

2018

Lessons from Case Study of Secured Transactions with Bitcoin

Xuan-Thao Nguyen

University of Washington School of Law

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Xuan-Thao Nguyen, *Lessons from Case Study of Secured Transactions with Bitcoin*, 21 SMU SCI. & TECH. L. REV. 181 (2018), <https://digitalcommons.law.uw.edu/faculty-articles/838>

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*Xuan-Thao Nguyen**

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I. INTRODUCTION

As of January 2018, there were 1,384 cryptocurrencies available, and the number continues to grow.¹ The term “cryptocurrencies,” for now, at least, covers Bitcoin; altcoins, which are simply coins that are variants or forks of Bitcoin when there is a change in the underlying codes; and tokens. Unlike Bitcoin and coins that operate on separate blockchains, tokens are issued and operated on top of a blockchain. Bitcoin enjoys its enviable leading role among all cryptocurrencies, and Ethereum follows Bitcoin in standing. At the present time and for convenience purposes in the confines of this article, the author will refer to Bitcoin as inclusive of other cryptocurrencies.

* Gerald L. Bepko Chair in Law & Director, Center for Intellectual Property & Innovation, Indiana University Robert H. McKinney School of Law; Former IP Associate, Fried Frank Harris Shriver & Jacobson (NYC) and Pryor Cashman Sherman & Flynn (NYC). Special thanks to Erik Darwin Hille and Khai-Leif Nguyen-Hille for their love, patience, and support.

1. *List of Cryptocurrencies*, WIKIPEDIA, https://en.wikipedia.org/wiki/List_of_cryptocurrencies (last visited Feb. 5, 2019).

There are about 1,000 people worldwide who own forty percent of the Bitcoin market; they are called the “Bitcoin Whales.”² The whales are reportedly in communication with one another, as they have been the Bitcoin believers since the early days. Fear exists that they will coordinate their activities in ways that may greatly influence the market.³ But there are people who own Bitcoins and don’t want to sell them but are in need of fiat.⁴ Potential borrowers include miners, funds, income investors, and small businesses.⁵ Even Bitcoin Jesus, a widely known nickname for Roger Vers who is one of the largest Bitcoin holders, has expressed his interest in access to lending against his Bitcoins.⁶ With the current market capitalization for Bitcoins hovering around \$140 billion, experts estimate that the lending market with Bitcoin as collateral to be in the tens of billions of dollars.⁷

There has been some discussion about the flaws in using secured transactions law, Article 9 of the Uniform Commercial Code (U.C.C.), to govern commercial transactions involving Bitcoins as collateral.⁸ Flaws necessitate the urgency of immediately fixing of the existing law. In the case of Bitcoins,

2. Olga Kharif, *The Bitcoin Whales: 1,000 People Who Own 40 Percent of the Market*, BLOOMBERG (Dec. 8, 2017, 4:00 AM), <https://www.bloomberg.com/news/articles/2017-12-08/the-bitcoin-whales-1-000-people-who-own-40-percent-of-the-market>.
3. *Id.* (reporting on the legality of sharing of information by whales that, according to securities experts, because “bitcoin is a digital currency and not a security . . . there’s no prohibition against a trade in which a group agrees to buy enough to push the price up and then cashes out in minutes.”).
4. Olga Kharif, *These Guys Want to Lend You Money Against Your Bitcoins*, BLOOMBERG (Dec. 14, 2017, 8:45 AM), <https://www.bloomberg.com/news/articles/2017-12-14/bitcoin-s-new-barons-no-longer-have-to-sell-to-live-in-luxury> (“The new loans should be of particular interest to miners, whose computers solve complex math problems to obtain new coins and help confirm transactions, Brown said. They have to pay for electricity and equipment. But, like many bitcoin believers, they don’t like to sell their crypto. Bitcoin startups also need cash to pay employees.”).
5. *Id.*
6. *Id.*
7. *First Came Bitcoin. Then Came Bitcoin Lenders*, FORTUNE (Dec. 14, 2017), <http://fortune.com/2017/12/14/bitcoin-lenders>.
8. See, e.g., Yves Smith, *Is UCC Article 9 Going to Kill the Use of Bitcoin by US Businesses?*, NAKED CAPITALISM (Mar. 13, 2014), <https://www.nakedcapitalism.com/2014/03/ucc-article-9-going-kill-us-bitcoin-us-businesses.html>; Lance P. Martin, *Can I Secure a Loan with Bitcoin? Part I*, WARD AND SMITH, P.A. (Mar. 16, 2018), <https://www.wardandsmith.com/articles/can-i-secure-a-loan-with-bitcoin-part-i> (classifying bitcoins as “general intangibles,” identifying problems under Article 9, and advocating that U.C.C. Article 8 is a better solution for borrowers and lenders who want to use bitcoin in secured transactions); Lance P. Martin, *Can I Secure a Loan with Bitcoin? Part II*, WARD AND SMITH,

there is still much to learn about the marketplace for secured transactions with Bitcoins as collateral. The rapid change in technology, the speed of new ideas proposed, the constant announcements of adoption and adaptation of smart contracts in transactions, the volatility in cryptocurrency value, the endless reports of scams, and the rise of dark pools and shadow banking all suggest that we should not touch Article 9 for now. The Article 9 system is adequate to accommodate cryptocurrencies—full of imperfection and uncertainty—at the present time. Haste will yield waste. Instead, we should study the lending market with cryptocurrencies as collateral and observe how law and technology have been utilized in fostering the development in the market. Case study is most appropriate, and lessons can be drawn in monitoring and evaluating whether change in Article 9 law is necessary.

This article begins with an observation of the responses from the U.S. Securities and Exchange Commission (SEC), the Chicago Board Options Exchange (CBOE), the Chicago Mercantile Exchange (CME), the U.S. Internal Revenue Service (IRS), and the National Conference of Commissioners on Uniform State Laws (NCCUSL) relating to Bitcoins. These responses together will pave the way for the lending market with Bitcoins as collateral. Part II examines the market for lending with Bitcoin through three different case studies: direct lending, L2B platform, and invoice financing for small and medium sized businesses. Part II will explain how Unchained Capital, Secured Automated Lending Technology (SALT) Lending, and the HIVE Project are conducting their lending business model. Part III then focuses on how lenders have crafted creative solutions rooted in technology to capture the market and address legal concerns. Part IV offers some final thoughts on the current state of law and technology in crypto lending.

II. RESPONSES FROM THE SEC, CBOE, CME, IRS, AND NCCUSL: PAVING THE WAY FOR THE LENDING MARKET WITH BITCOIN

With the fast growth of cryptocurrencies, various government and non-government authorities have issued statements, announcements, rulings, and proposed model laws.⁹ These responses have implications for the lending market using Bitcoins as collateral.

Notably, the SEC's Statement on Potentially Unlawful Online Platforms for Trading Digital Assets on March 7, 2018, recognized that some of the trading platforms of digital assets, including coins and tokens, meet the defi-

P.A. (Apr. 6, 2018), <https://www.wardandsmith.com/articles/can-i-secure-a-loan-with-bitcoin-part-ii>.

