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Articles

TRACEABLE SHARES AND CORPORATE LAW

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ABSTRACT—A healthy system of shareholder voting is crucial for any regime of corporate law. The proper allocation of governance power is subject to debate, of course, but the fitness of the underlying mechanism used to stuff the ballot boxes should concern everyone. Proponents of shareholder power, for instance, cannot argue for greater control if the legitimacy of the resulting tallies is suspect. And those who advocate for board deference do so on the bedrock of authority that reliable shareholder elections supposedly confer.

Unfortunately, our trust in the corporate franchise was forged during an era that predates modern complexities in the way that stock ownership is now tracked and traded. We do not trace shares, and any clear-eyed look at the conferral of voting rights via back-end stock clearing practices is unsettling. Evidence of the various entanglements crops up from time to time—in the form of questionable voting outcomes or disputes about standing for shareholder lawsuits—but the underlying problems are systemic, not episodic. Our stock clearing system is a kludge.

This is an important moment for corporate law, however, because new technology is approaching a state where clearing and settlement systems may soon support traceable shares. The rise of distributed ledgers and blockchain technology is poised to allow for specific share identification and precise records of share provenance. This may sound like an uninteresting technical sideshow, but as this Article will argue, the impact of traceable shares on corporate law will be profound. It will change the structure of shareholder lawsuits, alter the allocation of corporate governance rights, and require lawmakers to rethink fundamental principles of shareholder responsibility for corporate misdeeds.

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INTRODUCTION

After you buy a share of stock, what happens next? How does the resulting settlement and transfer of your new ownership certificate take place? For most corporate law scholars, these are especially uninteresting questions. Front-end trading strategies and flash algorithms may be exciting,¹ but the recessed plumbing of back-end clearing processes is not. Most people just ignore the topic. We assume that a share of stock will eventually “get” to its new owner—along with all the legal rights of ownership—without worrying much about what the transfer actually entails or the timing of when this might occur.

The primary claim of this Article, however, is that the mechanics of back-end share transfer matter deeply to corporate law. Our current clearing systems limit shareholder rights in ways that most owners do not completely understand. Conversely, selling shareholders may evade responsibility for some corporate misdeeds because it has become too difficult to link individual sellers back to a specific share transfer. This has sometimes resulted in the imposition of corporate-level liability under a framework that is not entirely satisfactory because money is simply shifted from one pocket

¹ See generally MICHAEL LEWIS, *FLASH BOYS: A WALL STREET REVOLT* (2014) (describing high-frequency trading algorithm strategies and market structures); Charles R. Korsmo, *High-Frequency Trading: A Regulatory Strategy*, 48 U. RICH. L. REV. 523, 529–30 (2014) (evaluating legal approaches for mitigating systemic market risk in high-frequency trading).

(that of all current shareholders) to another (that of wronged shareholders).² Ex-shareholders, who may have benefitted from a transgression, are not tracked down or held accountable in any way.³

The central player behind the scenes is the Depository Trust & Clearing Corporation (DTCC). Through numerous subsidiaries, DTCC takes physical possession of most stock certificates, serves as record owner for these shares, and clears trades by transferring beneficial ownership electronically from seller to buyer via bookkeeping adjustments.⁴ As we will see, this approach has played a crucial role in managing an exploding volume of stock trades over the past five decades by avoiding a need to coordinate the handoff of physical certificates from seller to buyer.⁵

Problems arise, however, because DTCC's warehouses of certificates are typically held in unidentifiable "fungible bulk."⁶ This means that it is often impossible to specify who owns any given share of stock. We do not say that Bryce Buyer is the beneficial owner of stock certificate #123456789; rather, Bryce owns one share from a large pool of certificates isolated and housed by DTCC. Similarly, when Bryce sells the stock a month later, DTCC does not link that specific share to one of the thousands purchased by other buyers that same day. Said differently, we do not trace shares.

In many cases, this does not matter. The fiscal trade has still occurred at a clearly defined moment and price. And beneficial shareholders, the true economic owners of the stock, can exercise most governance rights by asking their brokers to send corporate proxy materials and instructing these same brokers how to vote their shares.⁷

But this lack of share identification has meaningful implications for corporate law. Shareholders must sometimes argue that they bought shares

² See, e.g., John C. Coffee, Jr., *Causation by Presumption? Why the Supreme Court Should Reject Phantom Losses and Reverse Broudo*, 60 BUS. LAW. 533, 541 (2005); Christine Hurt, *The Undercivilization of Corporate Law*, 33 J. CORP. L. 361, 441–42 (2008). The attorneys bringing the suit will, of course, also take a share of any recovery, usually as part of any settlement agreement.

³ See, e.g., Coffee, *supra* note 2, at 541–42 (“[S]ecurities litigation in this context inherently results in a wealth transfer between two classes of public shareholders, neither of whom is necessarily culpable. . . . [T]he beneficiaries of the fraud are . . . the selling shareholders—and they escape without incurring any cost when liability is later imposed on their former corporation.”).

⁴ See Marcel Kahan & Edward Rock, *The Hanging Chads of Corporate Voting*, 96 GEO. L.J. 1227, 1238–40 (2008) (describing standard custodial practices). My description here is a slight simplification, as there may be several layers of custodians between the DTCC and the economic owner. See *infra* Section I.A.

⁵ See *infra* Section I.A.

⁶ Kahan & Rock, *supra* note 4, at 1239.

⁷ To be sure, mistakes will sometimes occur in a way that prejudices a shareholder's rights. See *infra* notes 82–89.

that qualify for certain legal rights—such as an appraisal claim⁸ or a Securities Act Section 11 lawsuit⁹—when resolution of this eligibility is indeterminate. Delays arise between a change in economic ownership and the transfer of the right to vote, which means that current shareholders may not always possess franchise rights for important matters of corporate governance.¹⁰ And the imposition of corporate damages for certain legal wrongs, such as fraud on the market,¹¹ has been criticized for effectively requiring “innocent” shareholders—who purchase the stock after a misrepresentation occurs—to compensate plaintiffs.¹² Untraceable selling shareholders, who may have benefitted economically from the fraudulent misrepresentation, evade any loss. Might it be better to trace back the shares to those who owned the firm at the time of a misdeed and allow the injured shareholders to seek restitution from a previous investor? To date, these questions have remained academic because it has not been possible to make this sort of match.

We are at a pivotal moment for corporate law, however, because back-office technology is nearing a state where clearing systems *can* trace shares.¹³ Prevailing stock settlement processes are likely to experience a fundamental transformation in the coming years with the rise of distributed ledger

⁸ Appraisal rights permit shareholders to sue, under certain circumstances, to obtain a judicially determined fair value for their shares, subject to procedural prerequisites. In Delaware, for instance, shareholders must perfect this right by demonstrating that their shares did not vote in favor of the transaction that triggered appraisal rights (often a merger). Many prospective plaintiffs, especially those who purchase shares after a voting record date, may be unable to determine whether “their shares” voted for or against the deal. *See infra* Section I.C.1.b.

⁹ Section 11 of the Securities Act of 1933 imposes liability for material misrepresentations in registration statements. *See* 15 U.S.C. § 77k (2012). Initial purchasers of the stock issued under the registration statement have clear Section 11 claims, but downstream buyers may have difficulty gaining standing for these claims. Many courts have permitted subsequent purchasers to pursue Section 11 claims only if the shareholders can definitively trace their shares back to the securities issued in connection with the problematic registration statement. As we will see, this is not an easy task, and courts deny some claims even when there is a high likelihood (though not quite 100% certainty) that a plaintiff’s shares came from the “tainted” issuance pool. *See infra* Section I.C.1.a.

¹⁰ Related concerns, such as “empty voting,” are also facilitated by an inability to specifically identify which shares belong to whom. *See infra* Section I.C.2. “Empty voting” typically refers to situations where an individual who does not have an economic interest in the outcome of the election exercises voting rights. *See, e.g.,* Henry T.C. Hu & Bernard Black, *Hedge Funds, Insiders, and the Decoupling of Economic and Voting Ownership: Empty Voting and Hidden (Morphable) Ownership*, 13 J. CORP. FIN. 343, 343 (2007) [hereinafter Hu & Black, *Hedge Funds*]; Henry T. C. Hu & Bernard Black, *The New Vote Buying: Empty Voting and Hidden (Morphable) Ownership*, 79 S. CAL. L. REV. 811, 815 (2006) [hereinafter Hu & Black, *New Vote Buying*].

¹¹ Fraud on the market allows shareholders to sue for corporate misrepresentations in connection with a security trade, even when the investor did not hear of the misleading statement directly. *See infra* Section III.D.

¹² *See* Coffee, *supra* note 2, at 543.

¹³ *See infra* Part II.

technology and new methods for identifying the origin and provenance of shares. This development would present new opportunities for reforming corporate governance and for rethinking foundational theories of corporate and shareholder liability. To be sure, such a change remains contingent, and new back-office paradigms are not inevitable. But revised settlement practices seem quite promising,¹⁴ and the era of unidentified fungible bulk may be drawing to a close.

If this transition does occur, the legal implications of traceable shares will be profound. Buyers and sellers could specifically identify stock in a way that allows them to know whether marketed shares would qualify for certain legal claims. Corporate voting processes could be streamlined to mitigate, though not eliminate, voting pathologies. Faster transfer of traceable shares might dramatically eliminate delays between share exchange and the exercise of franchise rights to make corporate governance more responsive to shareholder interests. In light of the information that traceable shares could offer, we may even need to reexamine fundamental principles of shareholder responsibility for corporate misdeeds.

This Article considers how the adoption of traceable shares would impact corporate law. Part I describes our current system for clearing stock trades and demonstrates how the failure to specifically identify shares creates legal problems. Part II surveys recent technological developments and argues that it may soon be possible to reform clearing systems in a way that replaces unidentified fungible bulk with traceable shares. Part III considers what this will mean for several key features of corporate law and offers normative suggestions for responding to these developments. A brief conclusion summarizes the Article.

I. UNIDENTIFIED FUNGIBLE BULK

Our mental model of corporate law envisions a stable body of shareholders who receive statements outlining the key issues on a forthcoming ballot, muster the information necessary to make sound decisions, and eventually cast their votes by proxy or at a shareholder meeting. In actuality, however, we do not live in such a stable world.

There are at least two fundamental and related features of our current system for clearing stock trades that explain this break between our perception and reality: ownership specification and the timing of rights transfers. Settlement and clearing procedures for stock trades have become complex—to the point where it is often impossible to specify who owns any given share of stock. And after the shares trade, delays can still persist

¹⁴ See *infra* notes 135–39 and accompanying text.

between a change in economic ownership and the transfer of some legal rights, including the right to vote. Taken together, these developments have led to intractable difficulties in corporate law. But first, consider some brief history.

A. A Brief History of Stock Settlement and Clearing Practices

In the early and mid-1900s, when corporate law lingered in a formative state, investors lived in a paper world. Numbered stock certificates were stashed in private file cabinets, or perhaps broker storerooms, and passed from seller to buyer like the deed to a house or title to a car.¹⁵ But a share of stock can trade hands much more frequently than a used automobile, and by the 1960s the system was snowed under.¹⁶ There was simply too much trading volume. During the height of this paperwork crisis, traders closed the stock markets every Wednesday just so the brokers could inspect the unruly piles of certificates for authenticity, organize them for distribution, and route them to their new owners.¹⁷ Many brokers could not keep up and closed their doors.¹⁸ The United States Attorney General, in a 1971 Senate hearing, estimated that organized criminals had taken advantage of the chaos to steal more than \$400 million in securities.¹⁹

This paperwork crisis would not do, and eventually Congress directed the Securities and Exchange Commission (SEC) to clear the logjam.²⁰ The agency, working with Wall Street brokers, settled on a fix: share immobilization.²¹ A central entity emerged to replace the network of

¹⁵ See Kahan & Rock, *supra* note 4, at 1237; Wyatt Wells, *Certificates and Computers: The Remaking of Wall Street, 1967 to 1971*, 74 BUS. HIST. REV. 193, 201 (2000).

¹⁶ Wells, *supra* note 15, at 201. Two other requirements exacerbated the problem: (1) sellers had to notarize their certificates and (2) buyers had to present this evidence of sale to a firm's transfer agent to become the new owner of record. Moreover, certificates designating more than 100 shares were uncommon, meaning that large purchases would often require numerous certificates to be processed. *Id.*

¹⁷ See WILLIAM T. DENTZER, JR., THE DEPOSITORY TRUST COMPANY: DTC'S FORMATIVE YEARS AND CREATION OF THE DEPOSITORY TRUST & CLEARING CORPORATION (DTCC) 1–2 (2008); FINRA Staff, *When Paper Paralyzed Wall Street: Remembering the 1960s Paperwork Crisis*, FINRA (Aug. 19, 2015), <https://www.finra.org/investors/when-paper-paralyzed-wall-street-remembering-1960s-paperwork-crisis> [<https://perma.cc/EL2Y-NPBB>] (describing the Wednesday closures and broker failures due to the paperwork confusion); *History of New York Stock Exchange Holidays*, NYSE.COM (Jan. 2011), <http://s3.amazonaws.com/armstrongeconomics-wp/2013/07/NYSE-Closings.pdf> [<https://perma.cc/7DLP-E54K>] (describing periodic closings due to “back office work load” and Wednesday closings from June to December of 1968).

¹⁸ See Wells, *supra* note 15, at 193 (estimating that about one-sixth of brokerage firms went out of business during this period).

¹⁹ See Marjorie Hunter, *Big Board Too Busy to Stop 1968–69 Thefts: Haack Tells Senate of ‘Near Crisis’ in Heavy Trading*, N.Y. TIMES, June 24, 1971, at 53.

²⁰ *In re Appraisal of Dell Inc.*, No. 9322-VCL, 2015 WL 4313206, at *1 (Del. Ch. July 30, 2015) (describing the pressure from Congress); Wells, *supra* note 15, at 208–09 (describing the role of the SEC).

