

Designing Effective Regulation for Blockchain-Based Markets

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I. INTRODUCTION

Effective regulation of blockchain-based markets calls for coordination among lawyers, businesses, coders, and lawmakers. How might we achieve adequate coordination and why is it important?¹ This Article takes up these questions, using one example of an increasingly popular type of blockchain-based financial transaction: the issuance of tokens backed by off-chain assets.² The objective here is not to advocate for a particular regulatory

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1. Various projects are currently taking up this challenge, coordinating technological developments with legal infrastructure, working at the intersection of law, code, and distributed ledgers. *See generally* CodeX, STAN. CTR. FOR LEGAL INFORMATICS, law.stanford.edu/codex-the-stanford-center-for-legal-informatics/ [<https://perma.cc/6TW2-8DJP>] (providing an example of one such project); *see, e.g.*, Morris, *infra* note 45 (the same). This article attests to the centrality of these projects as we collectively strive to define “effective regulation” of blockchain-based markets.

2. Property that exists in the off-chain, real world can be “tokenized” or represented by a token on blockchain. The practice of offering security tokens backed by various kinds of off-chain assets has gained traction, and it continues to grow. *See, e.g.*, Artem Tolkahev, *Why DeFi plus Asset Tokenization Will Take Crypto to New Heights*, COINTELEGRAPH (Jan. 17, 2021), <https://cointelegraph.com/news/why-defi-plus-asset-tokenization-will-take-crypto-to-new-heights> [<https://perma.cc/W9WM-ZBFN>] (describing using tokenization and DeFi with real-world assets); Elliot Hill, *What Is an Asset-Backed Token? A Complete Guide to Security Token Assets*, MEDIUM (Feb. 15, 2019) <https://medium.com/ico-launch-malta/what-is-an-asset-backed-token-a-complete-guide-to-security-token-assets-f7a0f111d443> [<https://perma.cc/BQ3V-SHAY>] (defining asset-backed tokens); Patrick Laurent et al., *The Tokenization of Assets Is Disrupting the Financial Industry. Are You Ready?*, 19 INSIDE MAG. DELOITTE 2 (Nov. 2018), <https://www2.deloitte.com/content/dam/Deloitte/lu/Documents/financial-services/lu-tokenization-of-assets-disrupting-financial-industry.pdf> [<https://perma.cc/JH93-WYS6>] (predicting growth of off-chain assets). Real estate transfers and recordings, for example, can transpire on the blockchain. *See Digital Deeds: Blockchain Real Estate Records Come to Ohio*, FRANTZ WARD (May 14, 2019), <https://www.frantzward.com/news-blog/may-2019/digital-deeds-blockchain-real-estate-records-come> [<https://perma.cc/4ALD-F3HX>] (describing the “Blockland Cleveland” initiative that utilizes blockchain technology); Daniel Kuhn, *TechCrunch Founder Sells \$1.6 Million House on Crypto Real Estate Platform*, COINDESK (June 24, 2019, 7:00 AM), <https://www.coindesk.com/techcrunch-founder-sells-1-6-million-house-on-blockchain-real-estate-platform> [<https://perma.cc/5DRR-96XV>] (reporting the sale of a property in San Francisco using Propy, a blockchain-based real estate platform); Stuart Kaplow, *Blockchain Has Come to U.S. Real Estate*, GREEN BLDG. L. UPDATE

treatment for asset tokenization, but rather to use this deal type as a springboard to discuss what “effective regulation” means in the context of blockchain-enabled markets.³

The topic of regulation often conjures a public/private dynamic in which private actors generate and trade financial claims and public agencies control for excessive risks.⁴ Focusing on a public/private dynamic, however, can obscure the regulatory role of complex private-law doctrines (contract and property) that enable enforceable deals in the first place.⁵ Effective regulation of blockchain-based financial transactions will demand both (i) compliance with requirements such as registration of securities offerings, know-your-customer (KYC) rules, and the like, and (ii) attention to the contract and property rules integral to the enforceability of claims on assets. In the context of asset tokenization, security token issuances must comply with any applicable securities and other regulations.⁶ Perhaps more fundamentally, security tokens must represent interests in assets that stakeholders can legally determine in the event of competing claims among investors, issuers, and third parties asserting rights in tokenized assets.⁷

