

THE COMPLEX IMPLICATIONS OF FINTECH FOR FINANCIAL INCLUSION

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I

INTRODUCTION

Emerging financial technologies, or “fintech,” such as cryptocurrencies, online mobile banking, crowd funding, blockchain-based transaction platforms, and the like, have potential to expand financial inclusion.¹ They can create access to banking services, investment possibilities, and capital for those currently underserved in these regards.² At the same time, new technologies have the

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* Professor, American University, Washington College of Law. I want to thank, for their very helpful comments, Ken Anderson, David Snyder, Brandon Weiss, Jonas Anderson, Hilary Allen, Jonathan Baker, Michael Carroll, Jerry Comizio, and Lewis Grossman.

1. In keeping with the definitional guidelines of this symposium, “financial inclusion” means widespread deposit-account ownership and access to payments services. Steven L. Schwarcz & Theodore L. Leonhardt, *Scoping and Defining Financial Inclusion, Access to Credit, and Sustainable Finance*, 84 LAW & CONTEMP. PROBS., no. 1, 2021, at 1, 5. Relatedly, “access to credit” means availability of adequate loan funding on reasonable terms, especially for aspiring entrepreneurs from underserved groups. *Id.* at 9. “Sustainable finance” means continuously providing financial inclusion and access to credit. *Id.* at 10.

2. Recent scholarship discusses the potential, but also concerns, for financial inclusion that fintech platforms present, including concerns about biased algorithms that produce discriminatory results and about data privacy. *See generally* Matthew Aaron Chou, Note: *What’s in the “Black Box”? Balancing Financial Inclusion and Privacy in Digital Consumer Lending*, 69 DUKE L.J. 1183 (2020); Adam Bruckner, *The Promise and Perils of Algorithmic Lenders’ Use of Big Data*, 93 CHI.-KENT L. REV. 3 (2018); Sonia K. Katyal, *Private Accountability in the Age of Artificial Intelligence*, 66 UCLA L. REV. 54 (2019) (noting the tension between Artificial Intelligence and civil rights); Lauren Kirchner, *When Discrimination Is Baked Into Algorithms*, ATLANTIC (Sept. 6, 2015), <https://www.theatlantic.com/business/archive/2015/09/discrimination-algorithms-disparate-impact/403969> [<https://perma.cc/V4JG-3RMW>]; Lizzie R. Hobbs, *Facebook’s Libra: The Social Media Giant’s Pursuit of Global Financial Inclusion*, 24 N.C. BANKING INST. 331 (2020); A. DEMIRGÜÇ-KUNT, LEORA KLAPPER, DOROTHE SINGER, SANIYA ANSAR & JAKE HESS, WORLD BANK GRP., THE GLOBAL FINDEX DATABASE 2017: MEASURING FINANCIAL INCLUSION AND THE FINTECH REVOLUTION 4 (2018), <https://globalindex.worldbank.org> [<https://perma.cc/B49W-7ZYU>]; DOUGLAS W. ARNER, ROSS P. BUCKLEY & DIRK A. ZETZSCHE, ALL. FOR FIN. INCLUSION, FINTECH FOR FINANCIAL INCLUSION: A FRAMEWORK FOR DIGITAL FINANCIAL TRANSFORMATION (2018), https://www.afi-global.org/sites/default/files/publications/2018-09/AFI_FinTech_Special%20Report_AW_digital.pdf [<https://perma.cc/Z3X3-2UG5>]; Julapa Jagtiani & Catharine Lemieux, *Fintech Lending: Financial Inclusion, Risk Pricing, and Alternative Information 1*, 7-17 (Fed. Rsrv. Bank of Phila., Working Paper No. 17-17, 2017) <https://www.philadelphiafed.org/-/media/research-anddata/publications/working-papers/2017/wp17-17.pdf> [<https://perma.cc/Q77H-QLKT>] (noting the potential for alternative data to improve financial inclusion); *Beyond Silk Road: Potential Risks, Threats, and Promises of Virtual Currency: Hearing Before the S. Comm. on Homeland Sec. & Governmental Affairs*, 113th Cong. 5 (2013) (statement of Patrick Murck, General Counsel, Bitcoin Foundation), <http://www.hsgac.senate.gov/download/?id=4cd1ff12-312d-429f-aa41-1d77034ec5a8> [<https://perma.cc/K28L-WPQ8>] (“We believe Bitcoin holds out a number

potential to aggravate systemic risk.³ For individuals and small businesses, the possibilities that emerging fintech platforms create are exciting.⁴ But, from a macro perspective, what are the implications for financial inclusion and sustainability of systemic risks that fintech may compound?

This Article builds upon recent scholarship on fintech, systemic risk, and financial regulation by (i) discussing two ways in which blockchain-based market activity may elevate systemic risk; (ii) contending that increased systemic risk threatens financial inclusion and sustainability; and (iii) arguing that, as blockchain-based financial activity evolves, we should not overlook the regulatory potential of private-law doctrines and concepts. Other scholars have articulated how fintech is poised to undermine the power dynamic between public and private actors that originated with the New Deal, presenting a grave public policy challenge.⁵ In engaging this public policy challenge, along with considering top-down regulatory options, lawmakers should articulate how blockchain-based transactions comport with contract, property, and entity laws. Failure to do so could aggravate fintech's effects on systemic risk. Market practices could proliferate despite incoherent or inconsistent legal grounding, making it difficult for regulators to enforce longstanding norms that private-law rules embody.

