

**Present Prologue and the Future of Securitization  
Amidst the Blockchain and AI Revolution**

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**Anthony R.G. Nolan\***

The future of securitization will revolve around innovations in distributed ledger (or blockchain) technology, the tokenization of financial markets, and the development of artificial intelligence (“AI”) and their application to financial services. In order to understand how these developments might change securitization, we should consider past innovations in this industry and the markets it serves.

1. Past as Prologue

The securitization industry as we know it began in the 1980s with the foundational innovation of the disintermediation of mortgage finance, meaning that capital markets investors increasingly replaced financial institutions as the ultimate source of capital for mortgage loan origination. This innovation, which is described in Michael Lewis’ book Liar’s Poker, was made possible by a confluence of housing policy, technological developments and resultant changes in law.<sup>1</sup>

Mortgage finance was not a novel practice in the 1980s. Mortgage bonds existed from at least the 1920s, and the federal policy of promoting home ownership dates from the 1930s, when Congress created the Federal Housing Administration, the Federal National Mortgage Agency (aka “*Fannie Mae*”) and the Federal Home Loan Banks (“*FHLBs*”) in response to the Great Depression to help ensure a reliable and affordable supply of mortgage funds throughout the country. Until the 1980s, the promotion of home ownership through accessible mortgage finance was largely predicated on using the balance sheets of banks and saving and loan associations to intermediate mortgage credit.

While government loan purchases and other programs could help mortgage lenders manage their balance sheets, they did not serve as a replacement source of capital. What was new was the use of technology and new laws to permit capital markets investors to provide the ultimate source of capital for loan origination. The technology used during this time included new data processing developments that facilitated modeling of large amounts of data to underwrite, service and transfer very large pools of mortgage loans to create securities with cash flows that did not match payments on individual mortgage loans. The technology was also used to provide statistical ratings of the likelihood of timely payment in full of the mortgage-backed securities.

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\* Partner, K&L Gates LLP, New York, New York. The author acknowledges the assistance of Andrew M. Hinkes a partner in the Miami office of K&L Gates LLP and of Carol S. Sanchez, an associate in the New York office of K&L Gates LLP.

<sup>1</sup> Michael Lewis, *Liar’s Poker: Rising Through the Wreckage on Wall Street* (1989).

Importantly, the innovations that permitted disintermediation through securitization were founded upon some previous innovations, such as the creation of a computerized book-entry securities ownership system in the 1970s with the creation of the Depository Trust Company (“DTC”) to bring the settlement system up to par with the increased speed and volume that computerization had brought to securities trading starting in the late 1960s.

These changes made it possible to deposit large pools of government-guaranteed mortgages into trusts that would issue time-tranched pass-through certificates to capital markets investors, thus helping disintermediate the mortgage finance market from reliance on the lender’s capital resources. Time-tranched means the various classes of securities are paid from available cash collections (or identified portions of the collections) in a particular order. Though admittedly oversimplifying a complicated topic with many nuances, the disintermediation of credit and cash flows changed the business of mortgage finance from a capital-intensive enterprise to one that permitted the lending institution to (i) recycle capital by selling its originated loans to capital markets investors and (ii) earn fee income as a service provider to the securitization trusts.

By de-linking the cash flows of individual securities from the credit risk and payment entitlements of individual mortgages, it became possible to slice and dice mortgage pools to appeal to investors with divergent views of credit risk, interest rate risk and different appetites for mortgage prepayment risk. Credit-tranching permitted insurance company general accounts to invest in AAA-rated securities while permitting speculative real estate funds and professional real estate investors to acquire the residual equity interests. Time-tranching made it possible for different types of investors to invest in particular aspects of the cash flows, whether through interest-only strips, principal-only securities, planned amortization classes, targeted amortization classes or other variants that repackaged the underlying mortgage payments into a dizzying profusion of payment entitlements.