Commentators identify automated compliance as a benefit of transactions expressed as blockchain-based smart contracts.⁸ Automated compliance mechanisms, so far, address the first regulatory challenge—compliance with securities laws and other agency-mandated, bright-line rules.⁹ That is a great development. But asset tokenization depends

(Dec. 16, 2018), <https://www.greenbuildinglawupdate.com/2018/12/articles/codes-and-regulations/blockchain-has-come-to-u-s-real-estate> [<https://perma.cc/P5DF-Y62C>] (discussing recent developments and attempts to incorporate blockchain in property transactions, which has the potential to “address high transaction costs, long time delays, and heterogeneity of real estate transaction types, accelerating the investment in real estate across sectors”).

3. The regulatory issues and challenges that this article discusses in the context of asset tokenization recur with other blockchain-enabled transactions. See *infra* text accompanying notes 20–24.

4. See, e.g., Saule T. Omarova, *New Tech v. New Deal: Fintech as a Systemic Phenomenon*, 36 YALE J. ON REGUL. 735, 790–91 (2019) (presenting “an alternative account of fintech as a systemic, macro-level phenomenon”); Hilary J. Allen, *Driverless Finance*, 10 HARV. BUS. L. REV. 157 *passim* (2020) (describing regulatory concerns that financial algorithms present and analogizing algorithm-based finance to driverless cars).

5. See generally Heather Hughes, *Financial Product Complexity, Moral Hazard, and the Private Law*, 20 STAN. J.L. BUS. & FIN. 179 (2015) (arguing that “the private law doctrines that govern financial transactions present under-explored regulatory possibilities”).

6. The SEC has ruled that securities laws may apply to token and coin offerings, depending on whether the offering creates an “investment contract” under the Howey test. See Frantz Jacques, *Securities Law and Digital Asset Products*, BLOOMBERG L. 1, 2–9 (2021) (surveying and explaining the applicability of current securities laws to digital asset products).

7. See Dominique Simon, *Special Purpose Vehicles: At the Intersection of Blockchain and Law*, MEDIUM (Feb. 12, 2019), <https://medium.com/@blockchainlawyer/special-purpose-vehicles-at-the-intersection-of-blockchain-and-law-f8a0c2b64ba1> [<https://perma.cc/T8DK-ZP5C>].

Blockchain and security tokens have the potential to significantly open up financial markets and investment practices to a broader range of people But the legalities of such practices lags behind as regulators find a way to deal with tokens and lawyers find ways to enforce the rights and remedies of token holders.

Id.

8. Blockchain and smart contracts are distinct technologies, but transacting parties can use blockchain platforms for the execution of smart contracts. The combination of these technologies gives rise to the blockchain-based markets that require effective regulation. For definitions of “blockchain” and “smart contract,” see *infra* notes 20, 22 and accompanying text.

9. See, e.g., Carlos Domingo, *DeFi and Security Tokens—Balancing Compliance with New Financial*

upon the proper, legal transfer of assets to investors. In a tokenization that is structured like a typical asset securitization, this means proper administration of true-sale and non-consolidation rules, to make tokenized assets bankruptcy remote vis-à-vis the asset originator.¹⁰ Might it be possible to design smart contracts for tokenization that ensure proper transfer of assets to the issuer, to automate compliance with property laws, thereby solidifying the claims of both investors and originators' creditors?¹¹ Could such a development enhance the value of security tokens?¹²

These questions are complex. First, what constitutes a "proper transfer" of assets for purposes of securitization, and the potential claims of investors and originators' creditors, can be very difficult to establish in many cases.¹³ Second, the difficulty of determining the legal scope of investors' rights in securitized assets relates to the value of an issuance. Legal uncertainty, generally speaking, can decrease the value of an issuance. At the same time, legal ambiguity can purposefully obscure the scope of property rights in a pool of securitized assets to increase value by creating an assignment to investors that is absolute on its face, but then is qualified with recourse that shields investors from depreciation.¹⁴ Extensive recourse makes the securities better for investors, but in the event of bankruptcy, this same recourse may support a finding that the securitized assets are not the property of investors.¹⁵ Rather, they are part of a bankruptcy estate against which the investors may assert claims along with various other creditors. This a worst-case scenario that investors of course want to avoid.

