HARVARD
BUSINESS LAW
REVIEW

BULLISH ON BLOCKCHAIN: EXAMINING DELAWARE'S APPROACH TO DISTRIBUTED LEDGER TECHNOLOGY IN CORPORATE GOVERNANCE LAW AND BEYOND

Wonnie Song[†]

I. Introduction

The buzz around blockchain is getting ever louder. Mergers & Acquisitions (M&A) activity in the blockchain technology sector rose 33.3% between Q2 2016 and Q2 2017,[1] and approximately 80% of respondents to Bain & Company's 2017 survey of financial institution executives expect their organizations to begin using the technology by the time current first-year law students graduate.[2] Nasdaq continues its investment in Nasdaq Linq, its blockchain-based platform for the private market, as stock exchanges around the world, such as the Australian Stock Exchange, Korea Exchange, and the London Stock Exchange, begin testing blockchain-based services in their respective markets.[3]

Increased legislative response is perhaps the clearest signal yet that blockchain technology may be more than a passing fad. As of September 2017, several jurisdictions in the United States have amended their state laws to explicitly legitimize the use of blockchain technology in both commerce and corporate governance.[4] Most notably, Delaware amended the Delaware General Corporation Law (DGCL) to expressly allow Delaware corporations to use "distributed electronic

---

[†] J.D. Candidate, Harvard Law School, 2019. A.B., magna cum laude, in English, Film & Chinese, Duke University, 2010. 2017 recipient of the Women in M&A scholarship from the American Bar Association (ABA). The author would like to thank the ABA's Women in M&A Taskforce for the opportunity to attend the 2017 Business Law Section Meeting of the ABA.

[1] *See* ARCHITECT PARTNERS, BLOCKCHAIN M&A SNAPSHOT 3 (2017).

[2] *See* BAIN & CO., BLOCKCHAIN IN FINANCIAL MARKETS: HOW TO GAIN AN EDGE 1 (2017).

[3] *See* Prableen Bajpai, *How Stock Exchanges Are Experimenting With Blockchain Technology*, NASDAQ (June 12, 2017, 8:50 AM), http://www.nasdaq.com/article/how-stock-exchanges-are-experimenting-with-blockchain-technology-cm801802; Laura Shin, *Why Nasdaq Is Even More Optimistic About Blockchain Than It Was 3 Years Ago*, FORBES (Feb. 21, 2017, 8:00 AM), https://www.forbes.com/sites/laurashin/2017/02/21/why-nasdaq-is-even-more-optimistic-about-blockchain-than-it-was-3-years-ago/#6036a7351a26.

[4] *See, e.g.*, ARIZ. REV. STAT. ANN. § 44-7061 (2017); NEV. REV. STAT. ANN. SB 398, § 4 (2017); 12 V.S.A. § 1913 (2017).

networks or databases"—blockchains—to create and maintain corporate records.[5] Just a few months after the new Delaware statutes were signed into law, the 2017 Business Law Section Meeting of the American Bar Association (ABA) featured a panel session entitled "Blockchain: How the Technology Behind Distributed Ledgers will Impact Corporate Law and M&A Practice."[6] The panel featured high-profile speakers such as Vice Chancellor Travis Laster of the Delaware Court of Chancery and Andrea Tinianow, Director of Corporate and International Development at the Delaware Department of State. Ms. Tinianow also serves as Director of the Delaware Blockchain Initiative.

With a focus on Delaware's embrace of blockchain technology, this Article examines the potential role of distributed ledgers in corporate governance and capital market transactions. The Article then considers the solutions such technology offers, as well as some barriers its advocates might face in pursuing its wide-scale adoption.

II. What is a Blockchain?

A blockchain is a digital ledger.[7] Blockchain technology is also known as "distributed ledger technology" (DLT), because copies of a single, shared ledger are distributed across a decentralized network of multiple "nodes," or users.[8]

In a blockchain, all transactions that occur within a network are validated and recorded in the ledger by consensus.[9] When a transaction is proposed, all nodes verify that the sell-side account has the promised inventory and that the buy-side account has the promised currency to purchase it.[10] If all nodes validate the transaction, the transaction is executed and cryptographically recorded in the shared ledger.[11] Thus, rather than having an intermediary institution reconcile the sell-side and buy-side's respective ledgers in order to settle the transaction, the transaction is authenticated and executed in real time by automated network consensus.[12]

In addition to circumventing the inefficiencies of relying on an intermediary, blockchain's automated consensus technology promises accuracy and security.[13] First, by consolidating data into a shared database, the technology minimizes the chance of accounting discrepancies—and

[5] DEL. CODE ANN. tit. 8, § 224 (2017); *see also* Pete Rizzo, *Delaware Governor Signs Blockchain Bill Into Law*, COINDESK (July 24, 2017, 1:30 PM), https://www.coindesk.com/delaware-governor-signs-blockchain-legislation-law/.