Commentators speculate that extensive market activity will transpire on blockchain-enabled platforms. This Article does not take a position on whether this is true or how soon developments will materialize. The purpose, here, is to consider implications of fintech, given possibilities that technology presents.

Blockchain-based financial activity has the potential to compound risks to market stability. First, it facilitates synthesizing financial assets into obtuse financial products, the trading of which can escalate in volume and speed seemingly without limit.⁶ Second, it enables self-executing transactions that may

of powerfully beneficial social and economic outcomes, including global financial inclusion, enhanced personal liberty and dignity, improved financial privacy, and a stable money supply for people in countries where monetary instability may threaten prosperity and even peace.”); EVA WOLKOWITZ & SARAH PARKER, CTR. FOR FIN. SERVS. INNOVATION, *BIG DATA, BIG POTENTIAL: HARNESSING DATA TECHNOLOGY FOR THE UNDERSERVED MARKET* (2015), <https://s3.amazonaws.com/cfsi-innovation-files/wp-content/uploads/2017/02/13062352/Big-Data-Big-Potential-Harnessing-Data-Technology-for-the-Underserved-Market.pdf> [<https://perma.cc/3PHS-Z39Y>]; Solon Barocas & Andrew D. Selbst, *Big Data's Disparate Impact*, 104 CALIF. L. REV. 671 (2016).

3. See generally Saule T. Omarova, *New Tech v. New Deal: FinTech as a Systemic Phenomenon*, 36 YALE J. ON REG. 735, 790–91 (2019) (arguing that fintech applications may shift the fundamental balance of the public and private roles in the financial sector, thus increasing systemic risk); Angela Walch, *The Bitcoin Blockchain as Financial Market Infrastructure: A Consideration of Operational Risk*, 18 N.Y.U. J. LEGIS. & PUB. POL'Y 837, 855–82 (2015); Heather Hughes, *Blockchain and the Future of Secured Transactions Law*, 3 STAN. J. BLOCKCHAIN L. & POL'Y 21 (2020); Hilary J. Allen, *Driverless Finance*, 10 HARV. BUS. L. REV. 157 (2020); William Magnuson, *Regulating Fintech*, 71 VAND. L. REV. 1167 (2018).

4. For example, fintech platforms can provide credit by using artificial intelligence underwriting and alternative data. See Christopher K. Odinet, *Securitizing Digital Debts*, 52 ARIZ. ST. L.J. 477, 490–94 (2020).

5. Omarova, *supra* note 3; see *infra* notes 30–36 and accompanying text.

6. Omarova, *supra* note 3.

defy private law doctrines and regulatory requirements in ways that are difficult to undo.⁷ Each of these attributes of blockchain-based financial markets aggravates systemic risk.⁸

Macro-level regulatory concerns presented by emerging platforms for financial activity implicate financial inclusion and sustainability. If the financial crisis of 2007–2008 is any guide, systemic financial instability can exacerbate the wealth gap and ultimately set back groups that, in theory, might have benefitted from the greater access to credit associated with market expansion. Financial crises hit those who are struggling harder than those who are wealthy, resulting in diminished financial inclusion and sustainability.

With respect to some market practices, we can trace a relationship between systemic risk concerns and efforts at financial inclusion for individual investors. For example, the expansion of sub-prime mortgage products in the early 2000s was intended, at least in theory and in part, to create access to credit to purchase homes for people who could not access this market using more traditional mortgage products.⁹ But the secondary market appetite for mortgage-backed securities and the rapid origination of higher-risk mortgage products had the effect, when markets failed, of further excluding many homeowners whose attempts at financial inclusion resulted in foreclosure.

While individual investor-orientated transactions enabled by blockchain that rely on secondary market capital do exist, this Article is not about the connection between products designed to increase inclusion but that also contribute to systemic risk. Rather, it is about how blockchain-based transactions can aggravate systemic risk, and the phenomenon that economic downturns caused by excessive systemic risk erode financial inclusion and sustainability. For example, Christopher Odinet has observed that consumer and small business-oriented fintech lending services rely on securitization of these loans (that are underwritten with algorithms) to access capital.¹⁰ This market activity directly links the creation of complex, fintech-based financial products to financial services associated with inclusion. But other fintech market practices are not

7. See Hughes, *supra* note 3 (discussing self-executing transactions and private-law norms); Allen, *supra* note 3 (discussing self-executing transactions, algorithmic complexity, and regulatory requirements). Blockchain-based market activity also brings operational risk inherent in software and decentralization (depending on whether the blockchain is permissioned and how it is administered). See Walch, *supra* note 3.

