

FINTECH AND SECURED TRANSACTIONS SYSTEMS OF THE FUTURE

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I

INTRODUCTION

A quarter century ago I served as special editor of the *Law and Contemporary Problems* issue “Technology and Commercial Law.”¹ My personal contribution to that issue focused on the role of information technology in the holding of securities through intermediaries, such as stockbrokers and banks²—these securities are now known as “intermediated securities.”³ I return here to the role of technology and commercial law—a personal Groundhog Day of sorts. Today, rapid developments in financial technology, or “fintech,” dominate discussions of financial markets. As George Walker has summarized this phenomenon:

FinTech has emerged as a powerful new market force as a result of the coming together of a number of disconnected trends. Significant advances have occurred in the areas of computer and digital technology, the Internet, mobile telecommunications as well as economics and finance, which have transformed traditional areas of study and created important potential new business structures and operations.⁴

Other contributions to this current symposium issue focus on the regulatory and systemic aspects of secured transactions,⁵ which are issues of great social

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This article is also available at <http://lcp.law.duke.edu/>.

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1. Charles W. Mooney, Jr., *Foreword*, 55 LAW & CONTEMP. PROBS., Summer 1992, at 1.

2. Charles W. Mooney, Jr., *Property, Credit, and Regulation Meet Information Technology: Clearance and Settlement in the Securities Markets*, 55 LAW & CONTEMP. PROBS., Summer 1992, at 131. Other articles in that issue addressed computerization of the U.C.C. Article 9 filing system, see Lynn M. LoPucki, *Computerization of the Article 9 Filing System: Thoughts on Building the Electronic Highway*, 55 LAW & CONTEMP. PROBS., Summer 1992, at 5; paperless letters of credit and documents of title, see Boris Kozolchyk, *The Paperless Letter of Credit and Related Documents of Title*, 55 LAW & CONTEMP. PROBS., Summer 1992, at 39; and information as a commodity, see Raymond T. Nimmer & Patricia Ann Krauthaus, *Information as a Commodity: New Imperatives of Commercial Law*, 55 LAW & CONTEMP. PROBS., Summer 1992, at 103.

3. The term “intermediated securities” was first adopted in the International Institute for the Unification of Private Law [UNIDROIT] Geneva Securities Convention. Convention on Substantive Rules for Intermediated Securities art. 1(b), Oct. 9, 2009, <http://www.unidroit.org/instruments/capital-markets/geneva-convention> [<https://perma.cc/9CNZ-EC9A>] (defining “intermediated securities”).

4. George Walker, *Financial Technology Law—A New Beginning and a New Future*, 50 INT’L LAW 137, 137 (2017).

5. See generally Giuliano G. Castellano & Marek Dubovec, *Credit Creation: Reconciling Legal and Regulatory Incentives*, 81 LAW & CONTEMP. PROBS., no. 1, 2018, at 63; Steven L. Schwarcz, *Secured*

significance as well as controversy. This article addresses a more foundational aspect: public and private registries. Registries provide the legal bases for the effectiveness of secured transactions, without which the role of security interests⁶ would be trivial or nonexistent. And registries provide a fertile ground for considering the role of fintech.

These days discussions of fintech almost invariably include a claim that so-called “distributed ledger technology” (DLT, or “blockchain” technology) is poised to revolutionize the financial markets.⁷ But this article does not dwell on these details of the relevant technology.⁸ Instead, it takes a functional approach to the future of secured transactions registries. Those experienced with secured transactions in the credit markets, including lawyers and law professors, may have much to offer by way of identifying the goals and requirements that registries must address. But once these needs are identified, it is for fintech to determine how the application of technology might address these needs. Secured transactions experts are well positioned to issue to the fintech sector metaphorical requests for proposals for technology-related structural reforms of secured transactions regimes. It is up to the fintech sector to devise and propose such reforms—or concede that it is unable to do so.

Earlier work concluded that the realization had emerged “that the ‘impossible’ is the ‘normal’ in the financial markets” and “perhaps the same realization will increasingly be seen as applicable to information technology.”⁹ That previous discussion led to a recent observation that “if we are worrying only about what we believe is possible, we are almost surely missing something important.”¹⁰ In this spirit, this article offers these observations about the future of fintech for secured transactions.

The article proceeds as follows. Part II considers fintech in secured transactions in the current legal and market environment. Much of this fintech primarily involves public and private registries. In general, notices of security interests, and in some cases other rights and interests, are lodged and searched in

Transactions and Financial Stability: Regulatory Challenges, 81 LAW & CONTEMP. PROBS., no. 1, 2018, at 45.

6. In general the article uses the term “security interest” to refer to an interest in personal property created by agreement that secures payment or performance of an obligation. It is a defined term in the Uniform Commercial Code (U.C.C.), adopted by all states in the United States. U.C.C. § 1-201(b)(35) (AM. LAW INST. & UNIF. LAW COMM’N 2010) (defining “security interest”).

7. See, e.g., Lael Brainard, Governor, Fed. Res. Sys., *Distributed Ledger Technology: Implications for Payments, Clearing, and Settlement*, Remarks at Institute of International Finance Annual Meeting (Oct. 7, 2016).

8. For an excellent treatment of fintech that does focus on details of the relevant technology in the context of secured transactions, see Teresa Rodríguez de las Heras Ballell, *Digital Technology-Based Solutions for Enhanced Effectiveness of Secured Transactions Law: The Road To Perfection?*, 81 LAW & CONTEMP. PROBS., no. 1, 2018, at 21.

9. Charles W. Mooney, Jr., *Property, Credit, and Regulation Meet Information Technology: Clearance and Settlement in the Securities Markets*, 55 LAW & CONTEMP. PROBS., Summer 1992, at 131, 158.

10. Charles W. Mooney, Jr., *United States Sovereign Debt: A Thought Experiment on Default and Restructuring*, in *IS U.S. GOVERNMENT DEBT DIFFERENT?* 169, 171 (Franklin Allen et al. eds., 2012).

a registry. Part II also examines the operation and rationale for these public and private registries—their function as conditions for third-party effectiveness, or perfection, and priority of security interests. These registries generally are grounded on the identification of grantors of security interests, the identification of the property that is the subject of security interests (the collateral), or both.

Technology plays a central role in the operations of registries. The operations primarily consist of the registration of security interests and searching for the existence—or possible existence—of security interests, including the identification of grantors of interests and property constituting the collateral. In the main these registries historically have been public registries—databases that may be accessed and searched by the public in general.

Part II also considers private registries—databases that are accessible to and searchable by only a limited set of interested persons. Private registries take an approach that differs substantially from that of conventional public registries. Although private registries continue to evolve, in general they consist of self-contained, specialized systems for the evidence, or creation and evidence, of assets and the transfers of rights and interests in the assets. The assets covered by the private registries are in many cases dematerialized versions of traditional paper assets—instruments that evidence monetary obligations (such as promissory notes), documents of title (such as bills of lading and warehouse receipts), and securities (such as shares of stock and bonds).

Part III explores various possibilities for the future development of public and private registries. It does not presume to offer an accurate prediction of the future. Certainly it does not venture to prognosticate the details of any future fintech equivalents of *The Jetsons*' flying cars¹¹ or *Star Trek*'s “Beam me up, Scotty” teleportation.¹² But it does aspire to provide some guidance to reformers of secured transactions laws and the developers of the fintech that supports secured transactions. In particular, Part III considers whether and to what extent private registries might supplant public registries. Part IV concludes the article.