²¹ See, e.g., *Dell*, 2015 WL 4313206, at *1–2.

messengers scurrying across the back alleys of New York. Over time, this organization, now known as the Depository Trust & Clearing Corporation (DTCC),²² began to serve as the permanent record owner for a majority of shares.²³ Secure DTCC warehouses hold certificates, physical or virtual, and the ownership name on each share no longer changes with every sale.²⁴ Similarly, a corporation will not adjust its official stockholder lists to reflect routine trades; the same record holder persists as the formal owner of the stock. Rather, the clearinghouse transfers beneficial ownership electronically from seller to buyer via bookkeeping adjustments.²⁵

Individual investors do not maintain accounts with DTCC, so another layer of intermediaries is needed to make this system work. Banks and brokerage firms serve this role, acting as custodians between DTCC and the principal investors.²⁶ While they both play similar bridging roles, banks and brokerage firms typically serve different types of clients and may have somewhat different business models.

Bank custodians work primarily with large institutional investors, such as university endowments, insurance companies, and mutual funds.²⁷ Each bank keeps a direct account with DTCC, but DTCC does not concern itself with how shares are allocated among the bank's various clients. For example, DTCC might record and track the total number of shares owned through The Bank of New York Mellon, State Street, JP Morgan Chase, and Citigroup (four behemoths of custodial banking), along with dozens of other smaller custodian banks. But DTCC keeps no information about how the 70 million shares of, say, Starbucks stock that are held in custody by JP Morgan Chase should be allocated between the New York Life Insurance Company, the Harvard endowment, T. Rowe Price, and numerous other institutional investors that might trade through JP Morgan Chase. The banks will maintain these records, of course, and they will work with their clients to determine how to disseminate important information and how to exercise governance rights, such as the right to vote. In some cases, the largest custodian banks

²² The DTCC actually provides a broader range of settlement and clearing activities; most stock transfers are handled by subsidiaries: the Depository Trust Company (DTC) and Cede & Company (Cede). See *The Depository Trust Company (DTC)*, DTCC, <http://www.dtcc.com/about/businesses-and-subsidiaries/dtc.aspx> [<https://perma.cc/4Y84-B52M>].

²³ For public firms, as much as 70%–80% of shares are estimated to be held through the DTCC and other nominees. See Larry T. Garvin, *The Changed (and Changing?) Uniform Commercial Code*, 26 FLA. ST. U. L. REV. 285, 315 (1999).

²⁴ See Kahan & Rock, *supra* note 4, at 1238–40.

²⁵ *Id.* at 1239.

²⁶ *Id.* at 1238–40.

²⁷ *Id.* at 1238.

will also perform these same services for smaller custodian banks—meaning that there can be several nested layers of intermediation.²⁸

What happens if Harvard decides to sell its stake in Starbucks? The endowment manager notifies its custodian bank, who may then help execute the trade.²⁹ The custodian bank will usually benchmark the economic effect of the sale immediately, but it will take longer to work everything through the back-end plumbing of clearing and settlement.³⁰ If another client of the custodian bank happens to take the other side of the trade, then DTCC, in theory, need not even be aware of the exchange. The bank might just adjust its records to show that Harvard no longer owns the stock and that a different client is now beneficial owner. Offsetting adjustments are also required, of course, to account for the transfer of cash from buyer to seller.³¹ In many cases, however, the buyer (or buyers, if the shares are sold in multiple blocks) and the seller will be represented by different brokers or bank custodians. If so, DTCC will need to record a bookkeeping adjustment to reduce the shares allocated to Harvard's bank custodian and increase the shares allocated to these other custodians.³² Note, however, that DTCC persists as record holder of the shares throughout this process and that no specific shares are identified as “the ones” being traded. Starbucks might not even realize that a large trade has occurred.

Brokerage firms, in contrast to custodian banks, tend to work with hedge funds, smaller retail customers, and individual investors.³³ Brokers may offer some different services, but their clearing process does not differ in a meaningful way from that of custodian banks. A brokerage firm maintains an account with the DTCC, processes stock trades on a client's behalf, preserves records of the shares bought and sold by clients, and works

²⁸ *Id.* at 1239.

²⁹ In addition to facilitating trading markets, banks typically perform a variety of additional services for clients, including settlement and asset safekeeping. Many banks also have a robust securities-lending business, where stock is loaned to outside parties (for a variety of purposes, including short-selling transactions) and the resulting fees are shared between the custodian bank and the client whose shares are loaned out. *Id.*

³⁰ Standards have converged recently on a settlement norm of T+2, meaning that everything should be settled and cleared by an average of two days after the trade. There is a push to shorten this time to T+1. Synchronous clearing might be described as the holy grail of exchange. See Pete Chandler, *T+2 Is Here*, FINRA (Sept. 7, 2017), <http://www.finra.org/investors/highlights/t-plus-two-is-here> [https://perma.cc/X8D5-9EXC].

³¹ For example, if the buyer and seller of the stock both trade with the same custodian, then the bank might increase the seller's cash account and decrease the buyer's cash account. If the buyer and seller use different custodians, then the custodian for the seller will increase the seller's cash account and the custodian for the buyer will decrease the buyer's cash account.

³² This is a slight simplification due to the possibility of netting. See *infra* note 188 and accompanying text.

³³ See Kahan & Rock, *supra* note 4, at 1240.

with the DTCC to adjust the broker's own DTCC account to reflect top-level changes in the number of shares held by clients.³⁴ Again, however, the shares remain isolated in unidentified fungible bulk.

The creation of the DTCC and the elimination of physical certificate transfer have, on the whole, been a welcome development. Indeed, it is impossible to imagine how the old system could support the roughly 5 million trades that occur each day on the New York Stock Exchange.³⁵ But the use of intermediate agents greatly complicates the mechanisms that must now be used to convey the vote and other important legal rights to beneficial shareholders.

B. Ownership and Voting Rights

Corporate law did not respond to the rise of fungible bulk shareholding by altering its doctrines to provide direct legal rights to beneficial owners. In Delaware, for instance, the record holder persists as registered owner of the stock on a corporation's books and retains the formal right to cast votes.³⁶ Any downstream custodial relationship between banks, brokers, and clients is treated as a matter of agency and not a primary concern for Delaware corporate law.³⁷ If mistakes arise from misunderstandings between beneficial owners and their brokers, then it is up to the private parties to sort out the problems; Delaware courts will not step in to make things right through equitable adjustments.³⁸ This is not because Delaware lawmakers are unaware of the DTCC framework, of course, but rather because they have elected to prioritize the certainty provided by a firm's absolute reliance on its formal list of record stockholders.³⁹

For many corporations, this means that a DTCC subsidiary named Cede & Company is listed as the record holder for a vast majority of stock. Yet Cede does not make substantive decisions about how to cast votes to elect directors or approve merger transactions. Rather, a complex series of events will typically occur to shift voting rights to the distributed beneficial

³⁴ *Id.* at 1239–40.

³⁵ For recent data about daily trading volumes on the NYSE, see *NYSE Group Volume in All Stocks Traded: 2010–Current*, NYXDATA.COM, http://www.nyxdata.com/nysedata/asp/factbook/viewer_edition.asp?mode=table&key=3320&category=3 [https://perma.cc/3TTC-M7PV].

³⁶ *See, e.g.*, DEL. CODE ANN. tit. 8, § 212 (West 2006) (describing who gets to vote); *id.* § 262(a) (noting that in the appraisal context “the word ‘stockholder’ means a holder of record of stock in a corporation”).

³⁷ *See In re Appraisal of Dell Inc.*, No. 9322-VCL, 2015 WL 4313206, at *6–7 (Del. Ch. July 30, 2015) (describing the evolution of Delaware's formal treatment of shareholders).

³⁸ *Id.* at *10–11.

³⁹ *Id.* at *17–18.

shareholders who should actually have the legal and economic right to weigh in on matters of corporate governance.

Professors Marcel Kahan and Edward Rock have described this process and its flaws in a seminal article on corporate voting,⁴⁰ so I will only summarize the key steps here. A firm preparing for an upcoming vote will contact DTCC to obtain the list of banks and brokers who hold shares as custodians for beneficial owners. The firm will then ask each of these custodians to provide the next level of information about who actually owns the stock, so that the corporation can prepare proxy materials related to the vote.⁴¹ This can take some time because there may be several layers of custodial ownership and the banks will need to obtain data from the very bottom level.⁴² The firm will then provide each custodian with copies of the proxy materials for distribution to beneficial owners.⁴³

How are votes actually cast if Cede retains the formal right, as record holder, to the franchise? Cede will execute a global proxy that allows its account holders, the custodian banks and brokers, to cast Cede's votes in proportion to their total allocation.⁴⁴ If JP Morgan Chase reports clients with 25% of the shares, for example, then Cede will send that bank a proxy allowing it to cast a quarter of the firm's votes. The custodians may then do the same thing for individual clients (moving down through the layers as necessary) and fragment these proxy rights even further. Granted this proxy, the beneficial holders can then cast their votes as they wish. Alternatively, the banks and brokers might just ask beneficial shareholders to supply them with timely voting instructions rather than execute a second proxy.⁴⁵ Many custodians seem to opt for the latter approach, aggregating the instructions

⁴⁰ Kahan & Rock, *supra* note 4, at 1243–48.

⁴¹ For annual elections, this will typically include an annual report describing the firm's recent performance, a proxy statement describing the key issues on the ballot, and instructions or materials (such as proxy card) for the actual casting of votes. See STEPHEN M. BAINBRIDGE, CORPORATE LAW § 10.3, at 246–47 (2d ed. 2009).

⁴² One sign of the imprecision raised by this framework is that the total number of shares reported up through the banks may not always match the corporation's records for the total number of shares issued and outstanding. Any discrepancies may remain unreconciled at this point in the process. See Kahan & Rock, *supra* note 4, at 1243–44.

⁴³ Most of these communication efforts with shareholders are outsourced to third-party specialists. Moreover, the SEC adopted “e-proxy” or “notice and access” rules in 2007 to allow firms to use e-mail and the internet for delivering these materials to willing shareholders. 17 C.F.R. § 240.14a-16 (2018).

⁴⁴ Kahan & Rock, *supra* note 4, at 1247.

⁴⁵ *Id.* The exact requirements are codified at 17 C.F.R. § 240.14b-2(b).

and then casting these votes with the firm.⁴⁶ As the votes arrive, the firm can then verify proxies, tabulate votes, and report the final results.⁴⁷

This is not an instantaneous process, and the need to gather and transmit information back and forth between multiple parties presents a fundamental timing concern: how to assign and freeze voting rights in an ever-churning river of stock trades. Large companies have vast trading volumes.⁴⁸ In the time that it takes to send information and collect responses, the pool of beneficial owners can change significantly, and the process would need to begin anew. How can we ever pause events long enough to locate the current beneficial owners, send the ballot, deliberate, and cast votes through the distributed mechanisms that are required in a regime of untraceable shares?

Corporate law finesses this problem by establishing a bright-line “record date” when franchise rights attach to current owners—even if these owners choose to sell their shares before the date of the actual vote.⁴⁹ This gives the firm time to distribute information and process the votes, though it weakens the incentives to participate for some shareholders who no longer own the shares and may not care about the voting matter. Starbucks, for instance, might designate a record date thirty days before its annual shareholder meeting. If so, an investor who buys stock after this T-30 date cannot normally vote the late-purchased stock.⁵⁰ Corporate law takes the same “snapshot” approach with dividends.⁵¹ Shareholders on the record date will eventually receive the payments, and the shares trade “ex dividend,”

⁴⁶ *Id.*

⁴⁷ Again, it is common for firms to outsource the actual processing and tabulation of votes to a third-party provider. For contested matters, such as director election contests, an independent inspector may also be retained to supervise the entire process. *See, e.g., In re Appraisal of Dell Inc.*, 143 A.3d 20, 32 (Del. Ch. 2016).

⁴⁸ On the very busiest days, for example, over 50 million shares of Apple stock are traded. *See Apple Inc. Common Stock Historical Stock Prices*, NASDAQ (June 11, 2018), <http://www.nasdaq.com/symbol/aapl/historical>.

⁴⁹ Delaware General Corporate Law is illustrative. Under § 213, a record date “not [] more than 60 nor less than 10 days before the date of such meeting” establishes the roster of eligible voters. DEL. CODE ANN. tit. 8, § 213(a) (West 2006).

⁵⁰ The selling shareholder will retain voting rights, in this example, and it is possible for the buying shareholder to make special arrangements with the selling shareholder to obtain a voting proxy that allows the later shareholder to cast the votes. This is generally understood to be uncommon. *See, e.g., George S. Geis, An Appraisal Puzzle*, 105 NW. U. L. REV. 1635, 1652 n.113 (2011).

⁵¹ More specifically, a firm will process dividends through a series of chronological steps. First, the board will approve an upcoming dividend. Second, the firm will announce the dividend and state that it will be paid to all shareholders who hold the stock on a given future date (the record date). Shares will begin to trade without dividend rights (“ex dividend”) a couple of days before the record date. Typically, the share price will drop on this date by the amount of the forthcoming dividend. Finally, the firm will distribute the dividend to all entitled shareholders, typically a week or so after the record date. For a more detailed discussion of this process, see RICHARD A. BREALEY ET AL., *PRINCIPLES OF CORPORATE FINANCE* § 16.2, at 392–93 (10th ed. 2011).

long before any checks are cut.⁵² This system seems to work fine for economic matters; share prices simply drop on the record date to reflect the severance of a forthcoming dividend payment from the stock. But delays between the vesting of voting rights on the record date and the time of the actual vote at the shareholder meeting—along with the lack of precision introduced by unidentified fungible bulk—can create more serious concerns.

Which brings us to the final question of this Part—What’s wrong with untraceable shares?

C. What’s Wrong with Untraceable Shares?

Untraceable shares present varying and consequential problems in corporate law. Among other things, the inability to specifically identify the owner of a share can affect a beneficial owner’s legal rights, foster illegitimate voting, and hinder efforts at corporate governance reform.