8. See *infra* Part II.

9. For example, the George W. Bush administration made explicit the policy objective of increasing rates of home ownership among minorities. Subprime mortgage lending enables access to credit and is superior in most instances to sale-leaseback or installment sale alternatives to traditional mortgage lending. Subprime lending did not necessitate increased predatory lending, the development of excessively complex financial products, or sloppy underwriting practices. Yet many home buyers ended up in foreclosure for a mix of reasons including misleading lending practices, loss of value to their homes due to overall market decline, lack of understanding of loan terms, or changed circumstances. See generally, FIN. CRISIS INQUIRY COMM'N, THE FINANCIAL CRISIS INQUIRY REPORT 83–213 (2011), govinfo.gov/content/pkg/GPO-FCIC/pdf/GPO-FCIC.pdf [<https://perma.cc/XE52-NPNX>].

10. Odinet, *supra* note 4.

necessarily linked directly to expanding retail products or individual investing. Regardless, the consequences of a failure of a systemically significant financial institution, or of widespread market failure, do affect individuals and can undermine financial inclusion and sustainability.

Policy makers have been considering for some years now how regulation can provide adequate consumer and investor protection in the context of emerging fintech platforms without stifling the potential for innovation and financial inclusion. Financial regulation to address systemic risk—the soundness of systemically significant financial institutions and the like—is often thought of as a field apart from investor protection regulation to mitigate risks to consumers and small businesses using emerging platforms. But both implicate the question of whether and how emerging financial technologies will affect financial inclusion and financial sustainability.¹¹

Part II of this Article describes a specific fintech development: blockchain-based financial transactions, or smart contracts for trade transactions executed on a distributed ledger. This Part describes what is new about this emerging financial technology that warrants heightened vigilance from a regulatory perspective and how this technology aggravates systemic risk. Part III assesses the relationship between systemic risk and financial inclusion. The potential for blockchain technology to expand financial inclusion is tremendous, but the macro-level financial concerns that this technology presents have complex implications for financial inclusion and sustainability. Part IV discusses regulation of market activity on emerging platforms, focusing on the importance of private-law rules. Private-law doctrines and concepts contribute to systemic stability in important ways that policymakers sometimes overlook.¹² For example, the limitations on freedom of contract imposed by the property concept of *numerus clausus*¹³ prevent market actors from circumventing various regulatory requirements.¹⁴ Blockchain-based smart contracts can conflate contract and property-law functions and can make security interests and entities indistinguishable.¹⁵ How do we ensure that private-law norms that contribute to

11. In addition, these fields are linked in contexts where practices like securitization involve consumer or small business loans. See Odinet, *supra* note 4 at 485 (showing “how fintech is causing a major convergence between policies associated with consumer protection (licensing, disclosures, fairness, etc.) on the one hand and those dealing with commercial and corporate finance (i.e., the capital markets, risk, and failure) on the other”); Erik F. Gerding, *The Subprime Crisis and the Link Between Consumer Financial Protection and Systemic Risk*, 4 FLA. INT’L U.L. REV., 435, 436 (2009) (observing the often-overlooked connection between “regulations designed to protect consumers and regulations intended to protect financial markets from the collapse of financial institutions”).

12. See Heather Hughes, *Financial Product Complexity, Moral Hazard, and the Private Law*, 20 STAN. J. L. BUS. & FIN. 179, 210–19 (2015) [hereinafter *Financial Product Complexity, Moral Hazard, and the Private Law*].

13. *Numerus clausus* is the principle that the law will only enforce an interest as a property right—rather than a contract right—if it conforms to a limited number of generally accepted and standardized forms. Thomas W. Merrill & Henry E. Smith, *Optimal Standardization in the Law of Property: The Numerus Clausus Principle*, 110 YALE L.J. 1, 3–4 (2000); see also *infra* text accompanying notes 64–67.

14. Hughes, *supra* note 12, at 211–16.

15. See Hughes, *supra* note 3, at 17–23.

systemic stability persist in fintech-enabled markets? How do we establish a functional relationship between private market activity and collective welfare? How we approach these broad, normative questions will determine whether fintech developments yield greater financial inclusion and sustainability, or the potential for worsening inequality and instability.

II

FINTECH AND REGULATORY CHALLENGES

The term fintech refers generally to technologies for financial services and transactions and includes a variety of platforms and developments. Developments in technology have at numerous junctures impacted financial transactions and services. As legal scholars Chris Brummer and Yesha Yadav state, contemporary fintech departs from past developments in that it “generally (i) relies on the use of big data; (ii) involves complex algorithms and artificial intelligence; and (iii) showcases a tendency to seek out disintermediation in traditional financial services and supply chains by a nontraditional set of firms.”¹⁶

This Article will focus primarily on one emerging financial technology: the use of blockchain-based smart contracts for financial transactions. Blockchain and smart contracts are distinct technologies that can function apart from each other. It is the use of blockchain platforms for the expression and execution of smart contracts that presents wide-ranging possibilities for financial markets. It is this financial technology that promises lower-cost, faster settlements in financial markets—offering the potential for lower costs of capital that can foster financial inclusion but also the potential for aggravated systemic risk.