[6] The author attended the ABA's Business Law Section Meeting in Chicago, Illinois from September 14 to September 16, 2017. *See also* A.B.A., *Business Law Section Annual Meeting 2017*, https://www.americanbar.org/groups/business_law/events_cle/annual_2017.html (last visited Nov. 13, 2017) (advertising the meeting as occurring from September 14 to September 16, 2017).

[7] *See* INVESTOPEDIA, *Blockchain* (Sept. 23, 2017, 3:18 PM), http://www.investopedia.com/terms/b/blockchain.asp.

[8] *See id.*

[9] *See generally Blockchain 101*, IBM, https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=XI912346USEN& (last visited Oct. 24, 2017).

[10] *See* OLIVER WYMAN & EUROCLEAR, BLOCKCHAIN IN CAPITAL MARKETS: THE PRIZE AND THE JOURNEY 10 (2016).

[11] *See id.* at 6 (describing encryption and mutual consensus verification technologies).

[12] *See id.* at 11.

[13] *See Blockchain 101*, *supra* note 9.

any subsequent disputes—among the parties involved.[14] The technology has been likened to the functionality of Google Docs, in which all permissioned parties have access to a single document at the same time and only a single version of the document exists at any one time.[15] Further, all transactions are recorded sequentially and irreversibly, thus creating an immutable and indisputable audit trail.[16] Finally, since copies of the ledger are cross-authenticated and updated in real time, enormous computing power would be required to corrupt any portion of the data encrypted in the network.[17]

III. Delaware's Approach

A. Examples of Corporate Governance Disputes in Recent Delaware Jurisprudence

With roughly two-thirds of Fortune 500 companies incorporated in Delaware, a vast portion of U.S. corporate litigation occurs in the state, and the Delaware Court of Chancery's docket provides a reliable snapshot of current trends in corporate governance disputes.[18] A March 2017 article co-authored by Andrea Tinianow, the state's Director of Corporate and International Development, pointed to two disputes in particular that were characteristic examples of transactional litigation that arises out of administrative error—*In re Appraisal of Dell, Inc.* and *In re Dole Food Co., Inc.*[19] *Dell* gives a dramatic example of how beneficial shareholders lost appraisal rights in a merger proposal due to a botched proxy vote. *Dole*, on the other hand, showcases the accounting discrepancies than can arise as a consequence of using a corporate record-keeping system that is unable to keep up with the volume and nature of today's capital market transactions. Though it should be noted that Tinianow's article explicitly advocates for the adoption of blockchain technology and that her co-author is Caitlin Long, Chairman and President of a start-up that offers a proprietary, blockchain-based issuance and securities trading platform, the cases the article cites do shed light on the systemic shortcomings of today's corporate infrastructure.

1. Proxy Voting Errors in *Dell*

Dell Inc. completed a go-private merger in February 2013, and in July 2013, certain of Dell's beneficial shareholders petitioned for appraisal.[20] In May 2016, Vice Chancellor Laster of the Delaware Court of Chancery denied the shareholders' petition and entered judgment against

[14] *See id.*

[15] *See What is Blockchain Technology?*, BLOCKGEEKS, https://blockgeeks.com/guides/what-is-blockchain-technology/ (last visited Oct. 24, 2017).

[16] *See* Andrea Tinianow & Caitlin Long, *Delaware Blockchain Initiative: Transforming the Foundational Infrastructure of Corporate Finance*, HARVARD LAW SCHOOL FORUM ON CORPORATE GOVERNANCE AND FINANCIAL REGULATION: THE DELAWARE LAW SERIES (Mar. 16, 2017), https://corpgov.law.harvard.edu/2017/03/16/delaware-blockchain-initiative-transforming-the-foundational-infrastructure-of-corporate-finance/.

[17] *See* BLOCKGEEKS, *supra* note 15.

[18] *See* DLA PIPER, DELAWARE CORPORATE LAW AND LITIGATION: WHAT HAPPENED IN 2016 AND WHAT IT MEANS FOR YOU IN 2017 (Feb. 6, 2017), https://www.dlapiper.com/en/us/insights/publications/2017/02/delaware-corporate-litigation-2016-2017/.