9. 35 U.S.C. § 41(c)(2) (2018); see *Statement on Potentially Unlawful Online Platforms for Trading Digital Assets*, U.S. SEC. & EXCHANGE COMM'N (Mar. 7, 2018), <https://www.sec.gov/news/public-statement/enforcement-tm-statement-potentially-unlawful-online-platforms-trading>.

inition of a “security” under the federal securities laws.¹⁰ That means these exchanges must be either registered or exempt from registration. These exchanges are subject to the securities regulation laws designed to protect investors and the integrity of the market.¹¹ Whether a cryptocurrency is a “security” certainly has implications when that cryptocurrency is also used as collateral in a secured lending.¹² Consequently, if a cryptocurrency is merely a product outside these types of exchanges, for instance, if the cryptocurrency is a product of computer mining, that cryptocurrency is not a “security.”¹³

One of the momentous events for cryptocurrency occurred on December 10, 2017, when trading on Bitcoin futures took place on the CBOE. A week after the CBOE began Bitcoin futures, the CME¹⁴ launched trading Bitcoin futures for larger contracts.¹⁵ A CME Bitcoin futures contract is five Bitcoins, while its smaller rival CBOE contract is one Bitcoin.¹⁶ Institutional investors tend to navigate towards the CME for larger contracts.¹⁷ The demand from global institutional investors for Bitcoin futures at the present time is robust.¹⁸ In fact, the demand drove the trading volumes on the CME up by more than fifty percent since the Exchange embarked on Bitcoin fu-

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10. *Statement on Potentially Unlawful Online Platforms for Trading Digital Assets*, *supra* note 9.
 11. *Statement on Potentially Unlawful Online Platforms for Trading Digital Assets*, *supra* note 9.
 12. *See* Part III *infra*.
 13. MINEREUM, <https://www.minereum.com> (last visited Feb. 5, 2019) (providing a self-mining smart contract to allow anyone to create their Ethereum token); NANOPOOL, <https://nanopool.io> (last visited Feb. 5, 2019) (facilitating the mining of Ethereum’s parented smart contract based ERC20 token).
 14. CME is a U.S.-registered designated contract market (DCM) and derivatives clearing organization (DCO). *CME Bitcoin Futures Frequently Asked Questions*, CME GRP. (Dec. 15, 2017), <https://www.cmegroup.com/education/bitcoin/cme-bitcoin-futures-frequently-asked-questions.html>.
 15. *Id.* (“CME Bitcoin futures are based on the CME CF Bitcoin Reference Rate (BRR), which aggregates bitcoin trading activity across major bitcoin spot exchanges between 3:00 p.m. and 4:00 p.m. London time.”).
 16. Laura He, *Demand from Institutional Investors Drives up Bitcoin Futures Trading Volumes on CME*, S. CHINA MORNING POST (Apr. 11, 2018, 11:26 AM), <http://www.scmp.com/business/markets/article/2141119/demand-institutional-investors-drives-bitcoin-futures-trading>.
 17. Evelyn Cheng, *Bitcoin Debuts on the World’s Largest Futures Exchange, and Prices Fall Slightly*, CNBC (Dec. 18, 2017, 5:44 PM), <https://www.cnbc.com/2017/12/17/worlds-largest-futures-exchange-set-to-launch-bitcoin-futures-sunday-night.html> (reporting that “institutional-level investors are trading the CME contract”).
 18. He, *supra* note 16.

tures trading four months earlier.¹⁹ Investors wanting to engage in Bitcoin futures trades typically have accounts with registered futures brokers.²⁰ Bitcoin futures are financially-settled and do not involve the actual exchange of Bitcoins.²¹ The CBOE settles its Bitcoin futures based on the Gemini's daily price,²² but the CME has its own Bitcoin reference rate derived from four Bitcoin exchanges.²³ The trading and clearing of Bitcoin futures on the CME are regulated by the Commodity Futures Trading Commission.²⁴

By allowing trading on bitcoin futures, the Exchanges desire to bring “transparency, efficient price discovery, deep liquidity and centralized clearing” to traders.²⁵ On the futures exchange, market participants can come together to trade, hedge their Bitcoin position, and gain exposure to Bitcoin prices.²⁶ That means trading on Bitcoin futures is subject to rules and regulations, bringing transparency and stability to the wide volatility of Bitcoin prices that the market had witnessed.²⁷ Moreover, as discussed in a later section, the Bitcoin futures would provide lenders means to minimize the lending risks.

19. He, *supra* note 16.

20. He, *supra* note 16.

21. He, *supra* note 16.

22. *XBT-Cboe Bitcoin Futures*, CBOE, <http://cfe.cboe.com/cfe-products/xbt-cboe-bitcoin-futures> (last visited Feb. 5, 2019) (“Gemini Trust Company, LLC (Gemini) is a digital asset exchange and custodian founded in 2014 that allows customers to buy, sell, and store digital assets such as bitcoin, and is subject to fiduciary obligations, capital reserve requirements, and banking compliance standards of the New York State Department of Financial Services.”).

23. See Cheng, *supra* note 17 (noting the differences between CME and CBOE trading on bitcoin futures); see also Celan Bryant, *Bitcoin Futures: Why I Trade BTC (CME), Not XBT (CBOE)*, SEEKING ALPHA (Dec. 19, 2017, 1:22 PM), <https://seekingalpha.com/article/4132773-bitcoin-futures-trade-btc-cme-xbt-cboe> (highlighting the differences between CME and CBOE on bitcoin futures).

24. *CME Bitcoin Futures Frequently Asked Questions*, *supra* note 14; see also Lanre Sarumi, *Understanding Futures: A Primer for Bitcoiners*, COINDESK (Dec. 11, 2017, 6:45 PM), <https://www.coindesk.com/understanding-futures-primer-bitcoiners> (explaining futures and that the exchanges are regulated by Commodity Futures Trading Commission (CFTC)).

25. *XBT-Cboe Bitcoin Futures*, *supra* note 22.

26. *XBT-Cboe Bitcoin Futures*, *supra* note 22; see also Sarumi, *supra* note 24.

27. Alexander Osipovich, *Bitcoin Futures Set to Start Trading as Regulator Gives Thumbs Up*, WALL STREET J. (Dec. 1, 2017, 3:43 PM), <https://www.wsj.com/articles/regulator-opens-way-to-bitcoin-futures-1512133201> (stating that the U.S. Commodity Futures Trading Commission's decision is a “potentially huge step in the evolution of the digital currency, making trading bitcoin easier for Wall Street bans and small investors alike.”).

More than three years before Bitcoin futures trading, the IRS issued Notice 2014-21 to treat Bitcoins and other virtual currency as property for U.S. federal tax purposes.²⁸ According to the Notice, virtual currency is a digital representation of value that functions as a medium of exchange and operates like “real” currency but without legal tender status.²⁹ The IRS noted virtual currency has an equivalent value in real currency and can be converted into U.S. dollars and other real and virtual currency.³⁰ That means virtual currency can be used to pay for goods or services or held for investment.³¹ In a sale or exchange of convertible virtual currency like Bitcoin, the IRS applies existing general tax principles to transactions using virtual currency.³² Accordingly, a taxpayer realizes capital gain or loss on the sale or exchange of virtual currency that is a capital asset in the hands of the taxpayer.³³ To be qualified for a capital gain, the taxpayer must hold the Bitcoin as a capital asset for more than one year.³⁴ The taxpayer then enjoys the favorable, low tax rate for capital gain when the taxpayer sells or exchanges the Bitcoin.³⁵ When holding the Bitcoin for less than one year, the taxpayer faces a higher tax rate for ordinary income when the taxpayer engages in a

28. I.R.S. Notice 2014-21, 2014-16 I.R.B. 938.

29. *Id.*

30. *Id.*

31. *Id.*

32. *Id.*

33. The Notice provides a set of Frequently Asked Questions. Question 7 asks: “What type of gain or loss does a taxpayer realize on the sale or exchange of virtual currency?” with the answer stating:

The character of the gain or loss generally depends on whether the virtual currency is a capital asset in the hands of the taxpayer. A taxpayer generally realizes capital gain or loss on the sale or exchange of virtual currency that is a capital asset in the hands of the taxpayer. For example, stocks, bonds, and other investment property are generally capital assets. A taxpayer generally realizes ordinary gain or loss on the sale or exchange of virtual currency that is not a capital asset in the hands of the taxpayer. Inventory and other property held mainly for sale to customers in a trade or business are examples of property that is not a capital asset. See Publication 544 for more information about capital assets and the character of gain or loss.

Id.

34. Kushal Agarwal, *Are There Taxes on Bitcoins?*, INVESTOPEDIA, <https://www.investopedia.com/articles/investing/040515/are-there-taxes-bitcoins.asp> (last visited Feb. 5, 2019) (explaining the short-term and long-term capital gains tax for bitcoin transactions).

35. *Id.*

sale or exchange of the Bitcoin.³⁶ In other words, Notice 2014-21 has serious tax consequences to Bitcoiners.³⁷ The tax issue has direct impact on the lending market with Bitcoins as collateral because some Bitcoiners may want access to finance without selling their Bitcoins and paying the high rate for ordinary income.