A blockchain is a distributed ledger that records transactions.¹⁷ When a ledger is distributed, it means that there is no master copy: any participant may maintain a copy of the ledger and yet all participants have confidence that theirs matches all other copies.¹⁸ Participants can trust the accuracy of a ledger without reference to a master copy or central authority; this is the innovation of blockchain

16. Chris Brummer & Yesha Yadav, *Fintech and the Innovation Trilemma*, 107 GEO. L.J. 235 (2019), at n.18.

17. All blockchains are distributed ledgers, but not all distributed ledgers fit neatly into the category “blockchain.” The Corda system for transactions among regulated financial institutions, for example, is a distributed ledger that uses a data structure that is distinct from a blockchain. See Richard Gendal Brown, *Introducing R3 Corda™: A Distributed Ledger Designed for Financial Services*, GENDAL.ME (Apr. 5, 2016), <https://gendal.me/2016/04/05/introducing-r3-corda-a-distributed-ledger-designed-for-financial-services> [<https://perma.cc/674Y-D4ZW>]. Despite its distinct data structure, commentators call the R3 financial services consortium a “blockchain firm” and include it in the discussions of blockchain technology. Walch notes that some have called expansive uses of the term blockchain “chainwashing” — using the word “blockchain” because of its market hype in contexts where “distributed ledger” would be more accurate. See Angela Walch, *The Path of the Blockchain Lexicon (and the Law)*, 36 REV. BANKING & FIN. L. 713, 727 (2017). A member of the R3 consortium has called out this “chainwashing” in contexts where companies either do not actually use blockchain technology, or do not need to use it to best serve their customers. See *id.*; Tim Swanson, *Chainwashing*, GREAT WALL NUMBERS (Feb. 13, 2017), <https://www.ofnumbers.com/2017/02/13/chainwashing> [<https://perma.cc/7CFB-Z9U7>].

18. Kevin Werbach, *Trust, but Verify: Why the Blockchain Needs the Law*, 33 BERKLEY TECH. L.J. 488, 500 (2018).

technology. People commonly refer to blockchain technology, blockchains, or the blockchain.¹⁹ Or, they refer to distributed ledger technology (DLT), or shared ledgers or consensus ledgers.²⁰ Some commentators assert that the term blockchain should refer only to public or permissionless ledgers, while others use blockchain to mean any distributed ledger—open access or permissioned.²¹ All blockchains are constituted by (i) a ledger,²² (ii) a network,²³ and (iii) consensus,²⁴ that is (iv) unalterable by feasible means.²⁵ This Article uses the term blockchain to refer to any platform constituted by these essential elements, regardless of whether it is permissioned or fully decentralized.

Smart contracts are agreements that are self-executing and self-enforcing, expressed in code.²⁶ Different forms of blockchain-based smart contract

19. While currently there are numerous blockchains in operation, it is possible that in the future there will be only one blockchain of consequence. *Id.*, at 501. When commentators use “the blockchain,” in some contexts it seems they are assuming such an outcome and referring to “the blockchain” as we refer to “the Internet.” In other contexts, “the blockchain” means the Bitcoin blockchain specifically, since Bitcoin is the dominant platform. Werbach notes: “Bitcoin today remains the biggest platform in terms of market capitalization of tokens, but its dominance appears to be waning. In twenty years, it could be worth several trillion dollars, or zero.” *Id.*

20. People use the word “blockchain” inconsistently, making the terminology surrounding this technology highly confusing. *See* Walch, *supra* note 17, at 718 (describing the inconsistent and misleading vocabulary surrounding blockchain and how the resulting confusion can affect regulation). The terms blockchain and distributed ledger are not necessarily interchangeable. Commentators refer to a “consensus ledger” as a ledger that does not keep track of a history of transactions but rather operates according to a consensus generated on a ledger of accounts that is updated with new transactions at each validation round. *See id.* at 719–20; Andrea Pinna & Wiebe Ruttenberg, *Distributed Ledger Technology in Securities post-Trading*, 9 (European Cent. Bank, Occasional Paper No. 172, Apr. 2016), <https://www.ecb.europa.eu/pub/pdf/scpops/ecbop172.en.pdf>; Sebastien Meunier, *Blockchain Technology—a Very Special Kind of Distributed Database*, MEDIUM (Dec. 29, 2016), <https://medium.com/@sbmeunier/blockchain-technology-a-very-special-kind-of-distributed-database-e63d00781118> [<https://perma.cc/AN44-3KBW>] (describing the iterations of distributed ledger technology, including blockchain).

21. Walch, *supra* note 17, at 725.

22. “The ledger is the database that expands as it incorporates approved transactions. Transactions are added to the ledger using cryptographic signatures and keys, and they are grouped into blocks. Each block contains a cryptographic hash to the previous block, keeping the blocks in order.” Hughes, *supra* note 3, at 31.

23. “The network is the computer nodes running the software for the application—for example, the nodes running the Bitcoin software, connected in a peer-to-peer network—where each node maintains a complete copy of the blockchain. Each new transaction is broadcast to all nodes in the network. The nodes add new blocks to the blockchain as transactions are validated.” *Id.* at 32.