[19] Tinianow & Long, *supra* note 16 (citing *In re Appraisal of Dell Inc.*, 143 A.3d 20 (Del. Ch. 2016) and *In re Dole Food Co., Inc.*, No. CV 8703-VCL, 2017 WL 624843 (Del. Ch. Feb. 15, 2017)).

[20] *See* In re Appraisal of Dell, Inc., No. 9322-VCL, 2015 WL 4313206, at *1, *7 (Del. Ch. July 30, 2015).

them by holding that they had lost standing to claim shareholder appraisal rights.[21]

Vice Chancellor Laster has publicly stated that the outcome of this case, while consistent with Delaware case law, is "absurd": the shareholders lost standing because of nothing more than a proxy voting error.[22]

Under § 262(a) of the DGCL, shareholders can request appraisal of the fair value of their shares only if they meet certain conditions. One such condition is the "Dissenter Requirement"—the shareholder must have neither voted in favor of the merger, nor consented thereto in writing.[23] Ultimately, the petitioning shareholders in *Dell* were deemed to have waived their appraisal rights because they voted in favor of the merger and thus did not meet the Dissenter Requirement.[24] However, the shareholders were so deemed only due to an almost laughable clerical error.

The shareholders—mutual funds sponsored by T. Rowe Price & Associates, Inc. (T. Rowe)—intended to vote against the merger. However, because they were beneficial shareholders and not holders of record, the shareholders voted by proxy.[25] As a result of an error in the voting instructions sent to their proxy voter, the shareholders' votes were inadvertently recorded *for* the merger.[26]

i. Stock Ownership and Voting Right Structure

The petitioning shareholders' votes were recorded through something akin to a protracted game of "telephone." Under Delaware law, voting authority for the shares beneficially owned by the petitioners lay with a company named Cede & Co. (Cede)—the holder of record whose name was represented on Dell's corporate stock ledger.[27] However, Cede did not have a direct relationship with the petitioners. Cede merely held Dell shares in "fungible bulk" for a number of custodial banks, including a certain State Street Bank & Trust Co. (State Street), which, in turn, held the *Dell* petitioners' shares in smaller fungible bulk.[28] Accordingly, when the Dell merger was announced, Cede had to seek shareholder approval through a long chain of intermediaries.

First, Cede transferred its voting authority to the relevant custodial banks, including, in the *Dell* petitioners' case, State Street.[29] State Street then outsourced the task of collecting and implementing voting instructions from the petitioners, as well its other account holders with claim to the fungible pool of Dell shares, by giving power of attorney to a third-party company named Broadridge Financial Solutions, Inc. (Broadridge).[30] On the other side of the chain, T. Rowe involved *another* third-party, called Institutional Shareholder Services, Inc. (ISS).[31] ISS was to

[21] *See Dell*, 143 A.3d at 59.
[22] Vice Chancellor J. Travis Laster, Keynote Speech at the Fall 2016 Meeting of the Council of Institutional Investors: The Block Chain Plunger: Using Technology to Clean Up Proxy Plumbing and Take Back the Vote (Sept. 29, 2016).
[23] *See* DEL. CODE ANN. tit. 8, § 262(a) (2017).
[24] *See Dell*, 143 A.3d at 59.
[25] *See id.* at 22.
[26] *See id.*
[27] *See id.*
[28] *See id.* See Figures 1 and 2 below for a visual representation of the chain of ownership and voting rights.
[29] *See Dell*, 143 A.3d at 22.
[30] *See id.*
[31] *See id.*

collect T. Rowe's voting instructions and convey them to Broadridge.[32]

Thus, in order for the *Dell* petitioners to oppose the Dell merger, their voting instructions needed to flow through ISS, then Broadridge, whose authority was delegated from State Street, which, in turn, had received proxy authority through Cede.

ii. Mistaken Voting Instructions

The critical error occurred in the process of ISS collecting T. Rowe's voting instructions. T. Rowe informed ISS that it wanted to vote *against* the merger in the vote to be held at Dell's July 2013 shareholder meeting.[33] T. Rowe's Corporate Governance Specialist explicitly asked ISS to override T. Rowe's default *for* vote, which would otherwise automatically populate the ISS voting system.[34] ISS confirmed accordingly; the entry in ISS's system for the July 2013 Dell shareholder meeting showed T. Rowe's voting instruction *against* the merger.[35]