While the SEC, IRS, CBOE, and CME decisions all have impact on the lending market with Bitcoins as collateral, the proposed model law from NC-CUSL does not, because it addresses the regulation of virtual currency business.³⁸ The Uniform Regulation of Virtual Currency Business Act merely relates to the licensure of entities engaging in virtual currency.³⁹ The Act does not regulate the virtual currency itself.⁴⁰ Currently, no state has adopted the proposed model law or any version of the law. Nevertheless, the proposed model law sheds light on what the drafters are currently thinking about virtual currency and confirms what the Bitcoins lending market has been experiencing: that Bitcoins and other virtual currency have value, and they are not going away.

III. THE LENDING MARKET WITH BITCOINS AS COLLATERAL: CASE STUDY

Throughout the history of lending, anything of value has been able to serve as security for payment. From tangible to intangible property, lenders

36. *Id.*; see also Vincenzo Villamena, *Everything You Need to Know About Bitcoin and Your Taxes*, CNBC (Feb. 21, 2018, 10:32 AM), <https://www.cnbc.com/2018/02/21/everything-you-need-to-know-about-bitcoin-and-your-taxes.html>.
37. Darla Mercado, *This Cryptocurrency Tax Mistake Could Cost You \$250,000*, CNBC (Apr. 12, 2018, 11:36 AM), <https://www.cnbc.com/2018/04/12/cryptocurrency-tax-mistakes-could-cost-you-250000.html> (reporting that the IRS has sent out warning to remind all filers that “any income stemming from” cryptocurrency transactions “must be reported on their tax returns”).
38. UNIFORM REGULATION OF VIRTUAL-CURRENCY BUSINESS ACT §§ 103(a)-(c), 102(25)(A) (UNIF. LAW COMM’N 2017), http://www.uniformlaws.org/shared/docs/regulation%20of%20virtual%20currencies/URVCBA_Final_2017oct9.pdf (“Virtual-currency business activity means exchanging, transferring, or storing virtual currency; holding electronic precious metals or certificates of electronic precious metals; or exchanging digital representations of value within online games for virtual currency or legal tender.”).
39. The Virtual Currency Businesses Act regulates persons with the following business activities: “(1) the exchange of virtual currencies; (2) the transfer of virtual currencies from one person to another; or (3) certain custodial or fiduciary services in which the property or asset under the custodian’s control are considered ‘virtual currency.’” Kristen Peters Watson, *Uniform Regulation of Virtual-Currency Businesses Act Offers States Regulatory Framework for the Virtual Currency Industry*, LEXOLOGY (Jan. 11, 2018), <https://www.lexology.com/library/detail.aspx?g=35b99670-7c77-4db6-8b69-53ce4ec21410>.
40. *Id.*

rely on old and new types of personal property in secured transactions. Bitcoins are of no exception to lenders, as they have watched the meteoric rise of Bitcoins in value.⁴¹ Lenders and the public witnessed that anyone who had purchased Bitcoins prior to November 11, 2017, at the price of \$5,939 per coin, would make a profit if they sell the coins at any time.⁴² On December 16, 2017, the price peaked at \$19,184, and as of today, the price is \$3,607.⁴³ The market capitalization of Bitcoins alone is currently about \$114 billion of all coins.⁴⁴ In other words, Bitcoins and other virtual currencies are too valuable for would-be lenders to ignore. Moreover, tax avoidance is a strong incentive for some Bitcoin holders to seek loans instead of selling their Bitcoins outright and paying either short-term or long-term capital gains tax on their profits.

Given the volatility of Bitcoin value, banks don't dare to tread in lending with only Bitcoins as collateral.⁴⁵ This opens the door for startups in the lending market. The startup lenders are numerous, including SALT Lending,⁴⁶ Nebeus,⁴⁷ CoinLoan,⁴⁸ ETHLend,⁴⁹ ELIX,⁵⁰ Jibrel Network,⁵¹ BTCPop,⁵² DigitalX,⁵³ and HIVE Project,⁵⁴ just to name a few.

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41. *Bitcoin Cash Charts*, BITCOIN, <https://charts.bitcoin.com/chart/price> (last visited Feb. 5, 2019).
 42. *Id.*
 43. *Bitcoin (BTC)*, COINDESK, <https://www.coindesk.com/price/bitcoin> (last visited Feb. 5, 2019).
 44. *Market Capitalization of Bitcoin from 1st Quarter 2012 to 3rd Quarter 2018 (in Billion U.S. Dollars)*, STATISTA, <https://www.statista.com/statistics/377382/bitcoin-market-capitalization/> (last visited Feb. 5, 2019).
 45. Banks are regulated and typically don't engage in speculative loans with non-traditional collateral like bitcoins. See *First Came Bitcoin, Then Came Bitcoin Lenders*, *supra* note 7 (reporting that while "banks hang back, startups . . . are diving into the breach").
 46. SALT, <https://www.saltlending.com> (last visited Feb. 5, 2019) (providing blockchain-backed loans: "hold your assets, get your cash").
 47. NEBEUS, <https://nebeus.com> (last visited Feb. 5, 2019) (bragging that the company is "Nebeus Crypto Bank" and is "building bridges between crypto and fiat fiancé").
 48. COINLOAN, <https://coinloan.io> (last visited Feb. 5, 2019) (providing "loans secured by cryptoassets").
 49. ETHLEND, <https://ethlend.io/en> (last visited Feb. 5, 2019) (stating that it is a place for "decentralized lending", serving as a "decentralized and secure financial marketplace for peer to peer lending agreements using Blockchain and Smart Contracts").
 50. ELIX, <https://www.elixirtoken.io> (last visited Feb. 5, 2019) ("a crowdfunding, payment ledger, and lending platform").
 51. JIBREL NETWORK, <https://jibrel.network> (last visited Feb. 5, 2019) (providing blockchain implementations for banks and "non-banks financial institutions");

Among these startup lenders, there are currently three distinct business models: direct lending, peer-to-peer lending, and factoring to small- and medium-sized business enterprises (SMEs).⁵⁵ A closer examination of each business model reveals how enterprising startup lenders capture their niche, and the competition is relentless, as seen in the next three case studies: Unchained Capital, SALT Lending, and Hive. But before devoting our time to the three lending models, a brief discussion on borrowers is necessary for a more complete understanding of the market.

A. Profiling the Borrowers in Crypto Lending

Lenders in cryptocurrencies know their borrowers under the Know Your Customer Anti Money Laundering (KYCAML) mantra. In the knowing your customer assessment, lenders evaluate the likelihood that borrowers will make payments, meet other contractual obligations, and comply with anti-money laundering laws.⁵⁶ Currently, lenders encounter various potential borrowers, organized in the four groups below.

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- see also White Paper, JIBREL NETWORK, [https://jibrel.network/assets/white_paper/Jibrel%20Network%20-%20White%20Paper%20\(2nd%20Draft\).pdf](https://jibrel.network/assets/white_paper/Jibrel%20Network%20-%20White%20Paper%20(2nd%20Draft).pdf) (last visited Feb. 5, 2019); Mike Butcher, *With Ethereum Wallets Under Constant Attack, Jibrel Network Decided to Build Their Own*, TECHCRUNCH (Nov. 22, 2017), <https://techcrunch.com/2017/11/22/with-ethereum-wallets-under-constant-attack-jibrel-network-decided-to-build-their-own>.*
52. BTCPOP, <https://btcpop.co/home.php> (last visited Feb. 5, 2019) (providing loans on peer to peer lending platform based on “reputation, not credit score”).
 53. *See DigitalX Limited: Stock Information*, REDCHIP, https://www.redchip.com/assets/reports/DCC_ResearchProfile_20160526_2.html (last visited Feb. 5, 2019) (stating that DigitalX looks into “potential for peer-to-peer lending for the under-banked. Most of these services represent very large, multibillion dollar markets. The p2p lending market, in particular, has shown extremely rapid growth, and many of these other potential services are expected to grow significantly in the next five years.”).
 54. HIVE, <https://www.hive-project.net> (last visited Feb. 5, 2019) (“a blockchain based platform providing you fast and low-cost liquidity”). Hive asserts that by “applying blockchain technology to factoring, the Hive Project Platform will create a distributed and highly efficient public ledger to open up new sources of finance to SMEs.” *Id.*
 55. *See New Approaches to SME and Entrepreneurship Financing: Broadening the Range of Instruments*, ORG. FOR ECONOMIC CO-OPERATION & DEVEL. (Oct. 2015) <http://dx.doi.org/10.1787/9789264240957-en>.
 56. *See Know Your Customer, Anti-Money Laundering & Surveillance Policy*, TRADE WINDS <http://tradewindsindia.com/PMLA.pdf> (last visited Feb. 5, 2019).