II

CURRENT FINTECH FOR SECURED TRANSACTIONS

In recent years, a global consensus has emerged around a set of general principles for secured transactions law. I refer to these as the “Modern Principles.”¹³ The Modern Principles are reflected in the recently promulgated United Nations Commission on International Trade Law (UNCITRAL) Model

11. See *The Jetsons*, WIKIPEDIA, https://en.wikipedia.org/wiki/The_Jetsons [<https://perma.cc/BS2P-6DV2>] (last visited Aug. 17, 2017).

12. See *Beam Me up, Scotty*, WIKIPEDIA, https://en.wikipedia.org/wiki/Beam_me_up,_Scotty [<https://perma.cc/4YD8-PKEQ>] (last visited Aug. 17, 2017).

13. For a summary listing of the Modern Principles, see Charles W. Mooney, Jr., *Choice-Of-Law Rules for Secured Transactions: An Interest-Based and Modern Principles-Based Framework for Assessment*, 22 UNIF. LAW REV. 842, 847 (2017).

Law on Secured Transactions (Model Law)¹⁴ and its forerunners, Uniform Commercial Code (U.C.C.) Article 9¹⁵ and the various personal property security acts (PPSAs) adopted by Canadian Provinces.¹⁶ These principles also are widely reflected in other model laws¹⁷ and in secured transactions reforms that have been adopted by many States over recent years¹⁸ or that are currently being considered by other States.¹⁹ One of the Modern Principles calls for a system of public notice as a general condition for third-party effectiveness—in other words, perfection of security interests—for example, as against judicial lien creditors, competing security interests, and buyers. Such a system would include the establishment of a public registry for the registration of notices of security interests. As described in the UNCITRAL Legislative Guide on Secured Transactions, this public registry would be a so-called “notice-filing” system, in which a minimum amount of information—for example, identification of the parties and a general indication of the collateral—is included in the public record.²⁰ The public registry would be based on a grantor identifier—such as the grantor’s name—against which registrations of notices would be both indexed and searched. Such a grantor-based public registry enhances transparency and legitimizes effective nonpossessory security interests, and also supports clear and predictable priority rules.²¹ The Modern Principles contemplate a general public registry covering notices of security interests in most types of tangible and intangible personal property; it would not require, though it would permit, identification of specific assets.²² The registry also would allow registering and searching electronically without the use of paper documentation.²³

Other public registries, such as specialized asset-specific registries, apply only to certain specific types of personal property. These asset-based registries record transactions—in many cases acquisitions and dispositions of title (ownership) as well as security interests—in particular types of assets and are modeled for the

14. U.N. COMMISSION ON INT’L TRADE L. [UNCITRAL], UNCITRAL MODEL L. ON SECURED TRANSACTIONS, at 1, U.N. Sales No. E.17.V.1 (2016) [hereinafter UNCITRAL MODEL LAW].

15. U.C.C. § 9 (AM. LAW INST. & UNIF. LAW COMM’N 2010).

16. See, e.g., Ontario Personal Property Security Act, R.S.O. 1990, c. P.10 (Can.). See also Personal Property Securities Act 2009 (Cth) (Austl.); Personal Property Securities Act 1999 (N.Z.), amended by Personal Property Securities Amendment Act 2011 (N.Z.).

17. See, e.g., Organization of American States, Model Inter-American Law on Secured Transactions, Feb. 8, 2002, CIDIP-VI/Res.6/02.

18. E.g., L. 1676, agosto 20, 2013, Diario Oficial [D.O.] (Colom.).

19. These States currently include Jordan, Paraguay, and Sri Lanka. E-mail from Andres F. Martinez, Senior Financial Sector Specialist, World Bank Group, to author (July 1, 2017, 08:34 EDT) (on file with author); e-mail from Murat Sultanov, Secured Transactions Specialist, World Bank Group, to author (July 1, 2017, 07:41 EDT) (on file with author).

20. UNCITRAL, UNCITRAL LEGISLATIVE GUIDE ON SECURED TRANSACTIONS, at 150, IV.A.2, para. 8, U.N. Sales No. E.09.V.12 (2007) [hereinafter UNCITRAL LGST]. The Modern Principles also generally continue to recognize the historical effectiveness of possession of tangible assets for purposes of public notice. UNCITRAL MODEL LAW, *supra* note 14, art. 18(2).

21. See UNCITRAL LGST, *supra* note 20, at 149 IV.A.1, para. 3.

22. *Id.* at 150 IV.A.2(a), para. 8.

23. *Id.* at 60–61 I.A.4(b), para. 122.

most part on traditional registries for immovable property.²⁴ Assets covered by these specialized public registries include ships, aircraft, and intellectual property.²⁵ Perhaps the single most successful modern specialized public registry is the international registry for aircraft objects established under the Cape Town Convention and its Aircraft Protocol.²⁶ The Cape Town Convention and the Aircraft Protocol provide for an asset-based international registry. Registrations are indexed by and searches are made against a description of an asset, such as an aircraft object, for the registration of “international interests” in aircraft objects—in general, large commercial airframes, aircraft engines, and helicopters.²⁷ Aviareto, a joint venture between Société Internationale de Télécommunications Aéronautiques (SITA SC) and the government of Ireland, is the registrar and operator of the international registry.²⁸ The international registry is a fully electronic notice-filing system that operates twenty-four hours a day, every day of the year.²⁹ Currently operating public registries, even including a modern registry such as the international aircraft registry, generally mimic the functions and attributes of a paper-based traditional registry, albeit with greater flexibility and accuracy made possible by electronic, computer-based registration and searching capabilities.

Private registries are more varied and, consequently, more difficult to characterize. Many private registries seek to replicate the transfer of paper assets that represent reified obligations, such as instruments, documents of title, and securities. Some examples will illustrate.

The revision of U.C.C. Article 9 that became effective in 2001 provided for a new type of collateral, “electronic chattel paper.”³⁰ Chattel paper consists of a

24. *Id.* at 119–21 III.A.5.

25. *Id.*

26. See International Institute for the Unification of Private Law [UNIDROIT], Convention on International Interests in Mobile Equipment, Nov. 16, 2001, 2307 U.N.T.S. 285 [hereinafter Cape Town Convention]; UNIDROIT, Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Aircraft Equipment, Nov. 16, 2001, 2367 U.N.T.S. 517 [hereinafter Aircraft Protocol]. The Cape Town Convention entered into force on March 1, 2006, and the Cape Town Convention and Aircraft Protocol have been adopted by seventy-three contracting States and one regional economic integration organization (European Union). UNIDROIT, *Status of the Convention on International Interests in Mobile Equipment*, <http://www.unidroit.org/status-2001capetown> [<https://perma.cc/2Q22-XQJG>] (last visited July 1, 2017).