In other words, the parties to financial transactions in many instances make a business decision that their deal is worth more to each of them if they defer the issue of pinning down the legal status of the assignment until there is a default. Default, at the time of closing, is a remote and unlikely event. This practical reality presents interesting issues for the effective regulation of blockchain-enabled transactions. If coders write smart contracts to dispose of tokenized assets upon default, how does that affect the efficacy of bankruptcy law's automatic stay?¹⁶ How might we design smart contracts to preserve the function of the automatic stay? If such a design were possible, what type of regulation would require contracting parties to use it? If such a design were not desirable, how do we articulate this policy choice about the claims of originators' creditors?

Lawyers, clients, coders, and lawmakers should explore whether blockchain-enabled

Innovations, MEDIUM (Oct. 12, 2020), <https://medium.com/securitize/defi-and-security-tokens-balancing-compliance-with-new-financial-innovations-330894caeea2> [<https://perma.cc/85TX-BW6M>] ("We believe that with the right checks and balances and the involvement of regulated entities when necessary, [blockchain] innovations can also be applied to Digital Securities in a 'HyFI' format and benefit the capital markets space.")

10. See Heather Hughes, *Reforming the True-Sale Doctrine*, 36 YALE J. ON REGUL. BULL. 51, 55 (2019) (arguing the importance of proper administration); see also Heather Hughes, *Property and the True-Sale Doctrine*, 19 U. PA. J. BUS. L. 870, 871–72 (2017) [hereinafter Hughes, *Property*] (emphasizing the need for proper administration and demonstrating the lack of uniformity and clarity).

11. See *infra* Part III (discussing regulations and how they are effective).

12. See *infra* Part IV (concluding that effective regulations can enhance the value of security tokens).

13. See Hughes, *Property*, *supra* note 10, at 875–76, 892 (highlighting various inefficiencies and variables in establishing claims).

14. *Id.*

15. *Id.*

16. See Heather Hughes, *Blockchain and the Future of Secured Transactions Law*, STAN. J. BLOCKCHAIN L. & POL'Y 1, 21 (2020) [hereinafter, Hughes, *Blockchain and the Future*] (discussing the asset-partitioning function of smart contracts).

smart contracts might automate compliance with private-law doctrines, perhaps cleaning up the legal underpinning of complex issuances. If blockchain technology enables the expansion and automation of raising capital against the value of various asset classes, it presents an opportunity to clarify the policy choices surrounding such transactions. The lessons that tokenization presents also are relevant, for example, in the contexts of blockchain-based secured lending, and securities repurchase agreements or “repos” (which are increasingly integral to cryptocurrency markets).¹⁷

Part II describes asset tokenization and decentralized finance. Part III describes why effective regulation requires coordinated efforts among lawyers, clients, coders, and lawmakers. It describes current “law and code” projects that present the potential for a coordinated approach to regulation. Part IV concludes by stating the importance of imagining and implementing effective regulation for blockchain-based markets. We must think critically about what we regulate, who the regulators are, and how regulation supports markets. Failure to do so could squander the potential of emerging platforms.

II. THE EXAMPLE OF ASSET TOKENIZATION

Technology companies have been developing platforms integral for the issuance of digitized securities, including debt instruments and asset-backed securities.¹⁸ A digital security or token can reference any kind of asset, making interests in various types of assets tradable on blockchain platforms. Market actors may digitize assets for a variety of purposes. For example, real estate records on blockchain platforms involve digitized deeds created to improve a county’s chain of title and decrease fraud.¹⁹ An asset tokenization is when a company digitizes rights to assets in order to offer asset-backed tokens on a decentralized platform. This is a form of decentralized finance, or DeFi²⁰—an issuance offered to purchasers on a blockchain platform.²¹

17. See Heather Hughes, *The Complex Implications of Fintech for Financial Inclusion*, 84 L. & CONTEMP. PROBS. 113, 121–22 (2021) (describing how lawmakers defined securities repurchase agreements as sales) [hereinafter Hughes, *The Complex Implications of Fintech*]; JAMES J. WHITE ET AL., SECURED TRANSACTIONS: TEACHING MATERIALS (5th ed. 2021).

