Modernizing the Stockholder Shield: How Blockchains and Distributed Ledgers Could Rescue the Appraisal Remedy

Brandon Ferrick
Boston College Law School, brandon.ferrick@bc.edu

Follow this and additional works at: https://lawdigitalcommons.bc.edu/bclr
Part of the Antitrust and Trade Regulation Commons, Business Organizations Law Commons, Commercial Law Commons, Computer Law Commons, Science and Technology Law Commons, and the State and Local Government Law Commons

Recommended Citation
Brandon Ferrick, Modernizing the Stockholder Shield: How Blockchains and Distributed Ledgers Could Rescue the Appraisal Remedy, 60 B.C.L. Rev. 621 (2019), https://lawdigitalcommons.bc.edu/bclr/vol60/iss2/6

This Notes is brought to you for free and open access by the Law Journals at Digital Commons @ Boston College Law School. It has been accepted for inclusion in Boston College Law Review by an authorized editor of Digital Commons @ Boston College Law School. For more information, please contact nick.szydlowski@bc.edu.
MODERNIZING THE STOCKHOLDER SHIELD: HOW BLOCKCHAINS AND DISTRIBUTED LEDGERS COULD RESCUE THE APPRAISAL REMEDY

Abstract: A recent wave of appraisal litigation has highlighted costly flaws in Delaware’s appraisal law. The genesis of the problems stems from dilapidated assumptions about stock ownership and corporate record keeping baked into the Delaware General Corporation Law. Technological advancements, namely distributed ledgers and blockchain technology, promise to bring Delaware’s appraisal law into the twenty-first century while remaining consistent with existing appraisal law. Distributed ledgers and blockchain technology promise lightning fast clearing times, infallible record keeping, and cost-efficient modes of transfer. States, private actors, and laypersons are already recognizing the litany of benefits offered by these technologies. This Note explores the flaws in the current appraisal system, discusses the benefits offered by distributed ledgers and blockchain technology, and demonstrates how blockchain technology can modernize not only corporate record keeping but appraisal litigation as well.

INTRODUCTION

Bitcoin has been championed as a cryptocurrency with the power to replace modern banking and revolutionize the exchange of goods and services.1

Thus, it should come as no surprise that the value of bitcoin and other cryptocurrencies have recently skyrocketed. What may come as a surprise, however, is that the technologies underlying bitcoin—distributed ledgers and blockchain networks—are more valuable than the coins themselves.

Paper, Cryptocurrencies: A Brief Thematic Review, ECON. NETWORKS J., Aug. 4, 2017, at 1 (commenting on the wide variety of cryptocurrencies); see also Popper, supra (describing the value of cryptocurrencies and their geneses). Bitcoin gets its value by open-market consensus, similar to the value of stocks or the dollar. See Popper, supra. Bitcoins are generated by a process called “mining” whereby participants on the bitcoin network run a program on their computers to solve a computationally-dense algorithm. Id.; see infra notes 203–206 and accompanying text (explaining the validation mechanism and proof of work protocol). The first to solve the puzzle is rewarded with bitcoins. Popper, supra. It is important to understand from the outset that this Note focuses on the network and technology underlying bitcoin and cryptocurrencies, rather than the cryptocurrencies themselves.


Distributed ledgers are electronic registers of transactions that are made available to all participants on the distributed ledger’s network. Distributed ledgers allow for fast and secure transactions that do not need to travel through the books of trusted third parties before clearing and settling. One area that can immediately benefit from distributed ledger technology is appraisal litigation following corporate mergers.

able to all participants on a blockchain network that can only be updated or changed by meeting certain requirements, like a majority consensus. See U.K. GOV’T CHIEF SCI. ADVISER, DISTRIBUTED LEDGER TECHNOLOGY: BEYOND BLOCK CHAIN 17 (2016) (describing blockchains as a “type of database that takes a number of records and puts them in a block . . . [e]ach block is then ‘chained’ to the next block . . .[:] [t]his allows blockchains to be used like a ledger, which can be shared and corroborated by anyone with . . . permissions.”); see also David Yermack, Corporate Governance and Blockchains, 21 REV. FIN. 7, 11 (2017) (noting that distributed ledgers are “essential component[s]” of the Bitcoin blockchain system). Bitcoin, unlike the blockchain network, is merely lines of computer code grafted onto the blockchain network that represents a record of an asset (or, more specifically, represents the asset itself). See Piazza, supra, at 267 (distinguishing Bitcoin and other cryptocurrencies from blockchain networks).

4 George S. Geis, Traceable Shares and Corporate Law, 113 NW. U. L. REV. 227, 255 (2018) (“A distributed ledger is simply a sequential database of assets that is shared across a network of users. It is distributed in the sense that all participants . . . have their own copy of the ledger identifying both historical transactions and the resulting ownership rights associated with the entire group of assets.”); see COMM. ON PAYMENTS & MARKET INFRASTRUCTURES, DISTRIBUTED LEDGER TECHNOLOGY IN PAYMENT, CLEARING AND SETTLEMENT: AN ANALYTICAL FRAMEWORK 2 (Feb. 2017) [hereinafter COMM. ON PAYMENTS], https://www.bis.org/cpmi/publ/d157.pdf [https://perma.cc/6TC3-7EZR] (describing distributed ledger technology as “the processes and related technologies that enable nodes in a network . . . to securely propose, validate, and record state changes to a synchronized ledger that is distributed across the network’s nodes”) (italics removed); see also U.K. GOV’T CHIEF SCI. ADVISER, supra note 3, at 17–18 (describing distributed ledgers are public databases with sequentially-stored records that are updated with a “certain quorum”). Distributed ledger technology can reform securities markets by: simplifying transfer processes, decreasing transfer and settlement times, maintaining only one ledger as opposed to several across different financial intermediaries, and reducing risks by limiting the opportunities to edit the ledger, all while improving transparency between network participants. COMM. ON PAYMENTS, supra, at 1.

5 Trevor I. Kiviat, Note, Beyond Bitcoin: Issues in Regulating Blockchain Transactions, 65 DUKE L. J. 569, 574 (2015) (describing blockchain networks as “trustless,” meaning that they can support transactions without the need for an intermediary); see U.K. GOV’T CHIEF SCI. ADVISER, supra note 3, at 36 (proposing blockchain technology as a “common solution” to problems posed by traditional record keeping methods in banking, offering that distributed ledgers could maintain accurate and timely records of transactions without the need for clearing and settlement intermediaries); see also Riley T. Svikhart, Note, Blockchain’s Big Hurdle, 70 STAN. L. REV. ONLINE 100, 101 (2017), https://www.stanfordlawreview.org/online/blockchains-big-hurdle/ [https://perma.cc/48P3-QDLY] (discussing that bitcoin uses blockchain technology to displace trusted third-party validations) (internal quotations omitted); OLIVER WYMAN, BLOCKCHAIN IN CAPITAL MARKETS: THE PRIZE AND THE JOURNEY 6 (2016), https://www.oliverwyman.com/content/dam/oliver-wyman/global/en/2016/feb/BlockChain-In-Capital-Markets.pdf [https://perma.cc/69HS-UTMD] (recognizing that distributed ledger technology opens pathways to maintain shared, accurate ledgers unlike any implemented previously).

6 See Geis, supra note 4, at 271–72 (arguing that blockchain technology can fix problems in appraisal litigation where intermediary holding systems create a rift between state appraisal law and securities ownership realities, resulting in the inadvertent loss of the appraisal right for some stockholders).
In the event of a merger or consolidation, Title 8, Section 262 of the Delaware General Corporation Law provides stockholders who oppose the transaction, or abstain from voting, with a way out of the deal by receiving the judicially-appraised fair value for their shares: the appraisal remedy. Because corporations are inherently democratic creatures, this remedy was intended to act as a shield for minority shareholders against renegade majorities.

Historically, appraisal has seen little use. In recent years, however, appraisal litigation has seen a spike in activity, highlighting problems with the current appraisal system that stem from conflicts between Delaware’s incorrect assumption that stocks are owned directly and realities about stock ownership under the current indirect ownership regime.

---

7 DEL. CODE ANN. tit. 8, § 262(a) (2016); CLAIRE HILL ET AL., Mergers and Acquisitions: Law, Theory, and Practice 61 (2006). For simplicity, this Note will use the term “merger” to represent both mergers and consolidations under Section 262 of the Delaware corporate law. See DEL. CODE ANN. tit. 8, § 262.


9 See Wertheimer, supra note 8 at 613 (discussing the potential negative effect of majority rule on minority shareholders). For example, when stockholder preferences diverge with respect to short-term or long-term investment strategies, minority stockholders may be at risk of having their shares artificially devalued at the hands of the majority for the purposes of short-term gains. Id.

10 HILL ET AL., supra note 7, at 78 (describing appraisal as “a lonely backwater for corporate work”). Appraisal has been criticized as being too procedurally burdensome, ineffective to amass change, and costly for the few petitioners for whom appraisal may actually be worthwhile. Charles R. Korsmo & Minor Myers, Appraisal Arbitrage and the Future of Public Company M&A, 92 WASH. U. L. REV. 1551, 1561 (2015) (surveying leading casebooks that describe appraisal as “a cumbersome remedy” with a “complicated maze” of procedural burdens) (citation omitted).

11 HILL ET AL., supra note 7, at 78; see Korsmo & Myers, supra note 10, at 1567 (discussing empirical data supporting that “appraisal activity involving public companies increased substantially starting in 2011, as measured both by the number of [appraisal] petitions filed and the value of the dissenting shares”); see, e.g., J. Travis Laster, Vice Chancellor, Delaware Court of Chancery, Keynote Speech at the Chicago Council of Institutional Investors, The Block Chain Plunger: Using Technology to Clean Up Proxy Plumbing and Take Back the Vote, at 6–7 (Sept. 29, 2016), https://www.cii.org/files/09_29_16_lasterRemarks.pdf [https://perma.cc/5B2W-22F9] (discussing In re Appraisal of Dell Inc., 2015 WL 4313206 (Del. Ch. July 30, 2015), and how the current problems with the appraisal system have had negative effects on stockholders). For example, some stockholders have lost their ability to seek appraisal (lost their shields) at the standing phase because of internal policies within the banks that held the stockholders’ shares when the banks retitled the stockholders’ shares without the stockholders’ consent. See, e.g., In re Appraisal of Dell, Inc. (Dell Ownership), 2015 WL 4313206, at *10 (Del. Ch. July 30, 2015) (finding that, when the custodial banks retitled the shares, the stockholders forfeited their rights to appraisal). In other instances, stockholders have had their shields bolstered—permitted to seek appraisal despite an inability to meet procedural requirements—when the stockholders did not have to show that the particular shares upon which the stockholders sought appraisal were not voted in favor of the merger. In re Appraisal of Transkaryotic Therapies, Inc. (Transkaryotic), 2007 WL 1378345, at *3 (Del. Ch. May 2, 2007) (finding that the “literal terms” of the appraisal statute do not require beneficial owners to perfect their rights to appraisal). The metaphor of a “shield” in the context of appraisal rights has been explored at least once before. See, e.g., Stanley Onyeador, Note, The Chancery Bank of Delaware: Appraisal Arbitrageurs Expose Need to Further Reform Defective Appraisal Statute, 70 VAND. L. REV. 339, 349–51 (2017). In other appraisal contexts, the concept of a shield is used to represent the five percent above-market interest rate provided
Recent technological developments, namely distributed ledger technologies, promise to clean up the procedural requirements for perfecting the appraisal remedy by issuing shares directly, via blockchain networks, thus realigning realities of stock ownership with Delaware law’s assumptions about how stocks are held. Issuing shares via blockchain networks can prevent stockholders’ shields from buckling under the pressure of Section 262’s procedural requirements while also ensuring that those stockholders are fairly held to their statutory burdens. Specifically, stockholders are required to demonstrate they did not vote in favor of the merger and are entitled to appraisal.

Part I of this Note provides a background of both Delaware’s appraisal remedy and the federal stock immobilization policy and introduces the problems that flow from the Delaware statute’s failure to grapple with realities in the securities market. Part II explains the concept of distributed ledgers and blockchain technology, introduces how bitcoin works on the blockchain network, and discusses the general trend of approval for blockchain technology’s adoption and use. Part III argues that blockchain technology can realign Delaware appraisal law with securities ownership realities.

to appraisal stockholders. See, e.g., id. In this Note, however, the concept of a “shield” refers to the appraisal remedy in its entirety, used to defend stockholders from receiving inadequate merger consideration.

Laster, supra note 11, at 16 (advocating that “distributed ledger technologies can provide better accuracy, greater transparency, and superior efficiency for settling securities trades and voting in corporate elections”); Stephen Fox, Recent Cases Demonstrate Need for Blockchain, HARVARD LAW SCH. FORUM ON CORP. GOVERNANCE & FIN. REGULATION (Aug. 8, 2017), https://corpgov.law.harvard.edu/2017/08/08/recent-cases-demonstrate-need-for-blockchain/ [https://perma.cc/W6MB-L974] (noting that issuing shares on a blockchain “raises the possibility of cutting out intermediaries” and “investors would be able to directly own shares”); see Geis, supra note 4, at 263 (discussing a securities market based on blockchain technology, supposing that “[i]t is possible to imagine a world of complete disintermediation, where individual investors join exchanges directly, downloading software to participate as full members of a distributed ledger,” and that those investors “could buy or sell stock directly through the exchange”).

See infra notes 260–267 and accompanying text (explaining how blockchain-based voting ensures that stockholder’s voting preferences are preserved without error).

See infra notes 287–308 and accompanying text. For example, distributed ledgers eliminate the current problems of not knowing how shares were voted and by whom, while also ensuring that indirect ownership does not interfere with a stockholder’s right to have their shares appraised. Yermack, supra note 3, at 17 (discussing the transparency of ownership provided by blockchains); see In re Dole Food Co. (Dole), 2017 WL 624842, at *4 n.1 (Del. Ch. Feb. 15, 2017) (proposing blockchain technology could fix problems of tracing share ownership).

See infra notes 18–178 and accompanying text.

See infra notes 179–238 and accompanying text.

See infra notes 239–308 and accompanying text.
I. SECURITIES OWNERSHIP, APPRAISAL, AND ENSUING PROBLEMS

Section A of this Part begins by providing an overview of modern securities ownership and the federal stock immobilization policy. Section B discusses the history and policies underlying the appraisal remedy and identifies some modern trends in appraisal litigation. Section C then details the various requirements and intricacies of the Delaware appraisal statute. Finally, Section D concludes with a discussion of the problems flowing from Delaware the appraisal statute and the federal stock immobilization policy.

A. Modern Securities Realities: Federal Securities Laws and Cede

Prior to 1970, stock of public corporations was transferred by signing and delivering physical stock certificates. Corporations were notified of the transfers and were then able to reflect a change of ownership on their stock ledgers. This process of physically endorsing stock transfers was arduous and paper-intensive, amassing “crisis proportions” by the late 1960’s due to a growing securities market. In an effort to resolve the crisis, Congress authorized the Securities and Exchange Commission (SEC) to issue a policy that...
“immobilized” stock, disallowing the physical transfer of stock certificates.26 In 1973, the member companies of the New York Stock Exchange banded together to create a depository system that would eliminate the need to physically transfer stock.27 They created the Depository Trust Company (“DTC”) to serve as a centralized hub to hold, manage, and clear their stocks and transfers.28

DTC operates by holding “jumbo” stock certificates of its participants (typically banks or brokers) in the name of its nominee, Cede & Co. (“Cede”).29 Whenever a participating public corporation issues stock, the stock is regis-

26 Dell Ownership, 2015 WL 4313206, at *5; see Securities Investor Protection Act of 1970, 15 U.S.C. § 78kkk(g) (2012) (directing the SEC, in 1970, to “compile a list of unsafe or unsound practices” concerning the securities crisis and to propose recommendations to Congress); see also Securities Acts Amendments of 1975, 15 U.S.C. § 78q–1(e) (2012) (“The [SEC] shall use its authority under this chapter to end the physical movement of securities certificates in connection with the settlement among brokers and dealers of transactions in securities consummated by means of the mails or any means or instrumentalities of interstate commerce”). Originally, Congress authorized the SEC to investigate the genesis of the paperwork problem. Donald, supra note 22, at 54. The SEC’s investigation culminated in a report that ultimately prompted the Securities Acts Amendments of 1975 (“SAA”). Id. It was the SAA that mandated the immobilization of securities and paved the way for an indirect holding system. Id.; see 15 U.S.C. § 78q-1(e) (granting the SEC the authority to immobilize stock certificates transfers). Leading up to the SAA, and during the investigation of the paperwork problem, interestingly enough, two solutions were heavily debated: (1) a centralized depository system that would hold stock certificates and assign rights to the securities it held to participants, and (2) a decentralized computer network that would have linked corporate stock ledgers, allowing for transfer of securities to directly change a corporation’s ledger. Donald, supra note 22, at 54. The banking industry lobbied for the former solution, while most market participants favored the latter. Id. at 56–57. The second model, ultimately rejected, would have burdened issuing corporations with retroactively turning their paper stock certificates into electronic recordings, whereas the first model, a centralized depository, would have outsourced the problem to an intermediary by having the intermediary hold and maintain a record of all issued shares. Id. at 56. Decertificating shares would have also required every state to promulgate laws allowing for their issuance. Id. at 58. Moreover, the technology in the 1970s simply could not provide the quick and safe integration that the market needed at that time. Id. at 57. Eventually, the centralized depository system was set in place: originally designed to be a transient solution on the road to a truly paperless securities market, but evidently became a permanent fixture in the securities market. Id. at 57. See generally id. (providing a more complete discussion of the history and policies behind the depository system and the Depository and Trust Clearing Corporation).

27 Dell Ownership, 2015 WL 4313206, at *5. See generally Wells, supra note 22 (providing a more complete discussion of the great pains that the NYSE and its members went through to establish a working stock certificate depository).