1. Legal Rights Requiring Share Identification

Many legal rights—such as the ability to collect dividends, sell shares, or file a shareholder derivative lawsuit—do not require share identification. It may be important to establish that you own *some* shares of a corporation to take these actions, but it does not matter *which* shares you own. Any certificate will do. On the other hand, some legal rights do invoke share identification requirements, and these situations can lead to intractable problems in a world of fungible bulk.

a. Section 11 claims

The most clear-cut example of the identification problem involves lawsuits filed under Section 11 of the Securities Act of 1933 (the “Securities Act”).⁵³ Section 11 imposes liability when shares are sold pursuant to a registration statement that contains materially misleading statements or omissions.⁵⁴ Its purpose is to ensure the accuracy and integrity of registration filings, often by imposing hefty sanctions for misdeeds.⁵⁵ The issuing firm is held strictly liable under Section 11, while a cluster of other possible

⁵² *Id.*

⁵³ 15 U.S.C. § 77k (2012).

⁵⁴ *Id.* § 77k(a).

⁵⁵ See, e.g., Joseph A. Grundfest, Morrison, *the Restricted Scope of Securities Act Section 11 Liability, and Prospects for Regulatory Reform*, 41 J. CORP. L. 1, 3 (2015) (“Section 11 liability is the source of many of the largest class action securities recoveries in history, and . . . can serve as the most plaintiff-friendly provision of the federal securities laws.” (footnote omitted)). In part, this is true because plaintiffs do not need to establish scienter or intent on the part of the defendants. See *In re Morgan Stanley Info. Fund Sec. Litig.*, 592 F.3d 347, 359 (2d Cir. 2010) (discussing the mental state required for liability).

defendants—including directors, accountants, and underwriters—can also be held liable under various negligence standards.⁵⁶

Section 11 lawsuits can grow complicated, however, when it becomes necessary to determine which shareholders may assert a claim or join a class action lawsuit. The language of the statute most clearly protects initial purchasers who might be expected to rely on the registration statement, either explicitly or constructively, when buying stock directly from the issuing firm.⁵⁷ These buyers have clear standing to bring a Section 11 claim when something goes awry.⁵⁸

Jurisdictions are split, however, on whether secondary market purchasers, who transact after the initial issuance, can bring or join claims under Section 11,⁵⁹ and the U.S. Supreme Court has not weighed in on the topic. Early appellate decisions rejected the position that *all* subsequent secondary market buyers had standing.⁶⁰ A few courts still insist that downstream buyers may *never* assert a Section 11 claim,⁶¹ but this is a minority view.⁶² The more common approach is to allow secondary market claims if plaintiffs can “trace” their stock back to the specific shares that

⁵⁶ The precise test for liability depends on the nature of the misrepresentation and the identity of the defendant. *See, e.g.*, THOMAS LEE HAZEN, 2 TREATISE ON THE LAW OF SECURITIES REGULATION § 7:4 (7th ed., 2016 rev. vol.) (analyzing the various standards of liability). Many defendants (though not the issuer) will also possess a due diligence defense to liability. *See* *Escott v. BarChris Constr. Corp.*, 283 F. Supp. 643, 682–703 (S.D.N.Y. 1968) (assessing liability standards and the availability of a due diligence defense for various types of defendants); William K. Sjostrom, Jr., *The Due Diligence Defense Under Section 11 of the Securities Act of 1933*, 44 BRANDEIS L.J. 549, 549–50 (2006).

⁵⁷ 15 U.S.C. § 77k(a) (“In case any part of the registration statement . . . contained an untrue statement of a material fact or omitted to state a material fact required to be stated therein or necessary to make the statements therein not misleading, any person acquiring such security (unless it is proved that at the time of such acquisition he knew of such untruth or omission) may, either at law or in equity, in any court of competent jurisdiction, sue [for damages].”).

⁵⁸ *See* Grundfest, *supra* note 55, at 5.

⁵⁹ *See In re Summit Med. Sys., Inc., Sec. Litig.*, 10 F. Supp. 2d 1068, 1070 (D. Minn. 1998) (“Courts are split as to the definition of potential plaintiffs who may bring claims under Section 11.”); Grundfest, *supra* note 55, at 5, 41–42, 41 n.237 (describing the split, including an apparent internal conflict within the Third Circuit).

⁶⁰ *See, e.g.*, *Barnes v. Osofsky*, 373 F.2d 269, 271–73 (2d Cir. 1967) (“[A]n action under § 11 may be maintained only by one who comes within a narrow class of persons, i.e. those who purchase securities that are the direct subject of the prospectus and registration statement.” (internal quotation marks omitted)).

⁶¹ *See* *Shapiro v. UJB Fin. Corp.*, 964 F.2d 272, 286 (3d Cir. 1992) (“If plaintiffs’ shares were purchased in the secondary market, they would not be linked to a registration statement filed during the class period, and the § 11 claim would fail.”); *Summit*, 10 F. Supp. 2d at 1070 (“Section 11 is applicable only to shareholders who acquired their stock in the IPO.”); *In re WRT Energy Sec. Litig.*, No. 96 CIV. 3610, 1997 WL 576023, at *6 (S.D.N.Y. Sept. 15, 1997) (holding that plaintiffs lacked standing for a Section 11 claim because they did not allege that they purchased the securities in the initial issuance).

⁶² *See* Grundfest, *supra* note 55, at 41–42, 41 n.237. Numerous federal circuit courts, including the Second, Fifth, Eighth, Ninth, and Tenth, do not impose an original purchaser requirement. *Id.*

were issued in connection with the tainted registration statement.⁶³ The logic seems to be that if the shares can be linked to the offending registration filing, then a Section 11 claim should not be severed, under the plain language of the statute, simply because there has been a transfer of ownership.⁶⁴ For example, if the only source of shares on a secondary market comes from a single public offering, then downstream buyers can trace their shares to this primary issuance and bring a Section 11 claim in most jurisdictions. There is no other way they could have obtained the shares. But it is not always so easy to demonstrate such pristine provenance.⁶⁵

What happens if a court cannot be 100 percent certain that a given plaintiff's shares were sold via the tainted registration statement? In *Krim v. pcOrder.com*, for example, several plaintiffs filed a Section 11 claim alleging that pcOrder had conducted an initial public offering with a fraudulent registration statement.⁶⁶ For a few months after this offering, no other shares were available for trading on the secondary markets. Eventually, however, some shares that had not been part of the public offering (owned by insiders at the firm) began to trickle out into the market.⁶⁷ Most of pcOrder's stock was isolated in fungible bulk by the DTCC, with Cede listed as the formal record owner.⁶⁸

Consider the fate of three different plaintiffs in the case. Plaintiff A bought 1000 shares on the secondary market soon after the IPO—when the

⁶³ See, e.g., *In re Global Crossing, Ltd. Sec. Litig.*, 313 F. Supp. 2d 189, 206 (S.D.N.Y. 2003) (rejecting the defendant's claim "that only those who purchased stock in the initial offering, and not aftermarket purchasers, are entitled to sue under section 11").

⁶⁴ Section 11 confers standing on "any person acquiring such security (unless it is proved that at the time of such acquisition he knew of such untruth or omission)." 15 U.S.C. § 77k(a) (2012). It does not state that the acquisition must have been an initial acquisition from the issuer. See *Krim v. pcOrder.com, Inc.*, 402 F.3d 489, 495 (5th Cir. 2005) ("[T]he plain language of [Section 11 suggests] there is no reason to categorically exclude aftermarket purchasers, 'so long as the security was indeed issued under that registration statement and not another.'" (quoting *DeMaria v. Andersen*, 318 F.3d 170, 176 (2d Cir. 2003))). One might also assert a policy justification for permitting these secondary market claims to provide additional deterrence against fraudulent registration statements that evade liability through the rapid share turnover that often accompanies public offerings. See, e.g., Hillary A. Sale, *Disappearing Without a Trace: Sections 11 and 12(a)(2) of the 1933 Securities Act*, 75 WASH. L. REV. 429, 462–73 (2000); Marc I. Steinberg & Brent A. Kirby, *The Assault on Section 11 of the Securities Act: A Study in Judicial Activism*, 63 RUTGERS L. REV. 1, 31–36 (2010).

⁶⁵ See Sale, *supra* note 64, at 441–62 (examining the common law development of Section 11's tracing doctrine, describing various tracing methods, and reiterating concerns about the mismatch between a tracing requirement and the use of fungible bulk clearing and settlement methods).

⁶⁶ 402 F.3d at 491–92. There were actually two public issuances: an IPO on February 26, 1999 (under which most of the shares were issued) and a secondary public offering on December 7, 1999 (under which fewer shares were issued). The plaintiffs alleged defects in both registration statements, and the use of two issuances, is not critical to the disposition of the case. *Id.*

⁶⁷ *Id.* at 492.

⁶⁸ *Id.*

Taylor,⁷⁵ considered four different ways of implementing a tracing requirement. First, the direct tracing method occurs when a plaintiff can demonstrate that she purchased the stock directly in an underwritten public offering.⁷⁶ This method obviously offers no help for secondary market claimants.

A second possible method, fungible mass tracing, posits that a plaintiff shareholder maintains a proportional interest in the number of tainted shares in the pool held in fungible bulk by DTCC.⁷⁷ For example, suppose DTCC holds 500 shares of a firm in fungible bulk, and 500 more shares are added under a fraudulent registration statement. A secondary market purchaser could argue that half of her shares should qualify for a Section 11 claim under fungible mass tracing. This approach, however, was rejected by the *Kirkwood* court,⁷⁸ and it has not caught on more generally.⁷⁹

A third possibility, the “contrabroker method,” occurs when a shareholder argues that she bought shares from a broker who, in turn, purchased the shares from another broker who was a market maker for the stock of the issuing firm.⁸⁰ The *Kirkwood* court quickly rejected this method, however, because the plaintiff could not demonstrate that the stock sold by the market maker was from the tainted registration statement.⁸¹ In other words, the market maker could have been dealing in older *or* newer issuances of the firm’s stock.⁸²

Finally, *Kirkwood* considered a fourth alternative, which it called “heritage tracing.”⁸³ Using this approach, a plaintiff traces back share certificates in a manner akin to genealogy research. In the words of the court:

Plaintiffs contend that they purchased stock in the over-the-counter market and received stock certificates registered in their individual names. In the records of [the firm’s] stock transfer agent, plaintiffs identified by code number the certificates they had received. Then plaintiffs identified the particular

⁷⁵ 590 F. Supp. 1375 (D. Minn. 1984). As an aside, the defending firm was represented by an attorney named James O’Hagan at Dorsey & Whitney, who became infamous in corporate law circles a few years later for his highly specialized knowledge of certain trading markets. See *United States v. O’Hagan*, 521 U.S. 642, 647–49 (1997).

⁷⁶ 590 F. Supp. at 1378.

⁷⁷ See *id.* at 1378–79.

⁷⁸ *Id.* at 1380.

⁷⁹ See, e.g., Sale, *supra* note 64, at 448–51 (describing one court’s analysis and ultimate rejection of the fungible mass tracing method).

⁸⁰ 590 F. Supp. at 1381–82. Market maker, in this context, refers to brokers who stand ready to buy or sell the stock of a particular firm to help establish trading liquidity.

⁸¹ *Id.* at 1381.

⁸² *Id.*

⁸³ *Id.* at 1382–83.

certificates from which their individual certificates were issued. The process was continued until plaintiffs determined the ultimate origin of their certificates. Some of those certificates were expressly issued in the [allegedly fraudulent] March 5, 1981 offering. Thus, plaintiffs maintain, they can trace their shares to the offering.⁸⁴

This method sounds more promising, but identifying the lineage of old stock certificates can be just as speculative as efforts to track down your ancestors. For instance, under the facts of the case, the plaintiff received three new share certificates: one that represented 1000 shares (MU038125), one that represented 500 shares (MU038126), and one that represented 500 shares (MU038286).⁸⁵ But these new certificates did not correspond on a one-for-one basis with other certificates that had been surrendered to the firm upon sale. Rather, four different certificates (MU033047, MU037214, MU037106, and MU037312) representing a total of about 9510 shares had been fed into the meat grinder in order to crank out two of the plaintiff's new certificates, along with several others.⁸⁶ The first three surrendered certificates could eventually be traced back to an offending registration statement, using this same method of heritage tracing, but the last surrendered certificate could not be linked back.⁸⁷ Moreover, since the MU037312 certificate represented over 2020 shares, it was possible that *all* of the plaintiff's shares came from this "untainted" batch.⁸⁸ For this reason, *Kirkwood* found the inquiry indeterminate and rejected proof via heritage tracing in this context.⁸⁹

Still another approach might be to permit all secondary market purchasers who transact within a short time period after an offending registration statement to join a Section 11 claim. A few courts have gone this route, essentially abandoning the strict tracing requirement for a more

⁸⁴ *Id.* at 1382.

⁸⁵ *Id.*

⁸⁶ *Id.*

⁸⁷ *Id.*

⁸⁸ *Id.*

⁸⁹ *Id.* at 1382–83. It is possible, of course, that heritage tracing might demonstrate a clear link. For example, if the last certificate in *Kirkwood* had not been fed into the meat grinder to issue the new certificates, then all the plaintiff's shares could have been definitively linked to the tainted registration statement. The real problem, however, is that the *Kirkwood* plaintiffs were only able to attempt heritage tracing because the new certificates had been issued in their personal names. *See Sale, supra* note 64, at 452 n.153. As described earlier, this is not common for modern trading situations today; most shares are held in street name, and heritage tracing thus offers little assistance for any buyer purchasing as a beneficial holder.

workable rule.⁹⁰ The problem, however, is that temporal claim allowance represents a significant departure from the statutory language of the Securities Act.⁹¹ It also poses a risk of overdeterrence in an era where the same share may be bought and sold by multiple parties repeatedly during the short period when claims are allowed. Perhaps for these reasons, courts rarely abandon the tracing test in favor of a temporal approach.⁹²

From the case law, it seems clear that impeccable share provenance is still the standard for Section 11 litigation, and statistical tracing is not current law. At the same time, definitively tracing shares back to a given issuance is exceedingly difficult—usually impossible—in a world of fungible bulk clearing. The upshot, then, is that most secondary market Section 11 claims are denied, even when it is highly likely that a plaintiff bought some shares from a “tainted” pool. This may or may not be problematic, depending upon one’s views about the optimal level of deterrence under the Securities Act.⁹³ Nonetheless, it does seem strange to establish a general principle that Section 11 claims are available for secondary buyers and then adopt a follow-on rule that effectively guts those same claims in most contexts.⁹⁴

b. Appraisal rights

Another illustration of the identification problem involves shareholder appraisal claims, an area of law that has recently seen a rise in legal activity.⁹⁵

⁹⁰ See, e.g., *Wade v. Indus. Funding Corp.*, No. C 92-0343 TEH, 1993 WL 650837, at *5–6 (N.D. Cal. Aug. 30, 1993) (allowing purchasers who bought within the ninety-day period following a registration statement to maintain their claims).