18. See, e.g., SECURITIZE, <https://www.securitize.io/> [<https://perma.cc/6C9K-QJ4W>]; CENTRIFUGE, <https://centrifuge.io/about> (last visited Mar. 3, 2021); HARBOR, <https://harbor.com> (last visited Mar. 3, 2021); MASTERWORKS, <https://www.masterworks.io/> [<https://perma.cc/DB2Y-WMAA>].

19. See Hughes, *Blockchain and the Future*, *supra* note 16, at 8 n.55 (describing specific application of blockchain to real estate systems and transaction); see also *Digital Deeds*, *supra* note 2 (discussing how blockchain technology is changing how real estate documents are recorded); Kuhn, *supra* note 2 (reporting the sale of a property in San Francisco using Propy, a blockchain-based real estate platform); Kaplow, *supra* note 2 (discussing recent developments and attempts to incorporate blockchain in property transactions, which has the potential to “address high transaction costs, long time delays, and heterogeneity of real estate transaction types, accelerating the investment in real estate across sectors”).

20. “DeFi” refers to any decentralized issuance—i.e., any financing that raises capital using a decentralized platform. It is not specific to asset tokenization. There are various degrees of decentralization on distributed ledger platforms. DeFi is a broad term that refers to decentralized finance generally. It can include issuances that are designed to be decentralized despite using a permissioned ledger, along with truly decentralized issuances on public blockchains. See Wulf A. Kaal, *Digital Asset Market Evolution*, 46 J. CORP. L. 909 (2021) (describing the proliferation of DeFi practices and calling for examination of DeFi technology infrastructure).

21. The same primary components constitute all blockchains: “(i) a ledger, (ii) a network, and (iii) consensus, that is (iv) unalterable by feasible means.” Hughes, *Blockchain and the Future*, *supra* note 16, at 7. The term “blockchain,” in this article, refers to any system comprised of a distributed ledger, a network, and

Blockchain-based smart contracts²² govern the terms of the security tokens. Market actors and regulators, including the U.S. Securities and Exchange Commission (SEC), identify tokenization of off-chain assets as an important emerging practice.²³ Securities broker-dealers are expressing increased interest in tokenized assets.²⁴

One advantage of security tokens is that they can be coded to ensure regulatory compliance. For example, if a given issuance must not involve more than a certain number of investors, the platform can disallow the purchase of shares by additional investors beyond the limit. When blockchain-based issuances “automate compliance,” securities regulation, KYC requirements, anti-money laundering (AML), and transfer controls are the kinds of regulations platform developers and issuers typically target.²⁵

Digitization presents different issues for different asset classes. Issuing shares of a commercial building to multiple and diffuse purchasers of real estate-backed security tokens on blockchain could lead, for example, to maintenance issues if no investor has sufficient control or interest to make expenditures for upkeep. Tokenized accounts receivable, on the other hand, do not present such an issue. Concerns with tokenized pools of accounts involve ensuring the enforceable assignment of payment streams and collection

consensus, regardless of whether it is open-access or permissioned.

22. A “smart contract” is an agreement expressed in digital form that is self-executing and self-enforcing. Different forms of blockchain-based smart contracts accomplish different ends. The smart contracts at issue here are single smart contracts for trade transactions executed on a decentralized ledger. These smart contracts create a “decentralized bond between two or more parties on blockchain” that operates in response to financial incentives. See Kevin Werbach & Nicolas Cornell, *Contracts Ex Machina*, 67 DUKE L.J. 313, 331–36 (2017) (describing different kinds of blockchain-based contracts, and how they work); Max Raskin, *The Law and Legality of Smart Contracts*, 1 GEO. L. TECH. REV. 305, 306 (2017) (defining smart contracts as “agreements wherein execution is automated, usually by computers”); Jeremy M. Sklaroff, Comment, *Smart Contracts and the Cost of Inflexibility*, 166 U. PA. L. REV. 263, 263 (2017) (stating that “[s]mart contracts are decentralized agreements built in computer code and stored on a blockchain”); Ai Deng, *Smart Contracts and Blockchains: Steroid for Collusion?*, BATES WHITE ECON. CONSULTING & JOHN HOPKINS U. 1, 1 (2018), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3187010 [<https://perma.cc/43S5-FB59>] (defining smart contracts); Christopher D. Clack et al., *Smart Contract Templates: Foundations, Design Landscape and Research Directions 2* (Aug. 4, 2016) (unpublished manuscript), <https://perma.cc/8Z5P-QRM9> (“A smart contract is an agreement whose execution is both automatable and enforceable. Automatable by computer, although some parts may require human input and control. Enforceable by either legal enforcement of rights and obligations or tamper-proof execution.”); Alexander Savelyev, *Contract Law 2.0: “Smart” Contracts as the Beginning of the End of Classic Contract Law 7* (Nat’l Rsch. U. Higher Sch. of Econ., Paper No. WP BRP 71/LAW/2016, 2016), <https://ssrn.com/abstract=2885241> (“[A s]mart contract is an agreement whose execution is automated.”); JP Buntinx, *What Is a DApp?*, MERKLE (Jan. 19, 2017), <https://themerke.com/what-is-a-dapp> [<https://perma.cc/NPU7-JGY5>] (explaining the nature of a blockchain-based contract).