27. Cape Town Convention, *supra* note 26, arts. 16–17; Aircraft Protocol, *supra* note 26, arts. XVII–XX. For an overview of the development and operation of the Convention’s international registry, see Jane K. Winn, *The Cape Town Convention’s International Registry: Decoding the Secrets of Success in Global Electronic Commerce*, 1 CAPE TOWN CONVENTION J. 25 (2012). An international interest under the Cape Town Convention includes the interest of a creditor under a security agreement—in other words, a security interest—a conditional seller under a title reservation agreement, or a lessor under a leasing agreement. Cape Town Convention, *supra* note 26, arts. 1(o), 2(2).

28. See AVIARETO, <http://www.aviareto.aero> [<https://perma.cc/8PLM-VVDC>] (last visited Sept. 1, 2017). For an overview of the international registry, see INT’L REGISTRY OF MOBILE ASSETS, <https://www.internationalregistry.aero/> [<https://perma.cc/Z9UA-QNVF>] (last visited Nov. 13, 2017).

29. See INTERNATIONAL REGISTRY OF MOBILE ASSETS, <https://www.internationalregistry.aero/> [<https://perma.cc/Z9UA-QNVF>] (last visited Nov. 13, 2017).

30. U.C.C. § 9-102(a)(31) (AM. LAW INST. & UNIF. LAW COMM’N 2010).

record or records evidencing a monetary obligation and either a security interest in specific goods or a lease of specific goods.³¹ Electronic chattel paper is chattel paper “consisting of information stored in an electronic medium.”³² Prior to the 2001 revision, chattel paper consisted only of “a writing or writings”³³; such chattel paper now is defined as “tangible chattel paper.”³⁴ A security interest in tangible chattel paper may be perfected by possession³⁵ and, when certain conditions are met, a possessory security interest in chattel paper qualifies for a special priority over nonpossessory security interests.³⁶ These possessory perfection and priority rules are replicated for security interests in electronic chattel paper that are perfected by “control.”³⁷

Control for electronic chattel paper replicates functionally in an electronic medium the possession of tangible chattel paper³⁸ by providing a standard for the establishment of control.³⁹ Control is achieved if a “system . . . reliably establishes the secured party” as the assignee of the chattel paper.⁴⁰ The definition then provides a “safe harbor” test that, if met, establishes control.⁴¹ The safe harbor test involves the assignment of an “authoritative copy” of the chattel paper that “is unique, identifiable, and . . . [with exceptions] unalterable.”⁴² The control definition “leaves to the marketplace the development of systems and procedures, through a combination of suitable technologies and business practices, for dealing with control of electronic chattel paper in a commercial context.”⁴³

Japanese law provides a somewhat similar private registry system for the “accrual and assignment . . . of Electronically Recorded Monetary Claims” (ERM

31. *Id.* § 9-102(a)(11).

32. *Id.* § 9-102(a)(31).

33. *Id.* § 9-105(1)(b)(AM. LAW INST. & UNIF. LAW COMM’N 1999) (defining “chattel paper”).

34. *Id.* § 9-102(a)(79) (AM. LAW INST. & UNIF. LAW COMM’N 2010).

35. *Id.* § 9-313(a).

36. *Id.* §§ 9-313(a); 9-330(a), (b). For background, see Permanent Editorial Board, *Commentary No. 8 Section 9-308*, at 1, 10 (UNIF. LAW COMM’N, final draft Dec. 10, 1991).

37. U.C.C. § 9-314(a); 9-330(a), (b). For other similar codifications, see Electronic Signatures in Global and National Commerce (E-SIGN) Act, 15 U.S.C. §7021 (2012), and Uniform Electronic Transactions Act, (UETA), 7A pt. 1 U.L.A. 211 (2002).

38. U.C.C. § 9-105, cmt. n.2 (“[C]ontrol of electronic chattel paper is the functional equivalent of possession of ‘tangible chattel paper.’”).

39. U.C.C. § 9-105(a). The standard derives from UETA section 16. *Id.* § 9-105, cmt. n.2.

40. U.C.C. § 9-105(a).

41. *Id.* § 9-105(b), cmt. n.2.

42. *Id.* § 9-105(b)(1).

43. *Id.* § 9-105, cmt. n.3. As the comment further explains: “Systems that evolve for control of electronic chattel paper may or may not involve a third party custodian of the relevant records.” *Id.* Under the safe harbor, the authoritative copy “is communicated to and maintained by the secured party or its designated custodian.” *Id.* § 9-105(b)(3). Because the statute does not mandate or otherwise provide for public access to the information lodged in a system for control of electronic chattel paper, it would be a “private registry” under the taxonomy adopted here. See UNCITRAL LGST, *supra* note 20 and accompanying text.

Claims) under the Electronically Recorded Monetary Claims Act (ERMCA).⁴⁴ ERM Claims are those monetary claims for which the Act requires electronic recording for the accrual or assignment.⁴⁵ ERMCA provides for the “accrual”—in other words, evidence of the existence⁴⁶—and for the third-party effectiveness of assignments of ERM Claims, including pledges.⁴⁷ Unlike the systems for electronic chattel paper under U.C.C. Article 9, however, the electronic system contemplated for ERM Claims is quite comprehensive, dealing also with the payment and discharge—including payment settlement through participating banks among obligors, obligees, and pledgees of claims⁴⁸—and electronically recorded guarantees.⁴⁹

ERMCA also differs from the Article 9 approach to electronic chattel paper systems in that it mandates considerable detail as to the systems that are authorized to deal with ERM Claims. Only “Electronic Monetary Claim Recording Institutions”⁵⁰ (RIs) are authorized to operate a “Registry”⁵¹ for the recording of “Monetary Claims Records.”⁵² The Act specifies the requirements for a person to be designated as an RI by a competent minister,⁵³ the contents of an application for designation,⁵⁴ the amount of stated capital and net assets of an RI,⁵⁵ and other requirements.⁵⁶ Currently there are five RIs that are operating ERM Claim systems in Japan.⁵⁷

UNCITRAL recently completed work on a new roadmap for certain types of private registries: the UNCITRAL Model Law on Electronic Transferable Records (MLETR).⁵⁸ The MLETR would provide for an “electronic transferable

44. Denshi Kirokiu Saiken Ho [Electronically Recorded Monetary Claims Act], Law No. 102 of 2007, art. 1, translated in Financial Services Agency, <http://www.fsa.go.jp/common/law/ele01.pdf> [<https://perma.cc/PCF7-P2NM>] (Japan) [hereinafter ERMCA]. ERMCA provides for a “private registry” in that only specified persons with specified interests in ERM Claims and related transactions are permitted access to the database. *Id.* arts. 87–88.

45. *Id.* art. 2(1).

46. *Id.* art. 16.

47. *Id.* arts. 17, 36–42.

48. *Id.* arts. 21–25, 62–66.

49. *Id.* arts. 31–35.

50. *Id.* art. 2(2).

51. *Id.* art. 2(3).

52. *Id.* arts. 2(4), 3.

53. *Id.* art. 51(1). For example, an RI must be a “stock company” that meets specific corporate governance standards. *Id.*

54. *Id.* art. 52.

55. *Id.* art. 53.

56. *See, e.g., id.* arts. 55 (confidentiality obligations), 56–57 (conduct of business), 58 (entrustment of parts of business to financial institutions), 59 (rules of operation), 60 (protection of customers of RIs), 61 (prohibition of discrimination), 67 (keeping of books and records), 71–72 (discontinuation of business), 73 (reporting and inspection).