28 Dell Ownership, 2015 WL 4313206, at *5. In 1999, a new holding company, the Depository Trust & Clearing Corporation (“DTCC”) was created and became parent to the Depository Trust Company (“DTC”). Donald, supra note 22, at 59. Today, DTC is the largest securities depository and the only domestic depository. Dell Ownership, 2015 WL 4313206, at *5. DTC holds over three quarters of publically traded stock. Id. DTC is owned by its participant companies, which are all public companies on various national exchanges. Id.

29 Id. at *4; see Donald, supra note 22, at 50 (discussing the securities holding system following the paperwork crisis in the 1970s, noting that stock certificates under the DTC system are “certificated as ‘jumbo’ or ‘global’ certificates that evidence millions of dollars of securities on one certificate”).
tered in Cede’s name.30 This gives Cede the legal title to the securities.31 Holders of legal title to stock are often referred to as being “record” holders, or “registered” holders.32 The issuance of stock is reflected in a corporation’s stock ledger by listing Cede as the registered owner of the issuer’s securities.33

Any certificates given to Cede are electronically registered and kept in an undifferentiated pool (colloquially referred to as “fungible bulk”), precluding any investor, bank, or broker from owning or transferring any one, particular physical share.34 Instead, DTC participants—banks and brokers—maintain an electronic position with DTC that represents their proportional ownership of Cede’s aggregate holding in a corporation.35 Any transfer—for example, a sale on a public stock exchange—is cleared and reflected in DTC’s electronic system by debiting or crediting DTC participants’ accounts.36 In other words, any shares that are bought or sold in the open market never actually leave Cede’s legal ownership—rather, electronic percentages of the fungible bulk are just shifted from one account to another on Cede’s books.37 Individual investors do

30 See, e.g., Dell Ownership, 2015 WL 4313206, at *1 (“The Funds held their shares through their custodial banks. By virtue of this relationship, the Funds did not have legal title to the shares, they were beneficial owners. But the custodial banks did not have legal title either. The shares they held were registered in the name of [Cede].”); John C. Wilcox & Niels C. Holch, “Street Name” Registration & The Proxy Solicitation Process, in A PRACTICAL GUIDE TO SEC PROXY & COMPENSATION RULES § 11.02 (5th ed. 2018) (describing DTC’s share registration process).

31 See, e.g., Dell Ownership, 2015 WL 4313206, at *1 (describing that Cede held legal title to the beneficial stockholders’ shares).

32 Wilcox & Holch, supra note 30, § 11.02 (“The legal owners of . . . stock are commonly referred to as either the ‘registered’ owners of the shares, because the owners’ names appear on the company’s register or . . . the ‘record’ owners because they legally own the shares on the record date”).

33 Id.

34 See In re Appraisal of Transkaryotic Therapies, Inc. (Transkaryotic), 2007 WL 1378345, at *2 (Del. Ch. May 2, 2007) (describing the “fungible bulk,” to mean that “no DTC participant, no customer of any participant (such as an intermediary bank or broker), and no investor who might ultimately have a beneficial interest in securities registered to Cede, has any ownership rights to any particular share of stock reflected on a certificate held by Cede”). In fact, in 1995, the SEC released an order mandating that all newly issued public securities be made eligible for the depository system. Rogers, supra note 22, at 1445.

35 Transkaryotic, 2007 WL 1378345, at *2. DTC maintains a record of its participants’ positions through a Fast Automated Securities Transfer account (the “FAST” account). Dell Ownership, 2015 WL 4313206, at *1; see Geis, supra note 4, at 233 (discussing the clearing and settlement processes of DTC, noting, “[DTC] transfers beneficial ownership electronically from seller to buyer via bookkeeping adjustments”).

36 Transkaryotic, 2007 WL 1378345, at *2.

37 Wilcox & Holch, supra note 30, § 11.02 (“John Investor purchased 200 shares of IBM common stock through his broker, Morgan Stanley (a DTC participant). John Investor’s shares are a small fraction of the total shares deposited in Morgan Stanley’s participant account (e.g. 10 million shares), which in turn are a small fraction of the total number of IBM shares represented by certificates held in DTC’s vaults (e.g. 950 million shares). (DTC’s entire position (e.g. 950 million shares) is represented on IBM’s share register under the name ‘Cede & Co.’) After John Investor gave his broker the instruction to purchase the shares, his broker obtained them in the market from one or more sellers, each of
not hold accounts with DTC—in fact, DTC may never know the individual investors exist or have rights the stock Cede holds. Instead, DTC participants act as an intermediary in the chain of ownership between DTC and individual investors. Just as Cede assigns economic rights in the stock to its participants, the participant banks and brokers assign those economic rights in the stock to their clients.

Neither Cede, DTC, nor the Depository Trust and Clearing Corporation (the parent holding company of DTC and Cede, “DTCC”) have an economic interest in the shares they hold. Instead, economic ownership, or beneficial ownership, belongs to DTC participants—brokers and banks—and the clients of those participants. The only way to determine who actually has a beneficial interest in a corporation for stock held in street name is to look through Cede and examine DTC’s electronic book-entry system to determine what proportion a bank or broker holds. Information about DTC’s participants is readily available for inquiring corporations, often referred to as a “Cede breakdown.” To obtain a truly accurate picture of who owns stock in a particular corporation, one must take the further step of looking at the participant banks which ultimately had its own DTC participant account. To effectuate the trade, DTC reduced the selling participants’ accounts by an aggregate of 200 and increased Morgan Stanley’s account by 200. These bookkeeping entries do not involve the creation or movement of the IBM stock certificates in DTC’s vaults.”); see Dell Ownership, 2015 WL 4313206, at *1 (describing the Cede’s ownership structure and the resultant effects on corporate ledgers).

Geis, supra note 4, at 233 (noting how DTCC does not delve into share allocation among its bank’s clients).

Geis, supra note 4, at 233–34 (describing the process of broker-dealers assigning rights in stock to their clients).


Wilcox & Holch, supra note 30, ¶ 11.02. Shares held in this way are said to be held in “street name.” Id.


See id. at *6 (noting the “ease” with which a Delaware corporation can acquire a Cede breakdown). A “Cede Breakdown” allows issuing corporations to look past Cede and determine, on a given date, which custodial banks and brokers are the first link on the chain of economic ownership. Id. DTC is required under federal law to provide issuing corporations with a list of all securities held in Cede’s name. Id. (citing 17 C.F.R. § 240.17Ad-8(b) (2012)) (requiring DTC to “furnish a securities position listing promptly to each issuer whose securities are held in the name of the clearing agency or its nominee”). A Cede breakdown can be acquired quickly. Id. (noting that Cede breakdowns are accessible “in a manner of minutes”). To obtain a Cede breakdown, an issuing corporation merely has to visit DTC’s website or call DTC itself. Id.
and brokers’ books to identify their clients with rights in the stock.\(^{45}\) Below is a useful diagram illustrating the chain of ownership from record holders to beneficial holders:\(^{46}\)

![Diagram of chain of ownership from record holders to beneficial holders.]

As illustrated above, the stock immobilization policy made Cede the holder of legal title, at all times, for nearly every publicly traded company on

\(^{45}\) Wilcox & Holch, supra note 30, § 11.02 (describing how Cede only manages its participants’ accounts by netting balances between them).

\(^{46}\) In re Appraisal of Dell Inc. (Dell Dissenters), 143 A.3d 20, 25 (Del. Ch. 2016). This chart, also available at https://www.bc.edu/content/dam/bc1/schools/law/pdf/law-review-content/BCLR/60-2/ferrick-graphic.pdf [https://perma.cc/9QCT-3V89], illustrates the chain of ownership in a 2016 Delaware Court of Chancery case. Id. The issuing corporation in this picture is Dell. Id. Like most publicly traded Delaware corporations, Dell issued its shares in Cede’s name, giving Cede full legal title to the issued shares. Id. There were also other names on the stock ledger, probably non-public or unregistered stockholders (the existence of other names on the ledger in this diagram is not relevant for the purposes of this Note). See id. at 24–25 (generally discussing Dell’s ownership structure). As discussed above, in Delaware, issuing shares to Cede has the legal effect of making Cede the record holder. Id. at 24. Cede, as record holder, can then assign rights to the shares that it holds to its participating banks and brokers. Id. Here, Cede assigned the economic rights in its shares to State Street, a large investment management company. Id. In this case, State Street acted as a mere custodian for its client T. Rowe Price. Id. Thus, State Street assigned the rights in the stock it received from Cede to T. Rowe Price (and whichever other clients decided to invest in Dell common stock through State Street). Id. At the custodian level, for purposes of federal law, State Street is considered to be a record holder. Id. Under Delaware law, however, State Street is only a beneficial owner. Id. This is discussed in more detail below. See infra notes 98–102 and accompanying text (describing the Delaware beneficial ownership system). Because State Street is a beneficial owner, its actions have no legal effect for the purposes of perfecting Delaware’s appraisal procedural requirements. See Transkaryotic, 2007 WL 1378345, at *4 (finding that “only a record holder . . . may claim and perfect appraisal rights”). Under Delaware law, both State Street and T. Rowe Price are considered to be beneficial owners. Dell Dissenters, 143 A.3d at 25.
both the federal and state level.47 At the federal level, to undo the effect of hav-
ing Cede as the largest stockholder on corporate ledgers, the SEC revised its
definition of “record holder” to include banks and brokers while simultane-
ously prohibiting DTC and Cede from being classified as a record holder.48 This
negated the quirk that Cede was the only listed record holder for many corpo-
rations, even though Cede’s name was actually the only name listed on stock
ledgers.49 In other words, to reflect that Cede merely acted as an intermediary,
the federal regulatory system recognized DTC participants—the banks and
brokers with actual economic rights to the stock—as the stockholders of rec-

Delaware courts and legislators, however, declined to recognize the ef-
facts of the federally-mandated stock immobilization policy, incorrectly as-
suming that stockholders of Delaware corporations directly owned their
shares.51 Unlike the federal system, Delaware did not carve out depositories
from their definition of “record holders,” but rather failed to recognize that the
intermediary system was not only required, but practically necessary to pre-
vant securities markets from drowning in paper.52 Delaware legislators were
not blind to the intermediary ownership system; they simply decided to favor
the confidence and consistency provided by reliance on stock ledgers rather
than judicial determinations of beneficial ownership.53 Thus, Delaware contin-

47 Wilcox & Holch, supra note 30, § 11.02 n.6 (noting that the SEC reported that “85% of securi-
ties traded on exchanges” are not held by individual investors, but by “banks or brokers, the vast ma-

48 See Dell Ownership, 2015 WL 4313206, at *6 (citing 17 C.F.R. § 240.14c–1(i)) (noting that
the SEC included custodial banks and brokers in the definition of record holders, defining depositories
as “clearing agencies” and record holders as, “any broker, dealer, voting trustee, bank, association or
other entity that exercises fiduciary powers which holds securities of record in nominee or name or
otherwise or as a participant in a clearing agency”).

49 See id. (discussing how the SEC amended its rules to accommodate for an intermediary share
ownership regime); see, e.g., Donald, supra note 22, at 65–67 (noting that “[t]he SEC seems to have
realized [the] problem” posed to stock ledgers by the intermediary holding system, and discussing the
SEC’s solution qua imposing proxy distribution requirements).

50 Dell Dissenters, 143 A.3d at 29 (noting that DTC is not a record holder for the purposes of
federal securities laws); Dell Ownership, 2015 WL 4313206, at *11 (same).

51 See Dell Ownership 2015 WL 3213206, at *18 (discussing Delaware law’s ignorance of the
depository system); see also Laster, supra note 11, at 6 (discussing the flaws in Delaware appraisal
law, noting that Delaware law assumes incorrectly that shares are owned directly). Delaware was not
the only state with this problem: generally, state corporate laws were drafted on the presumption that
record ownership would hinge on the issuance of paper certificates and that the sale of shares in an
issuing corporation would require those certificates to be returned to the issuing corporation and reis-
sued in the name of the purchaser. See HOWARD M. FRIEDMAN, PUBLICLY HELD CORPORATIONS: A
LAWYER’S GUIDE 41 (2011) (noting how state corporate laws were drafted based on assumptions that
paper stock certificates would exchange hands).

52 See Dell Ownership, 2015 WL 4313206 at *3 (discussing Delaware courts’ failure to distin-
guish “the voluntary relationship between a client and its custodial bank or broker . . . from the fed-
ernally mandated relationship between the custodial bank or broker and the DTC”).

53 See id. at *18 (discussing the development of the record holder requirement in Delaware).
ued to look only to a corporation’s stock ledger to determine record ownership. In reality, those who had an economic interest in the shares were rarely listed on a company’s ledger. As a result, Cede was (and is) habitually the largest record holder listed on the stock ledgers of publically traded Delaware corporations. Moreover, ownership barely ever shifted from Cede to another record holder, regardless of how many millions of trades occur among banks or brokers and investors. As described in Part I, Sections C and D, this failure created adverse consequences in appraisal litigation because the onus of perfecting the appraisal right rests solely with record holders.

B. An Overview of the Appraisal Remedy: History, Policy, & Trends

Before the twentieth century, fundamental corporate transactions typically required the unanimous approval of stockholders. This regime created opportunities for minority stockholders to hold majorities hostage by arbitrarily vetoing certain transactions or demanding payment to go along with transactions. As a result, many states abandoned the common law unanimity rule for a majority voting rule. In other states, like Massachusetts, more than a simple majority was required for the transactions or decisions to proceed. See, e.g., MASS. GEN. LAWS ch. 156B, § 78(c)(1)(iii) (2017) (“[T]he vote of two-thirds of the shares of each class of stock of each constituent corporation outstanding and entitled to vote on the question, or, if the articles of organization so provide, the vote of a lesser proportion but not less than a majority of each class of stock of each constituent corporation outstanding and entitled to vote on the question, shall be necessary for the approval of [a merger or consolidation].”).

54 See Dell Dissenters, 143 A.3d at 21 (affirming that Delaware appraisal law defines “stockholder” as “a holder of record of stock in a corporation”); Dell Ownership, 2015 WL 4313206, at *3 (finding that Delaware courts continue to treat Cede as the holder of record and apply the continuous ownership requirement strictly).
55 See Wilcox & Holch, supra note 30, § 11.02 (discussing how Cede’s name appears on corporate ledgers, not the names of beneficial owners).
57 See id. at *24 (noting how, through the use of Cede’s depository structure, “ownership does not change”). Delaware’s law is also inconsistent with itself. Laster, supra note 11, at 6. Although Delaware corporate law assumes stockholders directly own their shares, Delaware’s securities law assumes that each stockholder owns a pro rata portion of the shares held by Cede. Id. In other words, Delaware’s securities law, which mimics federal securities law, recognizes that stockholders own their shares indirectly through Cede, while the corporate law fails to follow suit. Id.
58 See notes 81–177 and accompanying text.
59 Transkaryotic, 2007 WL 1378345, at *3; Wertheimer, supra note 8, at 618–19.
60 See Salomon Bros., Inc. v. Interstate Bakeries Corp., 576 A.2d 650, 651–52 (Del. Ch. 1989) (describing a minority shareholder’s ability to eke out a share premium through obstinance); see also William F. Looney, Jr, Dissenting Minority Stockholder’s Right of Appraisal, 4 B.C. L. REV. 85, 85 (1962) (discussing the evolution of minority shareholders’ veto power under the unanimous shareholder-approval regime).
61 In re Ancestry.Com, Inc. (Ancestry), 2015 WL 66825, at *4 (Del. Ch. Jan. 5, 2015); see MODEL BUS. CORP. ACT §§ 11.03(e), 12.02(e) (AM. BAR ASS’N 2010) (requiring only majority approval for merger and sale of assets). Some states, like Massachusetts, required more than a simple majority for the transactions or decisions to proceed. See, e.g., MASS. GEN. LAWS ch. 156B, § 78(c)(1)(iii) (2017) (“[T]he vote of two-thirds of the shares of each class of stock of each constituent corporation outstanding and entitled to vote on the question, or, if the articles of organization so provide, the vote of a lesser proportion but not less than a majority of each class of stock of each constituent corporation outstanding and entitled to vote on the question, shall be necessary for the approval of [a merger or consolidation].”).
cially-appraised fair value for their shares to prevent them from being harmed by a transaction they disfavored: the appraisal remedy.62 As time passed and shares became substantially more liquid by virtue of a growing securities market, the policy goals behind appraisal shifted from a quid pro quo for the loss of veto power to protecting minority stockholders against a tyrannical or self-serving majority.63 In this capacity, the appraisal remedy provides a shield to protect investments for stockholders who do not believe they are getting a fair bargain for their shares.64 Today, any merger or consolidation in Delaware involving a shareholder vote provides an appraisal right.65

Both academics and jurists typically disfavor the appraisal remedy due to its procedural barriers and substantive remedy.66 The procedural hurdles to seek appraisal are burdensome and costly,67 the costs of litigation are difficult to share across a class,68 and the remedy is limited to only the “fair value” of a stockholder’s shares at the time of the transaction.69 Despite these disadvantages, there has been a recent spike in appraisal litigation by a new class of investors: sophisticated and appraisal-focused arbitrageurs.70

62 See Ancestry, 2015 WL 66825, at *4 (describing appraisal in its earlier forms as “a statutory means whereby the shareholder can avoid the conversion of his property into other property not of his choosing”); see also Ala. By-Pros. Corp. v. Cede & Co., 657 A.2d 254, 258 (Del. 1995) (describing appraisal as “a limited legislative remedy developed initially as a means to compensate stockholders of Delaware corporations for the loss of their common law right to prevent a merger or consolidation by refusal to consent to such transactions”).

63 See Ancestry, 2015 WL 66825, at *4 (describing how appraisal evolved into a “defensive” mechanism against majority-shareholder oppression); Robert B. Thompson, Exit, Liquidity, and Majority Rule: Appraisal’s Role in Corporate Law, 84 GEO. L.J. 1, 13 (1995) (noting that the policy goals have shifted from a quid pro quo to protecting minority stockholders from majority stockholders with an interest in a given transaction); Craig Boyd, Note, Appraisal Arbitrage: Closing the Floodgates on Hedge Funds and Activist Stockholders, 65 KAN. L. REV. 497, 501 (2016) (same).