i. The Miners

One category of crypto borrowers are miners.⁵⁷ One lender has revealed that thirty percent of its customers are businesses, including miners.⁵⁸ Cryptocurrency mining encounters different periods of computational difficulty.⁵⁹ When miners face a computationally challenging period, they may need to purchase additional hardware in order to stay competitive.⁶⁰ Constant mining equipment upgrades for each cycle is the typical hardship to which miners must respond.⁶¹ The miner's equipment purchase needs, however, may not coincide with a favorable time in the marketplace for the miner to sell Bitcoins previously earned.⁶² The miner may wish to obtain a loan to purchase the equipment instead of selling Bitcoins for the purchase.⁶³ Miners want the freedom to be able to sell when the price is right, not when they are forced to sell to adjust to the demand of additional hardware.⁶⁴

ii. The Funds

Another category of borrowers is funds, including crypto investment funds and private funds. The funds have received capital from original founders and individuals who were early acquirers of Bitcoins that are now literally "sitting on several million dollars" in cryptocurrency.⁶⁵ The funds, however, want to hold onto their Bitcoins but desire to make equity investment in some new startups, including "leveraged investment against another crypto asset."⁶⁶ Lenders characterize the funds' behavior as "another form of

57. Mining for cryptocurrency is "the complex process in which computers solve a complicated math puzzle to win a stack of virtual currency." Paul Roberts, *This Is What Happens When Bitcoin Miners Take Over Your Town*, POLITICO (Mar./Apr. 2018), <https://www.politico.com/magazine/story/2018/03/09/bitcoin-mining-energy-prices-smalltown-feature-217230>.

58. See Transcript of Interview by Clay Collins with Dhruv Bansal, a founder of Unchained Capital (Jan. 30, 2018), <https://blog.nomics.com/flipping/dhruv-bansal-unchained-capital-bitcoin-loans> [hereinafter Transcript].

59. *Id.*

60. *Id.*

61. *Id.*

62. *Id.*

63. See Vincent Ryan, *Lenders Now Taking Bitcoin as Collateral*, CFO (Jan. 4, 2018), <http://ww2.cfo.com/credit/2018/01/lenders-now-taking-bitcoin-collateral> (stating that miners need the loan to purchase more mining equipment).

64. Transcript, *supra* note 58.

65. Transcript, *supra* note 58.

66. Transcript, *supra* note 58.

leverage, just leveraging outside of crypto currency into other forms of assets like private company stock.”⁶⁷

iii. The Income Investors

The income investors who had bought lots of Bitcoins earlier now need to have money to buy houses, fix them up, and sell them for profit.⁶⁸ Lenders refer to this as a “use case,” and the ultimate goal of these “use cases” is income.⁶⁹ One lender has reported that thirty to forty percent of its borrowers use the loans to invest in real estate.⁷⁰

iv. The SMEs

Lending against cryptocurrency is within the scope of secured transactions governed by Article 9 of the U.C.C.⁷¹ Other transactions include the sale of accounts receivables, chattel paper, payment intangibles and promissory notes, among others.⁷² That means the scope of secured transactions is quite broad. In the cryptocurrency space, there are SMEs desiring to sell their accounts receivables to financiers. These small businesses are desperate for funds, cannot wait on the long billing cycle to collect from their customers, and are willing to sell their accounts receivables at a discount.⁷³ As the sale of accounts receivables is within the scope of Article 9, the financiers follow the secured transactions laws to protect their interest in the accounts.⁷⁴ As explained below in one of the business models, cryptocurrency is used in facilitating accounts receivables financing, which is also referred to as invoice financing.

67. Transcript, *supra* note 58; *see also* Ryan, *supra* note 63 (reporting that there are demands for loans from “cryptocurrency-native businesses, like exchanges and crypto-funds, that have working capital and cash-flow needs.”).

68. Transcript, *supra* note 58.

69. Transcript, *supra* note 58.

70. Penny Crosman, *Crypto Lending May Be Risky, But These Firms Say They’ve Solved the Riddle*, AM. BANKER (Apr. 30, 2018, 9:00 AM), <https://www.americanbanker.com/news/crypto-lending-may-be-risky-but-these-firms-say-theyve-solved-the-riddle>.

71. U.C.C. § 9-109(a)(1) (AM. LAW INST. & UNIF. LAW COMM’N 2018).

72. *Id.* § 9-109(a)(3).

73. *Why You Should Be Selling Accounts Receivable at a Discount*, FACTORING J. (Oct. 17, 2016), <https://factoringjournal.com/ar-invoicing/selling-accounts-receivable-discount>.

74. U.C.C. § 9-108(b)(2).

B. Direct Lending: Unchained Capital

An Austin-based company, Unchained Capital, offers direct lending to the public with loans secured by Bitcoins and Ethers.⁷⁵ Unlike any other financial business models involving Bitcoins, Unchained Capital does not require membership fees from potential borrowers.⁷⁶ Nor does it require potential borrowers to purchase tokens before they can leverage their crypto assets as collateral.⁷⁷ That also means Unchained Capital has made lending against crypto assets easier, as it dispenses with these burdensome steps.⁷⁸ Thus, Unchained Capital must have received its own capital from investors because it does not issue coins or tokens for financial resources, and it does not rely on others to function as lenders.⁷⁹

Borrowers submit their loan applications at Unchained Capital's website, and the process should only take minutes to complete.⁸⁰ Unchained Capital renders its decision on a loan application within twenty-four hours.⁸¹ Coinholders can borrow up to one million dollars and face interest rates of twelve to fourteen percent for a two-year term.⁸² The loans are interest-only.⁸³ That means the borrowers will pay monthly interest payments.⁸⁴ The borrowers use their existing wallets to send the collateral to their new loan's vault address provided by Unchained Capital.⁸⁵ As with any loan in traditional lending, Unchained Capital's loans are over-collateralized with

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75. Unchained Capital expanded to the California market in March 2018. The company is now operating in thirty-five states. See David Bently, *Unchained Capital Approved for Crypto-Backed Loans in California*, BLOCKCHAIN (Mar. 12, 2018), <http://www.the-blockchain.com/2018/03/12/unchained-capital-approved-for-crypto-backed-loans-in-california>; see also Crosman, *supra* note 70.
76. *Unchained Capital Announces Crypto-Secured Loans are Now Available to the Public*, BUS. WIRE (Nov. 30, 2017, 9:00 AM), <https://www.businesswire.com/news/home/20171130005323/en/Unchained-Capital-Announces-Crypto-Secured-Loans-Public>.
77. *Id.*
78. *Id.*
79. *Id.*
80. *How It Works*, UNCHAINED CAPITAL, https://www.unchained-capital.com/how_it_works (last visited Feb. 5, 2019).
81. *Id.* Prior to approving the loan, Unchained Capital conducts some due diligence, known as KYCAML procedures, on the borrowers. See Transcript, *supra* note 58.
82. *How It Works*, *supra* note 80.
83. *How It Works*, *supra* note 80.
84. *How It Works*, *supra* note 80.
85. *How It Works*, *supra* note 80.