24. Consensus is how blockchains establish trust among untrustworthy participants in the absence of a centralized authority or enforcement mechanism. On the Bitcoin network, for example, consensus is generated with a process called mining. This consensus mechanism first executed by the Bitcoin blockchain is commonly called “proof-of-work,” or creating consensus with a “proof-of-work algorithm.” Many permissionless and some permissioned blockchains rely on proof-of-work algorithms. These require considerable computing power (and energy) for their administration. Permissioned blockchains may use a consensus mechanism other than proof-of-work. Hyperledger Fabric, for example, provides a number of consensus algorithms available to participants who use a Hyperledger platform. The difficulty of these algorithms, and the computational power they demand, varies. *See id.* at 32–33.

25. No one can alter a transaction once it is approved because the blocks are linked in a sequence that cannot be feasibly altered. *See id.* at 31.

26. *See* Kevin Werbach & Nicolas Cornell, *Contracts ex Machina*, 67 Duke L.J. 313, 313 n.2, 319–20 (2017). There are other definitions of smart contracts. Max Raskin defines them as “agreements wherein

accomplish different ends. The smart contracts that this Article focuses on are single smart contracts for trade transactions, executed on a decentralized ledger. They reflect a “decentralized bond between two or more parties on the blockchain,” that operates in response to financial incentives.²⁷

Blockchain-based smart contracts, as a platform for financial markets, can compound risks to market stability. In recent scholarship Saule Omarova identifies a prevailing narrative around fintech: that it makes transactions easier and cheaper, through applied information science, in a normatively neutral way.²⁸ She challenges this narrative, asserting that fintech is a macro-level phenomenon with normative and political implications. In a similar vein, Hilary Allen identifies macro-level regulatory concerns surrounding fintech and discusses the importance of ethics in the administration of tech-driven markets.²⁹

Omarova states that fintech is poised to be “the catalyst for a potentially decisive shift in the underlying public-private balance of powers, competencies, and roles in the financial system.”³⁰ This underlying balance of powers in the U.S. financial system has been formed, over time, in terms of what Omarova calls the “New Deal settlement”: a system of financial sector regulation that took shape during the New Deal era and the essential premises of which have been replicated and perpetuated in sophisticated regulatory infrastructure for systematic oversight of financial markets.³¹ The New Deal settlement embodies normative judgments about the correct balance between private freedom and public control in financial markets:

[P]rivate market actors retain control over substantive decisions on how to allocate financial capital to various productive uses—and thus the power to determine the overall volume and structure of financial claims in the system. The public . . . bears the primary responsibility for maintaining the overall stability of the financial system

execution is automated, usually by computers.” Max Raskin, *The Law and Legality of Smart Contracts*, 1 Geo. L. Tech. Rev. 305, 306 (2017). Jeremy Sklaroff states that “[s]mart contracts are decentralized agreements built in computer code and stored on a blockchain.” Jeremy M. Sklaroff, Comment, *Smart Contracts and The Cost of Inflexibility*, 166 U. PA. L. REV. 263, 263 (2017). See also Ai Deng, *Smart Contracts and Blockchains: Steroid for Collusion?* 1 (Sept. 11, 2018), <https://ssrn.com/abstract=3187010> [<https://perma.cc/4T44-7VSP>]; Christopher D. Clack Vikram A. Bakshi & Lee Braine, *Smart Contract Templates: Foundations, Design Landscape and Research Directions* 2 (Aug. 4, 2016) (unpublished manuscript), <https://arxiv.org/pdf/1608.00771.pdf> (“A smart contract is an automatable and enforceable agreement. 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 Res. U. Higher Sch. of Econs., Paper No. WP BRP 71/LAW/2016, 2016), <https://ssrn.com/abstract=2885241> [<https://perma.cc/M84X-UD42>] (“Smart contract is an agreement whose execution is automated.”).

27. JP Buntinx, *What is a DApp?*, MERKLE, <https://themerke.com/what-is-a-dapp> [<https://perma.cc/DV9G-P8GJ>] (last updated Jan. 19, 2017).

28. Omarova, *supra* note 3.

29. See generally Allen, *supra* note 3, at 174–95, 202 (discussing various “potential threats to financial stability” from algorithmic finance, including ethical concerns surrounding artificial intelligence and machine learning).

30. Omarova, *supra* note 3 at 735.

31. See *id.* at 746–54.

[R]egulation constrains market participants' ability to generate excessive system-wide risks in pursuit of private profits.³²

This New Deal settlement embodies a contestable, unstable boundary between public and private that has been continuously renegotiated as market actors press for expanded freedoms to create and trade financial claims.

