra* note 181; Asner, Shipe & Mitter, *supra* note 44.

225 FBI & SDNY Press Release, *supra* note 223.

> several thousand drug dealers and other unlawful vendors to distribute hundreds of kilograms of illegal drugs[226]

during its approximately two and a half year operating life.

According to the February 4, 2014 indictment and other information and documents previously filed in the Manhattan federal court:

> The vast majority of items for sale on Silk Road were illegal drugs, which were openly advertised as such on the site. As of September 23, 2013, Silk Road had nearly 13,000 listings for controlled substances, listed under such categories as "Cannabis," "Dissociatives," "Ecstasy," "Intoxicants," "Opioids," "Precursors," "Prescription," "Psychedelics," and "Stimulants." From November 2011 to September 2013, law enforcement agents made more than 100 individual undercover purchases of controlled substances from Silk Road vendors. These purchases included heroin, cocaine, ecstasy, and LSD, among other illegal drugs, and were filled by vendors believed to be located in more than ten different countries, including the United States, Germany, the Netherlands, Canada, the United Kingdom, Spain, Ireland, Italy, Austria and France. . . .
>
> [O]ther illicit goods and services were openly bought and sold on Silk Road . . . : 159 listings under the category "Services," most of which offered computer-hacking services, such as a listing by a vendor offering to hack into social networking accounts of the customer's choosing; 801 listings under the category "Digital goods," including malicious software, hacked accounts at various online services, and pirated media content; and 169 listings under the category "Forgeries," including offers to produce fake driver's licenses, passports, Social Security cards, utility bills, credit card statements, car insurance records, and other forms of false identification documents.
>
> Using the online moniker "Dread Pirate Roberts," or "DPR," ULBRICHT controlled and oversaw every aspect of Silk Road, and managed a small staff of paid, online administrators who assisted with the day-to-day operation of the site. Through his ownership and operation of Silk Road, ULBRICHT reaped commissions worth tens of millions of dollars generated from the illicit sales conducted through the site. ULBRICHT also demonstrated a willingness to use violence to protect his criminal enterprise and the anonymity of its users. ULBRICHT even solicited six murders-for-hire in connection

---

226 *Id.*

> with operating the site, although there is no evidence that these murders were actually carried out.[227]

On January 16, 2014, the U.S. Attorney for the Southern District of New York announced the forfeiture of 29,655 bitcoins (worth approximately $28 million) and the forfeiture of the Silk Road hidden website.[228] Following a four-week jury trial, on February 5, 2015, Ross Ulbricht was found guilty in Manhattan Federal Court on all counts,[229] and sentenced to life in prison on May 29, 2015.[230]

VI. THREAT TO WORLD ORDER AND CURRENCY STABILITY

Since the near collapse of the global financial system during 2008–2009,[231] "the financial system has increased the risk of failure," according to statements made by Andrew Haldane in 2011, when he was the Executive Director for Financial Stability at the Bank of England; "Haldane . . . identified a 'doom loop' from banks creating credit to lend to each other."[232] Shann Turnbull observed that:

> 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

---

227 U.S. Attorney's Office Press Release, *supra* note 224.

228 Press Release, U.S. Attorney's Office for the S. Dist. of N.Y., Manhattan U.S. Attorney Announces Forfeiture of $28 Million Worth of Bitcoins Belonging to Silk Road (Jan. 16, 2014), http://www.justice.gov/usao/nys/pressreleases/January14/SilkRoadForfeiture.php; *see also* Hughes & Middlebrook, *supra* note 181; Asner, Shipe & Mitter, *supra* note 44.

229 Press Release, U.S. Attorney's Office for the S. Dist. of N.Y., Ross Ulbricht, The Creator and Owner of the "Silk Road" Website, Found Guilty in Manhattan Federal Court on All Counts (Feb. 5, 2015), http://www.justice.gov/usao-sdny/pr/ross-ulbricht-creator-and-owner-silk-road-website-found-guilty-manhattan-federal-court.