Bitcoins and Ethers at a two to one ratio of loan to collateral value.⁸⁶ When the loan is due, the borrower makes the final payment, and Unchained Capital returns the collateral to the borrower's address.⁸⁷

If the value of the collateral drops by twenty-five percent, Unchained Capital will request additional collateral or accelerate the rate of the loan.⁸⁸ In the event that there is a drastic drop in value of the collateral by forty-five percent or more, Unchained Capital has the right to repossess the collateral and sell it to recover the outstanding amount.⁸⁹

Illustratively, Unchained Capital provides what its loan pricing looks like for a \$10,000 loan with Bitcoin or Ether collateral: "A \$10,000 loan for 2 years costs \$2,500 with \$100 in monthly interest payments and one payment of \$10,000 due at maturity with an Annual Percentage Rate (APR) of 12.5%."⁹⁰

Presently, the average loan size issued by Unchained Capital is \$120,000 at a twelve percent interest rate.⁹¹ In the lending against Bitcoins space, Unchained Capital is a newcomer, and therefore benefits through learning from earlier lenders' failures.⁹² As a startup launched in late 2017, the Company has issued more than \$3 million loans secured by Bitcoins and Ethers and received \$10 million in capital backing.⁹³ Its simplified business model quickly enabled the Company to expand to the California market after three months in operation once it had received inbound interest from coinholders in that market to meet the demand.⁹⁴

C. Lender-to-Borrower (L2B): SALT Lending Platform

At the other end of lending with Bitcoin collateral is the Lender-to-Borrower (L2B) lending platform. There are many competitors in the L2B lending business: notably, SALT Lending, ETHlend, Nebeus, Bitbonds,

86. *How It Works*, *supra* note 80; *see also* Crosman, *supra* note 70 (discussing Unchained's loan ratio to collateral value).

87. *How It Works*, *supra* note 80.

88. *How It Works*, *supra* note 80.

89. *How It Works*, *supra* note 80.

90. *How It Works*, *supra* note 80.

91. *See* Crosman, *supra* note 70 (reporting on Unchained's lending activities).

92. *See* Transcript, *supra* note 58; *see also* Brady Dale, *NY Wealth Manger to Issue Loans Against Bitcoin*, COINDESK (Mar. 9, 2018, 12:30 PM), <https://www.coindesk.com/cash-hodl-family-office-offer-loans-bitcoin> (noting BTCJam and BitLending Club ended their lending business against Bitcoins while Bitbond barely survived and new companies emerged).

93. *See* Transcript, *supra* note 58.

94. Naxo is another example of direct lending against crypto assets. *See* Transcript, *supra* note 58; *see also* Crosman, *supra* note 70 (reporting that Unchained is also operating in other states).

CoinLoan, and BTCPOP, among others. Some of these companies are from England (Nebeus), Germany (Bitbond), Marshall Islands (BTCPOP), Estonia (ETHLend), and the United States.⁹⁵

SALT Lending typifies the FinTech L2B business model.⁹⁶ The L2B lending model facilitates transactions from lenders in different parts of the world and matches them with borrowers with crypto assets.⁹⁷ The platform aims to reach large audiences worldwide, offering English, Spanish, Chinese, Japanese, Dutch, and Russian as language choices for lenders and borrowers.⁹⁸ The loan disbursement is in the borrower's currency: the U.S. dollar, euro, British pound, Japanese yen, Chinese RMB, and Swiss franc.⁹⁹ That means borrowers don't incur additional costs in money exchange.

As SALT Lending is organized under U.S. law, the company requires all lenders to be accredited investors under Regulation D of 17 C.F.R. § 230.501 et seq. and have passed the SALT Lending Suitability Test.¹⁰⁰ Potential borrowers must first purchase a level of SALT membership.¹⁰¹ The loan amount a borrower may borrow is dependent on the level of SALT membership.¹⁰² The lowest level, with one SALT per year, allows borrowers to access up to \$10,000 in loans for three to twenty-four month terms.¹⁰³ One

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95. Angela Scott-Briggs, *Interview with Stani Kulechov the CEO of ETHLend: Decentralized Lending, Using Ethereum*, TECHBULLION (Oct. 11, 2017), <https://www.techbullion.com/ethlend-decentralized-lending-using-ethereum>.
 96. Jake Frankenfield, *Is SALT Blockchain-Based Lending the Future of All Personal Loans?*, INVESTOPEdia, <https://www.investopedia.com/tech/salt-secured-automated-lending-technology-blockchain/> (last updated May 28, 2018) (explaining SALT's business model).
 97. *Commercial Lending Model*, BANK OF QUEENSLAND LTD. (Apr. 29, 2013), <https://financialservices.royalcommission.gov.au/public-hearings/Documents/exhibits-2018/24-may/EXHIBIT-3-34-48.pdf>.
 98. ETHLEND, *supra* note 49 (providing a list of language for users to click and change).
 99. SALT, *supra* note 46 (listing the currency borrowers can obtain).
 100. *How Do I Become a Lender?*, SALT, <https://web.archive.org/web/20180510230847/https://saltlending.zendesk.com/hc/en-us/articles/115009447628-How-do-I-become-a-lender-> (last visited Feb. 5, 2019).
 101. *How Do I Become a Borrower?*, SALT, <https://saltlending.zendesk.com/hc/en-us/articles/115009218247-How-do-I-become-a-borrower-> (last visited Feb. 5, 2019).
 102. *What is a Salt Membership?*, SALT, <https://saltlending.zendesk.com/hc/en-us/articles/115009162787-What-is-a-SALT-Membership-> (last visited Feb. 5, 2019); *see also* *Am I Eligible for a Salt Loan?*, SALT, <https://saltlending.zendesk.com/hc/en-us/articles/115009217567-Am-I-eligible-for-a-SALT-loan-> (last visited Feb. 5, 2019).
 103. *How Much Can I Borrow?*, SALT, <https://saltlending.zendesk.com/hc/en-us/articles/115009218327-How-much-can-I-borrow-> (last visited Feb. 5, 2019);

SALT equals one transaction. The premier membership, with thirty SALT per year, can gain access to term financing and a line of credit up to \$100,000.¹⁰⁴ The loan amount can be disbursed in dollars, euros, pounds, yens, and RMB.¹⁰⁵ The highest enterprise levels with one hundred SALT per year, can obtain up to \$1,000,000 in loans in ad hoc currency selection.¹⁰⁶

SALT is decentralized in the sense that there is no authority vetting potential borrowers for credit worthiness to make more loans available to borrowers.¹⁰⁷ There are no origination fees, closing costs, or prepayment penalties on SALT's fixed rate term loans.¹⁰⁸ SALT's lenders do not charge borrowers additional costs if they wish to pay off their loans early.¹⁰⁹ Borrowers must post their Bitcoins as collateral to SALT, and the lender's funds will be deposited to the borrower's bank account.¹¹⁰

To obtain some of its own funding, SALT issued its initial public coin offering in Q3 2017.¹¹¹ Currently, a SALT token offered on its lending platform is at a preset price of \$27.50, but it is also available on exchanges at a fraction of the preset price.¹¹² SALT still has a total fixed supply of 120,000,000 membership units.¹¹³ As of February 2018, SALT had made loans for a total of \$7 million backed by Bitcoins.¹¹⁴

see also SALT, *supra* note 46; Steven Buchko, *What is SALT Lending? Beginner's Guide*, COINCENTRAL (Jan. 10, 2018), <https://coincentral.com/salt-lending-beginner-guide> (explaining different tiers of SALT membership).

104. SALT, *supra* note 46.

105. SALT, *supra* note 46.

106. SALT, *supra* note 46.

107. Kaustav, *SALT Bringing Loans to the Crypto Universe*, GLOBAL COIN REP. (Mar. 14, 2018), <https://globalcoinreport.com/bringing-loans-to-the-crypto-universe-salt>.

108. *Are There Any Origination or Prepayment Fees?*, SALT, <https://saltlending.zendesk.com/hc/en-us/articles/115009285307-Are-there-any-origination-or-prepayment-fees-> (last visited Feb. 5, 2019).

109. *Id.*

110. Charles Custer, *SALT Lending Review- Crypto-Collateralized Loans*, COINS REV. (Feb. 2, 2018), <https://coinreviews.io/salt-coin-review>.

111. *See* Buchko, *supra* note 103.

112. *See* Custer, *supra* note 110.