23. See D.C. Bar Ass’n, *The Status and Future of Tokenized Securities in the U.S.* (Jan. 27, 2021), www.dcbar.org (featuring Valerie Szczepanik, Dir., SEC’s FinHub; Michael Oh, Dir., FINRA’s Off. of Fin. Innovation; Jennifer Peve, Managing Dir., Bus. Innovation, DTCC; and Cathy Yoon, Founder and Principal, CJY Advisors).

24. *Id.*

25. See, e.g., WORLD ECON. F., *The Future of Financial Infra-structure: An Ambitious Look at How Blockchain Can Reshape Financial Services 1*, 18–21 (2016), www3.weforum.org/docs/WEF_The_future_of_financial_infrastructure.pdf [<https://perma.cc/VN2L-V2A6>] (describing implications of distributed ledger technology including automating compliance) [hereinafter *The Future of Financial Infrastructure*]; Dirk A. Zetsche et al., *The Distributed Liability of Distributed Ledgers: Legal Risks of Blockchain*, 2018 U. ILL. L. REV. 1361, 1364–65 (2018) (explaining that automated compliance is a use of distributed ledger technology); Onnig H. Dombalagian, *Preserving Human Agency in Automated Compliance*, 11 BROOK. J. CORP. FIN. & COM. L. 71, 78–85 (2016) (explaining the benefits and inevitability of automated compliance).

rights given that the investors will not participate in the administration of the pool.²⁶

In order to use the example of asset tokenization as a lens through which to explore effective regulation of blockchain-based markets, this Article will describe and focus on one, hypothetical example: tokens backed by a pool of receivables generated by a manufacturing company, issued to decentralized purchasers using a blockchain-based smart contract and structured like a traditional asset securitization.

When a manufacturing company securitizes its accounts receivable, it forms a subsidiary for the sole purpose of purchasing the receivables and issuing securities collateralized by them. This subsidiary is a special purpose entity or “SPE,” chartered with the limited purpose of issuing asset-backed securities. Attorneys for the manufacturing company assure the investors that the securitization SPE would survive a consolidation challenge, meaning a claim that the entity should be substantively consolidated with its parent in the event of the parent’s bankruptcy. The manufacturing company is the asset originator, the SPE is the issuer, and the investors are the purchasers of the resulting securities.²⁷

The deal documentation transfers assets from the originator to the issuer in an ostensible true sale. Attorneys for the originator render a true-sale opinion to the investors, attesting (often with much qualification) that the originator sold the assets to the SPE in exchange for a purchase price, rather than assigning to the SPE a security interest in them as collateral for a loan.²⁸ The proceeds of the SPE’s issuance of asset-backed securities to the investors supply the purchase price that the SPE pays to the originator to acquire the assets.²⁹ The purpose of securitization is to raise capital against the value of the company’s receivables, enhancing credit by separating these assets from the liabilities associated with the company. The SPE issues the asset-backed securities to investors, often utilizing the accredited investor exemption to securities registration requirements.