However, the July meeting was postponed three times.[36] Each time a new date was announced, ISS confirmed that T. Rowe's vote *against* the merger was recorded in ISS's system.[37] But when the vote was eventually pushed back to September 2013, the ISS system generated a new entry.[38] Unbeknownst to either ISS or T. Rowe, the new entry fatally replaced the July meeting entry. The new entry was automatically populated with T. Rowe's default *for* vote and thus, ISS submitted voting instructions to Broadridge indicating that the T. Rowe shareholders were *in favor of* the merger.[39] At just the second link of the proxy voting "telephone" chain, the petitioners' instructions were garbled; the petitioners had ostensibly approved the merger and effectively waived their appraisal rights.

[32] *See id.*
[33] *See id.* at 27.
[34] *See id.* T. Rowe assumed a default position that it would typically vote *for* the transaction when voting on transactions supported by the management of the entity.
[35] *See id.* at 27.
[36] *See id.*
[37] *See id.*
[38] *See id.* at 27–28.
[39] *See id.*

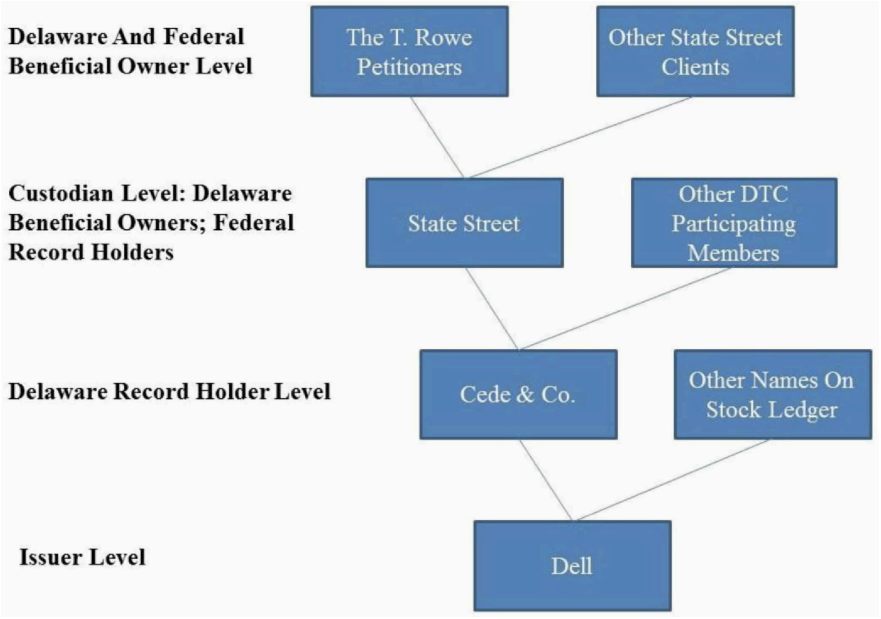

Figure 1: Chain of ownership between issuer, record holders, and beneficial owners. Dell*, 143 A.3d at 25.*

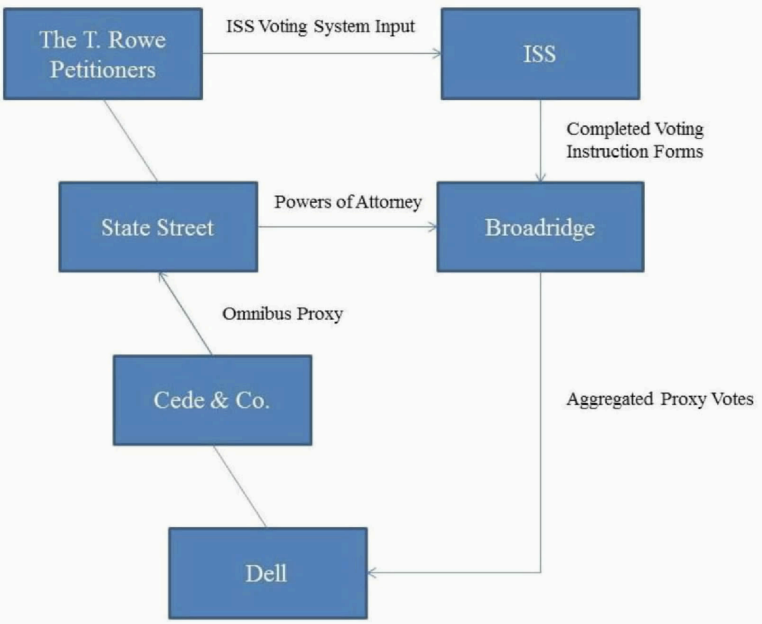

Figure 2: Chain of voting authority between issuer, record holders, and beneficial owners. Dell*, 143 A.3d at 31.*