The fact that the financial system's center of gravity has shifted from primary to secondary markets, coupled with excessive risk generation and untethered growth within secondary markets, has undermined the New Deal settlement.³³ The advent of blockchain-based platforms for financial markets threatens to further diminish it, leaving no sense of how, in the future, we will achieve a functional balance of private risk-taking and public welfare.³⁴ This is because blockchain-based platforms enable increasingly complex "pooling and layering of claims, and acceleration and compression of trades"—the mechanisms with which market actors achieve continuous synthesizing of tradable financial assets and increasing volume and speed of trading activity.³⁵ In the face of proliferating private market activity of this nature, the public side of the New Deal settlement is increasingly challenged to accommodate privately created claims while managing systemic risks. Given this dynamic, Omarova argues, fintech—with its macro-level financial implications—presents a "public policy challenge of the highest order."³⁶

In addition to risk associated with increased synthesizing of claims and scaling up of trading activity, blockchain-based smart contracts aggravate systemic risk by detaching financial transactions from private law rules and norms that integrate important policy choices into market activity.³⁷ Blockchain-based transactions may defy private law doctrines in ways that are difficult to undo.³⁸

Blockchain-based smart contracts are a device for transacting, not a type of transaction. But this device has a legal effect in that it dedicates assets to specific transactional counterparties—it accomplishes asset partitioning.³⁹ Regulators and policymakers tend to treat this technology as a new platform for executing established forms of transactions. But blockchain-based smart contracts can be difficult to fit into existing legal frameworks because their functionality conflates contract and property law devices, and mimics both security interests and entities.⁴⁰ As such, emerging platforms enable market actors to exploit the difficulty of challenging a transaction's characterization, enabling them to sidestep statutory boundaries that reflect longstanding political choices.

32. *Id.* at 740.

33. *See id.* at 756–59.

34. *See id.* at 790–92.

35. *Id.* at 741; *see generally* Allen, *supra* note 3.

36. Omarova, *supra* note 3 at 743.

37. *See* Hughes, *supra* note at 3, at 3.

38. *See id.*

39. *See id.*

40. *See id.*

For example, it may be possible for a fintech-enabled transaction to assign assets to a special purpose entity for purposes of securitization with a high degree of recourse that, if subject to a characterization challenge, would make the assets reachable by the originator's creditors. In the traditional or low-tech world, creditors—potentially employees, suppliers, or tort claimants—would have, through the bankruptcy process, a legal point of intervention at which to challenge the true-sale status of an assignment for the issuance of asset-backed securities. In a fintech-enabled transaction, however, there may be no such legal intervention point. The code expressing the transaction may be written to automatically transfer assets to the investors in asset-backed securities upon the occurrence of an originator bankruptcy. The originator may try to contest and eventually undo the disposition, but there is no possibility of an order permitting access to the assets pending the determination of their status in private-law terms.⁴¹

The narrative around legal treatment of blockchain-based smart contracts implies that existing legal infrastructure can accommodate this market activity so long as laws are sufficiently technology neutral. As Omarova observes, the fintech narrative focuses on concrete, transactional aspects of finance and how fintech can provide micro-level “win-wins” within the financial system.⁴² But fintech is introducing new mechanisms for executing transactions—more quickly and securely—that the law will recognize and interpret. This narrative obscures the complexity of applying established legal doctrines to transactions which can (i) defy straightforward legal characterization, and (ii) force transacting parties to contest outcomes only after execution, in a remedial posture.⁴³ The cumulative effect of this complexity could be markets that expand despite inconsistent or incoherent legal status, undermining the capacity to administer, in the future, rules designed to curtail problematic risks and externalities.⁴⁴

In other words, disregard of private-law rules invites systemic risk. Investors in mortgage-backed securities suffered, surrounding the 2007-2008 crisis, from uncertainty regarding the legal status of assets collateralizing issuances.⁴⁵ For another example, the market prominence of securities repurchase agreements or “repos” led lawmakers to define these agreements as sales despite the fact that they function as extensions of credit.⁴⁶ This sale treatment, based on form and regardless of economic substance, helped to catalyze a repo run on banks that

41. *Cf. 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).

42. Omarova, *supra* note 3.

43. *See* Hughes, *supra* note 3.

44. *See id.*

45. *See id.* at 57.

46. *See id.* at 58.

scholars identify as a central cause of the financial crisis.⁴⁷ If lawmakers decline to articulate how blockchain-based transactions implicate contract, property, and entity laws before these transactions become dominant and entrenched, markets could defy regulators' ability to enforce well-established legal norms.

III

FINANCIAL INCLUSION AND SYSTEMIC RISK

The relationship between systemic risk, fintech, and financial inclusion is complex. The very real prospects for increasing access to financial services and credit for individuals, and access to capital for small businesses, are exciting.⁴⁸ This is especially true from a global perspective. But fintech may have ominous repercussions⁴⁹ for financial inclusion if lawmakers do not take seriously the macro-level policy questions surrounding financial regulation, and the questions surrounding legal treatment of technology-enabled transactions, that emerging platforms for financial markets present. If the last financial crisis is any guide, excessive systemic risk and resulting market failures undermine financial inclusion and sustainability. They most hurt those striving for financial stability and upward mobility.

Older fintech developments—like the software that enables securitization, tranches, et cetera—were applied in contexts involving policy choices made expressly with financial inclusion in mind (that is, the sub-prime mortgage market).⁵⁰ But the systemic risk and market failure that resulted had the effect of exacerbating the wealth gap and undermining financial inclusion and sustainability.