One risk for investors, in addition to under-performance or default, is that a trustee or other creditors may claim an interest in the securitized assets in an originator bankruptcy. If this happens, the investors look to the true-sale and non-consolidation doctrines to establish that the originator no longer retains a property interest in the securitized assets (because they were sold, rather than assigned as collateral, and because the SPE is a legally distinct and independent subsidiary).³⁰ In rating an issuance of asset-backed securities, a rating agency may consider the existence of perfection and enforceability, true-sale and non-consolidation opinion letters from the originator’s counsel, to be value-enhancing.³¹

In an issuance of tokenized assets that mimics this basic securitization structure, the parties create digital securities encoded with rights to the pool of receivables that back the securities. These security tokens exist and trade on a blockchain platform, their terms set by a smart contract.

How does the migration of this type of issuance to decentralized investors on a blockchain affect its regulatory status? As already noted, it presents the possibility for

26. See generally Hughes, *Property*, *supra* note 10 (emphasizing the need for proper administration and demonstrating the lack of uniformity and clarity).

27. See *id.* at 881 (defining SPEs and describing their uses).

28. *Id.*

29. *Id.*

30. *Id.*

31. See Hughes, *Property*, *supra* note 10, at 896 (discussing securities’ ratings).

automated compliance with securities laws and other requirements imposed by regulatory agencies.³² But what about, for example, the way that blockchain-based smart contracts can affect the status of investors' claims in the event of an originator bankruptcy?

In an off-chain issuance, an originator filing a bankruptcy petition can seek an order for access to securitized assets pending resolution of the (often complex) question of whether the originator assigned the assets to the SPE in a true sale.³³ This enables the company to continue servicing obligations to unsecured creditors (such as employees) unless and until a court determines that the assets were in fact legally sold.³⁴ In an on-chain issuance, a smart contract governing the deal could instruct a sale or disposition of assets upon default, to capture their value for the investors. Such an event then puts the originator and its creditors in a remedial posture. If this disposition violates the automatic stay and puts assets out of reach of the originator's estate, the originator and its creditors are now stuck with the costs and logistics of trying to undo such a disposition.

Platform developers have not automated compliance with property and bankruptcy laws, and a blockchain-enabled issuance can aggravate concerns that these bodies of law address.³⁵ What kinds of automation of legal rules are possible?³⁶ The true-sale rules and bankruptcy consequences for an asset tokenization provide one context with which to take up this question. Other aspects of these transactions may present questions as well. For example, how can investors in tokenized assets collect and enforce claims against account debtors—i.e., the customers who owe money to the company (and issuer), the obligors on the receivables?³⁷

Effective regulation of blockchain-based markets should consider the effects of financial technologies on private-law claims. Part III will discuss how we might do this. Part IV discusses why this is an important component of market regulation.

III. STAKEHOLDER COORDINATION AND EFFECTIVE REGULATION

In order to design regulation of blockchain-based markets that accounts for the effects of financial technologies on private-law claims, we must identify the moments of legal import within market-dominant transactions that fintech platforms can affect. The discussion of asset tokenization and the issue of originator bankruptcy above identifies one

32. See *supra* text accompanying notes 7–11, 22 (discussing the possibility of automated compliance).

33. See, e.g., *In re LTV Steel Co., Inc.*, 274 B.R. 278, 285–86 (Bankr. N.D. Ohio 2001) (rejecting a creditor's motion for relief from an interim order permitting originator access to securitized accounts receivable).

34. *Id.*

35. See generally Hughes, *Blockchain and the Future*, *supra* note 16 (discussing the asset-partitioning function of smart contracts).

36. The field of “RegTech,” generally, engages difficult questions about the effects of automated compliance on regulation and regulatory compliance. See, e.g., Kenneth A. Bamberger, *Technologies of Compliance: Risk and Regulation in a Digital Age*, 88 TEX. L. REV. 669, 703 (2009) (identifying how automation of regulation can distill principles into bright-line rules that do not capture regulatory intent); Douglas W. Arner et al., *FinTech, RegTech and the Reconceptualization of Financial Regulation*, 37 NW. J. INT'L L. & BUS. 371, 373 (2017) (describing how emerging FinTech practices implicate RegTech concerns).