57. A List of Corporations Designated as an Electronic Monetary Claim Recording Institution, FINANCIAL SERVICES AGENCY (Japan), <http://www.fsa.go.jp/menkyo/menkyoj/denshisaiiken.pdf> [<https://perma.cc/KYU4-YJRN>] (translation on file with author).

58. UNCITRAL, UNCITRAL MODEL L. ON ELECTRONIC TRANSFERABLE RECORDS, at 3, U.N. Sales No. E.17.V.5 (2017) [hereinafter MLETR].

record”⁵⁹ that would functionally replicate a paper record (“transferable document or instrument”⁶⁰) such as a document of title or a negotiable instrument.⁶¹ The MLETR would facilitate the use of electronic records to emulate paper records containing the same information under the applicable legal regime. It adopts “the principle of technological neutrality and a functional equivalence approach” that “enable[s] the use of . . . registry, token, distributed ledger and other technology.”⁶²

Under the functional equivalence approach a person may achieve the equivalence of possession or transfer of possession of a paper transferable document or instrument by obtaining exclusive control or transfer of control of an electronic transferable record by a reliable method.⁶³ As for what constitutes such a reliable method, Article 12 of the MLETR provides a standard: the method must be “[a]s reliable as appropriate for the fulfillment of the function for which the method is being used, in the light of all relevant circumstances.”⁶⁴ It then recites examples of such relevant circumstances.⁶⁵ Thus, the MLETR would allow the electronic replication of physical possession and transfer of a paper negotiable instrument or negotiable document of title. For example, assume that the applicable law requires that a transferee take possession of a written instrument or document and that the transferor endorse the writing as a condition for the transferee to achieve the status of a holder in due course, thereby cutting off defenses of obligors and cutting off competing claims.⁶⁶ The MLETR would permit such a transfer of possession and endorsement to occur electronically, thus mimicking the delivery and endorsement of paper instruments and documents.

Technological neutrality is central to the MLETR. This is evidenced by the reliable method standard, which is agnostic as to the system that might be

59. *Id.* art. 2 (defining “electronic record” and “electronic transferable record”).

60. The MLETR does not, however, apply to “securities, such as shares and bonds, and other investment instruments.” *Id.* art. 1(3).

61. However, enacting jurisdictions are invited to consider excluding from the scope of the MLETR other documents and instruments, including those covered by the Convention Providing a Uniform Law of Bills of Exchange and Promissory Notes, June 7, 1930, 143 L.N.T.S. 257, and Convention Providing a Uniform Law for Cheques, Mar. 19, 1931, 143 L.N.T.S. 355. MLETR, *supra* note 58, art 1(3) n.1.

62. U.N. COMM’N ON INT’L TRADE LAW, DRAFT MODEL LAW ON ELECTRONIC TRANSFERABLE RECORDS WITH EXPLANATORY NOTES, art. 1, para. 1, U.N. Doc. A/CN.9/920, II. (July 2017).

63. MLETR, *supra* note 58, art. 11. The reliable method standard also applies for other purposes. *Id.* arts. 9 (signature), 10 (law requires transferable document or instrument), 13 (indication of time or place), 16 (amendment), 17 (replacement with electronic transferable record), 18 (replacement with transferable document or instrument).

64. *Id.* art. 12(a). A method also may be reliable if it is “[p]roven in fact to have fulfilled the function by itself or together with further evidence.” *Id.* art. 12(b).

65. *Id.* art. 12(a). Examples of “relevant circumstances” include “assurance of data integrity,” “security of hardware and software,” and “any applicable industry standard.” *Id.*

66. *See, e.g.*, U.C.C. §§ 3-305 (AM. LAW INST. & UNIF. LAW COMM’N 2002) (holder in due course (HDC) not subject to certain defenses); 3-306 (HDC takes free of conflicting claims); 3-302 (requirements for HDC status); 1-201(b)(21) (definition of “holder”).

employed to achieve reliability.⁶⁷ The approach is strikingly similar to that taken for control of electronic chattel paper under U.C.C. Article 9, which was devised almost two decades earlier.⁶⁸ These approaches involve legal rules that instruct the market as to the results that must be achieved but leave to the market the methods for achievement. They offer a vivid contrast to the approach of the ERMCA, which imposes a detailed structure for registries for monetary claims to be operated by licensed RIs.⁶⁹

The MLETR is already having an impact. Mexico is now in the process of establishing a DLT-based private registry for the issuance, sale, and creation of security interests in electronic warehouse receipts (EWRs), which it expects to be operational by May 2018.⁷⁰ The issuance and transfer of control of EWRs will be based on the MLETR concept and will be achieved by debits and credit in accounts of warehouses (bailees), depositors (bailors), secured creditors, and buyers. Authorized warehouses will be issued cryptographic identifiers—public–private keys—that will permit them to issue EWRs. The system will be operated within Mexico’s National Registry for Certificates, Warehouses and Merchandise. Each EWR will be represented by a digital “smart contract” containing the relevant identifying information and status of the EWR.⁷¹

The systems for electronic chattel paper under the U.C.C., electronic transferable records under the MLETR, and EWRs under the new Mexican system, explicitly replicate paper instruments and documents under the applicable law. While the ERMCA is instead a stand-alone system for the accrual and transfer of ERM Claims, in practice it was created to replace the cumbersome custom of transfers by delivery of promissory notes.⁷² Each of these systems has lifted the relevant legal regimes for paper-based transfers by delivery, and endorsement where applicable, largely intact and inserted them into the world of electronic media.

Other private registries are distinctive because they are maintained by the obligors on the assets—generally investment securities—that they cover. One familiar example is the register maintained by a corporation or other legal entity for its investment-security holders, such as its corporate shareholders or the holders of its debt securities.⁷³ In some cases registration of pledges or other

67. See MLETR, *supra* note 63 and accompanying text.

68. See *supra* note 40 and accompanying text.

69. See ERMCA, *supra* notes 50–56 and accompanying text.

70. E-mail from Marek Dubovec, National Law Center for Inter-American Free Trade (NatLaw), to author (Aug. 10, 2017, 16:58 EDT) (on file with author), attaching a description of Mexico’s electronic warehouse receipt (EWR) project. The following discussion is based on that description. The Mexican Ministry of Economy retained NatLaw to advise and assist it in the development of the EWR system.

71. Note that the MLETR’s technologically neutral standard allows the Mexican system to provide for a registry as well as a DLT-based structure. See MLETR, *supra* note 63 and accompanying text.

72. Nobuyoshi Inujima & Kohmei Shimizu, *The Electronically Recorded Monetary Claims Act*, INT’L FIN. L. REV. (Dec. 1, 2008), <http://www.iflr.com/Article/2075188/The-Electronically-Recorded-Monetary-Claims-Act.html> [https://perma.cc/FZ5Q-DBGW].

73. See, e.g., DEL. CODE ANN. tit. 8, §§ 219, 220, 224 (West 2017).

charges are also maintained in the entity's books as well.⁷⁴ Certificated securities may coexist with an issuer's register of security holders. In these regimes, delivery and endorsement of registered securities as well as registration on the issuer's books play a role in determining the effectiveness of property interests and transfers of those interests.⁷⁵ Registration of an interest on the entity's (the issuer's) books is often referred to as direct registration or the direct holding of securities.