64 HILL ET AL., supra note 7, at 61.

65 DEL. CODE ANN. tit. 8, § 262(a) (2016).

66 See Korsmo & Myers, supra note 10, at 1560 (providing an overview of scholars’ generally negative attitudes towards appraisal); see, e.g., Bayless Manning, The Shareholder’s Appraisal Remedy: An Essay for Frank Coker, 72 YALE L.J. 223, 260 (1962) (noting the limited circumstances for which the appraisal remedy would be useful).

67 Korsmo & Myers, supra note 10, at 1561 (surveying leading casebooks that describe appraisal as “a cumbersome remedy” with a “complicated maze” of procedural hurdles) (citation omitted).

68 See id. (noting that the appraisal remedy is generally disfavored because of the difficulties in rallying together a class).

69 See DEL. CODE ANN. tit. 8, § 262(a) (limiting plaintiffs to receiving the fair value of their shares); Cede & Co. v. Technicolor, Inc, 542 A.2d 1182, 1187 (Del. 1988) (finding “the only litigable issue” in an appraisal proceeding “is the determination of the value of the appraisal petitioners’ shares on the date of the merger . . . and the only relief available is a judgment against the surviving corporation for the fair value of the dissenters’ shares”); see also Korsmo & Myers, supra note 10, at 1561 (describing that appraisal is a disfavored remedy because it is limited to the “fair value” of stockholders’ shares).

70 See Korsmo & Myers, supra note 10, at 1568 (documenting the rise in appraisal litigation).
“Appraisal arbitrage” is an investment strategy where investors purchase stock in a corporation for the sole purpose of exercising appraisal rights.\textsuperscript{71} Arbitrageurs are investors, often hedge funds,\textsuperscript{72} who purchase stock in a corporation after the record date for a shareholder meeting to approve a merger, but before the effective date of the merger.\textsuperscript{73} The record date is a moment in time in which a corporation’s stock ledger is assessed to determine which stockholders are entitled to both notice and voting rights for a particular transaction.\textsuperscript{74} Scholars have debated the genesis of the recent increase in appraisal litigation.\textsuperscript{75} Some claim that the appraisal statute’s five percent above-market interest rate paid to appraisal plaintiffs is too generous, reducing the risk of seeking appraisal for arbitrageurs and making appraisal a more attractive vehicle for investment.\textsuperscript{76} Others point to recent judicial decisions allowing inves-
tors to exercise appraisal for shares purchased after the pool of voting-eligible stockholders has already been decided. Some commentators cast doubt on these factors as playing a pivotal role in the surge of appraisal litigation. In fact, some commentators propose that the rise in appraisal litigation is merely coincidental, arguing that some hedge fund got lucky and others wanted to replicate that success. What commentators do agree on, however, is that allowing stockholders to seek appraisal for shares purchased after the announcement of a merger created the conditions for such a surge of litigation to occur. As discussed in Section D, the ability to purchase shares after an announcement (more specifically, after the record date) flows as a natural consequence from the inconsistencies between Delaware appraisal law and realities about how securities are held.

C. The Delaware Appraisal Statute

1. When Can a Stockholder Have Their Shares Appraised?

Although the appraisal remedy has oft been considered absolute, only certain transactions trigger the right to demand it. Title 8, Section 262 of the General Delaware Corporation Law limits the appraisal remedy to mergers or consolidations on which stockholders vote. Delaware law does, however,

77 Compare Korsho & Myers, supra note 10, at 1578–80 (arguing that neither the Transkaryotic decision nor the statutory interest rate have had significant effects on the rise of appraisal), with Norwitz, supra note 75 (claiming appraisal arbitrage was “spawned by Transkaryotic”).

78 See Korsho & Myers, supra note 10, at 1578–80 (arguing that neither the Transkaryotic decision nor the statutory interest rate have had significant effects on appraisal filing).

79 See, e.g., id. at 1582 (proposing that the surge in appraisal litigation was mere happenstance).

80 Id. at 1566; Onyeador, supra note 11, at 349–50.

81 See infra notes 113–178 and accompanying text.


83 Compare DEL. CODE ANN. tit. 8, § 262(b) (permitting appraisal rights only in mergers or consolidations), with MODEL BUS. CORP. ACT § 13.02(a) (AM. BAR ASS’N 2010) (providing appraisal rights in mergers, consolidations, sales of all or substantially all of the assets of a corporation, or where certain amendments are made to the articles of incorporation). Delaware does not subscribe to the de facto merger doctrine, where transactions that have the same effect of a merger—for example, sales of all assets—will afford stockholders appraisal rights. HILL ET AL., supra note 7, at 54, 55. Rather, Delaware subscribes to the “equal dignity” doctrine, whereby each statute of the corporate law is given independent legal significance. See id. (“Delaware courts will not penalize boards of directors who comply with one provision of the statute and not another, and so will not apply the laws related to a merger to an asset sale (and vice versa).”).

84 DEL. CODE ANN. tit. 8, § 262(b) (“Appraisal rights shall be available for the shares of any class or series of stock of a constituent corporation in a merger or consolidation . . . ”); see HILL ET AL., supra note 7, at 63 (“Appraisal rights are only available if stockholders are dissenting from a statutory merger accomplished pursuant to any of [DGCL] §§ 251–258, 263–264, or 267. This includes short
permit corporations to amend their articles of incorporation to provide appraisal rights in a broader spectrum of occasions, including the sale of all or substantially all of the assets of the corporation or amendments to the articles of incorporation.  

Delaware carves out an exception that precludes stockholders from demanding appraisal on any publicly traded shares, the “market-out” exception.  

As an exception to that exception, however, a stockholder will be allowed to demand appraisal if the consideration for a merger is cash or anything other than stock of the surviving corporation or publicly-traded stock of a third corporation.

2. How Can a Stockholder Have Their Shares Appraised?

Once a merger has been announced, any stockholder can perfect their appraisal rights by jumping through a series of procedural hoops. Section 262 requires that a stockholder: (1) hold their stock on the date they make a demand to the corporation to exercise their appraisal rights; (2) continuously hold their stock through the effective date of the merger; (3) otherwise comply with the form and time requirements of the statute; and (4) not vote in favor of the merger.

Section 262’s requirement that a stockholder not vote in favor of a merger is conveniently called the “dissenter” requirement. It is met when a stock-
holders either casts a “no” vote or abstains from voting.91 Section 262’s require-
ment that a stockholder hold their shares from the date they make a writ-
ten demand through the effective date of the merger is referred to as the “con-
tinuous ownership” requirement.92 If even one of the above procedural steps is
not satisfied, a stockholder may forfeit their appraisal rights.93

3. Who Are Stockholders?

Embedded in the procedural hurdles is the “record holder” requirement,
which limits the perfection of appraisal to a “holder of record” or “record
holder.”94 The Delaware appraisal statute does not define what it means to be a
“holder of record,”95 but the term is interpreted by Delaware courts as stock-
holders that are listed on a corporation’s stock ledger.96 In the modern securi-
ties holding system, the record holder is usually not a party with an economic
interest in the shares, but instead is DTC, the centralized depository, that holds
all of an issuing corporation’s shares in an undifferentiated pool, assigning pro
rata economic rights in those shares to banks and brokers who in turn assign
those rights to investors.97

It is important to note that, in Delaware, the onus of perfecting the appraisal
procedures rests only with the record holder, not the beneficial owner.98

91 HILL ET AL., supra note 7, at 68.
92 Dell Ownership, 2015 WL 4313206, at *2. The effective date of the merger is the date that
either a certificate of merger or merger agreement is filed with Delaware’s Secretary of State. DEL.
CODE ANN. tit. 8, § 262(c).
93 See DEL. CODE ANN. tit. 8, § 262(g) (permitting the Court of Chancery to conduct a hearing to
determine whether stockholders have “complied with this section and who have become entitled to
appraisal rights”); HILL ET AL., supra note 7, at 61 (noting that Delaware courts “require scrupulous
adherence to the [appraisal] statute’s requirements in order to access the remedy”).
94 DEL. CODE ANN. tit. 8, § 262(a) (defining the word “stockholder” as “a holder of record of
stock in a corporation and also a member of record of a nonstock corporation”).
95 See Dell Ownership, 2015 WL 4313206, at *8 (noting that “no other provision of the DGCL de-
fines what it means to be a ‘holder of record’”).
96 See Dell Dissenters, 143 A.3d at 21 (defining “stockholder” as a holder of shares identified in
the ownership records of a corporation); HILL ET AL., supra note 7, at 62 (defining record stockholders
as “those in whose name shares are held”). Being a record holder is synonymous with holding legal
title of a share of stock, often evidenced by share certificates issued by a corporation in the name of
the legal title holder. Wilcox & Holch, supra note 30, § 11.02. Record ownership provides a stock-
holder a gaggle of rights under Delaware law, including the right to vote, inspect a company’s records,
and appraisal. Id.
98 See Ancestry, 2015 WL 66825, at *5, *8 (affirming that the focus of the procedural inquiry is
entirely on the record holder and that any actions by beneficial holders are irrelevant, reiterating that
“[t]o be entitled to appraisal, the beneficial owner must ensure that the record holder of his or her
shares makes the demand”) (citing Dirienzo v. Steel Partners Holdings L.P., 2009 WL 4652944, at *3
(Del. Ch. Dec. 8, 2009)); Transkaryotic, 2007 WL 1378345, at *3, *4 (finding that “the determinative
record regarding compliance with § 262 requirements is that of the record holder”); see also Kahan &
Rock, supra note 90, at 1233 (“Delaware corporate law [] puts record ownership, rather than benefi-
Delaware law has consistently emphasized this requirement, and it is well-settled that only the actions of the record holder are determinative of perfection in appraisal proceedings.99 Because Delaware only grants the right to perfect appraisal to record holders,100 and Cede is the largest and most common record holder, the onus of compliance with the appraisal statute rests with Cede to act as instructed by beneficial owners.101 This is where Delaware law and the federal system diverge—the federal system looks through Cede to determine who record holders are, whereas Delaware law only requires a superficial reference to a corporation’s stock ledger to identify stockholders of record.102

Even so, once the notice, holding, and voting requirements of Section 262(d) are met, Section 262(e) permits either the record holder or a beneficial owner to petition the Delaware Court of Chancery and bring an appraisal action.103 Effectively, this provision permits individuals with an economic interest in the shares to direct their record holder to seek appraisal on their be-

99 Ancestry, 2015 WL 66825, at *5, *8 (affirming that the focus of the procedural inquiry is entirely on the record holder and that any actions by beneficial holders are irrelevant, reiterating that “[t]o be entitled to appraisal, the beneficial owner must ensure that the record holder of his or her shares makes the demand”).

100 Id.

101 See HILLET ET AL., supra note 7, at 62 (describing that Cede, as record holder, holds all shares in street name on behalf of most beneficial owners, noting that, “because the record holder had to bring the action, the plaintiff in many appraisal cases was “Cede & Co.”); see also FRIEDMAN, supra note 51, at 42 (“[T]he record holder technically entitled to vote huge quantities of a public corporation’s stock is Cede & Co.”).

102 See Dell Dissenters, 143 A.3d at 21 (affirming that Delaware appraisal law defines “stockholder” as “a holder of record of stock in a corporation”; Dell Ownership, 2015 WL 4313206, at *3 (finding that Delaware courts continue to treat Cede as the holder of record and apply the continuous ownership requirement strictly); Transkaryotic, 2007 WL 1378345, at *4 (only requiring corporations to rely on their internal “records as the sole determinant of membership in the context of appraisal”).

103 DEL. CODE ANN. tit. 8, § 262(e); see, e.g., Ancestry, 2015 WL 66825, at *5 (noting that the beneficial owner filed the appraisal petition in its own name after Cede, the record holder, perfected its appraisal rights).
For beneficial owners, the only way to ensure they are having their interests protected is to direct Cede to perfect appraisal for them.\(^{105}\)

4. Machinations of Intrigue: Appraisal Rights Can Be Bought

One quirk of the modern iteration of the appraisal statute is that appraisal rights are marketable.\(^{106}\) Shares can be purchased from record holders after the announcement of a merger (and even after the record date) and subsequent purchasers will retain the right to seek appraisal.\(^{107}\) Historically, Delaware courts have not taken a hostile stance to this practice.\(^{108}\) Yet, this quirk has

\(^{104}\) See Onyeador, supra note 11, at 345 (discussing Section 262(e), noting how non-record holders can pursue standing on their own); see also Dell Dissenters, 143 A.3d at 51 (relaying the Ancestry decision’s discussion of Section 262(e), noting that, “the statutory amendment was intended to simplify the procedure for pursuing appraisal and not to effect substantive change”). When a beneficial owner seeks appraisal, DTC will remove from its fungible bulk an amount of shares sufficient to cover the beneficial owner’s demand from the FAST account by having the issuing company deliver a separate stock certificate in Cede’s name. Dell Ownership, 2015 WL 4313206, at *3. Generally, unless a participant pays for the service, DTC does not hold physical stock certificates of its participants. Id. at *7. Thus, when issued a stock certificate and a participant does not contract for the vault service, DTC sends the certificates to the participants themselves. See id. (describing that, because neither JP Morgan nor Bank of New York Mellon participated in the vault service, upon issuance of new stock certificates by Dell, DTC had them sent to the banks’ own custodians for safe-keeping).

\(^{105}\) Dell Ownership, 2015 WL 4313206, at *7. Beneficial owners can submit votes through proxy and petition the court by themselves. Id. But this system is not perfect: human error at the depository level can force beneficial owners to lose their rights to appraisal for no good reason. See Laster, supra note 11, at 10 (discussing Dell Dissenters, noting that, “this case shows how complexity breeds . . . mistakes”).

\(^{106}\) See Korsmo & Myers, supra note 10, at 1554 (discussing the ability to buy and sell appraisal rights through shares of stock, noting that “a stockholder need not own the stock on the date the challenged merger is announced”); see, e.g., BMC Software, 2015 WL 67586, at *6 (finding petitioners met the standing requirements of Section 262 where petitioners purchased legal title to shares after the record date and otherwise complied with Section 262(d)); see also HILL ET AL., supra note 7, at 67 (“The language of the statute permits beneficial holders to purchase shares of the target after announcement of the merger and then pursue an appraisal.”).

\(^{107}\) See Dell Dissenters, 143 A.3d at 36 (discussing prior cases where stockholders were allowed buy shares after the record date and seek appraisal for those shares). A post-record date purchaser of shares cannot vote with the shares they purchased—only the record holder as of the record date can vote. Wilcox & Holch, supra note 30, § 11.05 (“The post-record date purchaser, however, is not the legal owner as of the record date and is not permitted to vote this stock directly even if no vote or proxy is ultimately presented by the record owner.”). Because not voting “yes” is a requirement to seek appraisal, defendants in appraisal actions often claim that appraisal-seeking stockholders must prove that the particular shares they purchased after the record date were not voted in favor of the merger. See, e.g., BMC Software, 2015 WL 67586, at *4 (noting defendant corporation argued to impose a requirement where appraisal-seeking plaintiffs would have to prove their particular shares were not voted in favor of the merger).

\(^{108}\) See, e.g., BMC Software, 2015 WL 67586, at *6 (“Section 262 permits the existence of appraisal arbitration by allowing investors to petition for appraisal of stock purchased after a merger is announced.”); Salomon Bros, 576 A.2d at 654 (finding “nothing inequitable about an investor purchasing stock in a company after a merger has been announced with the thought that, if the merger is consummated on the announced terms, the investor may seek appraisal”).
opened the floodgates for appraisal litigation abuse by profit-seeking arbitrageurs.109

Investors may purchase appraisal-eligible shares after a merger is announced because the statute only requires a record holder to hold their shares from the date they make a written demand through the effective date of the merger.110 In other words, there is no requirement that the stockholder seeking appraisal be the record holder on the record date.111 In fact, as discussed below in Section D of Part I, recent decisions have held that neither beneficial owners nor record holders that purchase after the record date are barred from exercising appraisal.112

D. DTC/Cede Creates a Bulk of Problems

Cede is an intermediary with no economic stake in the shares that it holds.113 Nevertheless, because its name is listed on the ledger of a Delaware corporation, it bears the burdens and rights of a holder of full legal title.114 The only way to ensure beneficial owners’ interests are protected is to direct Cede to perfect appraisal on their behalf.115 This means that beneficial owners must instruct Cede not to vote in favor of the transaction,116 make a demand on the

---

109 See HILL ET AL., supra note 7, at 67 (describing the ability to perfect appraisal with shares purchased after the announcement of a merger as a “loophole” which has “created an avenue for arbitrageurs to buy shares and then pursue appraisal actions when they believe the announced deal values justify the investment”).

110 See DEL. CODE ANN. tit. 8, § 262(a) (providing appraisal rights to stockholders who hold their shares from “the date [they] mak[e] . . . a demand . . . through the effective date of the merger or consolidation”); see, e.g., BMC Software, 2015 WL 67586, at *8 (finding post-record date purchasing record holder met the procedural requirements of Section 262 where petitioner made a demand after purchase, voted against the transaction, and continued to hold shares through the effective merger date).

111 See BMC Software, 2015 WL 67586, at *6 (describing stockholders’ abilities to seek appraisal with shares purchased after the announcement of a merger). See generally Transkaryotic, 2007 WL 1378345 (finding beneficial owner plaintiffs not disqualified from pursuing standing where they purchased shares after the record date).

112 See, e.g., BMC Software, 2015 WL 67586, at *8 (finding record holders that purchased after the record date entitled to pursue appraisal rights); Transkaryotic, 2007 WL 1378345, at *5 (finding beneficial owners that purchased after the record date entitled to pursue appraisal rights).

113 Reder & Onyeador, supra note 41, at 281–82; Wilcox & Holch, supra note 30, § 11.02.

114 Wilcox & Holch, supra note 30, § 11.02.

115 See, e.g., Dell Ownership, 2015 WL 4313206, at *7 (finding that stockholders in a public corporation had to direct Cede to “demand appraisal on their behalf”). Beneficial owners can submit votes through proxy and petition the court by themselves. Wilcox & Holch, supra note 30, § 11.03. But this system is not perfect: human error at the depository level can force beneficial owners to lose their rights to appraisal for no good reason. See Laster, supra note 11, at 10 (discussing Dell Dissenters, noting that, “this case shows how complexity breeds . . . mistakes”).