113. Kaustav, *supra* note 107 ("At the time of writing (13/03/2018) SALT has a market cap of \$173,635,995 USD with a present circulating supply of 55,745,114 SALT. The total supply of tokens in the network is kept fixed at 120,000,000 SALT.").

114. *See* Custer, *supra* note 110.

D. Invoice Financing for SMEs: HIVE Project

SMEs typically have to wait anywhere between thirty to ninety days in the billing cycle to get paid from their customers. SMEs, however, are often desperately in need of funding and cannot wait for that long period of time. Some SMEs sell their accounts receivables or invoices to financiers at a discount in order to access immediate funding. This type of financing is called factoring or invoice financing and is within the scope of secured transactions law.¹¹⁵ Globally, invoice financing surpassed \$3 trillion in 2016.¹¹⁶

The HIVE Project is a peer-to-peer platform where SMEs can post their invoices for sale and financiers can buy the invoices at a discount.¹¹⁷ HIVE employs its own credit scoring algorithms to provide a real-time assessment of each invoice seller to ascertain level of risk.¹¹⁸ Though the invoice buyer and SME seller of an invoice can set their own price, HIVE would use its credit scoring of the SME to suggest a price to the invoice buyer.¹¹⁹ If the invoice buyer fails to settle its invoice, the financier can then sell the purchased invoice in a secondary market.¹²⁰ In the event that the invoice defaults (the seller's customers cannot pay on the invoice when due), the invoice will be forwarded to a collection agency or entity as in the traditional invoice financing market.¹²¹ HIVE promises to make claim insurance available to financiers, and the claims will be paid only with HIVE tokens, or HVN.¹²²

A HIVE token, or HVN, grants holders the right to claim ownership of invoices sold on the HIVE platform and obtain credit scores of SMEs.¹²³ In September 2017, the HIVE Project issued its ICO and has since attracted

115. See Part IV *infra* (discussing secured transactions law and technology solutions).

116. Dejan R., *How Big is the Market?*, HIVE (Nov. 2017), <http://hive-project.zendesk.com/hc/en-us/articles/115002794771-3-How-big-is-the-market>.

117. Dejan R., *Who Can Use the Hive Project Platform?*, HIVE (Nov. 2017), <https://hive-project.zendesk.com/hc/en-us/articles/115002791932-5-Who-can-use-the-Hive-Project-Platform>.

118. Dejan R., *What Assurances Do I Have that I Will Be Repaid?*, HIVE (Nov. 2017), <https://hive-project.zendesk.com/hc/en-us/articles/115002792832-6-What-assurances-do-I-have-that-I-will-be-repaid>.

119. Dejan R., *What Are the Passive Returns for Holding HVN Tokens?*, HIVE (Nov. 2017), <https://hive-project.zendesk.com/hc/en-us/articles/115002795811-4-What-are-the-passive-returns-for-holding-HVN-tokens>.

120. *Id.*

121. *Id.*

122. *Id.*

123. Dejan R., *What is HVN Token?*, HIVE (Nov. 2017), <https://hive-project.zendesk.com/hc/en-us/articles/115002792432-1-What-is-HVN-Token>.

believers to acquire seventy-five percent of its HVN tokens.¹²⁴ It is the first crypto startup in the invoice financing market.¹²⁵ Its market capitalization, as of April 16, 2018, is above \$16 million.¹²⁶

IV. THE LAW AND TECHNOLOGY RESPONSE: CASE STUDY

When a lender provides a loan or extends a credit line and accepts a security interest in the debtor's property, the lender typically employs one of the perfection methods to establish its priority against other creditors, bankruptcy trustees, buyers, and any other party who may have a right in the same property. Naturally, in the crypto lending market, the lenders or creditors who accept cryptocurrency as collateral want to perfect their security interest to ensure their priority in the cryptocurrency. There has been a robust discussion as to how cryptocurrency should be classified in order for the lender to use the most appropriate method of perfection to achieve optimal results in priority of conflicting interests.¹²⁷ The discussion will not be repeated in length here. In summary, some have raised concerns about the flaws in the current Article 9 of the U.C.C. and suggested that cryptocurrency be classified as "general intangibles" or "investment property" for perfection either through filing the financing statement or by taking control, respectively.¹²⁸ As the crypto lending market is still in its nascent stage, an examination of

124. HIVE issued 500 million HVN tokens. HIVE founders control sixteen percent of the issued tokens. Dejan R., *How Many HVN Tokens Exist and How Many are in Circulation?*, HIVE (Nov. 2017), <https://hive-project.zendesk.com/hc/en-us/articles/115002795311-5-How-many-HVN-tokens-exist-and-how-many-are-in-circulation>; see also *Hive Project*, COIN MARKET CAP, <https://coinmarketcap.com/currencies/hiveterminal-token/> (last visited Feb. 5, 2019).

125. HIVE platform will be available to SMEs in Slovenia, Austria, and Croatia during the first phase in Q1/2018. HIVE plans to then expand the platform in Germany, Scandinavia, Bulgaria, the Czech Republic, Slovakia, Poland, Hungary, the UK, France, the Gulf countries, and the United States. It will launch "peer-to-peer lending, giving individuals the chance to buy and sell invoices from each other." Dejan R., *How Will HIVE Project be Rolled Out?*, HIVE (Aug. 2018), <https://hive-project.zendesk.com/hc/en-us/articles/115002794851-6-How-will-Hive-Project-be-rolled-out>.

126. *Hive Project*, *supra* note 124.

127. See, e.g., Kevin Tu, *Rethinking Virtual Currency Regulation in the Bitcoin Age*, 90 WASH. L. REV. 271, 305–06 (2015); Daniela Sonderegger, *A Regulatory and Economic Perplexity: Bitcoin Needs Just a Bit of Regulation*, 47 WASH. U.J.L. & POL'Y 175, 191–95 (2015).

128. See, e.g., Lorena Yashira Gely-Rojas, *Cryptocurrencies and the Uniform Commercial Code: The Curious Case of Bitcoin*, 8 U. PUERTO RICO BUS. L.J. 129, 138 (2017); Lance P. Martin, *Can I Secure a Loan with Bitcoin?*, NAT'L L. REV. (Apr. 8, 2018), <https://www.natlawreview.com/article/can-i-secure-loan-bitcoin-part-i>. For various definitions of different types of collateral, see U.C.C. § 9-102.

how startups have combined technology and law in designing their business model is necessary prior to any suggestion for a change to existing legal framework.

The sudden rise in the value of Bitcoins in December 2017 has brought much excitement to the crypto lending market. Lenders in this market are startups who fiercely engage in competition against each other. Their legal and technological responses promise that there will be more to come.¹²⁹ For now, I will focus on two case studies showcasing the market response.

A. Multisig Smart Contract

Lenders like SALT Lending use multi-signature (multisig) smart contracts in their lending transactions.¹³⁰ SALT smart contracts operate on the Ethereum Blockchain.¹³¹ A multisig contract requires several signatures from different parties to a transaction to enhance security.¹³² A smart contract is a contract that includes the terms of the agreement, and it is “smart” because the cryptographic code has been programmed to self-execute on the terms of the agreement.¹³³

In a SALT lending transaction, the crypto asset collateral is stored in unique, three-of-four multisig smart contracts (think: wallets).¹³⁴ The bor-

129. Professor Ronald J. Mann discusses the law and technology response in “smart” lien, focusing on perfection of security interest directly on the blockchain. See Ronald J. Mann, *Reliable Perfection of Security Interests in Crypto-Currency*, 21 SMU SCI. & TECH. J. 101 (2018).

130. Transcript, *supra* note 58 (“SALT offers in terms of managing funds with smart contracts. It sounds very sexy but to me it’s a little frightening. As a person who writes smart contracts, I know what bugs are capable of doing. Their code is not open source, it’s difficult for me to trust that what they say is happening is really happening.”).

131. Vanessa_SALT, *On What Blockchain is the Technology Built?*, SALT (July 2018), <https://saltlending.zendesk.com/hc/en-us/articles/115009111567-On-what-blockchain-is-the-technology-built>.