These registries maintained by or on behalf of securities issuers may be contrasted with those maintained for securities accounts by third parties—intermediaries—for their account holders. These arrangements are sometimes referred to as “intermediated securities”⁷⁶ or the “indirect holding” of securities.⁷⁷ There exists a wide variety of legal regimes for the intermediated holding of securities.⁷⁸ But in general these systems provide that an intermediary must ensure that its account holders receive the economic—for example, the payment of dividends, principal, and interest—and legal—for example, voting rights—benefits of the underlying securities credited to securities accounts.

To sum up: Many modern registries, both public and private, employ modern technology for maintaining definitive records of ownership, security interests, and other interests and, in the case of public registries, for searching the records.⁷⁹ In general, the technology is employed to replicate more traditional paper-based registries. And private registries functionally and legally emulate the issuance and transfer, including physical delivery, of paper documents, instruments, and securities. Will public and private registries be satisfied to continue to meet the needs of markets by performing these same functions, albeit perhaps better, such as with more speed and accuracy? If so, should they be so satisfied? Part III considers these questions.

III

REGISTRIES OF THE FUTURE AND THE FUTURE OF REGISTRIES

Any conjecture about the future of secured transactions requires some basic

74. See, e.g., Kaisha Ho [Companies Act (Part I, Part II, Part III and Part IV)], Law No. 86 of 2005, arts. 146, 147, translated in (Japanese Law Translation [JLT DS]), <http://www.japanese-lawtranslation.go.jp/law/detail/?id=2035&vm=04&re=02> [<https://perma.cc/8GT2-GCVF>] (Japan) (statement or recordation of pledge in shareholder registry).

75. See, e.g., U.C.C. art. 8, pt. 2, 3 (AM. LAW INST. & UNIF. LAW COMM'N 1994) (issue and issuer of securities and transfer of certificated and uncertificated securities respectively).

76. See UNIDROIT, *supra* note 3 and accompanying text.

77. U.C.C. art. 8, *Prefatory Note*, I.C. (AM. LAW INST. & UNIF. LAW COMM'N 1994) (discussing indirect holding system in the United States).

78. UNIDROIT, LEGISLATIVE GUIDE ON INTERMEDIATED SECURITIES, I.A.4, para. 25–30 (2017), <http://www.unidroit.org/english/governments/councildocuments/2017session/cd-96-05-e.pdf> [<https://perma.cc/3SWQ-JGRV>] (describing intermediated securities holding models).

79. “Certificate of title” systems, generally established for automobiles, are *sui generis*. They are government-operated systems of public records for definitively recording ownership and security interests although the general public is not allowed to “search” these records. See generally, e.g., Uniform Certificate of Title Act, 7 pt. 1B U.L.A. 129 (2009).

factual assumptions about the future more generally. One assumption is that the extension of credit will retain its commercial utility and market significance because without it, a secured transactions regime would hardly matter. An even more basic assumption involves the continued legal respect for distinctions among entities—both natural persons and legal entities. Credit assumes the existence and identification of a debtor with enforceable legal obligations. Another basic assumption is the continued role of private ownership, and other, limited, interests in property that can be used as collateral to secure obligations—personal property being most relevant for present purposes. This assumption merely acknowledges that secured transactions as contemplated here generally involve private, consensual transactions in which interests in personal property are transferred to secure obligations.

The following musings on the future of fintech and secured transactions take these basic assumptions as a point of departure. With this grounding, the discussion aims to maintain its scope within some reasonable bounds of practical reality.⁸⁰

A. Rethinking Registries 101

Pondering the future of secured transactions, and registries in particular, may benefit from a functional perspective to registries as we know them: What do the registries achieve and for what purposes? Both public and private registries provide a connection between assets and persons, natural and otherwise, that have, or may claim, interests in the assets—they are official scorekeepers. Moreover, because public registries afford access to the general public, they must condition that access on the availability of objectively determinable facts. A person inputting information into a registry or searching the registry must know the identifier of a person, the description of an asset, or both, as a basis for a registration or search.

Currently, private registries generally involve assets that are a form of obligations owed to the persons with interests in the assets, either as a principal obligee or as transferee of the whole or limited interest in the asset. The private registries involve imbedding the existence, and sometimes creation as well, of the asset in the registry itself. That imbedded asset may consist of an obligation that relates to a separate, independent asset. For example, a securities intermediary's obligation in respect to a securities account (the asset) relates to the underlying securities (the separate asset) credited to that account, and an issuer's obligation under a warehouse receipt (the asset) relates to the goods (the separate asset) in the possession or control of that issuer. The defining characteristic is that assets are represented by tokens that are captured and imbedded in the private registry itself. The private registry, then, is a self-contained system capable of housing

80. For example, the article does not address the electronic contracting aspects of secured transactions or the potential for a database of unsecured claims—or the possible significance of such a database on priorities or the *pari passu* doctrine.

assets, which not only records but embodies the existence of assets and identifies the persons with interests in those assets.

Notwithstanding the development and benefits of these private registries, the public registries have been and continue to be the distinctive feature and cornerstone of the Modern Principles.⁸¹ Registration in a public registry, along with the alternative of possession of tangible assets, represents a key perfection step for third-party effectiveness. Why is this so? The Legislative Guide captures the conventional wisdom: “The two main approaches to achieving third-party effectiveness . . . (registration in a general security interest registry and creditor possession) . . . presuppose that the *central objective is to alert third parties to the possible existence of a security right.*”⁸² Does this central objective continue to make sense in the year 2018? Looking forward through the twenty-first century, should it continue to be a central benchmark of the Modern Principles? Might the general acceptance of the role of private registries provide some tentative answers to these questions?

The dominant characteristic of private registries, at least from the perspective of third parties, including the general public, is their secrecy. For example, there are no generally available means for discovering that a person even owns electronic chattel paper—or ERM Claims, or electronically transferable records—directly holds securities on the books of an issuer, or is an account holder on a securities account maintained with an intermediary.⁸³ *A fortiori* no such means exist for determining the pertinent details concerning such private-registry assets, including their descriptions and the persons who hold interests in the assets. Likewise, there are no reliable means for third parties to determine a person’s ownership of physical paper instruments, documents, and securities that exist and are transferred by delivery outside of private registries. However, physical possession does afford at least some modicum of public notice. But possession of these assets outside of a private registry clearly is an inferior method of “alert[ing] third parties” to the existence of rights and interests when compared to registration in a public registry.⁸⁴ Yet such possession generally is the legal equivalent of registration for purposes of perfection—and often is a superior method for purposes of priority of competing interests.⁸⁵ It is notable

81. See Giuliano G. Castellano, *Reforming Non-Possessory Secured Transactions Laws: A New Strategy?*, 78 MOD. L. REV. 611, 618–22 (2015) (arguing that implementation of a modern security interest registry is an effective strategy for reforming secured transactions laws).