116 See, e.g., Dell Dissenters 143 A.3d at 59 (denying standing for appraisal where Cede, the record holder, mistakenly voted beneficial owner-petitioners’ shares in favor of the merger); see also Kahan & Rock, supra note 90, at 1233 (discussing, in the voting context, Delaware courts look to record owners to determine how votes are cast, but recognize that “record owners may authorize oth-
corporation, and continuously hold shares from the date of the demand until the effective date of the merger.\textsuperscript{117} Too often, however, errors created by unnecessary intermediary steps involving Cede have determined the outcome of appraisal proceedings.\textsuperscript{118}

1. Fungible Bulk and the Dissenter Requirement

One of the problems presented by Cede’s ownership structure is that it is impossible to identify the specific shares beneficial holders own in Cede’s fungible bulk.\textsuperscript{119} Cede does not assign actual, individual shares to its participants, but rather assigns a \textit{pro rata} stake in the fungible bulk to banks and brokers.\textsuperscript{120} Thus, banks and brokers (and their beneficial-owner clients) cannot point to a specific share and claim it as theirs—they merely own an unidentifiable portion of the whole.\textsuperscript{121} But, to perfect and seek appraisal for a given share, a stockholder (record holder) must not vote in favor of the merger with the shares they seek to have appraised.\textsuperscript{122} This dissonance has effectively forced
the Delaware Court of Chancery to lift stockholders’ burdens of proving that the *particular* share for which they seek appraisal was not voted in favor of the merger.\textsuperscript{123} In other words, courts no longer require plaintiffs to trace their shares back to any particular vote.\textsuperscript{124}

The rationale is this: to *vote*, a stockholder must be a record holder on the record date.\textsuperscript{125} Inconsistently, a stockholder does not have to be a record holder on the record date to seek *appraisal*.\textsuperscript{126} Strangely, if a record holder sells their share after the record date, but before their vote is counted, they would lose their right to appraisal on that share, but retain their right to vote.\textsuperscript{127} Subsequent purchasers, however, may still exercise *appraisal* rights for those shares even though they have no vote.\textsuperscript{128} To have their shares appraised, stockholders who purchase after the record date would have to show that the *previous* owner—the record holder who retained the right to vote—did not vote in favor of the transaction with the share for which the subsequent stockholder is seeking appraisal.\textsuperscript{129} Because a stockholder cannot point to any specific share in Cede’s fungible bulk, however, this requirement is virtually impossible to meet, even for stockholders of record on the record date.\textsuperscript{130}

---

\textsuperscript{123} \textit{See, e.g.}, \textit{Transkaryotic}, 2007 WL 1378345, at *5 (declining to implement a requirement whereby plaintiffs would have to prove their specific shares, purchased after the record date, were not voted in favor of the merger).

\textsuperscript{124} \textit{Id.}; \textit{see also Ancestry}, 2015 WL 66825, at *5–6 (refusing to impose a share-tracing requirement on stockholders); \textit{BMC Software}, 2015 WL 67586, at *4 (same).

\textsuperscript{125} \textsc{Del. Code Ann.} tit. 8, § 219.

\textsuperscript{126} Id. § 262(a).

\textsuperscript{127} Id. § 262.

\textsuperscript{128} \textit{See id.; see e.g.}, \textit{Transkaryotic}, 2007 WL 1378345, at *1, *5 (permitting beneficial owner-purchasers of stock after the record date to pursue appraisal).

\textsuperscript{129} \textit{BMC Software}, 2015 WL 67586, at *3 (discussing defendant’s contention that plaintiffs must put forward proof that their shares were not voted in favor of the merger by Cede).

\textsuperscript{130} \textit{See Dell Dissenters}, 143 A.3d at 37 (summarizing the holdings of \textit{Transkaryotic, Ancestry}, and \textit{BMC Software} as not imposing a share-tracing requirement because “investors who held on the record date [or purchased after the record date] would not be able to prove how Cede voted the shares
The difficulty presented by the fungible bulk was first considered in 2007 by the Delaware Court of Chancery in *In re Appraisal of Transkaryotic Therapies, Inc.*. In *Transkaryotic*, hedge funds sought appraisal of over ten million shares, roughly eight million of which were purchased after the record date, but before the date of the shareholder vote. Cede was the holder of record for all relevant shares purchased by the hedge funds. The issue was whether a beneficial owner (the hedge funds), who bought their shares after the record date, had to prove that each share for which it sought appraisal was not voted in favor of the transaction by a previous beneficial owner. The court held that the petitioners did not have to prove how their shares were voted by a previous beneficial owner because only Cede, the record holder, could cast votes, so its actions were outcome-determinative. Moreover, when the court looked into how Cede cast its votes, it did not attempt to trace plaintiff’s shares to any particular share voted by Cede. Instead, the court found it sufficient that Cede voted against the merger or withheld a vote with a sum of shares sufficient to cover the amount of shares for which the hedge funds sought appraisal.

---

132 Id.
133 Id.
134 Id. at *3.
135 Id.
136 *Transkaryotic*, 2007 WL 1378345, at *3. In fact, both parties agreed that it would have been impossible to determine whether a specific share was voted for or against a merger. Id. at *2 (noting that stockholders could not prove their shares were not voted in favor of the merger, and the defendant corporation agreed that there existed “no proof that those specific shares are the shares petitioners hold”).
137 Id. at *4. In total, Cede held 29,720,074 shares of Transkaryotic Therapies, Inc. Id. at *1. Cede voted 12,882,000 in favor of the merger, 9,888,663 against it, and abstained 6,949,411 shares. Id. In other words, 16,838,074 shares were eligible for appraisal. Id. at *4. Petitioners sought appraisal on 10,972,650 shares. Id. The court found it sufficient that Cede perfected appraisal rights for roughly sixteen million shares because it covered the ten million upon which petitioners sought appraisal. Id. The court, although it considered the fungible bulk structure, came to its decision by relying on principles of strict statutory construction and declined to opine on the impossibility of tracing shares under the intermediary system. Id.
Decisions following *Transkaryotic* echoed these same principles. 138 In 2015, in both *Merion Capital LP v. BMC Software, Inc.* and *In re Ancestry.com*, the Delaware Court of Chancery held that petitioners did not have to trace their shares back to any particular previous owner to prove that the shares were not voted in favor of the merger. 139 In both cases, the court considered Cede’s fungible bulk ownership structure in coming to its decision. 140 The stockholders in *BMC Software* even argued that *pro rata* beneficial ownership prevented a shareholder from identifying how any *actual* share was voted by a record owner. 141

*BMC Software* took the precedent a step further by applying the *Transkaryotic* rule to a situation where the appraisal-seeking petitioner was a post-record date purchasing *record holder*, as opposed to the beneficial owner in *Transkaryotic* that purchased their shares after the record date. 142 In *BMC Software*, appraisal-seeking stockholders attempted to have their broker instruct Cede to seek appraisal on their behalf. 143 Because of a change in the broker’s internal policies, the broker rejected the stockholders’ requests. 144 Thus, to seek appraisal, the stockholders were left with one option: to become record holders by withdrawing their stock from Cede’s fungible bulk and registering their stock directly with the issuing corporation in their own name. 145 The stockholders did just that and then attempted to seek appraisal by fulfilling all of the other procedural requirements of section 262. 146 The court, ruling for the stockholders, declined to impose a share-tracing requirement, leaning heavily on the *Transkaryotic* decision to conclude that section 262 only requires appraisal-seeking stockholders to show that the record holder held enough

---


139 See *BMC Software*, 2015 WL 67586, at *4 (“Noticeably absent from [Section 262(a)], or any language in the statute, is an explicit requirement that the stockholder seeking appraisal prove that the specific shares it seeks to have appraised were not voted in favor of the merger.”); *Ancestry*, 2015 WL 66825, at *7 (finding that plaintiffs need not put forward evidence of how their shares were voted so long as Cede held a sufficient number of appraisal-eligible votes to “cover” the stockholders’ demand).

140 See *BMC Software*, 2015 WL 67586, at *5 (affirming the *Transkaryotic* court’s consideration of inability to trace votes back to shares in virtue of Cede’s ownership structure); *Ancestry*, 2015 WL 66825, at *5–6 (same).

141 See *BMC Software*, 2015 WL 67586, at *5 (discussing the holding from *Transkaryotic* and noting the “difficulties of tracing votes to specific shares due to the reality of modern securities practice[s]”). Similar to the *Transkaryotic* decision, the Delaware Court of Chancery considered that Cede’s fungible bulk made it impossible to trace shares, but rationalized its holdings on strict statutory construction. See id. at *4 (“Noticeably absent from [Section 262(a)], or any language in the statute, is an explicit requirement that the stockholder seeking appraisal prove that the specific shares it seeks to have appraised were not voted in favor of the merger.”).

142 See generally *BMC Software*, 2015 WL 67586.

143 Id. at *2.

144 Id.

145 Id.

146 Id. at *6 (concluding, “[the stockholders] ha[ve] otherwise complied with . . . Section 262”).
shares not voted in favor of the merger to meet the appraisal demand.\textsuperscript{147} After \textit{BMC Software}, regardless of whether a stockholder buys legal title or economic rights to stock before or after the record date, they can exercise appraisal without having to prove that your shares were not voted in favor of the merger.\textsuperscript{148}

Delaware courts have uniformly agreed that if petitioners were burdened with a requirement that forced them to produce evidence that \textit{their specific shares} were not voted for the merger, then no stockholder, even those who purchased before and held on the record date, would ever be able to successfully seek appraisal.\textsuperscript{149} Thus, to salvage Section 262 from its own absurdity, petitioners must only show that Cede voted against a transaction or abstained from voting with enough shares to cover the amount of shares petitioners are seeking to have appraised.\textsuperscript{150}

As a caveat, where evidence \textit{does exist} of how Cede voted particular shares, corporations may use that evidence defensively and preclude petitioners from exercising appraisal rights if it turns out their shares in fact voted in favor of the transaction.\textsuperscript{151} The lack of a share-tracing requirement was qualified in 2016 by the Delaware Court of Chancery in \textit{Dell Dissenters}.\textsuperscript{152} There, the court found that, although \textit{Transkaryotic}, \textit{Ancestry}, and \textit{BMC Software} were good law, their outcomes and holdings were dictated by evidentiary deficiencies in the fungible bulk system.\textsuperscript{153} Essentially, none of the previous decisions were faced with a situation where evidence \textit{actually existed} to support a finding of how Cede voted certain shares.\textsuperscript{154} When presented actual records generated by proxy-management companies about how certain shares were voted, the court seized the opportunity to create a burden-shifting rule for determining whether the dissenter requirement had been met.\textsuperscript{155}

This burden-shifting rule did not implement a share-tracing requirement.\textsuperscript{156} It merely provided corporations with a defense against appraisal-

\textsuperscript{147} Id.
\textsuperscript{148} See id. at *4.
\textsuperscript{149} See \textit{Dell Dissenters}, 143 A.3d at 36–37 (discussing the consistent holdings of \textit{Transkaryotic}, \textit{Ancestry}, and \textit{BMC Software}).
\textsuperscript{150} See, e.g., \textit{Ancestry}, 2015 WL 66825, at *1, *5 (finding that plaintiffs need not put forward evidence of how their shares were voted so long as Cede held enough appraisal-eligible shares to "cover" the stockholders’ appraisal demands).
\textsuperscript{151} \textit{Dell Dissenters}, 143 A.3d at 53–54 (describing the burden-shifting analysis where evidence of voting exists).
\textsuperscript{152} See id. (discussing defendant corporations’ ability to put forth evidence that plaintiff stockholders voted their shares in favor of the merger).
\textsuperscript{153} See id. at 37, 52 (distinguishing petitioner’s case from the appraisal arbitrage cases in virtue of the existence of evidence of how Cede voted certain shares).
\textsuperscript{154} Id.
\textsuperscript{155} Id. at 53.
\textsuperscript{156} Id. at 52.
petitioners where evidence existed that the petitioner’s shares were actually voted in favor of the merger. The rule operates as follows: because petitioners bear the burden of compliance with Section 262, they first must establish a prima facie case that the dissenter requirement had been met by showing that Cede held sufficient shares not voted for the merger or abstaining from the merger to cover the stockholders’ appraisal demands. Then, the burden shifts to the corporation to provide evidence that Cede actually voted the shares for which appraisal is sought in favor of the transaction. If the corporation can meet its burden, the dissenter requirement is not met, and the petitioner does not have standing to seek appraisal.

2. Extra Steps Create Room for Error: The Continuous Ownership Requirement

Another complication caused by Cede concerns the continuous ownership requirement. Section 262 requires that a stockholder hold their shares from the date they make a written demand on a defendant corporation through the effective date of the merger. When a beneficial owner wants to seek appraisal, they must ensure that they control the shares through the record date of the merger. Technically, Cede bears the burden of compliance. See Transkaryotic, 2007 WL 1378345 at *3–4 (finding that “the determinative record regarding compliance with § 262 requirements is that of the record holder”). Once a petitioner brings a suit, however, they have the burden to prove that Cede complied with Section 262. See Dell Dissenters, 143 A.3d at 53 (finding that “an appraisal petitioner that held in street name can establish a prima facie case that the dissenter requirement had been met by showing that there were sufficient shares at Cede that were not voted in favor of the merger to cover the appraisal class”).

The court found that the corporation can do this by using publicly available documents, like a Form N-PX, or other internal documents. Id. In the case of mutual funds, N-PX forms must be filed, disclosing how the mutual funds voted their securities. Id. at 34. Thus, information concerning how appraisal-seeking mutual funds voted their securities is publicly available and readily ascertainable. See id. at 53.

This is a very powerful defense mechanism if applied appropriately: it prevents stockholders from receiving the five percent above-market statutory interest because it disqualifies petitioners at the standing level. See Laster, supra note 11, at 8 (discussing that, in Dell Ownership, because petitioners did not have “standing to seek appraisal, they received no interest for the capital represented by their shares”).

See generally Dell Ownership, 2015 WL 4313206 (denying plaintiff’s standing where a miscommunication between Cede and plaintiff’s custodial banks caused Cede to register shares in the custodial banks’ name, defeating the continuous ownership requirement).
al, DTC removes a number of shares from the FAST account fungible bulk to cover the demand. DTC has the issuing corporation issue a new stock certificate for the number of shares in Cede’s name, thus complying with the continuous ownership requirement because Cede maintained ownership of the stock at all times. This process is not foolproof, however; having Cede remove stocks from its fungible bulk and re-title them leaves room for error when those re-titled stocks must be delivered to beneficial owners’ banks for safekeeping.

In 2015, in *Dell Ownership*, the Delaware Court of Chancery held that stockholders failed to meet the continuous ownership requirement because Cede transferred legal title to the stockholders’ custodial banks. *Dell Ownership*, beneficial stockholders sought appraisal and notified Cede of their desire to do so. DTC removed a number of shares from its FAST account to cover the demand and subsequently contacted Dell to have it issue new stock certificates in Cede’s name. Because the stockholders did not have a vault at DTC, DTC delivered the newly issued certificates to the beneficial stockholders’ custodial banks for safekeeping, but without the stockholders’ knowledge or consent. The problem arose when the custodial banks received the newly-issued shares. Due to an internal policy at the custodial banks, the banks refused to hold the stock certificates unless the shares were in their own name, or in a name of their own nominees. The banks thus directed Cede to have Dell’s transfer agent re-title the shares in the names of the banks’ nominee. The court found this to be a break in the chain of ownership, even though the transfer was without the consent of the beneficial owners. Vice-Chancellor Laster reasoned that the onus of compliance with Section 262(a) and (d) rested with Cede and that the appraisal statutes should be construed strictly.

---

164 *See, e.g., Dell Ownership*, 2015 WL 4313206, at *7 (finding that Cede moved stockholders’ shares from the FAST account upon request).
165 *Id.*
166 *Id.* note 11, at 7 ("[C]omplexities of the nominee system harmed stockholders").
168 *Id.*
169 *Id.*
170 *Id.* at *7.
171 *Id.* at *9.
172 *Id.* at *7* (noting that for ordinary business reasons, like insurance, internal recordkeeping, and theft mitigation, some banks and brokers refuse to hold certificates issued in another’s name).
173 *Id.* at *7*.
174 *Id.* at *9* ("The re-titling of a certified share after the demand but before the effective date violates the [continuous ownership requirement] by causing record ownership to change.") (citing *Nelson v. Frank E. Best Inc.*, 768 A.2d 473, 477 (Del. Ch. 2000)).
175 *Id.* at *10*. Because Delaware views the depository relationship as a voluntary one, the transfer was also considered voluntary, not a necessary part of the indirect holding system. *Id.*
record holder had changed, thus the beneficial owners failed to meet the con-
tinuous ownership requirement.176

In a later speech, Vice-Chancellor Laster noted that the result, although
unfortunate, was one he was forced to make.177 Vice-Chancellor Laster noted
that this result was one of many problems caused by the intermediary system,
but that blockchain technology and distributed ledgers could cleanly resolve
these issues by cutting out Cede, thus dissolving the distinction between bene-
ficial owners and record holders.178

176 Id. at *9. Vice-Chancellor Laster commented on this inadvertent loss of appraisal, noting that
the failure of Delaware law to recognize DTC participants as holders of record was determinative. Id.;
see Laster, supra note 11, at 6–7 (commenting how Vice-Chancellor Laster was “[c]onstrained by the
law” in the Dell Ownership case and was forced to deny standing to petitioners). Had the custodial
banks been record holders in the first instance, the transfer by Cede would not have violated the con-
tinuous ownership requirement. Dell Ownership, 2015 WL 4313206, at *11. To make matters worse,
not only were stockholders left without standing to seek the upside of appraisal, but, without standing,
they could not accrue the five percent above-market statutory interest while their investments were
locked-in for two years. Id.

177 Laster, supra note 11, at 7. (He commented, “Personally, I think [the result] is absurd. [The
actions by plaintiffs] was an example of people doing what they should do and then getting caught up
by the system.”).