132. See Kevin Werbach & Nicolas Cornell, *Contracts Ex Machina*, 67 DUKE L.J. 313, 345 (2017) (explaining mutisig or multiple signature verification is also automated in smart contracts and that in order for “a multisig smart contract to execute, more than one party must provide its private encryption keys, indicating approval to execute the previously agreed-upon transaction”).

133. The term was first proposed by Nick Szabo in 1994. See Rakesh Sharma, *Understanding Smart Contracts*, INVESTOPEDIA (July 25, 2016, 5:49 PM), <https://www.investopedia.com/news/understanding-smart-contracts/> (explaining the history of smart contracts and their advantages and disadvantages); see also Werbach & Cornell, *supra* note 132 (explaining how smart contracts may alter commercial transactions but will not displace contract law).

134. See Vanessa_SALT, *How are My Funds Stored and Managed?*, SALT (Nov. 2018), <https://saltlending.zendesk.com/hc/en-us/articles/115009443788-How-are-my-funds-stored-and-managed->; Vanessa_SALT, *Can the SALT Oracle Act*

rower, the lender, the SALT Secured Automated Lending Technology or Oracle, and a third party each holds a key (or signature).¹³⁵ If the borrower repays the loan as required per the loan agreement, the Oracle's, the third party's, and the borrower's keys constitute the three-of-four multisig, enabling the transfer of the collateral back to the borrower.¹³⁶ On the other hand, if the borrower breached the loan agreement and is in default, the Oracle's, the third party's, and the lender's keys will unlock the collateral for liquidation purposes to cover the past-due loan.¹³⁷ That means the multisig smart contracts provide the borrower with security and trust and SALT Lending the necessary control over the collateral.

Another control that SALT has over a borrower is the capability of Oracle to function independently. For example, SALT's Oracle monitors the loan, the interest payments, and the value of the crypto asset collateral.¹³⁸ The Oracle issues an alert when the value is below what has been agreed upon by the parties, triggers calls to the borrowers for additional collateral, and keeps the collateral until the borrowers meet the terms of the agreement.¹³⁹ If the borrowers fail to meet their obligations, the Oracle liquidates the collateral in accordance with the loan agreement.¹⁴⁰ The transfer of the collateral, how-

Independently Based on the Need to Liquidate Collateral per the Terms of the Loan?, SALT (Oct. 2018), <https://saltlending.zendesk.com/hc/en-us/articles/115009446888-Can-the-SALT-Oracle-act-independently-based-on-the-need-to-liquidate-collateral-per-the-terms-of-the-loan->.

135. Vanessa_SALT, *Who Holds Keys to Each SALT Collateral Wallet? How Many Keys per Loan?*, SALT (Sept. 2018), <https://saltlending.zendesk.com/hc/en-us/articles/115009443788-Who-holds-keys-to-each-SALT-collateral-wallet-How-many-keys-per-loan>.

136. *Id.*

137. *Id.*

138. SALT Oracle has the following features:

1. Monitoring of both the loan origination and the payments made by the borrower to the lender;
2. Monitoring of the value of the blockchain asset held as collateral;
3. Generation of alerts if the value of the blockchain asset drops below an agreed upon threshold;
4. Triggering of maintenance calls;
5. Storage of collateral until loan terms are fulfilled; and
6. Dispersal and or liquidation of collateral according to loan terms.

Vanessa_SALT, *What is the SALT Oracle Wallet?*, SALT (July 2018), <https://saltlending.zendesk.com/hc/en-us/articles/115009446648-What-is-the-SALT-Oracle-Wallet>.

139. *Id.*

140. *Id.*

ever, requires three of four signatures from the lender, the third party, and Oracle.¹⁴¹

SALT tokens, memberships, and multisig smart contracts are built on ERC-20.¹⁴² The ERC-20 is a standard adopted by all Ethereum token contracts for exchanging of tokens.¹⁴³ SALT's crypto asset collateral is recorded on its native blockchain and transfers of the collateral also occur on-chain.¹⁴⁴ SALT claims that its smart contracts are "among the most secure available,"¹⁴⁵ but some have complained that SALT smart contracts are vulnerable because the software codes are not open source.¹⁴⁶ Hacking has become a frequent problem for users who kept their crypto assets in wallets that are ERC-20 compatible.¹⁴⁷ For example, hackers stole users' funds kept in My-

141. Vanessa_SALT, *Can the SALT Oracle Act Independently Based on the Need to Liquidate Collateral Per the Terms of the Loan?*, SALT (Sept. 2018), <https://saltlending.zendesk.com/hc/en-us/articles/115009446888-Can-the-SALT-Oracle-act-independently-based-on-the-need-to-liquidate-collateral-per-the-terms-of-the-loan>.
142. Vanessa_SALT, *What is a SALT Membership?*, SALT (July 2018), <https://saltlending.zendesk.com/hc/en-us/articles/115009162787-What-is-a-SALT-Membership>.
143. See Michiel Mulders, *A Comparison Between ERC20, ERC223, and the New Ethereum ERC777 Token Standard*, COIN INTELLIGENCE (Feb. 19, 2018), <https://www.cointelligence.com/content/comparison-erc20-erc223-new-ethereum-erc777-token-standard> (reporting that there are 66,468 ERC20 token contracts allowing easy cryptocurrency exchanges to list various tokens on their platforms for trading).
144. Vanessa_SALT, *How does the Technology Interact with the Blockchain?*, SALT (July 2018), <https://saltlending.zendesk.com/hc/en-us/articles/115009446068-How-does-the-technology-interact-with-the-blockchain>.
145. Vanessa_SALT, *What are the Benefits of Smart Contract Based Membership?*, SALT (July 2018), <https://saltlending.zendesk.com/hc/en-us/articles/115009377648-What-are-the-benefits-of-smart-contract-based-Membership>.
146. See Ivan on Tech, *Ethereum Hacked?! ERC-20 Bug Explained*, YOUTUBE (Apr.27, 2018), <https://www.youtube.com/watch?v=sqcN8WS61CI>; see also Transcript, *supra* note 58 (The founder of Unchained Capital has raised security issue with SALT's smart contract: "I don't like the implementation that Salt offers in terms of managing funds with smart contracts. It sounds very sexy but to me it's a little frightening. As a person who writes smart contracts, I know what bugs are capable of doing. Their code is not open source, it's difficult for me to trust that what they say is happening is really happening.").
147. Christian Montoya, *How One Hacker Stole Thousands of Dollars Worth of Cryptocurrency with a Classic Code Injection Hack on EtherDelta and What You can Learn From It*, HACKERNOON (Sept. 25, 2017), <https://hackernoon.com/how-one-hacker-stole-thousands-of-dollars-worth-of-cryptocurrency-with-a-classic-code-injection-a3aba5d2bff0>.

EtherWallet.¹⁴⁸ As of today, there have been no security problems associated with SALT smart contracts.

B. Open Source, Multisig Contracts

Borrowers with ownership of Bitcoins or Ethers may desire simplicity but still need security and safety when they use their cryptocurrency as collateral for a loan. Their concern peaked in July 2017 when Parity wallet failed.¹⁴⁹ Let us take a look at the incident and the associated technology problem and examine how lenders have responded to security concerns.

Parity is a wallet developer for users to store their Ethers. Parity created its multisig Ethereum wallets in which each wallet requires multiple people to sign-off transactions, thus increasing the security level.¹⁵⁰ On July 20, 2017, hackers exploited Parity's software vulnerability and stole \$30 million worth of Ethers holdings belonging to various users: Swarm City, Edgeless Casino, and the æternity blockchain.¹⁵¹ The White Hat Group, upon learning about the vulnerable contracts, rescued and drained the 377,000 Ethers to holding accounts.¹⁵² After the July robbery, Parity updated their multisig wallet software. On November 10, 2017, hackers struck again by freezing Parity's \$280 million held in multi-signature Ethereum wallets.¹⁵³ The hackers did not touch the Ethers, but no one could gain access to their Ethers held in the wallets.¹⁵⁴ Parity blamed a single user, develops199, for inadvertently triggering a software flaw that brought down the wallets and prevented access to them.¹⁵⁵ Parity had coded all of its multisig wallets using a single

148. Maja Rogic, *Ethereum (ETH) Users' Funds Stolen as MyEtherWallet Gets Hacked*, GLOBAL COIN REP. (Apr. 27, 2018), <https://globalcoinreport.com/ethereum-eth-users-funds-stolen-as-myetherwallet-gets-hacked>.