Since the 1980s, the history of innovation in securitization markets has encompassed extending the basic concept of disintermediation described above to other asset classes. Securitization techniques were gradually extended to non-conforming residential mortgage loans, auto loans and leases, commercial mortgage loans, home equity loans, intellectual property licenses and leveraged and syndicated business loans, and even to short-term unsecured revolving credit such as credit card accounts. In some cases, the securitization of these asset classes was facilitated by developments in market infrastructure and structural conventions, such as the development of the Mortgage Electronic Registration System (“MERS”) in the late 1990s to facilitate recording of transfers of large volumes of mortgage loans, titling trust concepts that did the same for motor vehicle titles in auto lease securitizations, and master trust structures for securitizations of revolving assets such as credit card receivables and equipment dealer floor-plan advances. With the extension of securitization to private-label assets -- i.e. other than mortgages guaranteed by Fannie Mae or another government-sponsored agency -- credit-tranching became important in addition to time-tranching. Credit-tranching meant that realized losses owing to defaults on the pool assets could be allocated to the tranches in reverse order of seniority.<sup>2</sup>

Although these innovations revolutionized the industry, disintermediation of capital did not entirely eliminate the need for bank capital for lending businesses. Disintermediation made

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<sup>2</sup> For an overview of securitization concepts and dynamics, see Schwarcz, *The Alchemy of Asset Securitization*, 1 Stanford Journal of Law, Business & Finance 133 (1994).

lending more short-term in nature and more remote from the loans being financed. Banks still provide warehouse lines of credit to originators to bridge the period between origination and securitization, and investment banks still underwrite and make markets in mortgage-backed securities. Disintermediation of capital also did not remove intermediaries, but, if anything, helped create a plethora of them, including trustees, administrative agents, calculation agents, custodians, master servicers, subservicers, special servicers and back-up servicers, among others.

The legal innovations that facilitated securitization include the all-important tax legislation for Real Estate Mortgage Investment Conduits (“*REMIC*”), which removed tax friction that would otherwise have impeded the issuance of mortgage-backed securities. They also included corresponding changes to (or industry-wide regulatory interpretations of) statutes such as the Investment Company Act, the Securities Act, the Securities Exchange Act, the Employee Retirement Income Security Act (aka “*ERISA*”), the National Bank Act, the various states’ uniform commercial codes (“*UCCs*”) and others.

Aside from the REMIC law, legal doctrine has never played a leading role in the development of this market but has played more of a supporting role as the law sought to adapt to changes in the markets and the felt necessities of different times. For example, although the securities laws were modified to reflect securitization activities, their developments were often reactive and *ad hoc* until the Securities Exchange Commission (“*SEC*”) created a unified disclosure and registration regime for public offerings of mortgage and asset-backed securities with the promulgation of Regulation AB in 2005. (Incidentally, when the SEC sought to become more prescriptive by adopting Regulation AB II in 2014, it essentially closed the public securities markets to private label residential mortgage securitizations.) As another example, although the bankruptcy concepts of true sale and substantive non-consolidation are essential to structuring bankruptcy-remote securitization structures that can be de-linked from the originator’s credit risk, the Bankruptcy Code has not been amended to provide certainty for securitization transactions and the legal analysis and opinions are often based on caselaw by analogy.

The Achilles heel of the disintermediated finance model was exposed in the 2008 financial crisis, when the “originate to distribute” model for subprime mortgage securitization was widely panned for contributing to irresponsible loan underwriting practices and creating excessive implicit leverage in the financial system through successive re-securitizations of mezzanine tranches of mortgage-backed securities. These excesses gave rise to corrective regulations pursuant to the Dodd-Frank Act, including the credit risk-retention rules that are focused on ensuring that a securitization sponsor retains enough “skin in the game” that its interests are aligned with those of the securitization investors, and the recently adopted rules that prohibit conflicts of interest in certain securitizations.<sup>3</sup>

Another weakness of the disintermediated finance model that was exposed during the COVID shutdown was that certain service providers were insufficiently capitalized for their exposure to servicing assets, particularly to the extent they are required to provide liquidity to

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<sup>3</sup> For a lively view of the events in securitization markets leading up to the 2008 financial crisis, see Michal Lewis, *The Big Short: Inside the Doomsday Machine* (2010). For a description of the fallout of those events on a macro basis, see Andrew Ross Sorkin, *Too Big to Fail: The Inside Story of How Wall Street and Washington Fought to Save the Financial System--and Themselves* (2010). For a view of the 2008 mortgage market meltdown from the perspective of a fictional investment bank over a 24-hour period, see the film *Margin Call* (Before the Door Pictures 2011).

investors through advances of interest on the mortgage-backed securities when the underlying obligors are delinquent in their loan payment obligations. The financial stress on mortgage servicers became particularly acute as inflation and rising interest rates decreased the market value of their retained servicing rights.