⁹¹ Nothing in the text of Section 11 suggests that standing should be governed by temporal considerations. See *supra* note 64.

⁹² Cf. *Sale*, *supra* note 64, at 455 (describing how a handful of courts have used this method).

⁹³ For a more general discussion of the merits and policy implications of Section 11 liability, see, for example, Grundfest, *supra* note 55, at 56–58; Allan Horwich, *Section 11 of the Securities Act: The Cornerstone Needs Some Tuckpointing*, 58 BUS. LAW. 1 (2002); and Steinberg & Kirby, *supra* note 64.

⁹⁴ To further complicate matters, Professor Joseph Grundfest has argued that the international scope of initial stock offerings may throw an additional wrench into the machinery. See Grundfest, *supra* note 55, at 48–56. It can be argued that the Supreme Court’s decision in *Morrison v. National Australia Bank Ltd.*, 561 U.S. 247 (2010), which restricted the extraterritorial reach of Section 10(b) of the Exchange Act, has limited the availability of Section 11 claims to shares that are sold into domestic U.S. markets. See Grundfest, *supra* note 55, at 48–49. In many situations, however, a firm may sell some of its initial shares through foreign brokers who would not be considered domestic under a *Morrison* analysis. Accordingly, it is possible that some shares sold in a public offering are rendered ineligible for a Section 11 claim. This fact alone might make it impossible to trace back downstream shares to ones that originally qualified for legal standing. In a world of fungible bulk, a firm could conceivably evade *all* downstream Section 11 liability simply by including one small international buyer to stymie the absolute tracing requirements. See *id.* at 49. Of course, adopting a new clearing system that specifically traces shares would resolve this conundrum.

⁹⁵ See, e.g., Charles R. Korsmo & Minor Myers, *Appraisal Arbitrage and the Future of Public Company M&A*, 92 WASH. U. L. REV. 1551, 1566–78 (2015) (tracking the incidence of appraisal claims in recent years).

Appraisal rights, in a nutshell, allow shareholders to sue for the fair value of their shares, as determined through judicial proceedings, when they object to a merger or related fundamental transaction.⁹⁶ In Delaware, an owner may not seek appraisal rights if she votes her shares in favor of the merger. The tool is only available for dissenters.⁹⁷

If you are a beneficial owner who holds shares continuously from the time of a merger's announcement through the shareholder vote and eventual consummation of the deal, then it should be easy to dissent and perfect your appraisal rights. When the voting instructions arrive from your broker, you can vote your shares against the triggering transaction. Or you might just abstain because nonvoting shares are also eligible for appraisal rights.⁹⁸ Assuming that all goes according to plan, your lawsuit can proceed.

Given the complexity of this entire system, however, some missteps will inevitably occur. Consider a recent appraisal case involving Dell Inc.⁹⁹ During 2013, a group of shareholders objected to the price paid in a going-private buyout of Dell by founder Michael Dell.¹⁰⁰ One of the larger plaintiffs, T. Rowe Price, wished to instruct its bank custodian, State Street Bank & Trust, to vote its shares *against* the buyout in order to perfect an appraisal claim.¹⁰¹ Amazingly, evidence emerged that these shares were actually voted in *favor* of the deal by mistake.¹⁰² Dell quickly seized upon this fact to argue that T. Rowe Price's stock had become ineligible for appraisal rights because of this mistake.¹⁰³

⁹⁶ See Robert B. Thompson, *Exit, Liquidity, and Majority Rule: Appraisal's Role in Corporate Law*, 84 GEO. L.J. 1, 3–4 (1995) (describing appraisal rights and tracing their function); Barry M. Wertheimer, *The Shareholders' Appraisal Remedy and How Courts Determine Fair Value*, 47 DUKE L.J. 613, 618–26 (1998) (discussing the history and development of appraisal rights).

⁹⁷ DEL. CODE ANN. tit. 8, § 262(a) (West 2006).

⁹⁸ *Id.* Said differently, only shares that vote in favor of the disputed transaction are disqualified.

⁹⁹ *In re Appraisal of Dell Inc.*, 143 A.3d 20 (Del. Ch. 2016).

¹⁰⁰ *Id.* at 21–23.

¹⁰¹ *Id.* at 26–27.

¹⁰² *Id.* at 27–36. The fact that these sophisticated parties could make a voting mistake may sound ridiculous, but it becomes more understandable when one considers that firms often outsource the actual tasks of voting and vote processing to third parties. In this case, record holder State Street hired a firm named Broadridge Financial Solutions (“Broadridge,” a large player in this area) to process client voting instructions. *Id.* at 29. T. Rowe Price also outsourced the execution of its voting preferences to Institutional Shareholder Services (ISS). *Id.* at 25–26. During the Dell vote, T. Rowe Price intended to vote against the merger and informed ISS of this decision. *Id.* at 26–27. ISS prepared to vote no. *Id.* at 27. But when the shareholder meeting was rescheduled, a new database record was prepared and the voting instructions were reset. *Id.* at 27–28. T. Rowe Price had previously established a default voting instruction of “yes” with ISS, and a failure to override this default a second time (due to the rescheduled vote) led to the ultimate error. *Id.*

¹⁰³ *Id.* at 36.

The Delaware Vice Chancellor surely recognized T. Rowe Price's frustration, but he refused to allow the mutual fund to proceed with an appraisal claim for these shares.¹⁰⁴ In many cases it may not be possible to track down evidence related to how specific shares were voted,¹⁰⁵ but when the evidence is available,¹⁰⁶ the court held that it should be considered.¹⁰⁷ Because the shares linked to T. Rowe Price's position had clearly voted, albeit mistakenly, in favor of the merger, T. Rowe Price, the beneficial holder, lost its ability to pursue an appraisal claim.¹⁰⁸

The facts underlying this case are unusual, and we might expect that future claimants will be more careful about how their shares are voted. Yet the opinion also suggests that if specific shares can somehow be traced, then the court should use this evidence to determine the availability of appraisal rights.¹⁰⁹ Accordingly, though this case might otherwise be insignificant because blatant voting mistakes are uncommon, it will take on much greater significance if the technology used to clear and settle trades changes to allow for traceable shares.¹¹⁰

¹⁰⁴ *Id.* at 55–56.

¹⁰⁵ *See supra* notes 92–100 and accompanying text.

¹⁰⁶ The careful reader might wonder how Dell could prove that these shares had been voted in favor of the transaction in a world of fungible bulk. The ability to link the voting instructions of T. Rowe Price to a specific cluster of shares arose because Broadridge, the third party tasked with voting and vote processing, had assigned a unique internal control number to each transaction. A required filing with the SEC for mutual fund voting also provided additional evidence of the mistake. *Dell Inc.*, 143 A.3d at 30–36.

¹⁰⁷ *Id.* at 52.

¹⁰⁸ *Id.* at 59. Interestingly, this was not the only Dell appraisal case to limit a claimant's appraisal rights due to a technical violation of the qualification rules. In yet another proceeding related to this same dispute, the court also held that some shareholders lost their appraisal rights when the formal record holder for their shares changed from Cede to another custodial bank nominee. *See In re Appraisal of Dell Inc.*, No. 9322-VCL, 2015 WL 4313206, at *25 (Del. Ch. July 13, 2015). This event was triggered by a DTCC policy of releasing shares to the custodian banks when they learned that the record holders wished to dissent from a deal. *Id.* at *3. The banks, in turn, had a policy of formally retitling the shares in the names of their own nominees under internal policies. *Id.* Taken together, the court ruled that the continuous holding requirement of Section 262 had not been met and that plaintiffs lost their ability to seek appraisal for these shares. As a matter of formal logic, this makes sense; as a practical matter, however, it is crazy. The Vice Chancellor expressed consternation with this outcome—he spent half of his opinion advocating for reforms that would lead to a different structural approach—but felt bound to follow historical precedent that was established before the share immobilization reforms. *Id.* at *11–25 (arguing that Delaware law should look through Cede and recognize the custodian banks and brokers as record holders of the shares).

¹⁰⁹ *Dell Inc.*, 143 A.3d at 52 (“[Earlier decisions] address a situation in which there is an absence of proof. In each of those cases, no evidence was available to show how Cede voted the particular shares for which appraisal was sought It does not necessarily follow that just because in some cases there is no evidence regarding how Cede voted, then in other cases where it does exist the parties cannot introduce it and the court cannot consider it.”).

¹¹⁰ *See infra* Section III.B.2.a.

A more common appraisal problem occurs when it is simply impossible to trace an owner's shares back to a specific vote. This can happen, for instance, when an investor buys a block of stock after the record date for the vote and seeks to exercise an appraisal claim. This strategy, sometimes called "appraisal arbitrage," became prominent in 2007, when an important Delaware case took a permissive view on the availability of appraisal rights.¹¹¹ In that case, a biotech company named Transkaryotic Therapies had decided to sell itself to Shire Pharmaceuticals for \$37 per share.¹¹² A group of twelve beneficial owners, holding nearly 11 million shares, disliked this price and filed an appraisal claim.¹¹³ The problem, however, was that they had bought almost 8 million of their shares after voting rights for the merger had been severed by the passage of the record date but before the deadline to file for appraisal.¹¹⁴ Did this after-bought stock qualify for appraisal?

As we might expect, the continuous record holder for these shares was Cede. It was the formal legal owner of the Transkaryotic stock both before and after the plaintiffs purchased their shares; only the identity of the beneficial holders had changed.¹¹⁵ Accordingly, the Delaware court considered how Cede had ultimately "voted" its position: 12.9 million shares voted yes and 16.9 million shares abstained or voted no.¹¹⁶ It was impossible to determine whether the plaintiffs' 8 million shares belonged in the former group or the latter because, unlike the *Dell* case, there was no forensic evidence about how the plaintiffs' shares were actually voted.

The court allowed the lawsuit to proceed, under the logic that enough nonpositive Cede votes existed to support the plaintiffs' exercise of appraisal rights for the 8 million shares.¹¹⁷ In other words, as long as there are enough "qualified" votes to cover a petitioner's claims, appraisal claims remain viable. This decision seems to have sparked a surge of appraisal arbitrage lawsuits, where latecomer purchasers routinely object to an announced merger and insist that *their* shares are the ones that qualify for this legal right.¹¹⁸ As I have argued elsewhere, this is not necessarily a bad

¹¹¹ See *In re Appraisal of Transkaryotic Therapies, Inc.*, No. Civ.A. 1554-CC, 2007 WL 1378345 (Del. Ch. May 2, 2007).

¹¹² *Id.* at *1.

¹¹³ *Id.*

¹¹⁴ *Id.*

¹¹⁵ *Id.* at *1–2.

¹¹⁶ *Id.* at *1.

¹¹⁷ *Id.* at *4. Query what would have happened if a claimant had sought to exercise the rights for 18 million shares or if two groups of claimants had sought to exercise the rights for 9 million shares each.

¹¹⁸ See, e.g., Korsmo & Myers, *supra* note 95, at 1578–79 (exploring but ultimately rejecting the theory that *Transkaryotic* led to a large number of appraisal suits).

development,¹¹⁹ and *Transkaryotic* is clearly consistent with Delaware’s historical treatment of record shareholders as the group that formally matters.¹²⁰ Of course there might also be concerns about the expanded use of latecomer appraisal claims, especially if the risk of a large lawsuit blocks value-enhancing deals or leads to an increase in strike suits.¹²¹

Debating the question of whether expanded appraisal rights is a good or bad development, however, is not the point of this Article. As with the Section 11-tracing jurisprudence,¹²² the rise of appraisal arbitrage exposes a clear mismatch between the use of fungible bulk for stock settlement practices and the grant of legal rights to shareholders. In both cases, the relevant corporate law was established and developed during an earlier era when questions about ownership status were rarely so complex. Today, the same precedents bind, but resolution of a legal claim often relies on a largely indeterminate inquiry into the genealogy of shares. The gears do not mesh, and this is not a sensible approach to corporate law.

2. *Illegitimate Voting*

Another cluster of concerns arises when an actor retains franchise rights without economic exposure to the consequences of a decision. There are numerous variants of this problem, which has been dubbed “empty voting” in the literature.¹²³ For instance, an investor might buy a position in a company that is the target of a merger bid, sell her shares after the record date but before the date of the actual vote, and cast her votes against the merger to block the deal. Though it may seem unlikely for her to bother to

¹¹⁹ See George S. Geis, *supra* note 50, at 1661–65 (exploring how appraisal claims might act as a “back-end market for corporate control” in the face of an allegedly inadequate merger price). It is also worth emphasizing, however, that this decision might create practical problems—especially if more shares seek to assert a claim than are qualified under the *Transkaryotic* inquiry. A court would either need to allocate qualified shares among the individual claimants or come up with some other method for determining who gets to sue. This interesting problem may remain academic, however, even if traceable shares do not change the law, because voter apathy may generate a sufficient number of abstentions to support all appraisal claims.