2. Ledger Discrepancies in *Dole*

i. Inconsistent Ledgers

The cause of conflict in *Dole* could similarly be likened to a "telephone" game. As in *Dell*, the record owner of the relevant shares was Cede.[40] Cede again held shares in fungible bulk, and its stock ledger recorded the accounts of custodial institutions, which, in turn, held shares in fungible bulk for *their* clients—the actual beneficial owners.[41] But this time, Cede, the beneficial shareholders, and the layers of intermediaries between them muddled a much more routine communication—the routine trading of shares.[42] This muddled communication led to an inaccurate stock ledger, which came to the *Dole* court's attention in a case regarding a class action settlement.[43]

In the wake of the go-private merger of Dole Food Company, Inc. (Dole), which closed on November 1, 2013, shareholders brought a class action against Dole's fiduciaries.[44] The parties settled the case for $2.74 per share plus interest.[45] When the settlement administrator instructed class members to submit claims for the settlement consideration, it received facially valid claims for 49,164,415 shares.[46] Unfortunately, this far outnumbered the number of shares actually outstanding according to Cede's centralized stock ledger, which showed only 36,793,758 shares outstanding.[47] Asserting that it would require "a forensic audit of herculean proportions" to retrace every trade and to rectify the ledger, the *Dole* court held that the settlement consideration should be distributed by the same mechanism as the merger consideration—Cede's stock ledger would govern, even though this would mean that some beneficial owners, who admittedly fell within the class definition, would not be able to collect on their settlement claims.[48]

ii. Delayed Settlement and Unrecorded Transfers

Upon investigation, there were two main causes of the stock ledger discrepancy. First, in anticipation of needing to distribute merger consideration *pro rata* among the custodial institutions' claims, Cede had frozen its centralized ledger on the effective date of Dole's merger.[49] Freezing a ledger restricts securities from being deposited or withdrawn,[50] which would theoretically have given Cede an accurate snapshot of account balances on the merger's effective date. Unfortunately, however, this does not mesh with the current process for clearing trades; the clearing process has a lag time of three days, meaning that any trades placed in the two days prior

[40] *See* In re Dole Food Co., Inc., No. CV 8703-VCL, 2017 WL 624843, at *1 (Del. Ch. Feb. 15, 2017).
[41] *See id.* at *3.
[42] *See id.* ("DTC's centralized ledger did not reflect all of these trades.")
[43] *See id.*
[44] *See id.* at *1.
[45] *See id.*
[46] *See id.*
[47] *See id.* at *5.
[48] *See id.* at *4–6.
[49] *See id.* at *3.
[50] *See* U.S. SEC. AND EXCHANGE COMMISSION, *DTC Chills and Freezes*, INVESTOR.GOV: INVESTOR ALERTS & BULLETINS (Feb. 23, 2017), https://www.investor.gov/additional-resources/news-alerts/alerts-bulletins/dtc-chills-freezes.

to, or on the day of, the Dole merger's closing were not captured in Cede's ledger.[51] And in the three-day period prior to the merger becoming effective, more than thirty-two million shares of Dole common stock were traded.[52]

Second, this discrepancy was further exacerbated because, as of October 31, 2013, 2.9 million shares of Dole common stock had been shorted.[53] Current share-lending laws allow brokers and the custodial institutions that hold beneficial owners' shares in fungible bulk to lend shares for short sale without the beneficial owners' knowledge.[54] In *Dole*, this facilitated double counting. It created more beneficial owners who could facially claim settlement consideration, while the unknowing lenders of a shorted stock could simultaneously submit claims based on the same underlying shares.[55]

Declaring that it was "functionally impossible to resolve the share discrepancy in a practical or cost-effective manner," the *Dole* court held that the settlement consideration should be distributed according to Cede's ledger and shifted the burden to the custodial institutions to allocate the consideration among its clients.[56]