With respect to new fintech developments—such as AI-based underwriting of loans—the promise of expanding access to credit by looking beyond traditional credit score and income information holds promise for financial inclusion. These kinds of loans are funded by capital markets and, because underwriting is accomplished with AI and algorithms, they are obtuse.⁵¹ It is very difficult for a purchaser of securities to assess or have any insight into the underwriting criteria for the loans backing the securities.⁵² In the event that securitization of fintech-

47. Gary Gorton & Andrew Metrick, *Securitized Banking and the Run on Repo*, 104 J. FIN. ECON. 425, 447–48 (2012) (hypothesizing that the bankruptcy safe harbor for repo transactions aggravated the economic downturn).

48. See Odinet, *supra* note 4.

49. Others have focused on the problematic implications of fintech for financial inclusion as a function of discrimination by algorithms coded with or resulting in bias. See *supra* note 2. Here, the concern is distributional effects of market failures due to fintech-based financial activity.

50. See *supra* note 9 and accompanying text.

51. See Odinet, *supra* note 4 at 490.

52. See *id.* at 514 (explaining the difficulty of comprehending the underwriting done with AI because of the complexity of the data).

based loans expands, the risk that the opacity and complexity of these loans present could contribute to systemic risk.⁵³

The systemic risks that can threaten financial inclusion and sustainability are not limited to cases in which financial products derive from access-oriented lending activity. This Article concerns systemic risk generally—as related to any technology-enabled lowering of costs of capital by synthesizing claims or by eliminating characterization challenges. The concern is that the fall-out of excessive systemic risk hits harder people who are struggling for access to credit or capital for small businesses.

The point, here, is not to contemplate a trade-off between access-enabling fintech developments and increased risk to lower income people associated with the possibility of widespread economic downturn. Rather, it is to illustrate the multi-faceted implications of fintech for financial inclusion and sustainability.

IV

LAW, TECHNOLOGY AND MARKETS

At the heart of this inquiry into the implications of fintech for financial inclusion and sustainability is the question of how we conceive of the relationship between law and markets. Omarova speaks of a public and private dynamic in which private market actors generate financial claims and public agencies monitor and control for excessive risks. My own work casts the private law as the legal infrastructure of markets, without which there would be no enforceable claims to trade.⁵⁴

Referring to financial market dynamics surrounding the pooling and layering of financial assets and acceleration and compression of financial transactions, Omarova warns: “If (or when?) fintech delivers on its promise to make these mechanisms virtually frictionless, thus taking their operation to a qualitatively different level, the financial market will completely forsake the frail confines of the New Deal settlement. We need to start thinking seriously about what should replace it.”⁵⁵ Erosion of the New Deal settlement implies a waning capacity of regulatory agencies to monitor and control private market actors. In response,

53. See *id.* at 515 (discussing how acceptance of AI underwriting, without understanding it, will increase risk).

54. See generally Heather Hughes, *Financial Product Complexity, Moral Hazard, and the Private Law*, 20 STAN. J. L. BUS. & FIN. 179 (2015) (articulating a shift from a contract-law to a property-law framework for regulating transactional complexity after the financial crisis); Heather Hughes, *Reforming the True-Sale Doctrine*, 36 YALE J. ON REG. BULLETIN 51, (2018) [hereinafter, *Reforming the True-Sale Doctrine*] (arguing that state lawmakers should reform true-sale rules to include price in the analysis); Heather Hughes, *Property and the True-Sale Doctrine*, 19 U. PA. J. BUS. L. 870 (2017) [hereinafter *Property and the True-Sale Doctrine*] (mapping arguments about the efficiency of securitization to varying formulations of the true-sale doctrine).

55. *New Tech v. New Deal*, *supra* note 3, at 793. She has begun to answer her own call in a series of articles, on her own and with Bob Hockett. The task of thinking seriously about what will replace the public/private boundaries in a fintech-driven, post New Deal settlement world requires taking up deep normative questions about what kinds of finance there should be, and what finance and financial systems should do in a republic.

Omarova and others tend to focus on fortifying or re-configuring federal regulatory bodies and regulatory strategies.⁵⁶

But in thinking seriously about what should replace the New Deal settlement, we should not overlook the regulatory potential of state laws, especially the common law and commercial laws. Lawmakers should not be afraid to define new technology-enabled market practices and asset classes in private-law terms. While legal concepts will need to evolve to accommodate new practices, leaving technologies of legal import beyond private-law classification altogether invites a lack of clarity and a problematic dissonance between legal infrastructure and market practices. Once certain financial products or practices become too big to fail,⁵⁷ they may defy proper regulatory treatment despite excessive risks.⁵⁸ This Article offers one example of private-law rules that transactions executed using blockchain-based smart contracts could thwart, with wide-ranging consequences: the rules expressed in the Uniform Commercial Code (UCC) Article 9 governing secured transactions.