178 Id. at 16. It is worth discussing that Cede creates complications in areas beyond appraisal. See,
e.g., Dole, 2017 WL 624842, at *4 n.1 (discussing the inherent difficulties of a beneficial holder secur-
ities regime). In 2017, in In re Dole Food Company, Inc., DTC’s slow and antiquated clearing system
made it virtually impossible to determine which shares had actual claims to a settlement-entitled class
remedy, forcing the Delaware Court of Chancery to rely on Cede’s electronic records to distribute
proceeds to DTC participants. See id. at *7 (opining that the litany of issues facing appraisal-seeking
dissenters “appear endemic” to DTC’s share ownership structure). In Dole, the class challenging the
litigation comprised of roughly 36.8 million shares. Id. at *1. At the time of settlement, however, 49
million shares had facially-valid claims to the disbursement. Id. There existed 54,084,157 shares unaf-
filiated with the defendant corporation at the time the class was created. Id. Of those, 17,290,399 were
petitioners filing for appraisal, leaving 36,793,758 shares left to comprise the class. Id. The discrepan-
cy stemmed from the practice of settling stock trades within three business days from the time a trade
is executed. Id. at *3. During this three-day window, securities fly through the balance sheets of sev-
eral intermediaries: internally through brokers’ accounts, externally between brokers, and externally
between brokers and banks. Id.; Brian Patrick Eha, You Don’t Really Own Your Securities; Can
Blockchain Fix That?, AM. BANKER (July 27, 2016), https://www.americanbanker.com/news/you-
dont-really-own-your-securities-can-blockchains-fix-that [https://perma.cc/G8SQ-XPV5] (“Within the
three-day period required for securities transactions to settle, those securities travel through the bal-
ance sheets of multiple intermediaries.”). Even though Cede put a one-day freeze on trading Dole’s
stock to determine the stockholders of record, two previous days of trading still had not settled. Dole,
2017 WL 624842, at *3. In other words, at the effective time of the merger, DTC’s ledger did not
reflect all of the trades for the prior two days. Id. This, in turn, allowed for multiple owners to submit
claims for settlement based on shares involved in trades that did not clear: DTC participants whose
names were listed on the ledger could submit claims as well as the clients of the participants that ac-
quired the shares. Id. Moreover, short sales enabled both borrowers of shares and lenders of shares to
have submit valid claims for merger consideration from the same shares. Id. (“The shorting resulted in
additional beneficial owners who received the merger consideration, who fell within the technical
language of the class definition, and who could claim the settlement consideration. Meanwhile, the
lenders of the shares . . . also could claim the settlement consideration.”). A short sale involves sellers
borrowing shares from another stockholder and selling them (hopefully at a high price). Elvis Picardo,
II. THE BLOCKCHAIN SOLUTION

From tech savvy academics, to financial institutions, to the average investor, discussions about blockchain technology are nearly unavoidable. Blockchain technology is intertwined with bitcoin and other cryptocurrencies, and although they are often conflated, they are completely different concepts. This Note focuses on the network and technology underlying bitcoin and cryptocurrencies, rather than the cryptocurrencies themselves. Even though it is valuable, bitcoin is not, in and of itself, the solution to the beneficial ownership problems in the securities market. Bitcoin does, however, provide an apt analogy to how securities issued via blockchain might be traded, cleared, and settled because, like a share of stock that would be coded onto a blockchain, bitcoin is merely a string of code that amounts to an asset. Thus, this Part will reference bitcoin and other cryptocurrencies to aid in painting a picture of

shortselling/shortselling1.asp. The borrower of the stock only returns the shares once they are repurchased (at hopefully a lower price) and the position closes. Id. The short seller keeps the difference between the high price at which the borrowed shares were sold and the low price at which shares were repurchased as gain. Id. Vice-Chancellor Laster traced the genesis of the problem to be the DTC intermediary ownership system. Dole, 2017 WL 624842, at *3. The DTC system unfortunately requires participants and their broker customers to continuously net stock transfers and report the trades back to DTC. Id. Because of the one-day freeze that DTC put on Dole, DTC’s centralized ledger did not accurately reflect all of the trades from the two days leading up to the merger closing. Id. To obtain that data would mean compiling information from over 800 DTC participants and potentially even the individual banks of the participants. Id. The Court recognized that determining the actual ownership of the shares would require a colossal forensic analysis, one which would yield uncertainty and be unduly burdensome. Id. (noting the functionally insurmountable challenge of sorting through the share discrepancy).

how we may, one day, be able to have a robust blockchain-based securities market.\footnote{See \textit{infra} notes 187–238 and accompanying text.}

Section A of this Part introduces blockchains and distributed ledger technology and explains how they work.\footnote{See \textit{infra} notes 187–216 and accompanying text.} Section B of this Part discusses the recent legal support for blockchain technology.\footnote{See \textit{infra} notes 217–238 and accompanying text.}

\section{A. The Underlying Technology}

A “blockchain,” broadly speaking, is an electronic record keeping network that transcribes transactions to an online ledger.\footnote{See F. Dario de Martino & Spencer D. Klein, \textit{Morrison & Foerster Discusses Blockchain and Avoiding a Kodak-Like Downfall}, CLS BLUE SKY BLOG (Sept. 26, 2017) \url{http://clsbluesky.law.columbia.edu/2017/09/26/morrison-foerster-discusses-blockchain-and-avoiding-a-kodak-like-downfall/} [https://perma.cc/4P82-GRW6] (describing blockchains as “shared spreadsheets”); \textit{see also} U.K. GOV’T CHIEF SCI. ADVISER, supra note 3, at 17 (“A blockchain is a . . . database that takes a number of records and puts them in a block . . . . Each block is then ‘chained’ to the next block . . . . This allows block chains to be used like a ledger, which can be shared and corroborated by anyone with the appropriate permissions.”). Blockchain technology first hit the public market in 2008 after an unidentified individual (“Satoshi Nakamoto”) published a paper about Bitcoin, a virtual currency whose transactions could be verified without the need for trusted or known third parties. \textit{Comm. On Payments}, supra note 4, at 2. \textit{See generally} Satoshi Nakamoto, \textit{Bitcoin: A Peer-to-Peer Electronic Cash System}, BITCOIN.ORG (2008), \url{https://bitcoin.org/bitcoin.pdf} [https://perma.cc/ML3Z-GJ2X] (describing the origins of Bitcoin).}

Blockchains can come in various permutations, thus there is no one definition for what is a blockchain.\footnote{See \textit{Blockchain 101, supra} note 3, at 1 (discussing different “flavors” of blockchains).} There are, however, common characteristics shared by all variations of blockchains and the distributed ledgers they generate.\footnote{See de Martino & Klein, supra note 187 (discussing commonalities shared by all blockchains).} The name is derived from the way a blockchain records information; transactions within a window of time are bundled together into “blocks” and each block is added to a ledger in a sequential “chain.”\footnote{Blockchain 101, supra note 3, at 1 (discussing how blockchains group transactions and add them to sequential ledgers); see Yermack, supra note 3, at 11 (discussing the inception of blockchain technology as “bundling large volumes of transactions together into ‘blocks’” and that “[b]locks are ‘chained’ together . . . because each block contains a hash function reflecting the contents of the previous block”). Although the idea for distributed ledgers began as recording each transaction individually, chunking transactions into blocks before adding them to the ledger proved substantially more efficient. Yermack, supra note 3, at 11 (discussing the creation of the blockchain, noting, “[a]lthough the original design of [distributed ledgers] featured a sequence or ‘chain’ of individual transaction entities, one item at a time, implementing the idea in very large markets with millions of assets required grouping many transactions together so that the need for computer memory remained reasonable”). While distributed ledgers need not necessarily be generated by blockchain-based networks, clumping together transactions into blocks is a far more efficient process than individually entering transactions onto distributed ledgers. \textit{Id.} Thus, for the purposes of this Note, I will use the term “blockchain” specifically to refer to networks that group transactions into blocks before adding them to distributed ledgers. \textit{Id.}} The chain builds from itself; each new
block contains information about the new transactions to be added to the chain as well as information about the previous block of transactions. Fabricating or altering a blockchain-based ledger is virtually impossible because any change to a previous block drastically alters the information contained on subsequent blocks in the chain. Some blockchain networks, like the Ethereum blockchain, leave room for lines of code to be written onto the network, enabling the use of self-executing “smart contracts.”

Blockchains can generate distributed ledgers. The ledgers are “distributed” because they are accessible to all members of the specific blockchain’s

---

191 Yermack, supra note 3, at 11–12 (discussing the self-referential nature of blockchains).
192 Id. at 11 (“Attempting to forge the information retroactively by changing a prior entry in the archive would cause changes in the sequence of all subsequent entries, since any minor alteration to the input of a hash function causes significant change in its output this is trivial to observe.”).
193 Alyssa Hertig, How Do Ethereum Smart Contracts Work?, COINDESK, https://www.coindesk.com/information/ethereum-smart-contracts-work/ [https://perma.cc/9U2Y-BXSP] (describing the Ethereum blockchain). “Smart contracts” are lines of code, often written onto blockchain networks, that automatically execute the terms of contracts upon input of a certain triggering condition. COMM. ON PAYMENTS, supra note 4, at 3. For example, imagine a supply-chain transaction where a manufacturer contracts to deliver goods via an internalized shipping arm of the manufacturer’s company to a distributor who will purchase those goods. See Reggie O’Shields, Smart Contracts: Legal Agreements for the Blockchain, 21 N.C. BANKING INST. 177, 179 (2017) (discussing a broad overview of how smart contracts would apply in sales of goods). Upon delivery of the goods, the delivery driver scans a barcode on the cardboard box containing the shipped goods to confirm the delivery of the goods. See id. The device that scans the barcode is connected to a blockchain network, of which both the manufacturer and the distributor are participants. See id. The scanning of the barcode could trigger the execution of a smart contract whereby, because of the successful delivery (the triggering condition), payment is transferred from the distributor to the manufacturer. See id. One can further imagine that the distributor keeps an electronic record of the quantity or amount of received goods (presumably on the blockchain network). See id. The same scanning of the barcode that triggered payment upon delivery could update the distributor’s internal records (because the blockchain produces a distributed ledger to be shared by all trusted participants) to reflect an increase in inventory. See id. The distributor, as it sells inventory, could reduce from its asset account the appropriate amount of goods sold, and because this information is stored on the blockchain network, the manufacturer could receive constant updates about the distributor’s current supply. See id. Without another smart contract to trigger a second delivery, the manufacturer very well could contact the distributor and ask it whether it needs another shipment of goods when it notices that the distributor’s inventory is low, or simply wait for the distributor to contact it for another delivery. See id. But, by imposing smart contracts onto the blockchain network, as soon as the distributor reports that its inventory falls below a certain threshold, a smart contract could trigger, notifying the manufacturer’s warehouse that it must deliver a quantity of goods to the manufacturer. See id. Thus, the cycle restarts: shipping goods from manufacturer to distributor; confirming receipt and triggering a smart contract for payment; updating inventory received; running low on inventory and triggering another smart contract for another delivery. See id. Security is ensured by making the triggering of the smart contracts contingent upon the parties’ use of their “public” and “private” keys, discussed below. See id. at 179–81; infra notes 211–216 and accompanying text. For a more complete discussion of smart contracts, please see Kevin Werback & Nicolas Cornell, Contracts Ex Machina, 67 DUKE L.J. 313, 331 (2017) (describing smart contracts on a blockchain network and providing an example).

194 See Yermack, supra note 3, at 11 (noting that distributed ledgers are “essential component[s]” of blockchain systems, like Bitcoin). One can say that blockchains are a type of distributed ledger. COMM. ON PAYMENTS, supra note 4, at 3 (noting that blockchains are an example of a distributed
network.\textsuperscript{195} The ledger can be used to track record ownership of electronic assets or provide evidence of ownership of a physical asset.\textsuperscript{196} Distributed ledgers track transactions by providing a chronological compilation of its users’ transactions.\textsuperscript{197}

Distributed ledgers can be open to the public or privately managed.\textsuperscript{198} Public ledgers are not updated or maintained by any one, particular entity.\textsuperscript{199} Instead, public ledgers are open-sourced, decentralized, and maintained by all users of the network.\textsuperscript{200} It is unlikely for public blockchain participants to know one another because identities are masked by virtual pseudonyms.\textsuperscript{201} The bitcoin network is a prime example of a popular public blockchain.\textsuperscript{202}

Without a central administrator updating the ledger, public blockchains are updated by democratic consensus.\textsuperscript{203} This happens in two steps: validating ledger. There are other ways, similar to standard bookkeeping, to track data, and if they do not necessarily involve batching together transactions, but rather entering them one at a time.\textsuperscript{Id.} Further, distributed ledgers do not necessarily need to record the transfer of assets, but can also be employed to manage account balances.\textsuperscript{Id.}


\textsuperscript{198} Id.

\textsuperscript{199} See Yermack, supra note 3, at 12–13 (describing Bitcoin, a public blockchain, as not having a “sponsor or gatekeeper with the “update function . . . decentralized to all market participants in an ongoing competition catalyzed by the award of new bitcoins to the winner”).

\textsuperscript{200} Id.

\textsuperscript{201} Id. at 11 (explaining how public distributed ledgers publish versions of the ledger to be validated by any “interested user,” noting that distributed ledgers “essentially crowd-source[] the verification function classically played by auditors or bank inspectors”). “Consensus” is a process where computers agree to a common version of a ledger \textit{COMM. ON PAYMENTS, supra note 4}, at 4. This is performed cryptographically, with rules or procedures (for example, a majority vote) which layout the prerequisites to updating the common ledger. \textit{Id.} On the Bitcoin network, for example, consensus is reached via a “proof of work” process. \textit{Cardano Settlement Layer Documentation, CARDANO}, https://cardanodocs.com/introduction/ [https://perma.cc/3AW6-WPMV] [hereinafter \textit{CARDANO}]. “Proof of work” means that, to update the ledger, a computer must solve a particular computationally-dense puzzle. \textit{Id.} The only way to complete the puzzle would be to present evidence that the participating computer exerted a certain amount of computing energy. \textit{Id.} On the bitcoin network, that evidence is publishing both the solution to the puzzle and all the transactions that made up the block to be
transactions and adding them to the block, then adding the block to the ledger. By requiring a consensus to update the ledger, public blockchains are virtually unalterable. To incentivize participants to validate others’ transactions, public blockchains, like the bitcoin blockchain, often offer rewards to validators.


205 See Yermack, supra note 3, at 14. (He described any attempt to alter a blockchain ledger as “prohibitively difficult” because “even a minor change in a past block would have the . . . effect of changing . . . all subsequent blocks. A thief . . . seeking to alter old transactions would . . . face the insurmountable problem of having to find valid [data] for all [blocks] up to the latest . . . . The difficulty of this task explains why . . . [blockchains are] ‘immutable’.”).

206 See id. (describing the reward offered to network participants). The bitcoin network places all network participants in an ongoing competition to receive bitcoins, catalyzing both the process of validating transactions and adding blocks to the ledger in one swoop. Id. If John wanted to send bitcoins to Jane, John’s computer would first make a request of the network to change the ledger. See Bitcoin Transactions, supra note 204 (describing a basic Bitcoin transaction). Other network participants would then communicate with each other to verify that John has the requisite funds to transfer and that he did not already transfer those funds away. See id. If a majority of the network’s computing power agrees that John has the bitcoin required, John’s transaction is added to the block. See id. Once John’s transaction has been added to the block, it must then be added to the ledger. See id. In order to update the bitcoin proof-of-work ledger, participants must gather four pieces of information: (1) the previous block’s identifying information; (2) a timestamp; (3) information about transactions in the current block; and (4) a “nonce.” Yermack, supra note 3, at 13. A “nonce” is a random number that participating computers attempt to discover through computationally heavy trial-and-error processes (proof-of-work processes). Id. Whichever computer is the fastest (or luckiest) that finds the correct “nonce” will be able to complete the four-part bundle of information required to add a block to the chain and will be rewarded with a bounty of bitcoins (currently 12.5 bitcoins per block as of July 2016, periodically halving to mimic inflation to traditional currencies). Id. The process for finding a nonce becomes more or less difficult depending on how quickly the previous nonce was found: each block should take about ten minutes of problem solving to complete. Id. Completing a block entails that a computer has verified all transactions to be added to the ledger. Noelle Acheson, How Bitcoin Mining Works, COINDESK (Jan. 29, 2018), https://www.coindesk.com/information/how-bitcoin-mining-works/ [https://perma.cc/F8E5-GV58]. Although finding the nonce is computationally intensive, having other network participants verify that one computer found the correct solution is simple. CARDANO, supra note 203. The Bitcoin blockchain has been programmed to hold and issue a limited number of bitcoins (21 million). Acheson, supra; see Kiviat, supra note 5, at 579 (discussing the limited total supply of bitcoins). Once all bitcoins have been “mined,” the incentive structure will likely shift to offering transaction fees to miners proportional to their computational efforts. See Kiviat, supra note 5, at 570–80; see also CARDANO, supra note 203 (describing rewards given to validators on proof-of-work networks).
Private blockchains, on the other hand, allow for substantial control over, and manipulation of, the ledger.\(^{207}\) Whereas public blockchains have no centralized administrator with authority to control the blockchain, private blockchains can authorize trusted moderators to oversee the network.\(^{208}\) Moderators of private blockchains can restrict access to the ledger, make changes to previous blocks, and access participants’ data.\(^{209}\) Moderators can also control how and when the ledger is updated, replacing the need for network participants to update the ledger by consensus.\(^{210}\)

To maintain security, transactions on blockchain networks (both public and private) require two unique interrelated forms of identification to process a transaction: public keys and private keys.\(^{211}\) A public key is a publicly viewable code that allows network participants to view and verify messages or transactions sent on the network.\(^{212}\) Private keys are the passwords that give indi-

\(^{207}\) Yermack, supra note 3, at 12 (discussing the “enormous power” held by “parties with authority to encode new transactions into a blockchain”).