82. UNCITRAL LGST, *supra* note 20, at 119 (emphasis added).

83. Consider the requirements of the recently effective European Union Directive on money laundering, which requires entities to maintain in a central register information on their beneficial ownership. See Directive 2015/849, art. 30(3), (4), 2015 O.J. (L 141) (EU). However, these databases are searchable on the basis of the entities and not by identifiers of beneficial owners. *Id.* Moreover, they are not accessible to the general public but only by regulatory authorities, persons obligated to report, and other persons with a “legitimate interest.” *Id.* art. 30(5). The reporting requirements also are subject to the generally applicable rules for the protection of personal data. *Id.* art. 40. Accordingly, they are not functional equivalents of public registries.

84. See UNCITRAL LGST, *supra* note 20, at 119.

85. See, e.g., U.C.C. §§ 9-313(a) (AM. LAW INST. & UNIF. LAW COMM’N 2010) (perfection of

that these private registries replicate the reliability of the possession of negotiable paper but do not embrace any pretense of replicating the public notice function of perfection by possession.

Earlier work questioned the myth of so-called “ostensible ownership” as derived from physical possession as a determinative justification for public notice requirements, in particular registration, for perfection of security interests.⁸⁶ This work concluded that an important role of registration was the prevention of fraud and collusion and the enhancement of the veracity of the existence and timing, including for priority purposes, of security interests.⁸⁷ But private registries can address and solve problems of veracity, fraud, and timing as well as or better than public registries. They are fully capable of reliably establishing and recording the same information as public registries. The principal relevant difference is that public registries are accessible by the general public.

Given these attributes of registries and assuming that ostensible ownership derived from possession and appearances is not a significant concern, why not do away with public registries in favor of expanding regimes of private registries?⁸⁸ The historical reliance on public registries may be more a result of political concerns and attitudes than practical concerns about third parties’ actual need for information.⁸⁹ Indeed, it was the secured creditor interests that supported retention of a public registry in the original version of U.C.C. Article 9; private registries might meet their interests just as well.⁹⁰ A prospective transferor—seller or grantor of a security interest—can provide to a prospective buyer or secured party access to a private registry that establishes the prospective transferee’s position—perfection and priority—with respect to the relevant assets. The widespread acceptance of private registries demonstrates that modern private registries can adequately protect the interests of secured creditors and

security interest in chattel paper by possession); 9-330(a), (b) (priority of qualifying possessory security interests in chattel paper over security interests perfected by other methods).

86. Charles W. Mooney, Jr., *The Mystery and Myth of “Ostensible Ownership” and Article 9 Filing: A Critique of Proposals to Extend Filing Requirements to Leases*, 39 ALA. L. REV. 683, 725–43 (1988).

87. *Id.* at 687, 726–35, 751–52.

88. See James J. White, *Revising Article 9 to Reduce Wasteful Litigation*, 26 LOY. L.A. L. REV. 823, 823–26 (1993) (proposing that unperfected security interest have priority over a judicial lien creditor and, consequently, a trustee in bankruptcy). This proposal gained virtually no support among those involved with the 2001 revisions of U.C.C. Article 9. Steven L. Harris & Charles W. Mooney, Jr., *How Successful was the Revision of UCC Article 9?: Reflections of the Reporters*, 74 CHI. KENT L. REV. 1357, 1364 (1999). See also Thomas E. Plank, *Article 9 of the UCC: Reconciling Fundamental Property Principles and Plain Language*, 68 BUS. LAW. 439, 444–45, 448, 469–73, 479, 493, 505 (2013) (Article 9’s filing regime is unnecessary for addressing priority contests involving receivables).

89. As Grant Gilmore observed: “In the history of our security law there has been one constant factor: whenever a common law device has been covered by a statute, some form of public recordation or filing has been required as a condition of perfection of the security interest.” 1 GRANT GILMORE, SECURITY INTERESTS IN PERSONAL PROPERTY § 8.7, 274 (1965).

90. Gilmore explained that the original Article 9 Reporters proposed elimination of the public filing systems in exchange for obligating secured creditors to ensure that debtors’ financial statements reflected security interests. Secured creditors opposed this approach on the basis that a simplified notice filing system would provide more protection. Gilmore, *supra* note 89, § 15.1, at 463–65.

other transferees. Consequently, these stakeholders might not be counted on for continued support for public registries. As for third parties, such as prospective unsecured creditors, in the absence of public registries, credit reporting services might provide needed information about outstanding security interests.⁹¹

However, one should not underestimate the challenges that would face a broad expansion of private registries. Private registries work because they provide assurance that the existence, status, and claims against uniquely identified assets are captured within the system and only within that system. Private registries are asset-based registries for assets consisting of obligations owed to grantors. How could such registries be adapted to include tangible assets such as a grantor's equipment and inventory? Of course, one can imagine fintech solutions for the unique identification of such assets.⁹² But even such expanded asset-based private registries would not accommodate, for example, security interests in "all inventory and equipment now owned or hereafter acquired by grantor" or similarly broad descriptions of collateral under the currently prevailing approaches of private registries that are based on the specific identification of unique assets. Such broad coverage could be dealt with in a grantor-based private registry. But that approach would impose its own set of challenges for private registries.

Finally, rethinking registries should involve much more than reconsidering the respective roles, attributes, and comparative advantages of public versus private registries. It involves the overwhelming influence of path dependency, possible reductions in the multiplicity of registries through various approaches to consolidation and unification—especially through possible expansion of private registries—and the potential role of the fintech industry.

B. Identification in Registries: Herein of the "Internet of Assets" and the "Internet of Persons"

Subpart III.C briefly explores the question of whether private registries should substantially or entirely replace public registries. As suggested above, however, any such expansion would be challenged by the need for more specific methods of identification of grantors, assets, or both. Moreover, solving these

91. An important policy question is whether the "public" needs a means to discover a grantor's assignments generally, as under a general public registry, or whether it is sufficient to discover the status of a particular asset. The emergence and acceptance of private registries calls into question whether the needs of the general public require the continued involvement of public registries.

92. For example, consider the proposed system for providing unique identifiers for railway rolling stock under the Luxembourg Protocol to the Cape Town Convention. Cape Town Convention, *supra* note 26; Luxembourg Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Railway Rolling Stock, Feb. 23, 2007, <http://www.unidroit.org/instruments/security-interests/rail-protocol> [hereinafter Rail Protocol]. Under the Draft Regulations for the Rail Protocol the International Registry would be required to provide a "URVIS identifier" for items of railway rolling stock for purposes of registration. UNIDROIT, DRAFT REGULATIONS FOR THE INTERNATIONAL REGISTRY, §§ 2.1.16 (defining "URVIS identifier"), 5 (information required to effect registration), <http://www.unidroit.org/english/conventions/mobile-equipment/registry-rail/draft-regulations-20160222.pdf> [<https://perma.cc/8XFM-QC4K>] (last visited Nov. 17, 2017).

identification problems would not alone resolve the potential of the overlapping scope of private registries. A private registry for monetary claims, for example, can rely on obligors to ensure that their obligations are not created and existing in more than one registry—just as a maker of a negotiable promissory note would not execute more than one instrument evidencing the same obligation. Such a self-policing mechanism would not be available for a private registry covering, for example, a grantor’s goods—movables such as equipment and inventory. Consequently, it would be necessary to establish a method, such as a cross-indexing system, for ensuring that identified assets, all assets, or all of a particular type of assets, of an identified grantor that are covered by an asset-based or a grantor-based private registry are not, and cannot be, covered by any other private registry. Such a system might be limited to private registries governed by the law of a particular state—under conventional choice of law rules for secured transactions—or might be subject to an international regime for coordination. For this limited purpose, such a cross-indexing system could functionally convert separate systems into a single unified system. Alternatively, multiple states could designate a particular private registry to apply exclusively for the perfection of interests governed by the laws of those states.