37. Lawmakers are currently considering the idea of statutory rules for “controllable electronic records”—digital assets—and how such assets impact terms and rights under the contracts backing such digital assets. See Memorandum from Steven Harris to Comm. on the Uniform Commercial Code and Emerging Technologies (Jan. 22, 2021), <https://www.uniformlaws.org/HigherLogic/System/DownloadDocumentFile.aspx?DocumentFileKey=9afdf04c-04f8-5b6c-0ee6-8610af6ffe71&forceDialog=0> [<https://perma.cc/EV26-LE6J>].

such legal flashpoint. Blockchain-enabled smart contracts may undermine the positions of originators' creditors in favor of purchasers of security tokens.

States take different approaches to the legal status of investors' rights in assets backing securities. Most states retain a common-law true-sale doctrine under which the investors must establish that the level of recourse, price, and other terms of the originator's assignment reflect a sale of assets to the SPE.³⁸ There is no established set of factors; courts seek to determine the economic substance of the assignment based on the intent of the parties, as evidenced by the totality of deal terms.³⁹ A handful of states override this approach with asset-backed securities facilitation statutes, or "ABS statutes," that deem assignments for purposes of securitization to be sales regardless of economic substance.⁴⁰ Congress considered almost two decades ago amending the bankruptcy code to create an exception for securitized assets—a federal law that would accomplish the same ends as the state ABS statutes—but did not ultimately adopt the provisions.⁴¹

While the ABS statutes are problematic,⁴² they do provide clarity. This is a very important feature when considering automation of compliance and synthesis of on-chain and off-chain expectations. Setting aside the critiques of ABS statutes, they do—to the extent they are enforceable—create state property-law rights for investors in tokenized assets that comport with an issuance in which a smart contract automatically disposes of assets upon default, for investors' benefit.

If effective regulation of blockchain-based markets includes harmony between on-chain asset partitioning and disposition, and off-chain expectations, then bright-line rules and safe harbors may function better than messy common-law doctrines.⁴³ How do we craft rules that reflect sound policy choices, but also comport with automated transactions with legal consequences? If lawmakers were to adopt ABS statutes widely, might they also consider an equity carve-out to certain assignments, to preserve residual value for non-adjusting creditors, for example?⁴⁴ Such a concept would pair a bright-line rule—a percentage equity carve-out—with another bright-line rule—allocation of assets to investors so long as they acquire the assets in an assignment for tokenization (regardless of economic substance). The idea, here, is that the carve-out rule mitigates potential negative externalities of the ABS statute rule.

Again, this Article does not advocate for the adoption of any such rules. The point, here, is to identify regulatory strategies conducive to creating legally compliant blockchain-based markets.

Effective regulation of blockchain-based markets requires lawyers who can draft deal documentation that achieves client objectives and synthesizes off-chain expectations with the terms and operation of blockchain-based smart contracts. It requires lawmakers willing to make policy choices about commercial transactions and to consider law reform to make important rules amenable to automation. It requires platform developers and coders to communicate what they can automate and what they cannot, working with lawmakers and

38. See Hughes, *Property*, *supra* note 10, at 905–06 (describing the common-law true-sale doctrine).

39. *Id.*

40. *Id.*

41. *Id.*

42. *Id.*

43. Cf. Bamberger, *supra* note 36, at 724–25.

44. Hughes, *Property*, *supra* note 10, at 905–09, 912.

lawyers to yield the best possible confluence of automation, decentralization, and legal clarity.

Coders with legal expertise are actively exploring how to enact laws that are amenable to codification.⁴⁵ Legal scholars are working with code and coders to devise blockchain-based legal documents and notices.⁴⁶ Coding itself is now possible in plain English, using Lexon—a language devised with lawyers in mind.⁴⁷

Given how a blockchain-based smart contract operates, perhaps security tokens should contain code to recognize events of legal import beyond things like securities law compliance. For example, perhaps the code could require authorization for transfers of assets after the issuance of an automatic stay in the event an originator of assets backing security tokens files a bankruptcy petition. If security tokens were required to seek approval for the disposition of assets that might belong to a bankruptcy estate, we could preserve the intervention point for determining whether assets were assigned in a true sale.