¹²⁰ See, e.g., *In re Appraisal of Dell Inc.*, No. 9322-VCL, 2015 WL 4313206, at *9 (Del. Ch. July 13, 2015). Other cases have confirmed the lack of a legal tracing obligation for shareholder plaintiffs. See *Merion Capital LP v. BMC Software, Inc.*, No. 8900-VCG, 2015 WL 6164771, at *11 (Del. Ch. Oct. 21, 2015); *In re Appraisal of Ancestry.com, Inc.*, No. 8173-VCG, 2015 WL 399726, at *15 (Del. Ch. Jan. 30, 2015).

¹²¹ See, e.g., Richard A. Booth, *The Real Problem with Appraisal Arbitrage*, 72 BUS. LAW. 325 (2017) (evaluating several possible concerns about appraisal arbitrage). *But see* Korsmo & Myers, *supra* note 95, at 1588–97 (arguing that appraisal cases are less likely to lead to strike suits (meritless suits brought for settlement value) because plaintiffs must bear the risk of a lower valuation and therefore have an incentive not to bring spurious claims).

¹²² See *supra* Section I.C.1.a.

¹²³ In the mid-2000s, Henry Hu and Bernard Black described these problems extensively. See Hu & Black, *Hedge Funds*, *supra* note 10; Hu & Black, *New Vote Buying*, *supra* note 10.

vote in this scenario, there can be ways for the investor to take economic positions that will profit from this kind of spoilsport vote.

Consider a case involving the Canadian telecom firm Telus.¹²⁴ This company had established two classes of stock, one with voting rights and one without. The voting shares traded at about a 5% premium to the nonvoting shares.¹²⁵ Telus eventually decided to eliminate this disparate treatment to address investor concerns about a lack of franchise rights by consolidating both classes of stock into a single class where everyone could vote.¹²⁶ But Telus ignored the trading price differential, and its proposal sought to combine both classes of stock on identical terms. In response to this news, the price gap narrowed quickly, and the two classes of stock converged on a similar price.¹²⁷

Mason Capital, a U.S.-based hedge fund, saw an opportunity. It bought voting shares of Telus, while simultaneously shorting both the voting and nonvoting shares.¹²⁸ This strategy allowed Mason to hedge away any economic interest in the voting shares while retaining nearly twenty percent of the vote.¹²⁹ Further, the net short position in the nonvoting shares allowed Mason to profit if the proposal failed and the relative price gap of the nonvoting shares dropped back to prior levels. In essence, Mason had constructed a situation where it had strong ability and incentives to cast votes in a way that would stymie the attempted transaction.¹³⁰

Lawmakers have not ignored empty voting problems,¹³¹ but designing a treatment for this malady is difficult. More disclosure is one option, though, as suggested by the Telus story, the schemes used to perpetrate illegitimate voting can grow complex. Hedging strategies are not always easy to identify, and investors will sometimes arrive on an election day with far more votes

¹²⁴ *In re TELUS Corp.*, 2012 BCSC 1919 (Can. B.C.). This case is described in more detail in Wolf-Georg Ringe, *Empty Voting Revisited: The Telus Saga*, 28 J. INT'L BANKING & FIN. L. 154 (2013).

¹²⁵ *TELUS*, 2012 BCSC 1919, para. 12.

¹²⁶ Ringe, *supra* note 124.

¹²⁷ *Id.*

¹²⁸ *TELUS*, 2012 BCSC 1919, paras. 31–37. By taking short positions in these securities, Mason sold shares that it did not at the time own.

¹²⁹ *Id.*

¹³⁰ *Id.* In the event, Telus became aware of the situation and elected to use an alternative Canadian judicial procedure (a “plan of arrangement”) to accomplish the recapitalization. The plan had to be certified by the court as fair and reasonable under the circumstances, and the court was willing to consider Mason’s attempted sabotage in its deliberations. *Id.* paras. 54–69.

¹³¹ *See, e.g., Kurz v. Holbrook*, 989 A.2d 140, 178 (Del. Ch. 2010) (“Delaware decisions have exhibited consistent concern about transactions that create a misalignment between the voting interest and the economic interest.”), *rev’d sub nom. in part on other grounds*, *Crown EMAK Partners, LLC v. Kurz*, 992 A.2d 377 (Del. 2010).

than expected.¹³² Some commentators have called for regulation that removes votes from shareholders under certain situations,¹³³ but it is tricky to delineate the range of conditions where such a remedy might be appropriate. There is also a risk that interventions to disenfranchise some shareholders will lead to new distortions.¹³⁴ For these reasons, difficulties in the detection and prevention of empty voting persist.

Even apart from explicit malfeasance, vesting voting rights with a group of people who have no reason to care about the outcome of a decision because they have already sold their shares weakens corporate governance. To make the political analogy,¹³⁵ it is as if a sizeable population departed a democratic country, renounced their citizenship, but still cast ballots in a subsequent election. A lack of economic investment in the outcome also promotes apathy. Shareholder voting already suffers from concerns about low turnout and a perception that many investors are rationally apathetic.¹³⁶ Offering ballots to former owners cannot promote a healthier interest in the process.

One response to these concerns might be to shorten the time between the record date and the actual date of the vote. Under current Delaware law, this period cannot be less than ten days,¹³⁷ but a gap of twenty days, for instance, should lead to better voting incentives than a gap of fifty days.¹³⁸ Some firms are also starting to adopt bifurcated record dates, where one date is used to convey notice of a shareholder's meeting, while another later date

¹³² See, e.g., Henry T. C. Hu & Bernard Black, *Equity and Debt Coupling and Equity Voting II: Importance and Extensions*, 156 U. PA. L. REV. 625, 723–24 (2008) (showing the possibility that economic ownership might also be hedged out while retaining appraisal rights).

¹³³ See Ringe, *supra* note 124.

¹³⁴ See, e.g., Tamara C. Belinfanti, *Shareholder Cultivation and New Governance*, 38 DEL. J. CORP. L. 789, 854 (2014).

¹³⁵ In general, I would agree with Bayless Manning's contention that there is little gain by comparing democratic elections to corporation elections. See Bayless Manning, *The Shareholder's Appraisal Remedy: An Essay for Frank Coker*, 72 YALE L.J. 223, 226 (1962) ("[W]e have enough problems in the corporate field without importing additional nettles from the democratic political process."). But this analogy seems apt.

¹³⁶ See, e.g., Bernard S. Black, *Shareholder Passivity Reexamined*, 89 MICH. L. REV. 520, 526–28 (1990) (describing the general lack of shareholder incentives to vote); Kobi Kastiel & Yaron Nili, *In Search of the "Absent" Shareholders: A New Solution to Retail Investors' Apathy*, 41 DEL. J. CORP. L. 55, 59–66 (2016) (offering recent data on shareholder voting patterns at large firms).

¹³⁷ See *supra* note 44.

¹³⁸ To take a back-of-the-envelope example, if Apple has 5.25 billion shares outstanding, and an average trading volume of 30 million shares per day, then shortening the gap by 30 days could theoretically lead to a situation where the number of shareholder with ownership and voting rights increases by 17% of the total shareholder base (30 million shares times 30 days / 5.25 billion total shares). In actuality, of course, the increase is unlikely to be this large, as some of the buyers and sellers within the 30-day period may be short-term traders who will churn the same shares during these 30 days.

is used to convey the actual right to vote.¹³⁹ The logical extension of this strategy, of course, is to establish a system that sets the record date one hour, or even one second, before the actual vote. Under current settlement practices, however, this approach is just not practicable because it takes too long to move back and forth through the various custodial layers.

A third type of problem is perhaps just as important as empty voting and shareholder apathy: pure error. Professors Kahan and Rock have described numerous “hanging chads” in the corporate election process.¹⁴⁰ These situations arise when shareholder votes are cast or processed inaccurately due to the system’s complexity. Proxy materials may not arrive in time for beneficial shareholders to vote.¹⁴¹ Some last-minute votes (or changes to votes) may not be counted in order to meet various deadlines.¹⁴² The total votes allocated to custodians by DTCC may not match the more detailed aggregation of the custodian’s client accounts.¹⁴³ There are even some reported cases of overvoting, where more votes are cast than there are shares outstanding.¹⁴⁴ For all of these reasons, close shareholder votes should not inspire confidence in accurate outcomes.¹⁴⁵

3. *Feedback Loops Between Poor Voting Infrastructure and Corporate Governance Reform*

A more general concern with untraceable shares is that poor voting infrastructure might be creating feedback effects that thwart other sensible corporate governance adjustments. Of course, we cannot really know what corporate governance might look like with more accurate voting, but it is certainly possible that our existing system has limited the attractiveness of proxy access, shareholder bylaw proposals, or other governance initiatives. After all, lawmakers and other parties might be more nervous about establishing shareholder referendums on corporate decision-making if they fret about the underlying accuracy of investor votes.

¹³⁹ See, e.g., Daniel E. Wolf et al., *Kirkland M&A Update: Setting the Record (Date) Straight*, KIRKLAND & ELLIS (Apr. 17, 2013), www.kirkland.com/siteFiles/Publications/MAUpdate_041713.pdf [<https://perma.cc/3KFA-QUCU>].

¹⁴⁰ Kahan & Rock, *supra* note 4.

¹⁴¹ *Id.* at 1249. These unvoted shares can make it more difficult to obtain a quorum and also prevent approval of initiatives that require a majority of shares entitled to vote on a matter. *Id.*

¹⁴² *Id.* at 1251.

¹⁴³ *Id.* at 1253.

¹⁴⁴ *Id.* at 1258.

¹⁴⁵ Further evidence of these concerns can be seen in vote recounts that result in altered outcomes. For example, in 2017, Proctor & Gamble fought a highly publicized director election contest where an activist investor initially lost the election but won the board seat during a recount. See Sharon Terlep & David Benoit, *P&G Concedes Proxy Fight, Adds Nelson Peltz to Its Board*, WALL. ST. J. (Dec. 15, 2017, 7:18 PM), <https://www.wsj.com/articles/p-g-concedes-proxy-fight-adds-nelson-peltz-to-its-board-1513377485> [<https://perma.cc/4YMZ-U959>].

The recent turmoil related to proxy access illustrates the impact that the concern about inaccurate voting has on corporate governance. Questions, such as whether shareholders should enjoy the right to include their preferred board candidates on a firm's ballot or whether they should be forced to launch, and pay for, their own proxy battle to supplant an incumbent board, have commanded significant attention over the past decade, with a turbulent flurry of SEC reversals and judicial second-guessing.¹⁴⁶ Others have told the story in detail,¹⁴⁷ and there is no need to recount the specifics here. At this point, lawmakers seem to have abandoned efforts to mandate proxy access while still allowing individual shareholder groups to seek these rights through private ordering and shareholder proposals.¹⁴⁸

This may be the best outcome, as one might question the wisdom of a one-size-fits-all approach.¹⁴⁹ But it is natural to wonder whether this same equilibrium would have been reached if lawmakers had more confidence that shareholder votes reflected unbiased incentives and could be processed accurately.

Similarly, while we have seen a lot of recent activity in shareholder proposals that influence firm decision-making,¹⁵⁰ some have questioned whether this is a sensible way to govern.¹⁵¹ Why should a handful of fringe

¹⁴⁶ See, e.g., Jill E. Fisch, *The Destructive Ambiguity of Federal Proxy Access*, 61 EMORY L.J. 435, 457–75 (2012) (describing federalism challenges related to proxy access and advocating for private ordering solutions); Marcel Kahan & Edward Rock, *The Insignificance of Proxy Access*, 97 VA. L. REV. 1347, 1426–32 (2011) (asserting that many investors would not make use of proxy access and that the net effect of these changes would be minimal).

¹⁴⁷ *Id.*

¹⁴⁸ See, e.g., Catherine G. Dearlove & A. Jacob Werrett, *Proxy Access by Private Ordering: A Review of the 2012 and 2013 Proxy Seasons*, 69 BUS. LAW. 155, 158–60 (2013) (examining specific actions by firms shortly after it became clear in the case law that shareholder proposals to grant proxy access would be permitted).

¹⁴⁹ The debate chugs along with proponents of proxy access arguing that managerial accountability and collective action problems require liberal proxy access. See, e.g., Lucian A. Bebchuk & Scott Hirst, *Private Ordering and the Proxy Access Debate*, 65 BUS. LAW. 329, 349–50 (2010) (arguing against a no-access default rule); Bo Becker et al., *Does Shareholder Proxy Access Improve Firm Value? Evidence from the Business Roundtable's Challenge*, 56 J.L. & ECON. 127, 157 (2013) (presenting empirical analysis that financial markets place a positive value on the increased availability of proxy access). Not everyone agrees. Jill Fisch, for instance, has responded that universal access will lead to unjustified new expenses, special interest board representation that will lead to intra-shareholder conflicts, and other concerns. See Fisch, *supra* note 146; see also Kahan & Rock, *supra* note 146, at 1352–53 (arguing that proxy access may lead to increased costs, some internal conflicts, and some positive outcomes, but that it is unlikely to matter due to large institutional ownership of shares).

¹⁵⁰ See Ronald O. Mueller et al., *Shareholder Proposal Developments During the 2017 Proxy Season*, GIBSON DUNN (June 29, 2017), <https://www.gibsondunn.com/shareholder-proposal-developments-during-the-2017-proxy-season> [<https://perma.cc/ZXA6-AHT6>] (reporting 943 shareholder proposals in 2015, 916 proposals in 2016, and 827 proposals in 2017).

¹⁵¹ See, e.g., Stephen M. Bainbridge, *The Case for Limited Shareholder Voting Rights*, 53 UCLA L. REV. 601, 603 (2006).

investors be able to hijack the agenda?¹⁵² To be sure, there is a reasonable counterargument: firms might embrace different models of shareholder participation to produce diverse governance practices.¹⁵³ Indeed, we might imagine a variety of reforms that could clarify and extend the ability of shareholders to influence or constrain some corporate decisions.¹⁵⁴ Before fully embarking on such a project, however, it would be important to see more integrity in the underlying infrastructure of shareholder voting.