230 Press Release, U.S. Attorney's Office for the S. Dist. of N.Y., Ross Ulbricht, A/K/A "Dread Pirate Roberts," Sentenced in Manhattan Federal Court to Life in Prison (May 29, 2015), http://www.justice.gov/usao-sdny/pr/ross-ulbricht-aka-dread-pirate-roberts-sentenced-manhattan-federal-court-life-prison.

231 *See generally* Lawrence J. Trautman, Personal Ethics & the U.S. Financial Collapse of 2007–08 (Nov. 7, 2016) (unpublished manuscript) (http://ssrn.com/abstract=2502124). On the causes and continuing consequences of the financial crisis, see, for example, Alvin C. Harrell, *Commentary*: *Reflections on the Mortgage, Housing and Financial Crisis*, 68 CONSUMER FIN. L.Q. REP. 123 (2014); Alvin C. Harrell, *The Great Credit Contraction: Who, What, When, Where and Why*, 26 GA. ST. U. L. REV. 1209 (2010); Alvin C. Harrell, *Commentary: The Subprime Lending Crisis—The Perfect Credit Storm?*, 61 CONSUMER FIN. L.Q. REP. 626 (2007).

232 Shann Turnbull, Might Supplementary Tethered Currencies Reduce Financial System Risks? 2 (Jan. 15, 2015) (unpublished manuscript) (http://ssrn.com/abstract=2417826) (quoting Andrew Haldane, Exec. Dir. of Fin. Stability, Bank of Eng., Presentation at the Institute of International and European Affairs: Tackling the Credit Cycle and Too-Big-To-Fail (Jan. 20, 2011), http://www.iiea.com/event/archive_view?urlKey=andrew-haldane-on-fixing-finance).

> forms of money means that central banking policies are applied throughout an economy. Like command and control economies the opportunity for variety is denied.[233]

To examine how Bitcoin might pose a threat to international currency stability, briefly consider the role of the International Monetary Fund (IMF). Rebuilding international economies proved to be a major task at the end of World War II. As a specialized agency of the United Nations, the IMF is charged with tasks of: (1) "[O]verseeing the international monetary system to ensure exchange rate stability"; and (2) "encouraging members to eliminate exchange restrictions that hinder trade."[234] As Nicholas Plassaras has observed, the IMF: "[I]s the international institution tasked with coordinating the international foreign currency exchange market. It sets minimum standards for what member nations can do to their individual currencies in order to preserve global economic stability."[235] Nicholas Plassaras posed the following threat scenario:

> 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. As a result, the IMF is limited in what it can do to intervene in the event that a private digital currency like Bitcoin is used to attack the value of a conventional currency through what is known as a "speculative attack." A speculative attack occurs when an investor wishes to take advantage of a "weak currency," a currency that has depreciated in value relative to other currencies. If left unchecked, a successful attack can push a weak currency's value even lower, resulting in a destabilization of the international foreign currency exchange market. 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 those attacks.[236]

Plassaras also noted that the problem may, with time, become an ever-greater threat to world order, in that:

---

233 *Id.*

234 *History*, INT'L MONETARY FUND, http://www.imf.org/external/about/history.htm (last visited Jan. 7, 2017).

235 Plassaras, *supra* note 60, at 380 (footnote omitted).

236 *Id.* at 380–81 (footnotes omitted).

> [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 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.[237]

VII. WHAT IS THE FUTURE OF VIRTUAL CURRENCY REGULATION?

Contributing to regulatory concerns, Mt. Gox, once the dominant online marketplace for the purchase and sale of Bitcoin, failed on February 25, 2014, leaving many holders of bitcoins financially stranded.[238] Press accounts reported that "Mt. Gox had lost almost 750,000 bitcoins in a long-running theft. . . . valued at about $400 million at [then] current prices."[239] As Reuben Grinberg observed in 2011: "Although the Bitcoin economy is flourishing, users are anxious about Bitcoin's legal status and the possibility of a government crackdown."[240] The indictments and convictions in the Liberty Reserve and Silk Road cases resulted in new calls for regulatory oversight and action. In fact, thirteen or more United States governmental agencies are reported by the Government Accountability Office (GAO) to be examining Bitcoin, and in response the Bitcoin Foundation has retained

---

237 *Id.* at 381 (footnote omitted).