This type of deal-specific, private-law approach to regulating blockchain-based financial transactions could have interesting implications for attorneys. Attorneys' closing opinion letters regarding true-sale status, consolidation risk, and the like, can be highly qualified formalities. What if attorneys took a more active role in the regulation of blockchain-based markets? Transactional lawyers, as custodians of the private law, could ensure that the computational or digitized versions of market-dominant transactions do not thwart basic contract and property expectations. We could conceive of an entirely different kind of closing opinion letter, in which attorneys take responsibility for the legal status of interests expressed in code.

IV. CONCLUSION

The coordination among lawmakers, businesses, lawyers, and coders that effective regulation of blockchain-based markets will entail is still just beginning. Asset tokenization is one example of a blockchain-enabled transaction that presents challenges to harmonizing on-chain asset partitioning with off-chain norms and expectations.

Such harmonization should define “effective regulation” of blockchain-based markets. The designs of various blockchain-based financial transactions, and their level of consistency with common-law expectations, will affect macro-level risks associated with

45. See, e.g., Jason Morris, Presentation at Stanford CodeX Weekly Meeting, (Oct. 29, 2020), <https://law.stanford.edu/2020/10/28/codex-meeting-october-29th-2020/> [https://perma.cc/BLE5-5KEJ] (presenting a platform and strategy for coordinated work among lawmakers and coders to develop legal rules that code can express); BLAWX.COM, www.blawx.com [https://perma.cc/N6Q7-CBFK] (developing software to code legal rules); Jason Morris, *The Value of Rules as Code Without Computers*, MEDIUM (Aug. 14, 2020), <https://medium.com/computational-law-diary/computational-law-diary-the-value-of-rules-as-code-without-computers-2a59c0766310> [https://perma.cc/WKN4-GMS4] (discussing logistics and benefits of legislative drafting while expressing rules in code).

46. See Carla Reyes, Building a Crypto-Legal Structure: A Smart-UCC Financing Statement (unpublished manuscript) (on file with author) (explaining UCC-1 based on Lexon programming language); Carla Reyes, Presentation at Stanford CodeX Weekly Meeting (Jan. 21, 2021), <https://law.stanford.edu/2021/01/20/codex-meeting-january-21st-2021/> [https://perma.cc/2WT8-NP3N] (presenting a Lexon-enabled digital version of the UCC-1 financing statement for notice of liens).

47. See LEXON EDUC. HUB, <https://www.meetlexon.com> [https://perma.cc/EUV3-S3C4] (promoting the uses and advantages of Lexon).

blockchain-based markets.⁴⁸ Private-law doctrines are central to the administration and regulation of markets generally. The true-sale doctrine, rules for distinguishing debt from equity investments, or for distinguishing margin trading from securities repurchase agreements, for example, constitute the legal architecture of markets. Proper maintenance of this legal architecture by transacting parties, attorneys issuing closing opinions, courts, and legislatures, is a prerequisite to the effective administration of bankruptcy, statutory commercial reasonableness standards, taxation, and the like.⁴⁹

Reliance on a top-down regulatory approach for blockchain-enabled transactions may not yield the most robust and stable possible market. Emerging financial technologies are poised to disrupt the public/private dynamic that has defined market regulation in the United States since the New Deal.⁵⁰ Scholars have identified how blockchain-based transactions facilitate increasingly complex claims, rendered at increasing speeds.⁵¹ The evolution of secondary markets in recent decades has already revealed threats to macro-level market stability. Blockchain-enabled markets aggravate these threats,⁵² making it imperative that stakeholders define and implement effective regulatory strategies.

48. Hughes, *The Complex Implications of Fintech*, *supra* note 17, at 123–26.

49. *See id.* (discussing the asset-partitioning function of smart contracts); Hughes, *Blockchain and the Future*, *supra* note 16, at 60–61.

50. Omarova, *supra* note 4, at 735.

51. *Id.*

52. *See id.* (noting several potentialities that “render[] fintech a public policy challenge of the highest order”); Allen, *supra* note 4 (describing regulatory concerns that financial algorithms present and analogizing algorithm-based finance to driverless cars); Hughes, *The Complex Implications of Fintech*, *supra* note 17; Hughes, *Financial Product Complexity*, *supra* note 5 (arguing that “the private law doctrines that govern financial transactions present under-explored regulatory possibilities”).

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