149. See Iain Thomson, *Parity Calamity! Wallet Code Bug Destroys \$280m in Ethereum*, REGISTER (Nov. 7, 2017, 8:10 PM), https://www.theregister.co.uk/2017/11/07/parity_wallet_destroys_280m_ethereum/.

150. See Richard Chirgwin, *\$30 Million Below Parity: Ethereum Wallet Bug Fingers in Mass Heist, Crypto-cash Leak Made Possible by Software Stuff-up*, REGISTER (July 20, 2017, 12:55 AM), https://www.theregister.co.uk/2017/07/20/us30_million_below_parity_ethereum_bug_leads_to_big_coin_heist.

151. *Id.*

152. *Id.*; see also Wolfie Zhao, *\$30 Million Ether Reported Stolen Due to Parity Wallet Breach*, COINDESK (July 20, 2017, 1:05 PM), <https://www.coindesk.com/30-million-ether-reported-stolen-parity-wallet-breach>.

153. Thomson, *supra* note 149; see also Becky Peterson, *The Amount of Ether Frozen in Digital Wallets is Worth \$162 Million—Which Is Less Than Initially Feared*, BUS. INSIDER (Nov. 13, 2017, 4:06 PM), <https://www.businessinsider.com/ethereum-price-parity-hack-bug-fork-2017-11>.

154. See Thomson, *supra* note 149.

155. *Id.*; see also Anthony Akentieve, *Parity Multisign Hacked. Again*, MEDIUM (Nov. 8, 2017), <https://medium.com/chain-cloud-company-blog/parity-multi>

library, and the library contract was not properly initialized, allowing anyone to become its owner and self-destruct the entire library.¹⁵⁶ Moreover, three months before the November freeze, the bug in Parity software was identified on Github, but the Parity team ignored the risk.¹⁵⁷

The Parity wallet hacks posed a challenge to lending against cryptocurrency. Lending cannot occur without a technology solution to ensure users' simplicity and also deliver security and safety. In light of what has happened to Parity wallet, Unchained Capital adopted open source, multisig contracts to provide a law, business, and technology integrated solution.

Unchained Capital's open source smart contract requires at least two keys out of three multisigs to authorize a transaction.¹⁵⁸ The smart contract is accessible via a hosted dApp (distributed application), using a Trezor hardware wallet.¹⁵⁹ A Trezor hardware wallet is a safe device for users to store cryptocurrency because it does not keep them on exchanges.¹⁶⁰ Trezor implements a passphrase feature, making it difficult for hackers to break into the wallet.¹⁶¹ That means Unchained maximizes security by having its Ethereum multisig contracts use "no external contracts, no libraries," avoiding "many sources" of software bugs.¹⁶² In addition, by adopting an open source smart contract, Unchained relies on the community of crypto users to improve software code. Indeed, Unchained released a software bug bounty program with awards up to \$150,000 to entice others to subject its software to rigorous evaluation.¹⁶³

sig-hack-again-b46771eaa838 (explaining how @devops199 exploited Parity's vulnerable multisig wallets).

156. See Akentieve, *supra* note 155.

157. See Rachel Rose O'Leary, *Parity Team Publishes Postmortem on \$160 Million Ether Freeze*, COINDESK (Nov. 15, 2017, 3:05 PM), <https://www.coindesk.com/parity-team-publishes-postmortem-160-million-ether-freeze> (reporting that the software risk was identified on Github three months before the November freeze problem, but Parity team misinterpreted the risk and took no action to secure the wallets).

158. Transcript, *supra* note 58.

159. *Unchained Capital Open-Source Multisig Ethereum Smart Contract and dApp*, BUS. WIRE (Mar. 8, 2018, 9:00 AM), <https://www.businesswire.com/news/home/20180308005461/en/Unchained-Capital-Open-Sources-Multisig-Ethereum-Smart-Contract>.

160. See Sudhir Khatwani, *Which Cryptocoins Does Trezor Hardware Wallet Support?*, COINSUTRA (Sept. 24, 2018), <https://coinsutra.com/trezor-supported-coins>.

161. *Id.*

162. See *Unchained Capital Open-Source Multisig Ethereum Smart Contract and dApp*, *supra* note 159.

163. *Unchained Capital Open-Source Multisig Ethereum Smart Contract and dApp*, *supra* note 159.

Accordingly, Unchained's better secured, open source, multisig contract allows borrowers to pledge their cryptocurrencies, Bitcoins, and Ethers for loans.¹⁶⁴ Borrowers are required to post their cryptocurrencies for collateral in an escrow account.¹⁶⁵ Unchained has control of the crypto collateral and can show to borrowers what Unchained is holding on the client's behalf.¹⁶⁶ By retaining control of the crypto collateral, Unchained can monitor, declare default, and take possession of the collateral when events that trigger default occur.¹⁶⁷

V. FINAL THOUGHTS

Lending against crypto assets like Bitcoins and Ethers mimics asset-based lending in that the credit worthiness of the borrower is not of concern, and instead, the collateral's value is the determinable factor. Multisig smart contracts have simplified the escrow functionality while increasing security to protect the integrity of the transaction. While others have raised concerns related to perfection of security interest in crypto assets, these concerns can be easily addressed under both Article 9 of the U.C.C. and current smart contract technology to ensure that the lender will have priority through control of the crypto asset, in addition to filing a financing statement. As the crypto-asset collateral is recorded on its native chain, filing a financing statement to achieve notice may not be necessary. But we should wait and see. Further, filing a financing statement for perfection of the security interest in the crypto asset may be helpful to the lender if the borrower is later in bankruptcy. The lender will have priority over the bankruptcy trustee, the hypothetical lienor. Without perfection by filing, at least at the present time when the control method is only available for three specific types of collateral (in-

164. *Unchained Capital Open-Source Multisig Ethereum Smart Contract and dApp*, *supra* note 159.

165. *See Terms of Service*, UNCHAINED CAPITAL (June 5, 2018), https://www.unchained-capital.com/terms_of_service.

166. Multisig contracts will act like escrow and execute the terms of the loan agreement between Unchained Capital and borrowers. *Id.*; *see* Werbach & Cornell, *supra* 132, at 344–45 (“Smart contracts mimic the functionality of escrow. The smart contract code can place Bitcoins or other cryptocurrency tokens in a suspended state on the blockchain, where they cannot be spent until performance of the contract. The execution step may be fully automated, or it may be implemented through multiple-signature verification, known as multisig. In order for a multisig smart contract to execute, more than one party must provide its private encryption keys, indicating approval to execute the previously agreed-upon transaction.”).

167. *See* Werbach & Cornell, *supra* 132, at 345; *see also Terms of Service*, *supra* note 165 (stating that borrowers “will be required to transfer your Bitcoin Collateral to a secure escrow account”). Only when the borrowers repay the loan in full will Unchained transfer the cryptocurrency collateral back to the borrowers.

vestment property, letter of credit, and deposit account collateral), the lender may lose out to the hypothetical lienor.

An obvious problem with the discussion here is that it is U.S. centric. Crypto assets are global and many secured lending transactions against Bitcoins occur outside the United States.¹⁶⁸

VI. CONCLUSION

About sixty percent of Bitcoins have not been spent in 2017.¹⁶⁹ They reside in computers worldwide while the holders are watching their value widely fluctuate. Some of their holders are believers, wanting to hold onto the Bitcoins but in need of fiat. Lending against crypto assets has just begun worldwide. Technological solutions in crypto lending is currently apt to encourage more lending to occur. Haste will make waste with respect to changing Article 9, as the current legal framework is sufficient to cover lending against crypto assets.

168. The author will be in Asia in December 2018 to teach and learn from colleagues in secured lending against Bitcoins in various countries. A follow-up essay on how other countries are addressing crypto assets in secured transactions will then be in the works.

169. Transcript, *supra* note 58.