238 *See, e.g.*, Michael J. Casey, *Global Finance: Users Unite in Bitcoin Fight*, WALL STREET J., Mar. 27, 2014, at C3; Robin Sidel, Michael J. Casey & Eleanor Warnock, *Shutdown Rattles Bitcoin Market*, WALL STREET J., Feb. 26, 2014, at A1 (discussing the shutdown of Mt. Gox).

239 Sidel et al., *supra* note 238.

240 Grinberg, *supra* note 52, at 161 (citing epii, *How Long Until Governments Outlaw Bitcoin Usage?*, BITCOIN FORUM (Mar. 29, 2011, 8:40 AM), http://bitcointalk.org/index.php?topic=5110.msg74627#msg74627 ("I think that illegalization is Bitcoin's most likely mode of failure.")); *see also, e.g.*, epii, *supra* ("Considering how quickly services like Silk Road [an anonymous marketplace for illegal drugs] have sprung up, and the fact that the demographic of people who seem most interested in Bitcoin at this point *tends* to overlap with the demographic of likely tax evaders, I am afraid that this illegalization might just be a matter of time."); Catherine Martin Christopher, *Whack-A-Mole: Why Prosecuting Digital Currency Exchanges Won't Stop Online Money Laundering*, 18 LEWIS & CLARK L. REV. 1 (2014); Derek A. Dion, Note, *I'll Gladly Trade You Two Bits on Tuesday for a Byte Today: Bitcoin, Regulating Fraud in the E-Conomy of Hacker-Cash*, 2013 U. ILL. J.L. TECH. & POL'Y 165, 166 (2013) (discussing the legal principles that can be potentially leveraged to regulate Bitcoin); Paul H. Farmer, Jr., Note, *Speculative Tech: The Bitcoin Legal Quagmire & the Need for Legal Innovation*, 9 J. BUS. & TECH. L. 85 (2014).

a Washington, D.C.-based lobbying firm.[241] The Bitcoin community received more bad news as digital currency exchange Cryptsy announced its insolvency on January 15, 2016 because "the company . . . was hacked in 2014."[242] CEO Paul Vernon stated that Cryptsy had kept the information about its hacking and customer withdrawal problems "hidden to prevent 'a panic.'"[243]

Economist Robert J. Shiller has noted that "Bitcoin's future is very much in doubt. . . . [even though] I believe that electronic forms of money could give us better pricing, contracting and risk management."[244] Moreover, while Shiller has characterized Bitcoin as a "bubble," he also has stated that "the legacy of the Bitcoin experience should be that we move toward a system of stable economic units of measurement—a system empowered by sophisticated mechanisms of electronic payment."[245] While recognizing that "[t]o date, Bitcoin-related regulation has largely been focused on the application of 'know your customer,' anti-money-laundering rules, as well as consumer protection licensing, on these new intermediaries,"[246] Brito, Shadab, and Castillo contend that financial instruments such as securities and

241 Ryan Tracy, *Bitcoin's Backers Bolster Political Muscle*, WALL STREET J., July 10, 2014, at C3; *see also* Jim Harper, *Bitcoin Foundation Lobbying*, BITCOIN FOUND. (July 9, 2014), https://bitcoinfoundation.org/forum/index.php?/topic/1043-bitcoin-foundation-lobbying.

242 Stan Higgins, *Cryptsy CEO: Bitcoin Theft Kept Hidden to Avoid 'Panic'*, COINDESK (Jan. 22, 2016), http://www.coindesk.com/cryptsy-bitcoin-theft-avoid-panic.

243 *Id.*; *see also* Paul Vigna, *Virtual-Currency Theft Poses Riddle for Its Community*, WALL STREET J., July 15, 2016, at C1 (describing hack of an investment fund investing in virtual currency called Ethereum and subsequently funneling the virtual currency into a private account held by the hacker). *But see* Paul Vigna, *Cryptocurrency Code Gets Controversial Fix*, WALL STREET J., July 21, 2016, at C3 (describing controversial code change known as a hard fork, allowing money to be returned to rightful owner after nearly eighty-five percent of Ethereum miners rectified the proposal).