B. Delaware's Response

1. Vice Chancellor Laster's Criticism of the Current System

Vice Chancellor Laster summarized the history of the current stock ownership system and its incompatibility with the realities of modern-day securities trading in a different decision from the *Dole* case. In *In re Appraisal of Dell, Inc.*, he explained why most U.S. equity securities are currently registered in the name of Cede, rather than in the names of their beneficial owners.[57] In the 1970s, as trading volumes rose to an unprecedented level, the U.S. Securities and Exchange Commission (SEC) implemented a national "share immobilization" initiative.[58] The initiative halted the physical exchange of share certificates with every trade.[59] Instead, custodians such as banks and brokers—State Street in the case of *Dell*—placed "jumbo certificates" representing masses of shares into one of three depositories.[60] The jumbo certificates were issued in the name of each depository's nominee.[61] The depositories then served as central accountants—the depositories tracked any trades among the various custodians' accounts—but as discussed earlier, held the custodians' shares in fungible bulk.[62] The structure was then repeated at a smaller level within each custodian's account.[63] The custodians tracked any trades among their clients, who

[51] *See In re Dole Food Co., Inc.*, 2017 WL 624843, at *3.
[52] *See id*.
[53] *See id.*
[54] *See id.*
[55] *See id*. at *3.
[56] *See id*. at *4, *7.
[57] *See* In re Appraisal of Dell, Inc., No. 9322-VCL, 2015 WL 4313206, at *4 (Del. Ch. July 30, 2015).
[58] *See id.* at *1.
[59] Laster, *supra* note 22, at 4.
[60] *See In re Appraisal of Dell, Inc.*, 2015 WL 4313206, at *5.
[61] *See* Laster, *supra* note 22, at 4–5.
[62] *See id.* at 5.
[63] *See id.*

were the true beneficial shareholders, but actually held all their clients' shares in fungible bulk. [64]

This system is still in place, but today, the only surviving depository is the Depository Trust Company (DTC).[65] Now, almost all U.S. stock is issued in the name of DTC's nominee—Cede.[66]

Given that much of Delaware's corporate governance law exclusively grants shareholders' executory power to owners of record, rather than beneficial owners, this multilayered system requires all the parties involved to participate in a new game of "telephone" each time shareholder action is required.[67] Although the share immobilization system was designed to accommodate the increased trading volumes of the 1960s and 1970s, it has ironically become an enormous encumbrance on the exponentially higher trading volumes of the twenty-first century. Vice Chancellor Laster asserts that the current system's inability to accurately and timely track trading activity and shareholder voting is a "systemic failure[] [that] undermine[s] the legitimacy of our corporate governance system."[68] In *Dole*, he warned that the circumstances that led to the dispute were not uncommon and that "[t]he only difference [that made *Dole* unique] was the magnitude of the [stock ledger] discrepancy, which made the issues visible."[69] He noted that such discrepancies appeared "endemic to the depository system."[70]

2. The Beginnings of Blockchain-Based Governance Mechanisms in Delaware

Vice Chancellor Laster's warnings did not fall on deaf ears. Both the Delaware legislature and executive branch seemed to agree with his assessment of the state's corporate governance requirements. To much fanfare, Delaware Governor John Carney signed the "Blockchain Bill" into law in July 2017. The bill amends the DGCL to expressly allow the inclusion of blockchain technology in the infrastructure of corporate governance.[71] For example, § 151(f) of the DGCL now explicitly allows the delivery of certain shareholder communications by distributed ledger platforms, and, crucially, § 224 now grants statutory authority to use distributed ledgers in the creation and maintenance of corporate records.[72] The latter provision even enumerates minimum requirements of such records.[73]

---

[64] *See id.*

[65] *See In re Appraisal of Dell, Inc.*, 2015 WL 4313206, at *1.

[66] *See id.* at *4.

[67] *See* Laster, *supra* note 22, at 10 ("T. Rowe is not the only stockholder to have suffered from this daisy-chained system of share ownership.").

[68] Laster, *supra* note 22, at 14.

[69] In re Dole Food Co., Inc., No. CV 8703-VCL, 2017 WL 624843, at *7 (Del. Ch. Feb. 15, 2017).

[70] *Id.*; *see also* Concept Release on the U.S. Proxy System, Release Nos. 34-62495, Investment Advisor Act Release No. 3052, Investment Company Act Release No. 29,340, 75 Fed. Reg. 42,982, 42,990 (proposed July 22, 2010) ("Because the ownership of individual shares held beneficially is not tracked in the U.S. clearance and settlement system . . . imbalances occur.").