It is also worth considering whether a healthier settlement system might inspire more trust in board authority. Advocates of director primacy continue to assert that greater shareholder activism brings strategic ignorance and sows dysfunctional leadership teams.¹⁵⁵ But the argument that delegated board authority should be trusted to represent the best interests of a firm's owners relies on the bedrock of legitimacy that reliable elections supposedly confer. Much of the pushback against director primacy seems to arise from concerns that incumbent board members will be able to leverage the firm's resources to maintain power even in the face of agency abuses.¹⁵⁶ It is at least conceivable that a more accurate and responsive system to elect directors, and to sue them if necessary, would dampen the cry for greater shareholder power because it would become easier for shareholders to respond when questionable managerial actions occur.¹⁵⁷

In sum, if we have a system that is more responsive to current shareholders, and less prone to error, then lawmakers and corporate managers might be willing to adopt other governance levers. It is impossible

¹⁵² *Id.* at 635.

¹⁵³ See Luc Renneboog & Peter G. Szilagyi, *The Role of Shareholder Proposals in Corporate Governance*, 17 J. CORP. FIN. 167, 172–73 (2011) (claiming that recent shareholder proposals are receiving more support); D. Gordon Smith et al., *Private Ordering with Shareholder Bylaws*, 80 FORDHAM L. REV. 125, 127 (2011) (advocating for more shareholder democracy).

¹⁵⁴ See Smith et al., *supra* note 153, at 181–87 (proposing several, mostly technical, changes to Delaware law that would clarify and extend shareholder participation in firm governance by making it easier for shareholders to adopt new (and substantive) corporate bylaws).

¹⁵⁵ See Bainbridge, *supra* note 151, at 603–15.

¹⁵⁶ The agency cost problem has been discussed extensively in the legal and economic literature. The foundation for much of this work can be found in Michael C. Jensen & William H. Meckling, *Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure*, 3 J. FIN. ECON. 305 (1976). Additional discussions of agency abuses can be found in Kenneth J. Arrow, *The Economics of Agency*, in PRINCIPALS AND AGENTS: THE STRUCTURE OF BUSINESS 37 (John W. Pratt & Richard J. Zeckhauser eds., 1985); Kathleen M. Eisenhardt, *Agency Theory: An Assessment and Review*, 14 ACAD. MGMT. REV. 57 (1989); Eugene F. Fama, *Agency Problems and the Theory of the Firm*, 88 J. POL. ECON. 288 (1980); and Sanford J. Grossman & Oliver D. Hart, *An Analysis of the Principal-Agent Problem*, 51 ECONOMETRICA 7 (1983).

¹⁵⁷ This all assumes, of course, that shareholders are somehow able to detect the agency abuses; this information asymmetry lies at the heart of many problems. See *supra* note 156 (listing sources discussing information asymmetry problems).

to draw more solid conclusions, however, because this theory relies on counterfactual assumptions about what might happen in the presence of traceable shares.

* * *

To quickly recap, then, the financial services industry seems to have cobbled together a functioning settlement and clearing system that is a stark improvement over paper-based trading. But corporate law has paid a price for the resulting complexity. The mechanisms for managing and tallying shareholder votes encompass intricate layers of intermediaries that do not inspire confidence in accurate outcomes. Some legal rights, such as Section 11 claims and appraisal lawsuits, are linked to impossible determinations about when a specific share of stock was issued or how it was voted. And timing delays can lead to a problematic decoupling of vested franchise rights and economic ownership. These and other nasty entanglements caused by complexity in the exchange infrastructure are unhealthy for corporate governance. Is there a better way?

II. CREATING TRACEABLE SHARES

In 2017, DTCC announced a pilot project with IBM to clear securities through a customized distributed ledger system, sometimes described as blockchain technology.¹⁵⁸ This initiative will not impact stock markets, as it focuses on the settlement of credit derivatives.¹⁵⁹ Nevertheless, the project is important for several reasons. First, it signals that DTCC is beginning to embrace distributed ledger technology to pursue cost savings and other strategic benefits.¹⁶⁰ Second, the effort demonstrates that large technology firms like IBM, with support from smaller “fintech” partners, are willing to stand behind distributed ledgers and believe that they can be used to clear financial trades on a meaningful scale. And third, the project enjoys the backing of some of the world’s most important financial institutions, including Barclays, Citi, Credit Suisse, Deutsche Bank, JP Morgan, UBS, Wells Fargo, and others.¹⁶¹

¹⁵⁸ See Michael del Castillo, *\$11 Trillion Bet: DTCC to Process Derivatives with Blockchain Tech*, COINDESK (published Jan. 9, 2017, 12:59 PM; updated Dec. 21, 2017, 1:48 PM), <http://www.coindesk.com/11-trillion-bet-dtcc-clear-derivatives-blockchain-tech> [<https://perma.cc/EGV5-HGND>]. This is a major initiative but still one that would be dwarfed by any effort to transform stock settlement and clearing systems.

¹⁵⁹ *Id.*

¹⁶⁰ The CEO of DTCC’s derivatives service subsidiary stated, “We believe our own internal savings will cost-justify the project [with] additional saving to the industry.” *Id.*

¹⁶¹ These banks are all members of the “R3CEV consortium,” created in 2015 to help coordinate banks interested in adopting distributed ledgers. *Id.*

As efforts like this take root over the coming decade (the Australian Stock Exchange has launched a similar undertaking¹⁶²), it is becoming increasingly probable that the aging, back-office infrastructure of stock settlement will be retrofitted with new technology. We have already witnessed the revolution in front-end exchange—as open outcry trading pits and loud people in bright jackets gave way to the hum of server farms and click of electronic matching algorithms. Distributed ledger technology may soon spark a similar disruption to the back end of securities exchange.

A. Distributed Ledger Mechanics

In many ways, distributed ledger clearing is the conceptual opposite of current systems.¹⁶³ DTCC now uses a centralized, trust-based, and highly guarded method that relies on economies of scale to conduct back-office processing.¹⁶⁴ Distributed ledger technology would replace this with a decentralized, trustless, widely replicated, and (possibly) transparent mode of exchange. How does it work?

1. The General Idea

A distributed ledger is simply a sequential database of assets that is shared across a network of users.¹⁶⁵ It is distributed in the sense that all participants in the network have their own copy of the ledger identifying both the historical transactions and the resulting ownership rights associated with the entire group of assets. By comparison, most economic entities currently use double-entry bookkeeping ledgers to track the disposition of their assets; these ledgers are both private and fragmented. They only contain information related to the specific assets that each firm owns. Distributed ledgers, on the other hand, are more akin to government-managed real property registration systems, where anyone might examine current and historical ownership claims on a given parcel of property. But while public property records are typically centralized and housed in a single location, with limited accessibility, a distributed ledger can be split into hundreds or thousands of

¹⁶² See Jackie Range, *New Australian Securities Exchange Chief Defends Blockchain Plans*, FIN. TIMES (Sept. 4, 2016), <https://www.ft.com/content/45851b58-62d1-11e6-8310-ccf0bddad227> [<https://perma.cc/EKV6-DAT4>].

¹⁶³ See, e.g., DTCC, *EMBRACING DISRUPTION: TAPPING THE POTENTIAL OF DISTRIBUTED LEDGERS TO IMPROVE THE POST-TRADE LANDSCAPE* (2016) [hereinafter *DTCC WHITE PAPER*], <http://www.dtcc.com/news/2016/january/25/new-dtcc-white-paper-calls-for-leveraging-distributed-ledger-technology> [<https://perma.cc/3T7Z-VEJA>] (discussing conceptual differences between current clearing systems and the proposed distributed ledger technology).

¹⁶⁴ *Id.* at 1.

¹⁶⁵ *Id.*; see also David Mills et al., *Distributed Ledger Technology in Payments, Clearing, and Settlement* 10–11 (Wash.: Bd. of Governors of the Fed. Reserve Sys., Finance and Economics Discussion Series 2016-095, 2016), <https://doi.org/10.17016/FEDS.2016.095> [<https://perma.cc/5VBU-GVHT>].

identical copies and situated in the scattered computer systems of individual members or users.¹⁶⁶

Version control obviously becomes critical. It would not do to have a dishonest participant rapidly sell the same asset twice, before records can be updated. Accordingly, changes must be incorporated quickly across all versions of the ledger through a synchronization protocol. There are multiple ways to manage this task. For instance, rights to edit the database might be “unpermissioned” and open to public users under a consensus protocol where anyone who plays by preordained rules can modify records, or the rights might be secured in a way that controls or limits who can make changes and how these changes must occur.¹⁶⁷ Moreover, the distributed ledger can be public and fully transparent, or it can remain private and only accessible by a limited number of members.¹⁶⁸ Indeed, to accurately describe a distributed ledger system, we must distinguish between four alternatives: (1) traditional ledgers where a single copy is privately retained by each user (“Type 1”) (which is not a distributed ledger); (2) private distributed ledgers where there are multiple copies of the ledger that may only be viewed and changed by authorized participants (“Type 2”); (3) public distributed ledgers that are viewable by many but modifiable only by a subset of trusted actors (“Type 3”); and (4) publicly shared distributed ledgers that may be viewed and modified by any user under consensus protocols (“Type 4”).¹⁶⁹ The cryptocurrency bitcoin, currently the most (in)famous application of distributed ledger technology, is an example of the fourth variant.¹⁷⁰ By contrast, the second and third variants seem to be the leading choices for new financial market clearing platforms.¹⁷¹

The accuracy and security of a distributed ledger is maintained through blockchain technology, which ensures that all copies match and that all modifications reflecting new transactions follow the same path. As users buy and sell the relevant assets, blockchain technology gathers and organizes the details of each transaction into a string of data according to an established formatting algorithm.¹⁷² Multiple transactions are then grouped and transferred into a data block.¹⁷³ This block is linked, or “chained,” to the

¹⁶⁶ Mills et al., *supra* note 165, at 10.

¹⁶⁷ *Id.* at 12.

¹⁶⁸ *Id.*

¹⁶⁹ See DTCC WHITE PAPER, *supra* note 163.

¹⁷⁰ See Andrea Pinna & Wiebe Ruttenberg, *Distributed Ledger Technologies in Securities Post-Trading: Revolution or Evolution?*, at 10, European Central Bank Occasional Paper Series No. 172 (Apr. 2016), <https://www.ecb.europa.eu/pub/pdf/scpops/ecbop172.en.pdf> [<https://perma.cc/7DNJ-NQ7E>].

¹⁷¹ *Id.* at 11.

¹⁷² See, e.g., *id.* at 12.

¹⁷³ *Id.*

earlier blocks of transactional data in the ledger, time-stamped, and processed in a way that both refers to and verifies prior transactions. In other words, the cryptography is designed so that it becomes progressively more difficult for older blocks to be rewritten, increasing the verifiability and security of prior transactions.¹⁷⁴ The results are broadcast to members in a synchronization protocol, and the system starts a new cycle.

2. *A (Slightly) More Technical Examination*

The technical details of blockchain cryptography are mostly beyond the scope of this Article,¹⁷⁵ but a slightly more extensive description might be helpful for understanding the transformative nature of distributed ledgers. First, consider a Type 4 (public distributed) ledger. A member joining the distributed ledger network will receive unique public and private encryption keys. The private key is used to certify a transaction and can be verified by others in the network.¹⁷⁶ If a member wants to settle a fresh transaction, she uses her private key to “sign” and transmit the relevant details (such as which assets are being sold and to whom they are being transferred) through a string of data.¹⁷⁷ 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 exchange.¹⁷⁸ Any such transfer to a member via their public key can only be unlocked with that member’s private key.¹⁷⁹ As more of these transactions occur, they are queued, processed, and eventually published throughout the system according to the system architecture (more on this in a moment). This makes the ledger verifiable to any participant with read permission, in a way that should render the history of each transaction secure and irreversible.¹⁸⁰

The right to publish changes to a distributed ledger may vary according to the system. With an open, public network, such as bitcoin, any entity that accomplishes a specific task might earn the right to add the next block of

¹⁷⁴ *Id.*

¹⁷⁵ For a more extended discussion, see Kariappa Bheemaiah, *Why Business Schools Need to Teach About the Blockchain* (Mar. 2, 2015) (unpublished manuscript) (on file with *Northwestern University Law Review*).

¹⁷⁶ *Id.* at 7–8.

¹⁷⁷ *Id.*; see also Christian Catalini & Joshua S. Gans, *Some Simple Economics of the Blockchain* (MIT Sloan Research Paper No. 5191-16, 2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2874598 [<https://perma.cc/3SD8-XFRB>].

¹⁷⁸ See Bheemaiah, *supra* note 175, at 8.

¹⁷⁹ *Id.*

¹⁸⁰ The security features of a distributed ledger make theft extremely difficult. See *infra* notes 190–94 and accompanying text.

data, subject to confirmation of its success.¹⁸¹ The task will be arduous—such as solving the next iteration of a complex mathematical puzzle—but also easy to verify as correct once a solution is presented.¹⁸² With privately permissioned networks, Types 2 and 3, the right to modify might not require solving a task; preauthorized agents, such as banks, can simply add the new block.¹⁸³

Independent participants may have incentives to record the details of exchange transactions between other parties. For example, the solution to a mathematical puzzle might incorporate the details from completed transactions at the top of the recording queue.¹⁸⁴ Winning the race to solve each iteration thus requires participants to process and memorialize the most recent transactions.¹⁸⁵ The parties seeking to record their asset transfer details might pay a commission to the recording member who successfully publishes the transaction in the next block of data.¹⁸⁶ Or, members might earn a “point” or “token” when they become the first person to solve the next

¹⁸¹ See Pinna & Ruttenberg, *supra* note 170, at 12–13. This confirmation of success, or transaction validation, will arise under a prearranged set of rules. For example, a member who successfully mines a new solution to the current iteration of the challenge could be required to submit their answer to a transaction validator who would quickly verify that the solution was correct and then spread the new block to other transaction validator nodes. Once a majority of these validators agree that this is the first viable solution (under the prearranged synchronization protocols), then the new block would be indelibly written, and the process would begin anew. *Id.*

¹⁸² With bitcoin, for example, a member must find (or “mine”) a numerical solution that takes data from the most recent solution and the valid transactions to be recorded as inputs. The goal is to combine this data with another number, called a nonce, in a way that provides an output, when run through the relevant hash function, that accomplishes some specific task—such as producing an output string that begins with twelve zeros. The first person to accomplish this “wins” the right to write the data to the distributed ledger, gains a bitcoin or token of value, and starts the cycle anew. All others must begin from scratch with the new output string, and any leftover work from the prior iteration will probably be useless. The task is thus (1) difficult to accomplish, as the solution nonce can only arise through trial and error and massive computer processing power; and (2) easy to verify by looking at the solution output (for example, are there really twelve zeros at the start of the output?). Moreover, the difficulty of the task can be modified on the fly in an effort to render a solution slower or faster. Continuing with the bitcoin example, if the goal of the system is to generate a new block approximately every ten minutes, then the solution might require only ten zeros at the start of the string in order to expedite a solution, or require fourteen zeros at the start of the string in order to delay the next solution nonce. See Bheemaiah, *supra* note 175, at 10.