These developments lay behind a recent initiative of the Federal Housing Finance Agency (aka “FHFA”) – the prudential regulator of Fannie Mae and the other government-sponsored housing finance agencies as well as of the FHLBs -- to impose new regulatory capital requirements on mortgage servicers to address the riskiness of their retained mortgage servicing rights. Suddenly, the mortgage securitization market doesn’t seem quite so disintermediated anymore. Ironically, the FHFA regulatory capital requirements are being imposed on servicers at a time when large banks have generally exited the residential mortgage servicing market and the proposed changes to their own regulatory capital requirements under the so-called Basel III Endgame proposed rules would make it prohibitively expensive for them to re-enter that market.

This potted history of securitization brings to mind the parable of the hedgehog and the fox. The transformative innovation of the 1980s that created an entirely new way to provide capital for mortgage lending can be analogized to “the one big thing” the hedgehog knows. The next 40 years of expanding that model to other asset classes and product types represented the “many things” the fox knows. So now we can ask the question: do technological changes such as blockchain developments, the tokenization of financial markets and the recent emergence of adaptive AI represent a hedgehog moment that will fundamentally change the way we think of securitization, or do they simply represent an incremental innovation that develops existing markets but does not transform them into something new?

## 2. Future Perspectives

There is no question that Satoshi Nakamoto’s 2008 white paper was a seismic event that created a new technology of distributed ledgers (or blockchains – this paper uses both terms interchangeably) that could be used to reflect unique ownership and transfers of assets without the need for legally recognized outside intermediaries or processes to protect against double spending or double pledging.<sup>4</sup> Since then, we have seen a profusion of derivations and other applications of the technology in financial services and other markets, both lawful and illicit. These range from financial services applications sponsored by major banks to help reduce transaction settlement times and facilitate collateral management, to protocols for making various types of investments using decentralized finance (“DeFi”) systems, to the creation of a wide range of digital tokens to facilitate transactions on a blockchain and sometimes serve as a speculative means of investment listed on a cryptocurrency exchange.

The development of blockchain technology has generated debates about the very nature of law and society. Has distributed ledger technology -- particularly the Ethereum blockchain -- created entirely new categories of assets and markets that are outside of sovereign boundaries and existing legal frameworks? Or are fungible tokens such as those on the ERC-20 protocol simply new variants of well-defined regulatory assets such as securities, currencies, and commodity interests that can be regulated like their physical counterparts? Does a blockchain create a libertarian ideal world of radical disintermediation, in the sense that anyone can autonomously control their own digital assets and transfer them immediately across boundaries

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<sup>4</sup> Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System* (2008) <https://bitcoin.org/bitcoin.pdf>.

without the need to trust traditional third-party intermediaries? Or do the risks associated with self-control of one's own wallet such as hacking and inadvertent loss of access to wallets lodged in damaged or lost hard drives outweigh the risks of relying on others to do the right thing? Do the prominence of crypto exchanges such as FTX, Binance and Genesis show that even tech-savvy Generation Z wants a trusted intermediary for the sake of convenience and economic returns? And how can one trust any intermediary in this crypto Wild West in light of the scandals, bankruptcies and criminal cases involving exchanges like FTX, Binance and Genesis? Are we becoming our own parents?