[71] *See generally* Handout from Matthew J. O'Toole, Michael K. Reilly & David B. DiDonato, at the ABA's 2017 Business Law Section Meeting (Sept. 15, 2017); Matthew J. O'Toole & Michael K. Reilly, *The First Block in the Chain: Proposed Amendments to the DGCL Pave the Way for Distributed Ledgers and Beyond*, HARVARD LAW SCHOOL FORUM ON CORPORATE GOVERNANCE AND FINANCIAL REGULATION: THE DELAWARE LAW SERIES (Mar. 16, 2017), https://corpgov.law.harvard.edu/2017/03/16/the-first-block-in-the-chain-proposed-amendments-to-the-dgcl-pave-the-way-for-distributed-ledgers-and-beyond/.

[72] *See* DEL. CODE ANN. tit. 8, §§ 151(f), 224 (2017). *See generally* O'Toole, Reilly & DiDonato, *supra* note 71, at 3.

[73] *See* DEL. CODE ANN. tit. 8, § 224 (2017).

These legislative changes come in the midst of a broader push from the Delaware executive branch to embrace blockchain technology. In 2016, then-Governor Jack Markell announced the launch of the Delaware Blockchain Initiative.[74] A press release from the Governor's Office stated that the initiative is a "comprehensive program to provide an enabling regulatory and legal environment for the development of blockchain technology and to welcome blockchain companies to locate in the state."[75] Governor Markell announced that Delaware, in demonstration of its commitment to the technology, would also invest in its own use cases for blockchain and smart contract technology.[76] For example, Delaware partnered with Symbiont, a DLT start-up, to store state archival records on a distributed ledger.[77]

Further, Tinianow, who also serves as the Director of the Delaware Blockchain Initiative, used her March 2017 article to publicly contemplate the benefits of distributed stock ledgers and advocate unequivocally for Delaware's bullish position on the technology:

> If shares are registered on a distributed ledger, investors and issuers would be able to *interact directly*. *Property rights* would be crystal clear. *Capitalization table management* would become easy. *Proxy voting* would be transparent and always accurate. *Dividends* and other corporate actions (such as stock splits) would be automated and always accurate. *Certificates of good standing* would never again require a prerequisite forensic audit. Securities *lending records* would always be accurate, so accidental over-issue of securities would never happen.[78]

IV. Challenges to Wide-Scale Adoption

Tinianow and Long's piece certainly raises valid points about the advantages of adopting blockchain-based platforms. Features such as (1) direct issuer-investor relations; (2) transparent, unified, and real-time transaction data; and (3) automated processes for dividend distribution and investor communications all would seem likely to bring us closer to Vice Chancellor Laster's "utopian vision of share ownership system where there is only one type of owner: record owners."[79] Further, there seems to be consensus among capital markets experts that, by replacing the manual, redundant, and error-prone processes of secondary markets with an automated system for execution, clearing, and settlement, blockchain technology could not only minimize liquidity and credit risks, but allow companies to harness richer—but cheaper—market reference data.[80]

But both corporations and the capital markets still seem tepid towards wide-scale blockchain adoption.[81] Certainly, there are still technological limitations. Although the technology has been tested in smaller use cases, such as Nasdaq's previously mentioned private market platform,[82] and could have substantial near-term impacts on smaller domestically focused markets

[74] *See* Press Release, Del. Off. of the Governor, Governor Markell Launches Delaware Blockchain Initiative (May 2, 2016).
[75] *See id.*
[76] *See id.*
[77] *See id*.
[78] Tinianow & Long, *supra* note 16 (emphasis added).
[79] Laster, *supra* note 22, at 20.
[80] *See* BAIN & CO., *supra* note 2, at 4; OLIVER WYMAN, *supra* note 10, at 9.
[81] *See* BAIN & CO., *supra* note 2, at 1.
[82] *See* Bajpai, *supra* note 3.

such as the Australian Stock Exchange,[83] there are still questions regarding DLT's scalability and capacity to handle high-volume, high-frequency trading.[84]

Further, implementation requires some degree of consensus from all market participants, in terms of both policy and actual system design. Technology that distributes ledgers inherently requires group participation because there must be a network of nodes to which ledgers can be distributed, and all nodes in the network must agree to the protocols the network will use.[85] Naturally, such coordination will be harder to achieve in larger markets. Moreover, there needs to be a critical mass in the number of participants willing to invest in blockchain technology for it to become useful and an attractive investment.[86] As such, Bain & Co. predicts that many market actors will face "game-theory-type decisions."[87] Being the first to adopt a technology that may never achieve critical mass and widespread usage may result in a losing investment, but being too slow may result in being left behind as the market evolves.[88]