Expanding the scope and numbers of asset-based private registries would require enhanced methods of asset identification. While an asset-based registry for goods such as paper clips, paper cups, and paper hats would not be feasible under a cost–benefit analysis, such enhanced methods could be made available for a wide variety of uniquely identifiable assets of greater value. The currently available methods of unique identification are quite limited. The international registry for aircraft objects under the Cape Town Convention employs a system based on the manufacturer’s name and serial number.⁹³ But efforts to provide unique identifiers for other high-value assets contemplated by the Cape Town Convention’s draft MAC Protocol⁹⁴ have proven to be elusive.⁹⁵ For example, while most MAC equipment appears to possess a manufacturer’s serial number, not all manufacturers use the ISO-compatible Product Identification Numbers,⁹⁶

93. INT’L CIVIL AVIATION ORG., REGULATIONS AND PROCEDURES FOR THE INTERNATIONAL REGISTRY §§ 5, 7.1 (7th ed. 2016) (discussing information required to effect registration in § 5 and searches of the international registry in § 7.1). For a detailed discussion of asset identification under the Cape Town Convention and its Protocols, see Sir Roy Goode, *Asset Identification Under the Cape Town Convention and Protocols*, 81 LAW & CONTEMP. PROBS., no. 1, 2018, at 135.

94. Comm. of Governmental Experts, *Revised Preliminary Draft Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Agricultural, Construction and Mining Equipment*, UNIDROIT Study 72K–CGE2–Doc. 2 (May 2017), <http://www.unidroit.org/english/documents/2017/study72k/cge02/s-72k-cge02-02-e.pdf> [<https://perma.cc/C9W6-QS8Y>] [hereinafter MAC Protocol].

95. Intersessional Working Group on Registration Criteria, *Conclusions Paper*, UNIDROIT Study 72K – CGE2 – Doc. 11 (Sept. 2017). The following discussion of asset identification under the MAC Protocol is based on the Conclusions Paper.

96. The International Organization for Standards (ISO) is an independent, non-governmental international organization with a membership of national standards bodies. See generally ABOUT ISO, <https://www.iso.org/about-us.html> (last visited Nov. 26, 2017).

and some serial numbers assigned by one manufacturer also may be assigned to a different item of equipment by another manufacturer. Moreover, there are thousands of manufacturers of MAC equipment—many times more than for aircraft equipment—and those manufacturers' names are written in many languages and in various scripts other than the Latin/Roman alphabet. Even if there were a uniform system of manufacturer names and serial numbers in place, there would exist the additional problem of ensuring that the relevant identifying information is reliably and permanently inscribed on or imbedded in the items of equipment.

An internet of assets could solve or reduce these problems of unique asset identification. Upon the birth of a qualifying item—such as upon the completion of its manufacture, upon its transfer by the manufacturer to an initial owner, or at another uniformly prescribed time—it would be assigned a unique, standardized number identifying the manufacturer of the item and a unique item serial number that would be permanently inscribed on or imbedded in the item along with a corresponding barcode and perhaps a GPS locator. The identifying information would be immediately searchable on the internet. It could be used as the principal identifier in an asset-based private registry or as a permissible means of describing collateral in a grantor-based registry. Other private information, such as the names and identifiers of the owner(s)/grantor(s) and all other holders of interests in the asset, would be available online through the auspices of the relevant private registry. That information would be accessible only through use of a temporary private key provided by the owner(s)/grantor(s). In this way, a prospective buyer or secured creditor could, with the permission and cooperation of the owner(s)/grantor(s), conduct a search of the private registry.

In tandem with the internet of assets, an internet of persons would address the troublesome problem of identifying persons, and in particular grantors in connection with grantor-based private registries.⁹⁷ It also would be utilized for identifying persons claiming interests in assets under both grantor-based and asset-based private registries. Inasmuch as the internet of persons would accommodate the establishment of grantor-based private registries, these private registries would allow the registration of security interests in broad categories of assets such as “all equipment,” “all inventory,” or even “all assets” of a grantor.

For legal entities with publicly recorded birth certificates of organization, such as corporations and limited liability companies, those public records would memorialize the assigned unique personal identification numbers for use in connection with all registry transactions. For other legal entities, such as trusts and partnerships as well as natural persons, identification numbers would be assigned by registries in connection with such entities' involvement with and

97. The identification-oriented internet of assets and internet of persons contemplated here for registries could be utilized for and incorporated in many other systems and for many other purposes where the identification of assets and persons might be relevant. By limiting this discussion to their use for registries I do not intend to suggest otherwise.

participation in the registration process—as grantor or holder of an interest in an asset—with cross-indexing controls as described above to ensure that no multi-registry duplications of grantor or asset identifications occur. The systems would allow any person with an identification number to search all private registries for relevant entries involving that person’s number as grantor/owner or as the holder of any other interest. The methods for identification of assets and persons that would be available through an internet of assets and an internet of persons could be used for public as well as private registries, thereby improving the performance of the public registries.

Private registries could coexist with public registries as they do today. But accommodating such coexistence, especially for a grantor-based private registry, would require a legislative solution to priority issues—for example, dealing with earlier-registered interests in a public registry and later-registered interests in a private registry—as well as transition provisions. For example, a transition rule might require that earlier-registered interests in a public registry would retain their priority without any further steps or might require that such interests be lodged in a private registry within a specified period of time as a condition to retention of priority. It might be necessary for searches to take place in both a public registry and a private registry during a transition period. The transition to existing private registries was less challenging, inasmuch as they invoked legal rules involving delivery of paper documents and instruments that already provided for priority of possessory interests over interests registered in a public registry or addressed assets that were not the subject of a public registry. Space does not permit exploration of the details here, but past experience with shifting from one registration system to another teaches that accommodating these issues is quite feasible.

There are good reasons to favor the future use of private registries over public registries. The usual motivation for encouraging the participation of private actors over the dominance of public authorities would apply—absent a market failure, private action tends to be more efficient than government action.⁹⁸ Private action could also encourage experimentation through the operation of market forces and competition, thereby promising to break the path-dependent cycle of reliance on government-operated public registries. As self-contained systems accessible only through permissioned private keys, private registries also might serve to meet the concerns about privacy and security that invariably would be raised by the hypothesized internet of assets and internet of persons.

The feasibility of the internet of assets, the internet of persons, and the enhanced role of private registries contemplated here would turn on hard-nosed assessments based on cost–benefit analyses of applications of the relevant technology. For example, the use of systems employing DLT might be well suited for the development of the internets of assets and persons. That technology could employ tokens that would represent both assets and persons and could connect

98. This article adopts this guiding principle, but further analysis of the principle is beyond its scope.

particular persons with particular assets in the operation of a private registry.⁹⁹ One would hope, however, that this process could be left to the private sector to develop, promote, and operate private registries and to market participants to embrace—or reject—these registries. The role of legislation should be limited to ensuring that private registries would be legally effective in their governance of perfection and priority of security interests and any other property interests that they might cover. This is the approach taken by the private registries sanctioned by U.C.C. Article 9 for electronic chattel paper and by the ERMCA in Japan and as contemplated by the MLETR.¹⁰⁰ This article does not claim that public registries are inefficient or unnecessary—although intuitions lean toward skepticism. Affirmatively supporting that claim would be beyond the scope of this article. The claim here is more modest: The emergence of statutorily blessed private registries warrants the serious consideration of even broader legislation that would permit private registries to flourish, if and to the extent supported by sufficient stakeholder demand and acceptance.