\(^{208}\) See id. (“In many of the prominent blockchain applications now under development, such as the . . . Depository Trust Clearing Corp. in New York, the gatekeeper role is assumed by an established ‘trusted third party’ whose actions are constrained by government regulators as well as reputational concerns.”); see also COMM. ON PAYMENTS, supra note 4, at 7. (They describe the differences between public and private ledgers, noting, “At one extreme, a single entity could host and operate all the nodes . . . on behalf of participants and be the sole entity responsible for maintenance of the ledger. Alternatively, maintenance could be shares across many entities, each responsible for having a copy of the ledger.”).

\(^{209}\) Yermack, supra note 3, at 12 (describing a blockchain regulator’s authority to “restrict entry into a market, assess monopolistic user fees, edit incoming data, treat some users preferentially, limit users’ access to market data, and potentially share user data with outsiders” in private or permissioned blockchains).

\(^{210}\) See id. at 16 n.15 (discussing the possibility of incorporating a decentralized update function on a private blockchain, noting that, in the case of Ovestock.com’s private blockchain, the company operates and updates the blockchain itself). A third class of distributed ledgers are permissioned ledgers. Id. Permissioned ledgers are a happy medium between public and private: they can be open-sourced, but do not have to be. Id. While there is a known moderator, there may or may not be consensus validation protocols—updates can occur merely after a certain number of transactions or certain amount of time has occurred or passed. Id. The decision to use a public, private, or permissioned ledger will depend on the networks’ intended uses. Id. Transfer agents that advocate for the use of blockchain technology argue that permissioned or private blockchains be used to maintain control over private data and disclosures to network participants. See, e.g., McHale et al., supra note 198, at 20 (arguing, because personally identifiable information “cannot be fully disclosed on the distributed ledger due to data privacy concerns,” that “a role will need to be retained for an entity (issuer agent) to compile the central register from the relevant data sets”).

\(^{211}\) Geis, supra note 4, at 257. There are many applications that serve as “wallets,” similar to online accounts, within which participants can store their cryptocurrencies, like bitcoin, that provide users public and private keys. Id. These wallets often provide the software for transfer of cryptocurrencies from one user to another. Id. To further bolster security, the Bitcoin network operates anonymously, reducing the risks of identity theft or fraud. See Huang, supra note 1, at 2102 (“Bitcoin transactions are irreversible and do not involve any identifying personal information, which helps minimize fraudulent activity, prevent identity theft, and shield merchants from fraudulent chargebacks.”).

\(^{212}\) Geis, supra note 4, at 257 (“The public key is analogous to an email identifier, and it allows others—such as a buying party—to locate the selling member in order to send funds related to the
individuals access to their accounts and allow users to encrypt outgoing messages or transactions. Private keys are unique to each account and cannot be changed once they are generated. Private keys enable individuals to send assets from their own “wallets,” or accounts, to other addresses. Anyone in possession of a private key has complete access to the wallet.

B. Legal Framework and Support for Distributed Ledgers

Support for blockchain technology has come from many directions, including courts and state, federal, and foreign governments. Vice-Chancellor Laster of the Delaware Court of Chancery has even advocated for the use of exchange.”); see Lewis, supra note 195, at 7 (“Just like bank accounts, if you want to receive a bitcoin payment, you need to tell someone your bitcoin [public key] so they know where to send bitcoins to [sic].”).

Geis, supra note 4, at 257. Because public keys are related to private keys, if a sender “signs” a transaction using their private key, anyone with access to the public key will know that the transaction must trace back to one particular account. Public-Key Cryptography, WIKIPEDIA, https://en.wikipedia.org/wiki/Public-key_cryptography#Typical_use [https://perma.cc/SC2N-9VXT]. An apt analogy is wax seals on envelopes. Id. The sealed envelopes can be opened by anyone, and everyone that opens it will know that the message was sent from one particular individual. Id. The keys interact in the following way: for Jane to send Sue bitcoins and ensure that only Sue can receive the bitcoins, Jane will inscribe her transaction—the transfer of a bitcoin—into a message, addressed to Sue’s account, and encrypt that message with her own private key (her wax seal). See id. Sue’s account will receive the bitcoins (she will open the envelope with the public key), and Sue will verify the transaction by confirming that the message came from Jane (opening the message with the public key verifies that it must have come from Jane). See id.

214 Lewis, supra note 195, at 7–9.

215 Id.

216 Id. Because private keys are so valuable to blockchain participants, and because they cannot be changed once generated, private keys are often password-protected so no one can access the file that stores a private key unless a password chosen by the wallet holder is entered. Id. Participants on the Bitcoin network can send bitcoins to each other without the use of intermediaries through a combination of their wallet software, their public, and their private keys. See id. To initiate a transaction on the Bitcoin network, a participant will first have to enter into their wallet software the amount of Bitcoin they wish to transfer. See id. Then, they must enter the address of the receiving wallet. See id. These instructions are authorized and “signed” by the user’s private key. Id. In wallets that allow users to encrypt their private key with a chosen password, entering the user’s password suffices to “unlock” the private key and verify that the transaction ought to be sent out to the network for validation. See id.

blockchain technology in corporate record keeping. The sweeping praise for blockchain technology all hums the same tune: blockchains are faster, more secure, and more accurate than traditional record-keeping methods, such as the DTC system. This, however, doesn’t provide a legal basis for their use.

Businesses must maintain a keen focus on the extent to which state and federal law permit the use of blockchain technology, if they do so at all.

There is currently no consensus among states about the legality of blockchain technology, but there appears to be a slow trend towards acceptance of the technology. For example, in 2017, Delaware amended its corporate law to allow corporations to use blockchain technology to create and maintain records, including stock ledgers, and to communicate with stockholders via blockchain. The changes also provide that records stored on a blockchain will be admissible in evidence just like their paper counterparts.

---

218 See *In re Dole Food Co. (Dole)*, 2017 WL 624842, at *4 n.1 (Del. Ch. Feb. 15, 2017); Laster, supra note 11, at 16.

219 See, e.g., Laster, supra note 11, at 16 (“Distributed ledger technologies can provide better accuracy, greater transparency, and superior efficiency for settling securities trades and voting in corporate elections.”).

220 See, e.g., Svikhart, supra note 5, at 111 (discussing the potential for the federal Electronic Signatures in Global and National Commerce Act (“ESIGN”) to preempt state law governing blockchain technology and virtual currencies).

221 See id. (discussing the uncertainty surrounding ESIGN and its potential effect on state blockchain law).

222 Wales & Kohen, supra note 217, at 1.

223 See DEL. CODE ANN. tit. 8, § 224 (2016) (permitting “[a]ny records administered by or on behalf of the corporation . . . including its stock ledger, books of account, and minute books” to be stored on “one or more electronic networks or databases (including one or more distributed electronic networks or databases), provided that the records so kept can be converted into clearly legible paper form within a reasonable time”); see also id. § 219 (defining “stock ledger” to mean “records administered by or on behalf of the corporation in which the names of all of the corporation’s stockholders of record, the address and number of shares registered in the name of each such stockholder, and all issuances of stock of the corporation are recorded in accordance with § 224 of this title”). Communication with stockholders via blockchain means that corporations can deliver proxy materials, prospectuses, and any other relevant stockholders information, by first identifying stockholders entitled to receive such information through the corporations’ stock ledger, then delivering that information electronically by releasing it on the blockchain network, similar to a mass email. See id. §§ 219, 214; Donald, supra note 22, at 93 (discussing the benefits to stockholder communications on a blockchain network, opining that communications with stockholders directly, rather than through financial intermediaries via proxy, would be economically efficient, noting, “[i]f an issuer had direct access to electronic addresses for its security-holders, mass communication would be no more expensive than sending the original notice to the [central securities depository]”).

Public corporations have similarly expressed interest in blockchain technology. Following Delaware’s amendments to its corporate law, Overstock.com has begun to issue shares of its stock via private blockchain. The Depository Trust & Clearing Corporation (“DTCC”) has contracted with IBM to develop blockchain technology compatible with the derivatives market. Initial coin offerings have also become increasing popular crowdfunding avenues, seeing a 3000% increase in funding in 2017, amassing over $6.5 billion in funds raised.

Federal lawmakers expressed mixed attitudes towards the use of blockchain technology. In September 2016, the U.S. House of Representatives expressed its interest for the U.S. Government to develop and explore the use of blockchain, and (iii) enforces ownership rights if they were secured by transactions on blockchains. Id. New York legislators have recently proposed a bill to investigate the potential benefits and uses of blockchain technology. A08793, 2018 Gen. Assemb., Reg. Sess. (N.Y. 2018).


Cade Metz, Overstock Begins Trading Its Shares Via the Bitcoin Blockchain, WIRED (Dec. 15, 2016), https://www.wired.com/2016/12/overstock-com-issues-stock-via-bitcoin-blockchain/ [https://perma.cc/2S9R-9Y9U] (noting that Overstock.com issued over 126,000 shares of its “internet-only stock” on a private blockchain). Overstock.com oversees its own blockchain, but still publishes a copy of the transactions on its private ledger to the Bitcoin ledger for the sake of complete transparency. Id.


Yuji Nakamura, Startups Are Raising Billions Using Initial Coin Offering, BLOOMBERG BUSINESSWEEK (Jan. 22, 2018), https://www.bloomberg.com/news/articles/2018-01-22/startups-are-raising-billions-using-initial-coin-offerings [https://perma.cc/DG3H-237H]. An initial coin offering (“ICO”) is a method of raising money for financing a business without issuing stock. Nathaniel Popper, An Explanation of Initial Coin Offerings, N.Y. TIMES (Oct. 27, 2017), https://www.nytimes.com/2017/10/27/technology/what-is-an-initial-coin-offering.html [https://perma.cc/TMC7-M8U3]. Companies raise funds by selling a newly minted cryptocurrency, typically developed by the fundraising company, to be used in the future on that company’s network. Id. For example, BET is a virtual coin designed by a company that seeks to build an online casino by raising money through an ICO. Id. The investors in the ICO can use the coins they received for their investment as virtual chips at the BET casino. Id. Unlike typical stock offerings, coin offerings do not provide investors with an equity stake. Id. Ostensibly, people purchase coins in ICOs because they wish to actually use the services provided by the issuing company (and they hope the value of the coins will go up). Id. After an ICO, the issued coins are transferrable through an open market like any other currency or stock. Id.

See Caytas, supra note 224 (“Regulatory responses . . . to blockchain . . . range from excitement to suspicion to indifference.”).
of blockchain technology.\textsuperscript{230} Subsequently, a bipartisan Congressional Block-
chain Caucus led by Representatives Mick Mulvaney and Jared Polis was an-
nounced to further promote blockchain research.\textsuperscript{231} Neither the bill nor the
caucus have culminated into legislative action.\textsuperscript{232}

Regulation promulgated by federal agencies tends to focus more on
Bitcoin and other cryptocurrencies rather than the underlying blockchain tech-

ology.\textsuperscript{233} In the criminal sphere, the Financial Crimes Enforcement Network
(“FinCEN”) recognized cryptocurrencies as devices to effectuate money laun-
dering and financial terrorism.\textsuperscript{234} In the tax realm, the Internal Revenue Ser-
vice (IRS) treats cryptocurrency as property.\textsuperscript{235} The Commodities Futures
Trading Commission considers cryptocurrencies to be “commodities” under
the Commodity Exchange Act.\textsuperscript{236} In his testimony before the U.S. Senate
Committee on Banking, Housing, and Urban Affairs, Jay Clayton, the Chair-
man of the SEC, expressed the view that issuances of cryptocurrencies to raise
capital fall within the definition of “securities” under the Securities Exchange
Act of 1933 and are thus subject to federal regulation.\textsuperscript{237} Moreover, the SEC
released a statement that online cryptocurrency trading platforms must register
with the SEC as national exchanges.\textsuperscript{238}

\begin{footnotesize}
\begin{itemize}
\item\textsuperscript{230} Legal Landscape, supra note 217, at 1 (discussing the “eager[ness]” of federal lawmakers to
develop blockchain technology); see H.R. 835, 114th Cong. (2016) (advocating that the United States
adopt policy to explore the potentials of blockchain technology).
\item\textsuperscript{231} Legal Landscape, supra note 217, at 1; Jerry Brito, Bipartisan Blockchain Caucus Formed in
Congress, COIN CENTER (Sept. 26, 2016), https://coincenter.org/entry/bipartisan-blockchain-caucus-
formed-in-congress [https://perma.cc/N3CG-252L].
\item\textsuperscript{232} Caytas, supra note 224.
\item\textsuperscript{233} See, e.g., de Martino & Klein, supra note 197 (discussing recent federal regulations on crypto-
currencies). But see Samuel Pearse & Tim Wright, Gibraltar’s Financial Services Regulator Adopts
com/legalnews/gibraltar-s-financial-services-36749/ [https://perma.cc/SLW2-FLWZ] (discussing
Gibraltar’s requirement that firms which desire to use distributed ledger technology for “transmitting
payments, recording transactions and similar use cases” will need to receive a license from the Gibral-
tar Financial Services Commission).
\item\textsuperscript{234} Caytas, supra note 224.
\item\textsuperscript{235} Id.
\item\textsuperscript{236} Id.
\item\textsuperscript{237} Chairman’s Testimony on Virtual Currencies: The Roles of the SEC and CFTC, SEC. & EXCH.
COMM’N (Feb. 6, 2018), https://www.sec.gov/news/testimony/testimony-virtual-currencies-oversight-
role-us-securities-and-exchange-commission#_ [https://perma.cc/AR42-J8L4] (noting that “many in
the ICO space have sought to [raise capital to fund an enterprise]” using crypto currencies, and that
“determining what falls within the ambit of a securities offer and sales is a facts-and-circumstances
analysis”).
\item\textsuperscript{238} See generally Unlawful Platforms, supra note 2 (discussing recently regulatory requirements
imposed on cryptocurrency exchanges).
\end{itemize}
\end{footnotesize}
III. BACK TO THE FUTURE: BLOCKCHAIN OPTIMIZES DELAWARE APPRAISALS

Blockchain technology extends far beyond merely supporting the exchange of cryptocurrencies. At their core, blockchains and distributed ledgers can eliminate the need for financial intermediaries in a range of transactions. Blockchains instantly create permanent records of transactions for all to see, enabling investors to directly own their shares, clear transactions quickly, and optimize voting without having to rely on costly third party oversight. Replacing financial intermediaries with distributed ledger technology could save somewhere between fifteen and twenty billion dollars per year by 2022 in fees and costs associated with outsourcing, clearing, and settlement.

One of the upshots of blockchain technology is its ability to address procedural snags in appraisal law. As it stands, Delaware’s failure to recognize the distinction between beneficial and record holders has created costly and unfortunate outcomes in appraisal litigation for both stockholders and corporate defendants. Issuing shares via blockchain can safeguard stockholders’ compliance with Section 262’s procedural requirements while also ensuring

239 See Don Tapscott & Alex Tapscott, Here’s Why Blockchains Will Change the World, FOR-TUNE (May 8, 2016), http://fortune.com/2016/05/08/why-blockchains-will-change-the-world/ [https://perma.cc/WDC6-HSQP] (opining on the uses for blockchain technology, including recording “birth and death certificates, deeds and titles of ownership, financial accounts, votes, [and] provenance of food”); see also Blockchain 101, supra note 3, at 2 (opining that blockchain technology is not limited to Bitcoin transactions).


241 Yermack, supra note 3, at 9; see Huang, supra note 1, at 2102 (describing bitcoin transactions as “instantaneous and borderless” without “any limitations on the time, place, or amount of its transactions” and having “very low transaction fees and sellers have the ability to bypass the usual cost of accepting a credit card payment”).


243 See Laster, supra note 11, at 16 (opining that distributed ledger technologies offer solutions to problems with corporate voting and stock ownership).

244 See id. at 7, 8 (discussing In re Appraisal of Dell Inc., 2015 WL 4313206 (Del. Ch. July 30, 2015)) and opining that outcome “was an example of people doing what they should do and then getting caught up by the system”).
that those stockholders are fairly held to their burdens to demonstrate that they did not vote in favor of the merger and are entitled to appraisal.245

There are, however, real roadblocks that stymie a massive securities overhaul: whether to use a public, private, or permissioned blockchain; ensuring an ability to process a large volume of transactions quickly; how to replace existing intermediaries smoothly; and compliance with existing law.246 Many of these concerns can be quickly assuaged in virtue of distributed ledgers’ proven ability to handle cryptocurrency transactions.247 Moreover, even though blockchain technology is still in its infancy, there is reason to be hopeful that, with time, the technology could easily handle the transaction loads of current technology.248

This Part argues that blockchain technology has the potential to cure appraisal deficiencies created by the depository system in a manner consistent with existing Delaware law, and discusses potential pitfalls to the prototypical public blockchain in a robust securities market.249 Section A argues that blockchain-based securities can be issued directly to investors without the need for DTC to hold stock certificates in a way that comports with existing Delaware appraisal law.250 Section A also argues that, although blockchain technology is premised on total decentralization, it is unlikely that a robust securities market would be completely unregulated.251 Section B argues that blockchain-based securities can be traced—votes and transfers can be tracked back to particular shares of stock and stockholders—which restores stockholders burdens to prove that their shares were not voted in favor of a merger, and may have a

245 See supra notes 254–308 and accompanying text.
246 OLIVER WYMAN, supra note 5, at 14 (discussing “hurdles to adoption” of blockchain technology, opining that the transition to a blockchain network will be a slow process); Marco A. Santori, Delaware Share Ownership and the Blockchain, HARVARD LAW SCH. FORUM ON CORP. GOVERNANCE & FIN. REGULATION (June 24, 2016), https://corpgov.law.harvard.edu/2016/06/24/delaware-share-ownership-and-the-blockchain/ [https://perma.cc/QQ48-9TJM] (opining on the hardships of finding consensus among financial institutions on a uniform blockchain network). For example, although the practical benefits of faster settlement may be apparent, the legal authority for settlement finality by blockchain is still uncertain. See Santori, supra (“Legally-cognizable settlement finality on a blockchain is an unproven theory . . . . [I]t is an open question whether distributed ledger shares . . . are recognized under the law.”). 247 See Yermack, supra note 3, at 9 (opining on the benefits that blockchain technology provides).
248 Sean Williams, 3 Cryptocurrencies Processing 1,500 (or More) Transactions Per Second, MOTLEY FOOL (Feb. 1, 2018), https://www.fool.com/investing/2018/02/01/3-cryptocurrencies-processing-1500-or-more-transac.aspx [https://perma.cc/DL7B-V9LT]. Currently, Visa can process roughly 24,000 transactions per second. Id. Even in their infancy, however, there are at least three blockchains able to process 1,500 transactions, or more, per second: Ripple, which has partnered with American Express and Banco Santander can process 1,500 transactions per second; the NEM blockchain, at 4,000 transactions per second; and Raiblocks, with a whopping 7,000 transactions per second. Id. 249 See infra notes 254–308 and accompanying text.
250 See infra notes 254–280 and accompanying text.
251 See infra notes 254–280 and accompanying text.
deterrent effect on appraisal arbitrageurs. Section C argues that, because blockchain-based securities could be issued directly to investors, investors would no longer lose their rights for trivial reasons, like from conflicting stock-certificate policies at custodial banks.