¹⁸³ Pinna & Ruttenberg, *supra* note 170, at 12–15.

¹⁸⁴ *Id.* at 12.

¹⁸⁵ *Id.*

¹⁸⁶ Again, borrowing from the bitcoin example, a seller will typically pay a transaction fee to the recording party denominated in some fraction of a bitcoin. For example, the current cost to record one byte of data in the system might be 400 satoshis, where one satoshi (the smallest unit of bitcoin currency) equals one hundred millionth (0.00000001) of a bitcoin. As one might imagine, the recording fees will float according to the supply and demand of recording bandwidth. A system can also set fixed rates, minimum and maximum rates, premium rates for priority recording, and use other features related to queueing incentives. See Bheemaiah, *supra* note 175, at 10.

iteration of the problem, offer proof of this work, and publish another block in the chain.¹⁸⁷ These tokens might then be monetized (as with bitcoin and other cryptocurrency systems) and become valuable in their own right.¹⁸⁸

In closed distributed ledger systems, Types 2 and 3, it may not be necessary to create cryptocurrency rewards via the generation of tokens. The payment of commissions should be sufficient to incentivize members to develop the next block in the chain. Indeed, if the members with modification rights enjoy sufficient levels of trust, mining for the solution to a complex mathematical puzzle may not be needed at all. The modifying parties will simply add a new block whenever enough transactions are queued to justify the next link in the chain.¹⁸⁹

Embedded throughout the use of distributed ledgers is a processing “hash function,” the heart of the cryptography. A hash function is simply an algorithm that takes a variable-length string of data as an input, crunches the information, and spits out a fixed-length string of numbers and letters.¹⁹⁰ The hash function used by bitcoin, for example, was initially devised by the National Security Agency (NSA) and produces a 256-bit output.¹⁹¹ An identical output result is always obtained when the same string of input data is fed into the function.¹⁹² But it is exceedingly difficult to reverse engineer the input data by observing only the output data; changing just one character

¹⁸⁷ *Id.* In actuality, many transactions are bundled into every “solution” to increase capacity. The ability to solve enough iterations of the problem to meet underlying transactional demand is a possible limit to the underlying capacity of any blockchain clearing system. On days with a high volume of stock trades, for instance, it is possible that a backlog of trades will gather to be bundled and processed by the solving members. This could raise the same concerns as the paper system crisis of the 1960s, but there would also be new worries relating to the timing and integrity of the synchronization protocol. *See supra* notes 15–20 and accompanying text. Any backlog would also raise questions about the optimal way to process queued transactions. Should everything be done on a first-in-first-out basis? Or should transacting parties who wish to receive recording priority be able to pay a higher fee to a recording member in order to jump the queue? These types of question can be sidestepped, of course, if capacity is not constrained.

¹⁸⁸ Indeed, “initial coin offering” markets have started to emerge for various cryptocurrencies. Investors buy the virtual currencies from successful miners in the hope that each coin or token will appreciate in value. These markets are not the focus of this Article, though it is worth noting that they are starting to present thorny regulatory questions. *See, e.g., The Market in Initial Coin Offerings Risks Becoming a Bubble*, *ECONOMIST* (Apr. 27, 2017), <http://www.economist.com/news/finance-and-economics/21721425-it-may-also-spawn-valuable-innovations-market-initial-coin-offerings> [<https://perma.cc/Y6G9-S4G7>].

¹⁸⁹ Removing the need to solve a complex puzzle eliminates the creation of cryptocurrency coins because it allows for the creation of new blocks on demand. This increases the speed at which a distributed ledger can record transactions, which should also increase the security of a network as a rapidly evolving chain becomes more difficult for a rogue member to rewrite. *See Catalini & Gans, supra* note 177, at 6–11 (discussing verification costs).

¹⁹⁰ Bheemaiah, *supra* note 175, at 9.

¹⁹¹ *Id.*

¹⁹² *Id.*

in the input string will completely transform the output of a hash function.¹⁹³ In order to create the next block in the chain, a member will need to take the output hash string from the most recent block and compute a new output hash string that incorporates the details of the queued transactions for recording, adds a time stamp for additional security, and meets any other predefined requirements.¹⁹⁴

In this way, the most recently created block intersects with older blocks in the chain. Because the only way to develop a new block is to begin with the previous block's output string—and because the only way to obtain the previous block's output string is to crunch the most recent transactional records with the hash function—there will be an ongoing confirmation of prior transactions that grows stronger as the length of the chain increases.¹⁹⁵ Any effort to rewrite history, by going back several links to change the recorded owner of a given asset, will generate a different output string when run through the hash function. This alteration would not match the results obtained by other members and would be rejected.¹⁹⁶ The only way to succeed in stealing assets through a modified distributed ledger would be to find an alternative solution to the hash algorithm and quickly permeate this alternative reality down through subsequent links in the chain in a way that complies with the synchronization protocol. This is thought to be exceedingly difficult, though not impossible,¹⁹⁷ because the correct chain continues to move forward as other members add links—making any attempt at theft a moving target.

¹⁹³ *Id.*

¹⁹⁴ See *supra* note 156. The predefined requirements may be arbitrary (such as producing an output hash string that begins with a certain number of zeros), and typically serve to limit the supply of blocks that can be generated.

¹⁹⁵ Bheemaiah, *supra* note 175, at 9–10.

¹⁹⁶ In an open system like bitcoin, the resulting output hash function might also not meet the requirements of the algorithmic puzzle. For instance, changing the owner of an asset recorded in the prior link would lead to an output hash function that would not start with the required number of zeros. *Id.*

¹⁹⁷ There are numerous online discussions about attacks and counterattacks of various cryptocurrencies. One notorious battle occurred in 2016 when an anonymous party attacked a cryptocurrency named ethereum seeking to steal assets from some other members. The event attracted widespread media attention and was ultimately defended by a controversial “fork” response, under which the system returned to a period before the attempted theft and created an alternative chain to stymie the theft. For some, this cure was worse than the disease, as it demonstrated that blockchain history might be rewritten under extreme circumstances, undermining some of the public trust that was thought to accompany distributed ledgers. See Klint Finley, *A \$50 Million Hack Just Showed That the DAO Was All Too Human*, WIRED (June 18, 2016, 4:30 AM), <https://www.wired.com/2016/06/50-million-hack-just-showed-dao-human> [<https://perma.cc/X68D-Z3VA>]; Jonathan Ore, *How a \$64M Hack Changed the Fate of Ethereum, Bitcoin's Closest Competitor*, CBC NEWS (Aug. 28, 2016, 9:00 AM), <http://www.cbc.ca/news/technology/ethereum-hack-blockchain-fork-bitcoin-1.3719009> [<https://perma.cc/9GC7-RM8M>].

Finally, each member will need to keep an accurate version of the current ledger, or version control problems will proliferate. For this reason, distributed ledgers must incorporate a synchronization protocol. The details of alternative protocols can grow complicated,¹⁹⁸ but in a nutshell, a member seeking to add a new block must generally broadcast its request and wait for a majority (or supermajority) of participants to agree that the solution works (if proof of work is required) and is timely (first in line to add a new block).¹⁹⁹ Again, differences may arise between public and permissioned ledgers,²⁰⁰ but once the pending block is verified, the new chain of data should be irrevocably connected. The data is disseminated throughout the network, and the next cycle begins.

Many questions remain, of course, about the efficacy, governance, and security of distributed ledgers. Will there be enough capacity to process all of the pending transactions, or might everything bog down when volume spikes? Is there a natural limit or end point to the use of a specific hash function, such that a mature distributed ledger might need to be transplanted to a new system after some period of time? To some extent, these concerns might be addressed or mitigated by establishing variable proof of work standards²⁰¹ or by using metasynchronization protocols that allow temporary differences to arise. Multiple chains could possibly be reconciled later by braiding individual strands into a master chain.²⁰² But these strategies, in turn, would raise governance concerns, such as who should be entitled to

¹⁹⁸ For example, some networks may limit the pace at which any single member can broadcast new blocks through an iterative process that requires everyone else to also propose a new block. This mitigates the ability of a single rogue participant to spam inaccurate information, but it may also limit the pace at which changes can be made. There are other design possibilities, but the output must always be consensus. See Mills et al., *supra* note 165, at 13–14.

¹⁹⁹ See Pinna & Ruttenberg, *supra* note 170, at 12–15.

²⁰⁰ With public ledgers, for instance, the validation process may require individual members to verify that the solution is correct. With a private ledger that does not contain a proof-of-work requirement, the key question may be only who is first in line to add the next block. *Id.* at 12–14.

²⁰¹ The use of a variable number of zeros at the beginning of the bitcoin hash function is a good example of this. See *supra* note 156. Making a puzzle easier or harder to solve is a good way to increase or decrease the system capacity. In some cases, it may be possible to write rules in advance that establish when and how this variability will be implemented. For example, if the goal is to add a new block approximately every ten minutes, then a failure to meet this deadline with the most recent block or with several blocks in a row could trigger an easier version of the puzzle. Conversely, excessively rapid block creation would lead to more difficult problem architecture.

²⁰² This topic raises another important question—Can disparate, distributed ledger systems be stitched together in a way that avoids fragmentation? This is conceivably quite important for the use of distributed ledgers to settle and clear stock trades, because brokers or intermediaries may not all wish to adopt a single system at the outset of this project. If several systems are put in place at the same time, it may become necessary to combine the data in some manner in order to obtain comprehensive information about firm ownership.

exercise any discretion that is built into the adaptive rules,²⁰³ and whether the power to make these changes would create new risks of fraud or abuse.

Perhaps the most worrisome concern is security. Distributed ledgers are designed to be tamper-resistant, but it is always possible that a rogue member might hack a system to steal assets from other parties by retroactively rewriting the history of asset transfers. Because the ledgers are supposed to provide an indisputable record related to the truth of ownership, it may not be easy to make a convincing case that something improper occurred. Relatedly, an important distributed ledger may create a tempting target for terrorism and invite attacks that seek only to harm instead of steal. Generally, these types of attacks are thought to be difficult to accomplish because of the historical record that permeates the database and the consensus-oriented synchronization protocols.²⁰⁴ But the risk is still there.

Despite all this, commentators have grown increasingly excited about the ways that distributed ledgers might be used for innovation.²⁰⁵ Some predict that this technology will ultimately have as much impact on the economy as the invention of double-entry bookkeeping or the Internet.²⁰⁶ The applications are seemingly endless and often speculative. For example, some have suggested that distributed ledgers will unleash a new breed of “smart contracting,” where electronic agents can automatically execute and update agreements as various conditions unfold over time.²⁰⁷ It is not entirely clear what smart contracts mean or how code might replace law and human agency. Some uses of this technology are more straightforward, however, and it is not too hard to imagine how distributed ledgers could transform stock settlement and clearing processes.²⁰⁸

B. *New Stock Clearing Methods*

If we could snap our fingers and create an ideal stock clearing platform, we would probably abandon paper share certificates, along with the

²⁰³ See, e.g., Pinna & Rutenberg, *supra* note 170, at 27.

²⁰⁴ See *supra* notes 163–68 and accompanying text.

²⁰⁵ See, e.g., DON TAPSCOTT & ALEX TAPSCOTT, *BLOCKCHAIN REVOLUTION: HOW THE TECHNOLOGY BEHIND BITCOIN IS CHANGING MONEY, BUSINESS, AND THE WORLD* (2016).

²⁰⁶ See, e.g., *Blockchain: The Next Big Thing*, *ECONOMIST* (May 9, 2015), <https://www.economist.com/special-report/2015/05/09/the-next-big-thing> [<https://perma.cc/S9N4-SW9G>].

²⁰⁷ See Max Raskin, *The Law and Legality of Smart Contracts*, 1 *GEO. L. TECH. REV.* 305 (2017) (offering a more general discussion of smart contracts and their legal implications); Trevor I. Kiviat, Note, *Beyond Bitcoin: Issues in Regulating Blockchain Transactions*, 65 *DUKE L.J.* 569, 605–07 (2015) (discussing a smart contract to trade futures).

²⁰⁸ Typically, the first large-scale application of distributed ledger technology relates to improved, real-time payment systems. But better settlement and clearing architecture for securities is often not very far behind payment systems on the list of likely applications. See TAPSCOTT & TAPSCOTT, *supra* note 205, at 18–19.

complicated and multi-layered distinction between record and beneficial owners. A share of stock would trade electronically, perhaps through brokers and exchanges, but the details of each transfer would be processed by a secured and trusted protocol that specifically identifies *each share* being exchanged. This information would be rapidly updated (ideally in real time) and accessible by appropriate parties with the right clearance or, conceivably, by the public. In short, we would have immediate clearing of stock transfers in a way that preserves a precise chain of title.