For several years there was a sense that digital tokens might be immune from regulatory oversight, and certainly that they were not susceptible to securities regulation since tokens are merely strings of code and their technical use cases were not obviously like securities in many instances. More broadly, there were intimations that blockchain technology was so new and *sui generis* that digital tokens were effectively exempted from most national regulatory regimes governing matters as diverse as taxation, anti-money laundering, anti-terrorism, bank regulation, exchange controls, environmental emissions controls etc. While the contours of policy in the United States are being debated and likely will not be completely established without legislation, it has become clear that digital tokens created on a blockchain are susceptible to securities regulation in material respects based on the Supreme Court's Howey test.<sup>5</sup> Indeed, since 2021 the SEC has staked out an aggressive position that virtually all digital tokens – including stablecoins – are securities, though it has relied more on enforcement actions than thoughtful systematic rulemaking and interpretations to articulate that position.<sup>6</sup>

While digital ledger technology is essential infrastructure that will lastingly affect securitization markets in profound ways, it is unlikely that the new technology or new types of digital assets will displace the basic regulatory framework for securitization. Given the maturity and pervasive regulation of the securitization industry and the size of the market, which at over \$12 trillion in the United States alone dwarfs that of the approximately \$1 trillion global cryptomony, tokenization of securitization markets to reflect the technological changes will likely not create a new paradigm for credit finance, but will be more of an incremental innovation, more like the fox than the hedgehog.

However, the incremental changes will be of an order of magnitude we have not seen since the late 1980s and will affect not only the processes of securitization, but the types of asset classes that can be securitized including potentially the creation of entirely new asset classes. How the securitization markets will adapt to ongoing technological innovation remains to be seen, and it is an open question whether, how far and how fast the new technologies or new types of digital assets will displace the existing technology of securitization. What is certain is that there will undoubtedly be much micro-innovation as transactions and markets adjust to allow for developments in digital ledger technology and tokenization, including protocols to allow different

<sup>5</sup> *SEC v W.J. Howey Co.* 328 U.S. 293 (1946).

<sup>6</sup> *E.g. Office Hours with Gary Gensler: Crypto Platforms & Securities Laws* (May 3, 2023), <https://www.sec.gov/news/video-transcript/office-hours-gary-gensler-crypto-platforms-securities-laws>. Cf. *SEC, v. Ripple Labs, Inc.* 20 Civ. 10832 (AT) (S.D.N.Y. Oct. 3, 2023) and *SEC v. Terraform Labs. Pte. Ltd.* 23-cv-1346 (JSR) (S.D.N.Y. Jul. 31, 2023).



blockchains to communicate where, for example, securitized assets are originated using one blockchain and securitized using a different one.

The existence of a blockchain that records asset originations, transfers and performance data in a secure, transparent, immutable and auditable manner will over time fundamentally change how assets are originated, warehoused and securitized. This could impact all participants in the securitization ecosystem—from originators, issuers, and servicers to rating agencies, trustees, custodians and investors. The promise of blockchain technology to reduce friction in financial transactions by increasing flexibility, speed and transparency will be particularly prominent to the extent consumer and business lending platforms use distributed ledger technology to tokenize the securitized financial assets and their underlying collateral, so that there can be relatively seamless interfaces between the asset origination and securitization processes. In such a case, the securitized assets will increasingly come to be represented by electronic records on blockchains rather than traditional paper notes, mortgages or chattel paper. This would represent an incremental move from existing digital settlement and recording systems such as MERS on the asset side and DTC on the liability side.

Distributed ledger technology has the potential to reduce costs and create operational efficiencies in all aspects of loan origination and servicing, as well as to improve transparency and accuracy throughout the securitization market.<sup>7</sup> For example:

- Depending on the architecture used, some blockchains may create immutable records wherein they may place time-stamped data on the relevant blockchain and offer a verifiable audit trail so that from origination through securitization and until the end of the securitization transaction it will no longer be necessary to re-underwrite data or import data from different silos for information relevant to underwriting and servicing. The tagging of loans to unique owners will eliminate double pledging and reduce fraud risk. For example, moving the MERS system to the blockchain could be a great innovation provided the technology actually includes censorship resistance and other measures that create trust in the record set, provided that law adapts to recognize transactions on the system as dispositive of legal rights and dispenses of the writing requirements that apply to assignments of mortgage.
- The use of smart contracts will permit asset servicing to become truly automated and integrated, with the ability to track and manage payments, initiate corrective measures, and adjust underlying loan records. The use of blockchain consensus protocols would eliminate duplication and reduce misalignment among different parties' models of the formulae and algorithms in the smart contract. Smart