A. Seceding from Cede: Direct Share Ownership

Recall that almost all publically traded shares are actually held of record by Cede & Co. As a result, transactions at the investor level (and even at the broker level) involving public stock often involve nothing more than exchanges of IOUs—debits and credits of beneficial rights within DTC’s electronic book-entry system. Cede, at all times, retains legal title to the securities, and Cede assigns beneficial rights to the shares it holds in its fungible bulk to custodial banks and brokers, who then re-assign the rights to investors. As illustrated by Transkaryotic in 2007, BMC Software and Ancestry in 2015, and Dell Dissenters in 2016, the pro rata apportionment has made it impossible to determine, without evidence extrinsic to DTC, whether any one particular share purchased after the announcement of a merger was voted for the merger, even for record holders. Moreover, Dell Ownership, in 2015, revealed that actions by financial intermediaries can deny stockholders the ability to opt out of disfavored transactions when they reissue shares without stockholders’ consent. Blockchain technology can resolve these stock-tracing problems by eliminat-

252 See infra notes 281–300 and accompanying text.
253 See infra notes 301–308 and accompanying text.
254 In re Appraisal of Dell Inc. (Dell Ownership), 2015 WL 4313206, at *5 (Del. Ch. July 30, 2015); see supra notes 118–123 and accompanying text.
255 Eha, supra note 178 (analogizing publicly traded stock to “IOUs”).
256 Id. (noting that the record holder is always Cede, irrespective of how many beneficial owners trade shares); see In re Appraisal of Transkaryotic Therapies, Inc. (Transkaryotic), 2007 WL 1378345, at *2 (Del. Ch. May 2, 2007) (describing the assignment of rights through Cede’s fungible bulk system).
257 See In re Appraisal of Dell Inc. (Dell Dissenters), 143 A.3d 20, 36–37 (Del. Ch. 2016) (implicitly acknowledging that Cede’s fungible bulk, makes it impossible to determine how particular shares were voted in the absence of evidence extrinsic to Cede); In re Ancestry.Com, Inc. (Ancestry), 2015 WL 66825, at *5–6 (Del. Ch. Jan. 5, 2015) (affirming the Transkaryotic court’s consideration of inability to trace votes back to shares in virtue of Cede’s ownership structure, finding that plaintiffs need not put forward evidence of how their shares were voted so long as “Cede . . . had sufficient shares not voted in favor of the merger . . . to cover the number of shares for which [plaintiff] sought appraisal”); Merion Capital LP v. BMC Software, Inc. (BMC Software), 2015 WL 67586, *4 (Del. Ch. Oct. 7, 2014) (“Noticeably absent from [Section 262(a)], or any language in [Section 262], is an explicit requirement that the stockholder seeking appraisal prove that the specific shares it seeks to have appraised were not voted in favor of the merger.”).
ing intermediaries, ensuring that beneficial owners hold full title, not mere contractual rights against institutions higher on the chain. 259

Blockchains and distributed ledgers eradicate the beneficial ownership problem by allowing corporations to issue stock directly to investors, effectively handing investors electronic stock certificates. 260 Securities issued on a blockchain could be the actual shares themselves, rather than a book-entry position that evidences ownership in an undifferentiated pool of stock. 261 Each individual share could be tracked and traced from issuance to ownership—irrespective of how many times or how often the shares change hands—by virtue of unique transaction identifiers for each share. 262 Moreover, each network participants’ account could display a comprehensive list of that account’s prior transactions to further track ownership. 263 Rather than rely on DTC to track and net trades between participating banks and brokers, that information can be stored directly on the ledger, accessible to all participants, and automatically updated without the need to net transactions. 264

259 See Fox, supra note 12 (noting that issuing shares on a blockchain “raises the possibility of cutting out intermediaries” and “investors would be able to directly own shares”).

260 See COMM. ON PAYMENTS, supra note 4, at 3 (discussing assets that exist solely via digital ledgers, noting that “distributed ledger[s] [can be] employed to record ownership”); Fox, supra note 12 (describing blockchain networks in the context of corporate ownership); see also Donald, supra note 22, at 97 (discussing a direct ownership system where securities are issued without paper stock certificates, noting that “transferring uncertificated securities would mean that every owner of the security would simultaneously become to registered owner,” and that “the distinction between ‘beneficial’ and ‘registered’ owners would disappear (except in cases where the security-holder chose to remain anonymous . . . )”); Laster, supra note 11, at 20 (opining that distributed ledgers create a “utopian version of share ownership system” without beneficial ownership, only record ownership). One can imagine securities “issued” on a blockchain in a number of ways: creating unique cryptocurrencies, each created by different issuing corporations and made tradeable on one network, that act as a share of stock. See Yermack, supra note 3, at 16 (describing “tokens” that can represent shares of stock on the blockchain network). Alternatively, shares of securities could be encoded onto the transfer of bitcoin (or any other coin). See id. For example, if Jane were to transfer one share of ABC Corporation to Amy using bitcoin, Jane could transfer a trivial amount of bitcoin to Amy (like an amount less than one tenth of one cent), and include, attached to the transfer, a message, contract, or other information that would represent, or even serve as, the delivery of title of the share to Amy. See id.

261 Yermack, supra note 3, at 17 (discussing blockchains’ transparency).

262 Yermack, supra note 3, at 18 (discussing the network could be programmed to allow accounts to have “sub-accounts,” whereby intermediaries (like banks and brokers) could maintain their assets on the distributed ledger through their own principal account, then keep track of their clients’ shares within the sub-accounts. Id. All the accounts—principals and subs—would be viewable on the distributed ledger to determine custodial possession by the broker but registered ownership by the investing clients. Id.

263 Yermack, supra note 3, at 9 (describing blockchain’s benefits for stockholders, including no longer needing financial intermediaries to track transactions). This model could look nearly identical to the transfer of bitcoins on the Bitcoin network. See Kiviat, supra note 5, at 594, 603 (discussing the “basic structure” of blockchain networks, opining that while “this basic structure was designed for
Issuing shares via blockchain not only fixes the beneficial ownership problems, but can be done without changing existing Delaware appraisal law. Rather than changing the appraisal statute to account for indirect ownership, returning the securities market to direct ownership would realign both Delaware’s presumptions about securities ownership and the underlying securities market. By issuing shares via blockchain, Delaware corporations could still rely on their stock ledgers to determine record ownership, with the only difference being that those ledgers would list stockholders with an actual economic stake in the shares, not just Cede. This would eradicate the troublesome inconsistency whereby Delaware recognized prorated ownership in Cede’s fungible bulk under Delaware’s securities laws, but assumes direct ownership under Delaware corporate law.

Returning the securities market to direct ownership would probably not remove DTC from the picture entirely because it is possible that DTC would continue transferring ownership of bitcoins... they can also transmit richer forms of information,” and that “blockchain-based currencies share some economic properties with commodity money, and legal definitions support their characterization as a commodity”). One commentator provided an apt example of a “utopian” picture of securities transactions: two clients are connected through an exchange medium on a blockchain network that instantaneously confirms each party has the wherewithal to complete a transaction by reviewing the ledger. See OLIVER WYMAN, supra note 5, at 10. Both parties agree to execute the transaction by having their private keys deliver access to their funds or assets, then transfer those assets using public keys. See id. The transaction is distributed to network participants to be validated and added to the distributed ledger upon a subsequent ledger update. See id. Laster, supra note 11, at 6 (discussing Delaware corporate and securities law).

Id. at 7, 20 (advocating for the implementation of blockchain technology as a way to resolve problems ensuing from the beneficial-record owner distinction); see Andrea Tinianow & Caitlin Long, Delaware Blockchain Initiative: Transforming the Foundational Infrastructure of Corporate Finance, HARVARD LAW SCH. FORUM ON CORP. GOVERNANCE & FIN. REGULATION (Mar. 16, 2017), https://corpgov.law.harvard.edu/2017/03/16/delaware-blockchain-initiative-transforming-the-foundational-infrastructure-of-corporate-finance/ [https://perma.cc/XC3Q-SU5Y] (opining that “distributed ledger shares would also solve an inconsistency between corporate and securities laws); see also Donald, supra note 22, at 97–98 (noting that the Uniform Commercial Code Drafting Committee originally supported an uncertificated system of securities transfer in 1978).

See Transkaryotic, 2007 WL 1378345, at *4 (only requiring corporations to rely on their internal “records as the sole determinant of membership in the context of appraisal”); Donald, supra note 22, at 97 (noting that transfers of stock issued via decentralized networks would occur simply by updating the issuer’s records). This scenario is simple to imagine: first, a corporation issues shares by registering the names of banks, brokers, and directly purchasing individual investors on its distributed stock ledger. See Donald, supra note 22, at 97–98 (“A transferee obtains ‘control’ over an uncertificated security by having his name entered on the [issuing corporation’s] list.”). In the case of individual investors, they hold both title and beneficial rights to their newly purchased stock. See id. (discussing how issuing uncertificated shares on a decentralized network would rid the securities system of beneficial owners, unless the choice to remain a beneficial owner was voluntary). Banks and brokers that purchase the issued stock would have their names on the ledger, but transfer of shares to their clients could also update the corporation’s stock ledger to reflect the change in ownership from broker to client. See id. Although there would be no paper stock certificate to issue to banks and brokers, they could still “hold” shares of their clients on their behalf by maintaining wallets or accounts which hold their clients’ electronically-issued securities. See id.

See Laster, supra note 11, at 6 (discussing Delaware’s internal inconsistencies).
shift from a centralized title holder to a network regulator, overseeing transactions and preventing fraud.\textsuperscript{269} Although a public blockchain has its benefits, it is difficult to imagine a world where government authorities and regulators are willing to cede their power to decentralized markets without any oversight capabilities.\textsuperscript{270} It is likely that an entity, like DTC, would oversee a blockchain-based securities market.\textsuperscript{271} In fact, DTC is currently developing permissioned distributed ledgers.\textsuperscript{272}

Although possible, it is also unlikely that banks, brokers, and other intermediaries would completely dissolve from the picture.\textsuperscript{273} Intermediaries promote trust and reduce the risk of fraud in transactions.\textsuperscript{274} It is also easier for investors to find willing buyers and sellers with the help of broker intermediaries.\textsuperscript{275} Moreover, given the niche market for financial intermediaries that has developed to make the indirect ownership system more efficient, it is unlikely these actors would willingly have their roles replaced without trying to find

\textsuperscript{269} See Geis, supra note 4, at 263 (proposing, “it is possible to imagine a world of complete disintermediation, where individual investors join exchanges directly, downloading software to participate as a full member of a distributed ledger,” and later discussing how “there are many reasons to believe that complete disintermediation will not occur”).

\textsuperscript{270} See id.; McHale et al., supra note 198, at 20 (opining that a permissioned ledger “is most likely to be [implemented in] securities markets). Commentators debate whether markets would benefit from a truly decentralized and autonomous securities market, or whether there ought to be some degree of regulatory oversight. Compare Chris Dixon, Why Decentralization Matters, MEDIUM (Feb. 18, 2018), https://medium.com/@cdixon/why-decentralization-matters-5e3f79f7638e [https://perma.cc/CF8L-QLL7] (arguing for the use of decentralized financial networks as a means to promote economic growth by “winning the hearts and minds of entrepreneurs and developers”), with McHale et al., supra note 198, at 19–20 (proposing that, in the context of transfer agents, distributed ledgers will still require the maintenance of “a central securities register” because “legal/regulatory and operational aspects will require . . . a master security-holder file administered by an agent on behalf of the issuer, which would integrate the distributed ledger of transactions rather than being replaced by it”).

\textsuperscript{271} See Geis, supra note 4, at 263–64 (opining on the future of blockchain-based securities markets). DTC can control which participants have the ability to update the distributed ledger. See U.K. GOV’T CHIEF SCI. ADVISER, supra note 3, at 44 (proposing ways in which government authorities could regulate distributed ledgers by either imposing regulations on private parties or building restrictions into the distributed ledger networks themselves). DTC could allow banks to update the ledger with each transaction, in batches, or at the end of each trading day. Cf. id. at 36 (describing benefits blockchain technology could provide banking services). This could allow banks to use the same or similar netting procedures they have used in the past to optimize securities transfers. Cf. id.

\textsuperscript{272} Yermack, supra note 3, at 12 (discussing DTC’s blockchain application, wherein DTC takes on a “gatekeeper role . . . whose actions are constrained by government regulators as well as reputational concerns”).

\textsuperscript{273} See Geis, supra note 4, at 263–64 (opining that it is unlikely investors would deny the advice of financial services professionals in blockchain-based securities market). Kiviat, supra note 5, at 606 (discussing the “trust” intermediaries bring to transactions); see Geis, supra note 4, at 263–64 (noting that “some investors will continue to enjoy the useful financial advice that they receive from experts, and they might be loath to trade directly”).

\textsuperscript{275} Geis, supra note 4, at 263–64 (opining that it is unlikely investors would deny the useful advice of financial services professionals in blockchain-based securities market).
their way to fit in a blockchain-based direct ownership system.\footnote{276} Even in a blockchain-based securities market, banks and brokers would probably take on an intermediary role, facilitating the execution of transactions.\footnote{277} In this picture, DTC would likely give particular banks and brokers access to the blockchain network and issuing corporations could issue shares directly to those banks and brokers, rather than to DTC.\footnote{278} The banks and brokers could then decide with their clients whether to transfer title directly to their clients, or hold the shares and merely transfer beneficial rights to their clients (to maintain liquidity and ease of trade).\footnote{279} DTC would maintain control over confiden-

\footnote{276}{See Donald, supra note 22, at 91–94 (discussing the ways in which broker-dealers and banks benefit from the indirect holding system). For example, investors have grown accustomed to leaving their securities within the hands of trusted brokers, and brokers have enjoyed the benefits of holding customer’s securities in their name. Id.; see Geis, supra note 4, at 263–64 (proposing reasons for why investors will continue to use financial intermediaries in a blockchain-based securities market, including receiving financial advice, or investing in mutual funds or hedge funds to mitigate risk). Moreover, because of the legal rift between record holders and beneficial owners in the indirect holding system, an entire market has developed to facilitate the distribution of proxy materials. See Donald, supra note 22, at 93 (“Companies like Broadridge exist only to reap profits from the current depository system’s negative externalities. Such companies look at the creation of a . . . system of direct registration [as] . . . an open threat to their very existence.”).}

\footnote{277}{Geis, supra note 4, at 263–64 (proposing reasons why financial intermediaries would continue to exist in a blockchain-based securities system). But see Kiviat, supra note 5, at 574 (proposing that blockchain, as a “trustless” technology, facilitates trade, clearing, settlement, and enforcement without “the presence of a trust third party or central institution”).}

\footnote{278}{See U.K. GOV’T CHIEF SCI. ADVISER, supra note 3, at 44 (proposing ways in which regulatory bodies could maintain authority over a blockchain network). It is difficult to justify a position where individual investors are actually purchasing shares directly from issuers or on a marketplace without some sort of intermediary guidance. See Geis, supra note 4, at 263–64 (discussing that some investors will still enjoy the ease associated with having their trades executed through the use of brokers). Even to purchase Bitcoin, a cryptocurrency on a purely public blockchain, investors typically turn to managed marketplaces that facilitate settlement and clearing. Jake Frankelfield, Coinbase: What Is It and How Do You Use It?, INVESTOPEDIA (Dec. 22, 2017), https://www.investopedia.com/tech/coinbase-what-it-and-how-do-you-use-it/ [https://perma.cc/4HEA-HQLK] (discussing the typical approaches to investing in cryptocurrencies). For example, Coinbase, a popular cryptocurrency exchange, offers useful services to investors, like acting as a centralized bank to hold investors’ Bitcoins, and provides an electronic marketplace for participating investors to buy and sell various cryptocurrencies. Id. Investors can also purchase cryptocurrencies, like Bitcoin, directly from Coinbase. Id. Coinbase facilitates transactions by connecting sellers with potential buyers by scanning its internal register of listed sales. Id. These transactions, while facilitated through the Coinbase exchange, are verified, cleared, and settled through the actual Bitcoin blockchain. Id. In this capacity, Coinbase merely acts as a transaction facilitator. Id. This is probably the picture one would expect in a blockchain-based securities market: banks and brokers would retain their role of acting as intermediaries, finding willing buyers and sellers and facilitating transactions through a marketplace. Cf. id. (describing Coinbase’s role as a transaction facilitator). DTC would oversee these transactions, but all clearing and settling would occur on the blockchain network itself. Cf. id.}

\footnote{279}{See Donald, supra note 22, at 97 (noting that, where the distinction between record holder and beneficial holder dissolves, stockholders can still choose to have their shares held on their behalf). This picture could look similar to the current system: DTC participants could band together and join a private blockchain, moderated by DTC, where the participating banks and brokers would have rights to view and update the ledger. See Geis, supra note 4, at 264. An investor could query the market via...}
tial information, voting decisions, and the like, while preventing hacks and fraud from destabilizing the market.280

B. Disaggregating the Bulk: Tracing Votes Back to Shares

Blockchain technology can also make it possible to determine whether particular shares were voted in favor of a merger, irrespective of when a stockholder purchased them.281 As illustrated by Transkaryotic in 2007, BMC Software and Ancestry in 2015, and Dell Dissenters in 2016, Cede’s fungible bulk has made it impossible to determine, without evidence extrinsic to DTC, whether any one particular share purchased after the announcement of a merger had been voted for the merger, even for record holders.282 In 2016, in Dell Dissenters, when faced with such extrinsic evidence, the Delaware Court of Chancery established a burden-shifting rule to handle situations where evidence actually existed of how shares were voted in a merger.283 The court held that a corporation can put forth evidence indicating how the petitioners’ particular shares were voted by prior owners to defeat a petitioner’s prima facie

its broker. Id. The broker could facilitate the execution of the trade and also update the distributed ledger. Id. It is likely inefficient for brokers to be transferring title back and forth between clients and across other banks’ and brokers’ clients. Wilcox & Holch, supra note 30, § 11.01 (explaining that many investors prefer to have their shares held on their behalf by intermediaries, like brokers, to “expedite stock transfers and subsequent re-registration”). To facilitate faster trading, it is likely that brokers would hold title to stockholders’ shares and then make actual transfers at the end of a day, netting positions within the brokers’ books, and making trades between other brokers and banks. Cf. id. Alternatively, the network could be programmed to allow accounts to have “sub-accounts,” whereby intermediaries (like banks and brokers) could maintain their assets on the distributed ledger through their own principal account, then keep track of their clients’ shares within the sub-accounts. Cf. id. All the accounts—principals and subs—would be viewable on the distributed ledger to determine custodial possession by the broker but registered ownership by the investing clients. See Geis, supra note 4, at 263–64 (describing distributed ledgers and the role of intermediaries in a blockchain-based market).