“Agreements that market actors do not currently associate with UCC Article 9, when expressed as smart contracts, behave like secured transactions.”⁵⁹ For example, if a liquidated damages clause in a services contract becomes self-executing, then the contract partitions assets to satisfy obligations. “Code-based, self-executing mechanisms arguably bring any agreement that utilizes them within the UCC’s statutory parameters for security interests.”⁶⁰ At the same time, blockchain-based smart contracts can create a “functional convergence of security interests and entities.”⁶¹ “If blockchain-based smart contracts partition assets in ways that are difficult to classify, market actors may proceed on the grounds that transactions on a blockchain avoid secured transactions law all together.”⁶²

Secured transactions law expresses numerous policy choices relevant to the curtailment of systemic risk. Consider, for example, UCC Article 9’s various rules regarding notice and requiring the reasonable disposition of assets upon default. If entire markets can use fintech to side-step the UCC’s notice requirements and commercial reasonableness standards for disposition of assets, then fintech can undermine longstanding policy choices of political significance. How would such a development impact systemic risk?

A joint study group of the American Law Institute (ALI) and Uniform Law Commission (ULC) has been meeting to evaluate the UCC and emerging

56. *Id.*

57. See Kenneth C. Kettering, *Securitization and its Discontents: The Dynamics of Financial Product Development*, 29 CARDOZO L. REV. 1553,1633 (2008) (explaining how courts and lawmakers decline to enforce legal doctrines that threaten dominant market practices when doing so would cause upheaval.)

58. See *id.*; Allen, *supra* note 3 (arguing that regulators should be involved with algorithmic automation now, while they can still have influence).

59. *Blockchain and the Future of Secured Transactions Law*, *supra* note 3.

60. *Id.*

61. *Id.*

62. *Id.*

technologies. This ALI and ULC effort proceeds with the posture of assessing whether the UCC is sufficiently technology neutral. The statute is sufficiently technology neutral if current rules can accommodate and do not conflict with emerging technology-enabled transactions and practices. The group engages normative questions about the desirability of intermediation, or about the meaning and purpose of perfection of a security interest, for example. But the group, given time constraints and the number of issues to address, does not necessarily engage the type of normative, values-driven assessment of law and fintech that legal scholars are calling for. Ensuring that the UCC does not impede or fail to accommodate emerging technologies is an important step. Waiting for market practices to evolve before taking on more difficult and conceptual questions, however, runs the risk that market practices will depart from legal norms in an irretrievable way.⁶³

A decade ago, in the wake of the last financial crisis, scholars observed that levels of complexity that can exacerbate moral hazard and financial instability indicate a disregard for foundational property-law principles.⁶⁴ If financial transactions are creatures of contract alone, then nothing prevents contracting to oblivion: creating more and more complex and compounded claims. Contracts may be infinitely complex and obtuse, as they are enforceable only by and against parties in privity of contract with one another. Property rights, in contrast, are enforceable against third parties. As such, *numerus clausus* is a feature of property law systems around the world.⁶⁵ This concept—“the number is closed”—refers to how property law will only enforce interests in property that take an established, recognizable form.⁶⁶ Market actors cannot make up new forms of property by contract. If they could, they would contract around bankruptcy rules, foreclosure protections, and tax obligations. The scope of a property interest is determined by law, based on the intent of the parties as evidenced by the economic substance of the deal.⁶⁷

It is an example of *numerus clausus* when a court characterizes a conveyance as an assignment of a security interest rather than an outright sale. For another example, consider the various, established forms of business entities recognized by statute in each state. Scholars have argued for regulation to standardize financial products, such as, for example, permitting issuance of new products with a “conform or explain” approach.⁶⁸ This would help preserve the capacity of secondary markets to assess and value—and therefore trade—claims more readily when markets are volatile.

63. See *id.*; Allen, *supra* note 3, at 195 (arguing that waiting for proof of risks before addressing them through policy can be very costly).

64. See *Financial Product Complexity, Moral Hazard, and the Private Law*, *supra* note 12, at 4.

65. See Merrill & Smith, *supra* note 13.

66. *Id.* at 4.

67. *Property and the True-Sale Doctrine*, *supra* note 54, at 148.

68. See Jill E. Fisch, *Rethinking the Regulation of Securities Intermediaries*, 158 U. PA. L. REV. 1961, 2030 (2010) (describing the benefits of the “conform or explain” approach).

Now, consider the implications for market complexity of a transacting platform—blockchain-enabled smart contracts—that expresses contractual obligations enforceable against third parties. This type of fintech platform presents a challenge. If the functions of contract and property law converge, how do we sustain the dynamic between freedom of contract and the formalities of property law that is integral to the legal administration of markets? Tasking various federal regulatory bodies with policing outcomes in blockchain-based financial markets, to preserve financial stability, may be crucial. But it is also crucial to watch and digest how private-law concepts operate on emerging platforms and to tend to the state statutes and common law doctrines on which market expectations rely.

V

CONCLUSION

To the extent lawmakers wish to preserve existing policy choices, and to forge a functional public and private dynamic surrounding financial markets, they must be willing to engage with fintech as a phenomenon that presents normative questions. To the extent we wish to foster financial inclusion and sustainability, we must think critically about how to harness the best of fintech for the provision of banking services and access to credit, while protecting against its challenges to financial systems.