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<sup>7</sup> For discussions of the impact of distributed ledger technology on securitization transactions, see Kroll Bond Rating Agency, *Blockchain: Evolution or Revolution?* April 22, 2019 (<https://www.kbra.com/publications/SsCgxCfv/structured-finance-blockchain-evolution-or-revolution>); Structured Finance Industry Group, *Applying Blockchain in Securitization: opportunities for reinvention* (2019) <https://www2.deloitte.com/us/en/pages/regulatory/articles/applying-blockchain-in-securitization.html>; and Structured Finance Industry Group, *Can Blockchain Reinvent the Securitization Industry?* <https://d3h0qzni6h08fz.cloudfront.net/reports/applying-blockchain-in-securitization-executive-summary.pdf>.

contracts could also be used to allocate asset-level payments and realized losses to different tranches of securities based on the contractual waterfall and could be used to transmit data to regulators, rating agencies, and secondary markets data utilities. This would help simplify reporting and compliance tasks. Rating transparency and timeliness would improve as monitoring software on the blockchain could track security performance raising red flags or triggering reviews as necessary.

- To the extent mortgage-backed or asset-backed securities are issued on a blockchain, or are represented by stablecoins, the time for settlement of transfers of securities could be reduced from the DTC standard of T+2 to essentially zero time, if desired.

The securitization market will likely utilize private (or permissioned) blockchains, where a single or group of administrators oversee the blockchain environment, vetting of transaction parties, granting them access to the blockchain nodes for particular purposes, and determining the criteria for validating and recording information. The inclusion of blockchain technology into securitization processes may transform the role of some critical transaction parties (e.g., the servicer, trustee, custodian, paying agent, etc.), while at the same time introduce new transaction parties (e.g., the blockchain administrator), all of which can add new operational risks to securitization transactions.

By reducing or possibly eliminating the need to re-underwrite financial assets along the loan production chain and during the life cycle of a transaction, technology may reduce the need for gatekeepers at various stages, but in doing so it will fundamentally change the nature of the gate. The disclosure and regulatory / legal issues that securitization professionals engage in will continue to seek the goals of investor protection and transformation of cash flows to facilitate the use of disintermediated capital markets to fund secured loans. However, the close integration of technology into the processes of asset finance will require that the gatekeepers master new concepts and be open to technological change. Does the legal system recognize circumstances governed by the technological system, or could an investor with rights granted by the technology find that those rights are not cognizable in law? (This issue is somewhat the inverse of the maxim that says “possession is 99% of the law” and has featured in several avoidance actions in crypto bankruptcy cases.)

While the use of smart contracts to enhance collection and payment processes could alter the role of service providers, it raises important questions that will have to be answered.

- Might smart contracts have negative consequences if the automation of enforcement processes reduces the ability of servicers to engage in meaningful workouts of defaulted or seriously delinquent loans?
- How will automatic enforcement of remedies through smart contracts satisfy the legal requirements for foreclosures on collateral to be “commercially reasonable” under the UCC?
- What conflicts might arise if the smart contract algorithm for redirecting cash flows among different tranches of securities is flawed? These could potentially give rise to something like the “tranche warfare” litigation after the 2008 financial crisis that involved disputes over traditional waterfalls in pooling and servicing agreements and indentures that allegedly did not work as intended in moments of stress. How

will the algorithmic workings of the code for the blockchain protocols be described for investors?

- What remedies may be available to stop or alter the ongoing conduct of smart contract code?
- Are securitization processes and players susceptible to being co-opted by a DeFi model that uses blockchain technology to provide financial products without traditional financial intermediaries at all?