Finally, private registries facilitated by an internet of assets and an internet of persons would require harmonization and standardization across and within jurisdictions as well as internationally among states. This also would involve adjustments of choice-of-law rules governing perfection and priority of security interests. And it raises the obvious challenges of political economy and the obstacles presented by the historical path dependence of public registries.

C. Political Economy of Registries: Path Dependence, Unification versus Multiplicity of Registries, and the Role of Fintech

The principal challenge for any fintech innovations for secured transactions is overcoming the entrenched, path-dependent¹⁰¹ public registry-based systems that primarily feature generally applicable, grantor-based approaches adopted on a model of jurisdiction-by-jurisdiction government operation. These systems not only predominate in jurisdictions that have adopted the Modern Principles but are a central feature of the Modern Principles as proposed for widespread future adoptions, as evidenced by the UNCITRAL Model Law.

It is of course appropriate to refer to *Modern Principles* in the global context of secured transactions reforms. But it is worth remembering that the attributes

99. See Jason Kravitt, Massimo Capretta & Michael Gaffney, *The Blockchain Moves Fast; the Law Less So*, 73 SECURED LENDER, Mar. 17, 2017, at 12 (explaining how a shared (distributed) ledger system could provide a more reliable and accurate method for protecting purchasers of receivables, assuming that applicable law would ensure legal entitlements).

100. See *supra* text at notes 44–72.

101. I do not employ the concept of path dependency here in any technical or formal sense. I use it to refer to the general acceptance of public registries as an integral component of modern secured transactions regimes accompanied by the entrenched positions of existing registries and the governmental and other actors that operate, use, and rely on public registries. For an analysis and critique of path dependency in the context of comparative corporate governance, see Craig LaChance, *Nature v. Nurture: Evolution, Path Dependence and Corporate Governance*, 18 ARIZ. J. INT'L & COMP. L. 279 (2001). See also Mark J. Roe, *Chaos and Evolution in Law and Economics*, 109 HARV. L. REV. 641 (1996).

of the public registry and registration-related priority rules embodied in these Modern Principles are essentially those adopted by the earliest version of the U.C.C. in the United States more than sixty years ago.¹⁰² This situation is a virtual monument to path dependence—indeed, to ossification. Consider a stark, and unfortunate, example of registry-related path dependence, albeit in a specialized asset context. When the United States ratified the Cape Town Convention and the Aircraft Protocol, it retained in its accompanying legislation the requirement that complete sets of transaction documents be filed for recordation with the central Federal Aviation Administration (FAA).¹⁰³ This was required even though registration of an international interest with the international registry is the required step for perfection.¹⁰⁴ As has been explained elsewhere, “[t]his structure was thought necessary to obtain the support and cooperation of the FAA and Oklahoma City-based interests (such as attorneys and title companies) in the process of obtaining USA ratification of Cape Town.”¹⁰⁵ One should not underestimate the political power of those who administer registries and those who support and are supported by registries.

To be sure, this phenomenon of path dependence does not prove the inefficiency or inferiority of public registries to private registries. But it does explain why legislative intervention would be necessary for any expansion of private registries beyond the role of proxies for the physical delivery of documents and instruments. And it identifies likely sectors of opposition to such expansion. Time will tell whether the existing multiplicity of government-operated jurisdiction-by-jurisdiction public registries for security interests will persist. A move toward the establishment of enhanced private registries that would displace some or all functions now performed by public registries actually could consolidate these functions. A private registry need observe no geographical or political boundaries. So long as a registry would meet the statutory requirements, such as a reliability standard, established by the applicable law, that same registry could serve to govern perfection and priority for interests governed by a multiplicity of applicable laws.

This article advanced the idea that private registries, reformulated to extend beyond the replication of deliveries of paper assets, could displace public registries, at least to some extent, and that this development could provide net benefits. This is merely an idea that hopefully will promote a discussion of the future role of fintech in the realm of secured transactions. Whether this conversation will progress in earnest and lead to actual change will depend on the interests and efforts of the fintech industry and actual stakeholders such as the manufacturers of goods to be financed, financial institutions, and other

102. U.C.C. (AM. LAW INST. & UNIF. LAW COMM’N 1954).

103. 49 U.S.C. § 44107(e)(3); 14 C.F.R. § 49.63 (2017).

104. Cape Town Convention *supra* note 26, arts. 29, 30.

105. Charles W. Mooney, Jr., *United States of America: Reconsidering the Transaction Document Filing Requirement for National Registry*, in IMPLEMENTING THE CAPE TOWN CONVENTION AND THE DOMESTIC LAWS ON SECURED TRANSACTIONS 197, 200 (Souichirou Kozuka ed., 2017).

providers of secured credit, and debtors who require financing for the maintenance and expansion of businesses.

IV CONCLUSION

The goal of this article was to provoke a conversation about the role of fintech in the development of law and systems for secured transactions. Whether or not the thoughts about private registries suggested here are widely shared, the article's central theme is that current players in the security interests registry world are unlikely candidates to break the bounds of path dependency. Perhaps if entrepreneurs, investors, and fintech organizations were to embrace secured transactions fintech, it might better serve the underlying goals of secured transactions law as these goals continue to evolve. The fintech industry might then be able to overcome the historical approaches that continue to be dominated by government-operated public registries.

This path dependency is not confined to the domain of public registries for security interests. Fintech developments in the investment securities markets also reflect the potential dominance of existing market participants with entrenched interests.¹⁰⁶ For secured transactions regimes, fintech industry participants from outside the existing security interests registry environment may offer the most likely source of innovation. Perhaps innovative firms such as Amazon, ALIBABA, Google, Microsoft, Facebook, and the next generation of tech firms will recognize that the prospects for an internet of assets and an internet of persons offer the promise of a new frontier for security interest registries.

106. See Jane Wild, Martin Arnold & Philip Stafford, *Technology: Banks Seek the Key to Blockchain*, FINANCIAL TIMES (Nov. 1, 2015), <https://www.ft.com/content/eb1f8256-7b4b-11e5-a1fe-567b37f80b64> [<https://perma.cc/GB72-476M>].

[A]lmost every big financial services institution has now overcome that initial suspicion [of blockchain technology]. And the technology has swung from being a weapon wielded against the banks to being heralded as their ultimate back-office makeover, a bitter blow to the libertarians who conceived the idea of the blockchain to circumvent the global banking system.

....

"In lots of areas it looks like the blockchain will work and it is easy to see how it could revolutionise finance," says Rhomaios Ram, head of product management at Deutsche Bank's global transaction banking division. "The speed of execution is so much faster for securities settlement. [And] you can see how it could reduce the capital, that banks have to hold, against each trade."