244 Robert J. Shiller, *In Search of a Stable Electronic Currency*, N.Y. TIMES, Mar. 2, 2014, at BU4; *see also* Fabio Massacci, Chan-Nam Ngo & Julian M. Williams, Decentralized Transaction Clearing Beyond Blockchains (June 13, 2016) (unpublished paper) (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2794913) (illustrating viability of blockchain-based transactions such as derivatives-contracts-as-programs that are marked to market, or an account that is margined, where computations are automatically calculated and whose ownership transactions are recorded, in a distributed payment network); Joanna Diane 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.

245 Shiller, *supra* note 244.

246 Jerry Brito, Houman Shadab & Andrea Castillo, *Bitcoin Financial Regulation: Securities, Derivatives, Prediction Markets, and Gambling*, 16 COLUM. SCI. & TECH. L. REV. 144, 146 (2014). On internet gambling, see generally Kristin R. Drake, *A "Royal Flush" Solution to the UIGEA Act of 2006—Congress Considers a Feasible Option to Legalizing and Regulating Online Poker in the United States*, 66 CONSUMER FIN. L.Q. REP. 211 (2012).

derivatives, along with gambling and financial prediction markets, are likely to be the next focus of Bitcoin and virtual currency regulation.[247]

During recent months, blockchain technology has continued to gain validation by an announcement of a partnership including nine of the world's largest banks,[248] proof of a concept experiment by Bank of Canada,[249] an announcement that a Chinese digital currency will be issued "as soon as possible,"[250] and the publication of a research paper by Bank of England economists John Barrdear and Michael Kumhof.[251] Finding that "the theoretical and empirical gaps in our knowledge concerning CBDC [central bank digital currency] have become much clearer," the Barrdear and Kumhof paper identifies numerous advantages from a central bank digital currency, including "large steady state output gains of almost 3% for an injection of CBDC equal to 30% of GDP, and sizeable gains in the effectiveness of systematic or discretionary countercyclical monetary policy."[252] Barrdear and Kumhof also suggest that four empirical questions require better answers—what are:

1. "the appropriate calibration of the main sources of demand for bank liabilities";
2. "the interest semi-elasticity of the demand for bank deposits";
3. "the interest semi-elasticity of the demand for CBDC relative to bank deposits, and therefore, by implication, the elasticity of substitution between CBDC and bank deposits in household and firm portfolios of monetary transaction balances"; and
4. "the appropriate calibration of the steady state spread between the interest rate paid on CBDC and that paid on bank deposits."[253]

---

247 Brito, Shadab & Castillo, *supra* note 246, at 221.

248 *See* Lawrence J. Trautman, *Is Disruptive Blockchain Technology the Future of Financial Services?*, 69 CONSUMER FIN. L.Q. REP. 232, 239 (2016); Jemima Kelly, *Nine of World's Biggest Banks Join to form Blockchain Partnership*, REUTERS (Sept. 15, 2015, 12:47 PM), http://www.reuters.com/article/us-banks-blockchain-idUSKCN0RF24M20150915 (partnership includes Barclay's, BBVA, Commonwealth Bank of Australia, Credit Suisse, Goldman Sachs, JP Morgan, Royal Bank of Scotland, State Street, and UBS with financial tech firm R3).

249 *See* Paul Vieira and Paul Vigna, *Bank of Canada Explores Bitcoin's Technology*, WALL STREET J. (June 16, 2016, 7:31 PM), http://www.wsj.com/articles/bank-of-canada-explores-blockchain-technology-1466107171.

250 Misha Yang, Note, Cryptocurrency in China: Light-Touch Regulation in Demand 1 (May 2, 2016) (unpublished paper) (http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2792477) (quoting Wang Yongli, *The Far-Reaching Impact of the Introduction of the Digital Currency by PBoC,* SINA (Jan. 22, 2016, 11:02 AM), http://finance.sina.com.cn/zl/bank/2016-01-22/zl-ifxnuvxc1587128.shtml).

251 *See* Barrdear & Kumhof, *supra* note 54.

252 *Id.* at 66.

253 *Id.* at 66–67.