Smart contracts raise unique legal issues. One example of issues that might come up under the Securities Act will be whether the algorithms use by the smart contracts must be disclosed to investors, and what liability issuers and sponsors would bear for misstatements or omissions in that disclosure. These issues could have a bearing on whether securitization transactions using blockchain technology could be issued in registered public offerings or would be limited to the Rule 144A market.<sup>8</sup> Contract law may also be challenged by the need to adapt old doctrines of contract formation to circumstances where the actor may be a bot acting on code written by a developer.<sup>9</sup>

The use of generative or predictive AI -- in loan origination particularly but also in other aspects of servicing and underwriting -- will magnify the import of these questions as it promises to increase the volume of lending decisions and transactions exponentially. AI raises many other questions, some of which first emerged when online or “marketplace” lenders used algorithms to make fast automated credit decisions on unsecured loans. How can one tell what standards are used to make credit decisions? What if an AI-powered loan origination or servicing model is taught to discriminate against potential borrowers on the basis of race, gender or other protected characteristics?<sup>10</sup>

Market participants and policy makers should be sensitive to whether the use of technological innovations discussed above in securitization may contain the seeds of financial instability when technology that has been created and deployed in a relatively small segment of the economy is deployed to a sector that was at the center of the last great financial crisis.<sup>11</sup> This may

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<sup>8</sup> As an example of one type of securities law issue that might be posed: when the SEC originally proposed Regulation AB, it considered having issuers post the issuing document waterfall provisions in Python code in a form that could be accessed and manipulated by prospective investors to model cash flows in various scenarios. This idea was ultimately dropped owing to concerns by securitization issuers and sponsors regarding potential Section 11 liability arising from disclosure of programming code that may describe distribution provisions with complex contingencies. These types of issues would be even more fraught with smart contracts or AI generated processes.

<sup>9</sup> Cf. *e.g. B2C2 Ltd. v. Quoine Pte. Ltd.* [2019] SGHC(I) 03 (Singapore International Commercial Court) (intent of developer who wrote code for a trading bot governs whether equitable remedies of mistake or novation could be applied to reverse a trade made by the bot).

<sup>10</sup> For discussions of these types of issues, see John C. Williams, *Fintech: The Power of the Possible and Potential Pitfalls* (Presentation to the Lendit USA 2016 Conference, April 12, 2016). <https://www.frbsf.org/news-and-media/speeches/williams-speeches/2016/04/fintech-power-of-the-possible-potential-pitfalls/>.

<sup>11</sup> For a discussion of these issues, see Pablo D. Azar et al, *The Financial Stability Implications of Digital Assets*, Federal Reserve Bank of New York Staff Reports, no. 1034 (September 2022).



not be a practical issue to the extent securitizations rely on permissioned blockchains and are not using DeFi protocols and the like, but the financial stability risk would be consistent with past experience in this disintermediated market, particularly if transactional service providers could be supplemented or superseded by algorithmic controls.

It is likely to take some time before legal framework of securitization fully accommodates the requirements of digitized markets using distributed ledger technology. The evolution of legal standards to address the new technological realities will require much effort and may lead to unpredictable outcomes. Some of these efforts are already underway. For example, many states are in the process of amending their UCCs to incorporate the 2022 amendments that accommodate digital assets (with the rest expected to follow suit).<sup>12</sup> The UCC amendments will benefit securitization markets, but practitioners will need to learn an entirely new sets of concepts and terms in the UCC that will sit alongside pre-existing traditional ones. By the same token, the bankruptcy cases that followed the so-called crypto winter of 2018 – 2020 have provided some guidance for how to address some of the bankruptcy questions and investor rights issues in the digital assets context that are important to creating bankruptcy-remote structures in securitization. One of the key issues arising in bankruptcy cases is whether a secured creditor with technical control over digital assets posted as collateral through control of the related private key has a perfected security interest in the collateral or whether foreclosure on the digital asset collateral may expose it to claw-back claims as a voidable preference or fraudulent conveyance by the debtor.

This is heavy.

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[https://www.newyorkfed.org/medialibrary/media/research/staff\\_reports/sr1034.pdf](https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr1034.pdf).

<sup>12</sup> For detailed materials regarding the 2022 amendments to the UCC and the progress toward adoption in various states, see the Uniform Law Commission website for that project:

<https://www.uniformlaws.org/committees/community-home?CommunityKey=1457c422-ddb7-40b0-8c76-39a1991651ac>.