280 See Frankelfield, supra note 278 (describing Coinbase’s role as a transaction intermediary). At least one transfer agent has advocated that a central authority to moderate and oversee the ledger is necessary for blockchains to be fully incorporated to the public securities sphere. McHale et al., supra note 198, at 20. This model works if it assumes that whatever blockchain system were to be implemented would be private, not public. Id. at 20.

281 See Yermack, supra note 3, at 17 (discussing blockchain’s ownership transparency).

282 See Dell Dissenters, 143 A.3d at 36–37, 56 (implicitly acknowledging that Cede’s fungible bulk, makes it impossible to determine how particular shares were voted in the absence of evidence extrinsic to Cede); BMC Software, 2015 WL 67586, at *5 (considering plaintiff’s argument that share-tracing is impossible in virtue of Cede’s fungible bulk holding structure); Ancestry, 2015 WL 66825, at *5–6 (affirming the Transkaryotic court’s consideration of inability to trace votes back to shares in virtue of Cede’s ownership structure, finding that plaintiffs need not put forward evidence of how their shares were voted so long as “Cede . . . had sufficient shares not voted in favor of the merger . . . to cover the number of shares for which [plaintiff] sought appraisal”).

283 Dell Dissenters, 143 A.3d at 53–54 (describing the burden-shifting analysis).
claim that Cede did not vote in favor of a merger with sufficient shares to cover petitioners’ appraisal demands.\textsuperscript{284}

Without having to change this analysis, blockchain technology would make defendant corporation’s evidentiary burden lighter.\textsuperscript{285} Blockchain technology would provide a record of all transfers of stock, including how that particular share of stock was voted.\textsuperscript{286} Shares can be encoded with information about voting decisions that would affix to the distributed ledger, making it easy to keep track of how each share was voted.\textsuperscript{287}

Taken to the extreme, the burden-shifting rule in \textit{Dell Dissenters} (and the lack of a share tracing rule promulgated by \textit{Transkaryotic}) would be moot; rather than giving stockholders the boon of not having to prove their particular shares were not voted in favor of the merger, the distributed ledger would hold petitioners to their burden, as record holders, of compliance with section 262(b).\textsuperscript{288}

There is reason to believe that blockchain record keeping would dissuade appraisal arbitrageurs as well.\textsuperscript{289} Arbitrageurs rely on being able to purchase a

\textsuperscript{284} Id. Following this decision, commentators have suggested that appraisal arbitrageurs would likely aim to purchase shares in the open market, as opposed to approaching individual stockholders with large stakes in a corporation, to increase their chances that the purchased shares could not be tied back to a vote. See Reder & Onyeador, \textit{supra} note 41, at 294 (arguing “appraisal arbitrageurs . . . will likely purchase shares only from disparate investors in the anonymous open market to decrease the chance that those shares could be traced back to a vote in favor of the merger”). With the imposition of blockchain technology, however, the benefit conferred by purchasing shares veiled by Cede’s fungible bulk dissipates. \textit{Cf. id.} A blockchain-based network would nullify any chance that shares purchased on the open market could not be traced back to a vote. \textit{Cf. id.}

\textsuperscript{285} See Laster, \textit{supra} note 11, at 20 (noting that blockchain technology allows stockholders to be aware, at all times, of who owns a particular security).

\textsuperscript{286} See Tinianow & Long, \textit{supra} note 266 (discussing the inaccuracies in the proxy voting system and proposing blockchain technology as a solution).

\textsuperscript{287} \textit{Id.} For example, voting via blockchain could occur by issuing non-value holding tokens to registered owners proportional to their ownership in a corporation. See Piazza, \textit{supra} note 3, at 293 (describing a token-based corporate governance voting regime). To ensure that the voting-tokens could be traced back to particular shares, the tokens could be programmed to automatically encode a number to the vote-token that matches a number encoded to a particular share of stock. See Yermack, \textit{supra} note 3, at 23 (“In a blockchain election, eligible voters would receive tokens that they could transmit to addresses on the blockchain to register their preferences.”). Owners could then vote their tokens by sending them to a particular “yes” or “no” address. See \textit{id.} Because transfers of voting-tokens would occur on a blockchain network, the votes could be traced back to individuals and their particular shares. See \textit{id.} This would ensure that there are no duplicate votes, because each share would have a unique identifier and there would only be one vote-token assigned to any individual share. See \textit{id.}

\textsuperscript{288} See Piazza, \textit{supra} note 3, at 293; \textit{see also} \textit{Transkaryotic}, 2007 WL 1378345, at *4 (finding the burden of meeting the disserter requirement lies with record holders).

\textsuperscript{289} See \textit{Ancestry}, 2015 WL 66825, at *1, *6–7 (refusing to impose a share-tracing requirement, finding that arbitrageur petitioners did not have to prove the particular shares purchased after the record date were not voted in favor of the merger); \textit{see also} \textit{BMC Software}, 2015 WL 67586, at *6 (same). It is a further question, one beyond the scope of this Note, whether deterring appraisal arbi-
chunk of shares after the announcement of a merger to find undervalued deals.\textsuperscript{290} Previously, arbitrageurs could haphazardly purchase blocks of shares and rest assured that they did not have to prove that their shares were not voted in favor of the transaction.\textsuperscript{291} Implementing a record keeping system that makes it easy to track and trace ownership upends that logic; voting signatures would be tied directly to individual shares and would be searchable on the blockchain, making share-tracing a viable reality.\textsuperscript{292} Recall that, in the case of cryptocurrencies like Bitcoin, additional information can be coded onto the transfer of a coin, like a message or a contract (or even voting preferences).\textsuperscript{293} These encodings are indelibly etched onto the ledger after the transactions are verified.\textsuperscript{294} Thus, arbitrageurs would have to proceed with caution before purchasing a bundle of shares in the hopes of seeking appraisal, perhaps discouraging the strategy altogether.\textsuperscript{295}

On the other hand, if information about how particular shares were voted was made publically available, it may create a temporary market where shares that veto or abstain from a merger are worth more than shares that vote in favor of the merger because vetoes and abstentions provide access to the appraisal remedy.\textsuperscript{296} One can even imagine a scenario where, because arbitrage is, in fact, a desired outcome. See \textit{BMC Software}, 2015 WL 67586, at *5 (finding that Section 262 permits arbitrageurs to seek out investments through the appraisal remedy).

\textsuperscript{290} See \textit{BMC Software}, 2015 WL 67586, at *5 (discussing defendant corporation’s argument that “absent a share-tracing requirement ‘an appraisal arbitrageur . . . could purchase most or all of a corporation’s shares after the record date without securing proxies or revocation of proxies, and then seek appraisal for those shares even though the record-date holder voted them for the merger’”); Korsmo & Myers, \textit{supra} note 10, at 1566 (discussing arbitrageurs’ ability to purchase shares after the announcement of a merger).

\textsuperscript{291} See \textit{BMC Software}, 2015 WL 67586, at *4 (“Noticeably absent from [Section 262(a)], or any language in the statute, is an explicit requirement that the stockholder seeking appraisal prove that the specific shares it seeks to have appraised were not voted in favor of the merger.”).

\textsuperscript{292} See Yermack, \textit{supra} note 3, at 23 (opining that voting on a blockchain network would be traceable just like cryptocurrencies are traceable on blockchain networks).

\textsuperscript{293} \textit{Id.} at 16, 23.

\textsuperscript{294} See \textit{id.} at 11, 14, 16, 23 (discussing the virtually permanent nature of information stored on a blockchain and the “benefits of blockchain elections”).

\textsuperscript{295} See Jack B. Jacobs, \textit{Pushbacks and Delaware Appraisal Arbitrage}, HARVARD LAW SCH. FORUM ON CORP. GOVERNANCE & FIN. REGULATION (June 28, 2016), https://corpgov.law.harvard.edu/2016/06/28/pushbacks-and-delaware-appraisal-arbitrage/ [https://perma.cc/5QAK-KZZL] (opining that share-tracing injects unwanted uncertainty to appraisal arbitrage, namely that arbitrageurs will be unaware of whether the shares they are purchasing will be appraisal-eligible); cf. Reder & Onyeador, \textit{supra} note 41, at 294 (arguing that share-tracing dissuades appraisal arbitrageurs from haphazardly purchasing shares, forcing them to act carefully).

\textsuperscript{296} Geis, \textit{supra} note 4, at 272 (describing “bifurcated markets” that would emerge where a time gap between vote submissions and appraisal filings permitted arbitrageurs to target shares that did not vote in favor of a transaction). One can imagine a scenario, via a public blockchain, where arbitrageurs create an algorithm to track voting decisions of shares in a particular corporation. \textit{Id.} Using that information, arbitrageurs may be able to target particular “no” votes or abstentions and offer holders of those shares consideration above the deal price, but below what they anticipate to be the value resulting from an appraisal proceeding. \textit{Id.} This would create a scenario where “yes” votes, within a
geurs would offer a premium for “no” votes and abstentions, stockholders would veto otherwise value-producing mergers solely for immediate financial gain from these arbitrageurs. To ameliorate this potential problem, distributed ledgers in a securities market could not be wholly transparent and public. Permissioned blockchains would need to allow regulators to modulate the amount of information being released into the market. Given attempts by states and regulators to develop rules to maintain some regulatory authority over blockchain networks, is unlikely that corporations would be able to track share ownership through a purely public blockchain.

C. Breaking the Authorization Chain: Dell Ownership

If nothing else, the Delaware Court of Chancery’s holding in 2016 in Dell Ownership stands for the proposition that centralizing stock certificates through depositories causes unnecessary complications and room for error. In Dell Ownership, stockholders lost their appraisal rights when, after having notified Cede of their intent to seek appraisal, Cede issued paper stock certificates to the petitioners’ custodial banks. Because of internal policies at the custodial banks, and without petitioners’ consent, Cede reissued those paper...
shares in the name of the petitioners’ custodian, Kray & Co.303 The result was a change in the record holder and the continuous ownership requirement was violated.304

Blockchain technology ensures that this problem would not happen again.305 At all times, beneficial owners could also be record owners.306 Because stockholders would own their shares directly, there would simply be no room for an intermediary to hold and then remove shares from a fungible bulk and reissue those shares to the appraisal seeking stockholders.307 Any transfers would not only be recorded, but stockholders would be aware of whether they were giving up their rights to appraisal from an ensuing transfer because they would be the ones initiating transfers of legal title.308

303 Id. at *3 (noting that for ordinary business reasons, like insurance requirements, internal recordkeeping, and theft mitigation, some banks and brokers refuse to hold certificates issued in another’s name).

304 Id. at *9.

305 See Laster, supra note 11, at 16 (opining that blockchain technology could resolve stock ownership quandaries by dissolving the beneficial ownership regime).

306 See id. at 20 (noting that stock-holding intermediaries would no longer be necessary where beneficial owners are also legal owners). Even where stockholders opted to have their banks or brokers hold their shares for them, each share could be registered in the stockholders’ name, such that corporate stock ledgers would accurately reflect beneficial owners as owners of the securities. See Donald, supra note 22, at 98 (“Every owner of a listed security would . . . become a registered owner, transparently holding all rights . . . unless the security-holder chose to remain anonymous.”).

307 See Laster, supra note 11, at 7 (reiterating that, “under current law, ownership changes driven by DTC’s role in the depository system are regarded as voluntary transfers,” and as a result of the voluntary transfer by Cede to petitioners’ custodian bank, “beneficial owners did not meet the continuous ownership requirement”).

308 See id. at 7, 20 (discussing how stockholders lost standing to seek appraisal for no fault of their own, and proposing that, with blockchain technology, “stockholders could share a common ledger of their holdings that allows them to keep track of the execution, lending, and settlement of securities transactions”). Albeit not a direct appraisal issue, it is still worth discussing an additional benefit conferred by the blockchain system: fast transaction clearing. See Yermack, supra note 3, at 19 (discussing blockchains ability to speed up execution, clearing, and settlement). Currently, transactions involving bonds, equities, and private debt instruments take at least three days to settle. In re Dole Food Co. (Dole), 2017 WL 624843, at *3 (Del. Ch. Feb. 15, 2017); Yermack, supra note 3, at 19 (“Stock trades in the USA generally require three business days for settlement to occur and ownership to move formally from seller to buyer.”). Rather than the standard three-day clearing period, blockchains can record changes to a security’s legal owner in under one day. See Metz, supra note 226 (“On Wall Street, it still takes up to three days to settle a stock trade . . . [b]lockchain techn[ology] can take this from three days down (T–3) to zero (T–0).”). Participants on public blockchains take on the role of clearinghouses by confirming the existence of a user’s wherewithal for a given transaction. See COMM. ON PAYMENTS, supra note 4, at 3–4 (discussing the transaction verification process). Even on a private blockchain, where parties that trust each other allow each participant to update the ledger on their own accord, updating the ledger acts as a form of clearing and settlement. See Geis, supra note 4, at 263–64 (discussing clearing and settlement of securities issued on a blockchain). Settlement picks up the pace by cutting out the arduous process of reconciling internal records between parties and relying on consensus to update the ledger. See O’Toole & Reilly, supra note 240 (“Blockchain technology enables parties to transfer assets directly to one another without the costs and delays inherently resulting from the involvement of intermediaries.”); see also Yermack, supra note 3, at 19 (discussing that transfers of stock via blockchain “would not require numerous middlemen” and would generate
CONCLUSION

A wave of appraisal litigation brought by hedge funds brought to light inefficiencies in Delaware law. Delaware appraisal law does not currently recognize that the securities immobilization regime has fundamentally changed the way stockholders own their securities. Rather than holding legal title, most stockholders of publicly traded Delaware corporations own mere beneficial rights in the shares they purport to own. Delaware’s failure to grapple with this reality cost both stockholders and corporations hundreds of millions of dollars. Luckily, blockchain technology offers a simple solution that comports with the Delaware legal framework. By issuing shares of stock on a blockchain, companies can offer stockholders full legal title to their shares, rather than mere beneficial rights. This makes it easy to track how shares were voted in merger transactions to determine whether stockholders are entitled to seek an appraisal for the shares they own. Moreover, removing securities depositories from the ownership picture eliminates the possibility of accidental transfers of legal title. As the tide of positive sentiment toward blockchain technology continues to swell, it is imperative that we think deeply about nonobvious ways to incorporate blockchain technology into commerce. The benefits of blockchain technology are far reaching, and as our world economy continues to grow and optimize, traditional methods of transfer and record keeping must be reconsidered to keep up the pace.

BRANDON FERRICK

savings “from the reduction in personnel and streamlining of processes compared with those used currently”). In other words, shares issued on a blockchain would not have to traverse brokers’ and banks’ balance sheets before being netted through Cede, the transactions would instantly be recorded and visible for all. See Yermack, supra note 3, at 19 (noting that the current system requires “funds pass between brokers and their clients, and shares are transferred on the books of the brokerage and the ledger of the corporation, all under the supervision of [DTC]”). For example, Bitcoin transactions are transcribed onto the ledger once a block is mined and added to the chain, occurring approximately every ten minutes. Id. at 13–14. In the context of securities transactions, once a sufficient number of transactions have occurred, network participants could similarly bundle those transactions and add them to the ledger, possibly having DTC vet the transactions for an added layer of security. Id. These changes would prevent the catastrophe from 2017 in Dole, where roughly forty-nine million petitioners submitted valid claims to settlement proceeds for a class of only about thirty-two million. Dole, 2017 WL 624843, at *4. In Dole, Vice-Chancellor Laster of the Delaware Court of Chancery found that the discrepancy was due to a combination of the three-day transaction clearing period and made more complex by ensuing short sales. Id. at *3–4. He found that, even with a one-day freeze on trading on DTC’s books, there were still two days where shares were passed around by beneficial owners. Id. at *3. While these transfers weren’t recorded on DTC’s ledger, they created a valid prima facie claim to settlement disbursement. Id. at *1, *3. To rectify the problem, in a footnote, Vice-Chancellor Laster proposed implementing distributed ledger technology to keep track of share ownership. Id. at *4 n.1. He opined that the open, contemporaneous, and accessible nature of distributed ledgers would provide accurate information as to which shares belonged to the settlement class. Id. (“Distributed ledger technology offers a potential technological solution by maintaining multiple, current copies of a single and comprehensive stock ownership ledger.”).