Relatedly, although Delaware has adapted the DGCL to welcome the advent of blockchain technology, for most market participants, changes to Delaware law alone may not be sufficient to justify migrating to blockchain-based platforms. Although the Blockchain Bill's changes to the DGCL seem to promise a path to Vice Chancellor Laster's utopia, they are hardly a panacea to the convoluted system currently in place. First, Delaware's new rules address only record ownership, and while this could be revolutionary for companies incorporating in Delaware moving forward, existing corporations will be largely unaffected. Existing entities, who see very little day-to-day change in their stock ledgers and whose shares are currently traded almost exclusively in the secondary market, will only feel the simplifying benefits of a blockchain-based platform when secondary market actors buy into the technology too.[89]

Second, as the DGCL stands now, a Delaware corporation may only use uncertificated shares—and shares issued or recorded exclusively by DLT would necessarily be uncertificated—if certificates that previously represented those shares are surrendered to the corporation.[90] This requirement renews precisely the logistical challenge that the SEC's 1970s share immobilization initiative sought to defeat—the physical movement of stock certificates. For Delaware corporations with stock certificates outstanding, which encompasses the vast majority of publicly traded corporations, this is an additional labor and cost intensive obstacle to transitioning to blockchain-based stock ledgers.[91]

Perhaps most crucially, widespread adoption may be slowed because the benefits of migrating to blockchain-based trading will not be distributed evenly.[92] Recent estimates from an Oliver Wyman study put global annual expenditure on post-trade and securities servicing in the region of $100 billion, with an additional $100 to $150 billion in general information technology

[83] *See* BAIN & CO., *supra* note 2, at 2.
[84] *See* Caitlin Long, Remarks at the ABA's 2017 Business Law Section Meeting (Sept. 15, 2017); OLIVER WYMAN, *supra* note 10, at 14.
[85] *See* OLIVER WYMAN, *supra* note 10, at 7.
[86] *See* BAIN & CO., *supra* note 2, at 5.
[87] *Id.*
[88] *See id.*
[89] *See* O'Toole, Reilly & DiDonato, *supra* note 71, at 4.
[90] *See* DEL. CODE ANN. tit. 8, § 158 (2017).
[91] *See* O'Toole, Reilly & DiDonato, *supra* note 71, at 4.
[92] *See* BAIN & CO., *supra* note 2, at 4.

and operations expenses in capital markets.[93] Although Bain & Co.'s research suggests that issuers and end-investors may see between fifteen and thirty-five billion dollars in savings by transitioning secondary markets to blockchain technology, those savings will likely come at the expense of clearinghouses and custodians, whose utility would be replaced by DLT.[94] As such, those intermediary actors, who currently hold vast power in the ecosystem,[95] have little incentive to make or facilitate the transition. Though many intermediaries are actively exploring the potential of blockchain technology lest the market leave them behind,[96] the risk of disrupting their own business models and competitive offerings looms large.[97]

V. Conclusion

In light of the issues "endemic to the depository system,"[98] DLT undeniably has potential to improve the current infrastructures of corporate governance and capital market transactions. The Delaware Blockchain Initiative and subsequent Blockchain Bill certainly mark significant steps toward wider implementation of the technology. However, blockchain proponents face a conundrum: to unlock its full potential, the technology must become scalable, and a critical mass of market participants must take the leap. To be successful, advocates must stimulate enough market interest in the technology to keep driving product innovation and to persuade all actors that the upside is worth the investment.

[93] OLIVER WYMAN, *supra* note 10, at 20.

[94] BAIN & CO., *supra* note 2, at 4–5.

[95] *See, e.g.*, Laster, *supra* note 22, at 15 (citing Broadridge's monopoly power in controlling over ninety-eight percent of the U.S. market for proxy voting processing services); In re Dole Food Co., Inc., No. CV 8703-VCL, 2017 WL 624843 (Del. Ch. Feb. 15, 2017), at *5 (noting that the only feasible solution to stock ledger discrepancies caused by the current system's inadequacies disproportionately benefits large holders).

[96] For instance, the Bain & Co. study cited throughout this Article was written in collaboration with Broadridge and the Oliver Wyman study was co-authored by Euroclear, another provider of post-trade services.

[97] BAIN & CO., *supra* note 2, at 5.

[98] In re Dole Food Co., Inc., No. CV 8703-VCL, 2017 WL 624843, at *7 (Del. Ch. Feb. 15, 2017).