In addition to these threshold issues listed immediately above, theoretical questions benefiting from additional research include:

A. "What are the welfare properties of alternative CBDC policy rules, including their interaction with traditional monetary policy rules, with macroprudential policy rules, and with fiscal policy rules?"
B. "Should CBDC policy rules also react to financial variables, rather than simply to inflation . . . ?"
C. "What are the advantages and disadvantages of introducing CBDC into the economy through spending (on goods/services and/or transfers), lending (directly or via the banking system), or the purchase of financial assets, including not only government bonds but also other financial assets? Which of these would best safeguard financial stability?"
D. "How might the issuance of CBDC interact with the unwinding of Quantitative Easing?"
E. "What could be the impact of CBDC on international liquidity and exchange rate dynamics?"
F. "How might the introduction of CBDC affect the likelihood of a bank run when bank deposits carry default risk, or the dynamics of a run if one were to occur?"[254]

In a scenario where digital cash is issued and made available to the general public by central banks, "money would exist electronically outside bank accounts in digital wallets, much as physical bank notes do. This means households and businesses would be able to bypass banks altogether when making payments to one another."[255] Peter Stella, former head of the Central Banking and Monetary and Foreign Exchange Operations Divisions at the International Monetary Fund warns, "I don't see how banks could compete."[256]

As with the Internet,[257] the future (and promise) of virtual currencies depend on the nature, scope, and direction of the applicable laws and regulations. Like negotiable instruments and other payment systems, virtual currencies are products of contract law and cannot survive in viable form without enforceable contracts and a stable rule of law. If smothered by excessive regulation or an uncertain legal and

254 *Id.* at 66.

255 *See* Jon Sindreu, *Should Nations Issue Bitcoin?*, WALL STREET J., July 20, 2016 at C1.

256 *Id.*

257 *See, e.g.*, Bambauer, *supra* note 119, at 424–35; Shanika Chapman, *Hands Off My Internet! Why the FCC Should Refrain from Regulating the Internet*, 67 CONSUMER FIN. L.Q. REP. 375 (2013); Alvin C. Harrell, *Ten Current Issues Affecting Consumer Financial Services Law*, 68 CONSUMER FIN. L.Q. REP. 286, 289 (2014); Lawrence J. Trautman & George P. Michaely, Jr., *The SEC and the Internet: Regulating the Web of Deceit*, 68 CONSUMER FIN. L.Q. REP. 262 (2014).

regulatory environment, the promise and potential benefits will be lost. As always, a proper balance between law, regulation, and freedom is essential.

CONCLUSION

In a relatively short period of time, virtual currencies have gained significant traction and become an economic reality, with Bitcoin being the most dominant among over 500 virtual currencies. Bitcoin and other virtual currencies present a particularly difficult and unique jurisdictional challenge to existing regulatory and enforcement agencies because of their ability to transcend national borders in a fraction of a second, and their anonymity due to encryption. This Article explores the impact of payment systems law on the rapidly developing use of virtual and cybercurrencies, especially Bitcoins.

Perhaps the most encouraging development in this area of law is discussed above at Section IV.D. As noted there, in January 2014 the ULC created a Study Committee on Alternative and Mobile Payments (Study Committee). The focus of the Study Committee (now designated 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. The Study Committee/Drafting Committee subsequently concluded that the New York regulatory framework for virtual currencies (New York "BitLicense"[258]) is "well drafted" and was suitable as a beginning template for a uniform law. As customary in uniform law projects, the Study Committee/Drafting Committee work to date suggests there are realistic prospects for a consensus-based and rationale state law framework to govern the important issues. As this Article suggests, a remaining significant issue is the extent to which the proposed uniform law should go beyond the licensing, compliance, and enforcement issues common to the CSBS regulatory framework and the New York "BitLicense" rule, to cover substantive commercial transaction issues as in the UCC. In any event, the resulting progress offers great promise for virtual currencies. Additional issues relating to technology, such as advances in the blockchain technology underlying Bitcoin and many other virtual currencies, also may hold promise for increasing efficiencies in the transfer cost of money and data. Despite the obvious setbacks, challenges, and risks, for virtual currencies, it appears that the future is now.

---

258 *See* N.Y. STATE DEP'T OF FIN. SERVICES, *supra* note 186.