Five or ten years ago, most experts would have dismissed this vision as fantasy. It was simply too difficult to imagine how state-of-the-art computing power could keep up with the ongoing tide of trades. Recently, however, it has become possible to envision how distributed ledger technology might be adopted to permit direct and rapid settlement of stock trades.

Early platforms are emerging.²⁰⁹ The goal is to create a “golden ledger” of stockholders, reflecting the most current ownership data and substantially reducing, or perhaps even eliminating, the need for the custodial arrangements described in Part I of this Article. Piloting fintech firms anticipate processing thousands of transactions per second while maintaining a complete and perpetual record of all historical transactions related to any security.²¹⁰

One of the more interesting questions involves the role, if any, that banks, brokers, and other intermediaries might play in a new settlement platform.²¹¹ It 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. They could buy or sell stock directly through the exchange and write changes to the distributed ledger under a public protocol akin to that used by bitcoin.²¹²

On the other hand, there are many reasons to believe that complete disintermediation will not occur. For one, some investors will continue to enjoy the financial advice that they receive from experts, and they might be

²⁰⁹ For example, one venture named SETL is building a custom blockchain application that allows brokers to settle transactions on a peer-to-peer distributed ledger. See Jemima Kelly, *Computershare Teams Up with Start-up SETL on Blockchain Project*, REUTERS (Apr. 28, 2016, 6:51 AM), <https://www.reuters.com/article/us-securities-blockchain-computershare/computershare-teams-up-with-start-up-setl-on-blockchain-project-idUSKCN0XP1NL> [<https://perma.cc/YYF4-3NZM>].

²¹⁰ See *id.*

²¹¹ See, e.g., Mills et al., *supra* note 165, at 6–8 (exploring the costs and benefits of intermediaries in distributed ledgers); DTCC WHITE PAPER, *supra* note 163 (same).

²¹² It is also possible, of course, to imagine a specialization of labor similar to the evolution of the bitcoin system. Investors uninterested in mining for new blocks might have their transactions queued for processing by other miners in the exchange. These miners may not trade actively in equity securities, but rather seek to generate revenues through commissions, the generation of cryptocurrency coins, or both.

loath to trade directly. Others may continue to seek the diversification and scale benefits that arise through mutual funds and alternative investments, such as hedge funds. Moreover, the security risks and capacity limitations associated with a public ledger stock exchange will probably be too great for most people to stomach in the near term. Recall that public blockchains require members to submit some proof of work in order to earn the right to add a new block to the distributed ledger.²¹³ This has clear advantages in a world of distrust: one must incorporate the queued transactions for recording in the solution algorithm. However, it significantly limits the speed with which trades can be memorialized because all parties must wait for a new solution to be discovered through brute computing trial and error.²¹⁴

For these and other reasons, it is likely that banks and brokers will continue to play a role in the creation and operation of new stock clearing platforms. One can imagine, for instance, a project where a consortium of intermediaries establishes a private ledger where they are the only ones with viewing and modification rights. An investor seeking to buy or sell stock would contact a broker member to execute trades. The broker would locate a counterparty and then process and record each transaction on the distributed ledger.²¹⁵ With just a small number of permissioned parties who trust each other, each broker would not need to solve an algorithmic puzzle; they could just write a new block as soon as a sufficient number of transactions are queued for processing.²¹⁶

From the client's perspective, not much would seem to change. The brokers would continue to provide economic information and share positions. The trades would settle more quickly, and there would be a detailed and traceable record of title for every single share of stock. Depending on the level of visibility offered by the ledger, clients might be able to see ownership and trading data about other shareholders in a firm. It is also possible, however, that the platform might keep this information from individual investors.²¹⁷

²¹³ See *supra* notes 155–61 and accompanying text.

²¹⁴ See *supra* note 156.

²¹⁵ Various financial arrangements are possible to ensure that client funds are available to stand behind these trades in a manner consistent with current arrangements between broker and client (such as those relating to margin trading).

²¹⁶ The threat of sanction or expulsion from the network for misdeeds might also mitigate bad behavior by brokers.

²¹⁷ Determining how much access should be provided to historical trading data will raise interesting regulatory issues. For example, some investors or brokers may seek to monitor the identity of specific traders closely to determine whether senior executives at a firm or renowned external traders are changing their positions in order to glean information about the firm's current prospects. In other words, there may be governance benefits to obtaining data about insider trades on a real-time basis. See, e.g., David Yermack, *Corporate Governance and Blockchains*, 21 REV. FIN. 7, 17–26 (2017).

Moving to a different clearing system would introduce some new costs. One advantage of fungible bulk is that intraday trades can be netted against each other in a way that reduces the ultimate need to record bookkeeping adjustments for every stock trade.²¹⁸ Imagine, for instance, an active day-trader who consistently buys a share of Amazon whenever the price hits \$990 and sells it at \$1000. In a single volatile day, this hypothetical trader may move in and out of this stock several times or more. Under current systems, brokers need not worry about clearing each of these intraday transactions. Rather, the trader's moves can just be netted against all of his other trades and tallied at the end of the day, or some equivalent processing milestone. For example, ten buys and nine sells would ultimately result in a need to settle and clear just one share of Amazon stock for this trader. In this same way, banks and brokers may first determine the total change in share position by all of their internal clients and only report this net change in position to DTCC at the end of the day. For large custodians, many of the accounting adjustments for internal clients might be accomplished within the walls of the bank or brokerage by moving money and share positions between clients.²¹⁹ Only the residual amounts need be settled at the end of the day with DTCC.

By contrast, under a distributed ledger system, every single move by our hypothetical day trader would need to be incorporated into the chain of title. This is not insurmountable, but it would mean that actively traded firms might have much longer histories of ownership and require more significant processing activity to track share provenance.

Moreover, a number of important questions will need to be answered before distributed ledger platforms change stock clearing practices.²²⁰ Who would pay for an infrastructure rewiring project and why?²²¹ Should a system be managed and/or viewable on a private distributed ledger or available for public access? What privacy protocols should be established for individual investors? Could a new system scale to handle the necessary volume of stock

²¹⁸ See, e.g., Michael McClain, *How Does DTCC Netting & Settlement Reduce Risk and Cost for the Industry?*, DTCC (Nov. 28, 2017), <http://www.dtcc.com/news/2017/november/28/how-does-dtcc-netting-and-settlement-reduce-risk-and-cost-for-the-industry> [<https://perma.cc/ZUY5-LM8K>].

²¹⁹ By some estimates, the use of netting allows banks and brokers to reduce clearing activity by ninety percent or more. *Id.*

²²⁰ See, e.g., Geis, *supra* note 50, at 1669–70.

²²¹ Many people would benefit from stock-clearing reforms: investors (through better governance and perhaps higher firm values), aspiring managers (through an ability to mount proxy contests), adjudicators (through clearer governance mechanisms), and perhaps those responsible for operating the new system (if they can command a reasonable profit for their services). But there is an obvious free-rider problem because once the clearinghouse is established, everyone can take the benefits without necessarily contributing funds for the completion of the efforts.

Id. at 1669.

trades?²²² Can pilot efforts or dual-system clearing processes be implemented to test new clearing platforms without leaping over a cliff?²²³ Who, if anyone, would ultimately retain governance rights over the clearing infrastructure, and would these governance rights introduce new security or regulatory concerns? Until these and other questions are answered, it is not obvious that clearing institutions, corporations, financial institutions, investors, and regulators will be willing to abandon a slow and clumsy system that works for a rapid and elegant system that relies on exciting but unproven technology. A major stock settlement failure would be catastrophic.

In any event, the point of this Article is not to evangelize for change. The move to a new technology paradigm is not inevitable, but the promise of cheaper,²²⁴ faster, and (possibly) more secure clearing systems does mean that the odds of a transformation cannot be ignored. Any change is unlikely to happen overnight, but neither is this purely the stuff of science fiction. DTCC is testing the waters. Some companies have issued shares that trade electronically on a distributed ledger backbone.²²⁵ The former Governor of Delaware has launched an initiative to clarify how the state's corporate law will work for distributed ledger stock transfers.²²⁶ The Australian Stock Exchange is transitioning everything to a distributed ledger clearing platform.²²⁷ And entrepreneurial tech firms, armed with funding from financial institutions, continue to grapple with the best ways to design new systems.²²⁸ It is not too early to consider the legal effects of an exchange technology that eliminates the need for centralized stock holdings in unidentified fungible bulk.

²²² Daily trading volume vary significantly, but, by way of illustration, roughly one billion shares were traded on the NYSE each day during the first month of 2017. See *NYSE Group Volume in All Stocks Traded*, *supra* note 35.

²²³ The notion here is that trades would continue as normal, but over time an electronic signature would be added to more and more trades. Eventually, the system could be “switched on,” run in parallel for some time to permit testing, and eventually “take over” as the exclusive trading method.

²²⁴ One recent report estimates that banks might save \$15–\$20 billion per year by migrating clearing and other processes onto distributed ledger technologies. See SATANDER ET AL., *THE FINTECH 2.0 PAPER: REBOOTING FINANCIAL SERVICES* 14–15 (2015), <https://www.finextra.com/finextra-downloads/newsdocs/the%20fintech%20%20%20paper.pdf> [<https://perma.cc/5644-83RQ>].

²²⁵ See Cade Metz, *Overstock Begins Trading Its Shares via the Bitcoin Blockchain*, WIRE (Dec. 15, 2016, 6:20 PM), <https://www.wired.com/2016/12/overstock-com-issues-stock-via-bitcoin-blockchain> [<https://perma.cc/6CRH-LSBU>].

²²⁶ 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/98AV-WHHT>].

²²⁷ See Range, *supra* note 162.

²²⁸ See del Castillo, *supra* note 158.

III. THE IMPACT ON CORPORATE LAW

The defining feature of traceable shares is that every unit of stock will have a clear chain of title identifying all current and prior owners. Stock will no longer need to be physically isolated and held in unidentified fungible bulk. In many cases, investors may not notice a difference: buyers can happily accept the economic rights that accompany each share without giving a second thought to the lineage of ownership history that accompanies this transfer of title.

The elimination of fungible bulk holdings by intermediaries and the increased transparency of share provenance, however, would address some of the governance concerns described earlier in this Article. Voting rights would be exercised by current owners, rather than stockholders who sold their shares after the record date.²²⁹ Section 11 claimants could easily trace shares to establish standing.²³⁰ Appraisal litigants would no longer need to face indeterminate inquiries about how their shares have voted.²³¹ The increased trust in accurate outcomes might bolster the use of other corporate governance mechanisms, such as shareholder proposals.²³² On a more general note, the ability to track the granular histories of current and former shareholders might present opportunities to rethink foundational theories of corporate and shareholder responsibility. This Part considers each of these ideas in turn, offering some thoughts on how corporate law might benefit from traceable shares.

A. Voting

Firms with traceable shares should find it possible to significantly narrow the temporal decoupling of governance rights and economic interest. Voting power can remain attached to stock for a longer period of time, preventing sellers from voting shares they no longer own weeks or months after a trade. Indeed, investors might be able to continue buying and selling stock with voting power right up until the moment a vote is called.

To be sure, advance notification of an election would still be required, so that shareholders (or potential shareholders) would have time to muster information, evaluate competing proposals, and make up their minds. But firms would no longer need to set a record date that severs voting rights far in advance of election day. There would be little need to move up and down through layers of custodial ownership to identify current holders, send them

²²⁹ See *supra* Section II.C.2.

²³⁰ See *supra* Section I.C.1.a.

²³¹ See *supra* Section I.C.1.b.

²³² See *supra* Section I.C.3.

the relevant information, and process voting instructions on their behalf. For example, a firm might announce on May 1 that all current shareholders on, say, 4:00 p.m. EDT on June 15 will have voting rights that will be tallied over the next twenty-four hours.²³³ These votes, many of which could be cast earlier than June 15 if desired, would be gathered, checked against the “golden ledger” of owners to ensure that each voting shareholder really did hold the shares on June 15 at 4:00 pm, and counted accordingly.²³⁴

A centralized ledger of owners would also reduce the need to enlist brokers or proxy solicitation firms to track down beneficial owners and distribute voting materials. Shareholders would still need to receive the relevant information, including voting instructions, but this might now be accomplished with three overlapping strategies. First, upon announcement of an upcoming vote, all current shareholders could be sent this information—possibly drawing upon a contact database that is linked to their identification as owner in the distributed ledger. Second, as shares trade between this announcement date and the day that is designated for the vote, new purchasers could be sent this same information. Third, all of the voting materials might be uploaded to a central online repository,²³⁵ accessible by anyone who wants to watch from the sidelines while contemplating a possible acquisition of shares. Every vote will be verified by checking the stock ownership records against the timestamped distributed ledger database, so there should be no need to worry about former owners or unrelated parties casting fraudulent votes. These would be rejected as invalid. For this reason, it is even possible that ballots might be made available to anyone.

Processing votes in this manner would result in a variety of benefits. The most obvious one is a reduction of unintentional errors, allowing firms to gain confidence in the accuracy of shareholder votes and minimizing the messy litigation that can occur when record holders make a mistake or fail to vote shares as instructed.²³⁶ Overvoting would also be screened out, recounts would be reduced, and there would no longer be a need to reconcile subtotals among various custodians or to worry about situations where the

²³³ Paper proxies might still be used for owners without online access or for long-term investors who will not change their positions and want to vote before the twenty-four-hour window—though some additional processing would obviously be required.

²³⁴ The identity of the person actually performing these validation and processing tasks presents other interesting questions, but it is likely that current tallying agents, like Broadridge, would migrate their business models to perform such services. It is also possible that the new platforms would offer these services directly.

²³⁵ This central online repository could perhaps be maintained by a leading proxy solicitation firm or vote-processing outsourcing vendor.

²³⁶ See, e.g., *Kurz v. Holbrook*, 989 A.2d 140, 153–54 (Del. Ch. 2010) (documenting voting mistakes by the record owner in a closely contested director election), *rev'd sub nom. in part on other grounds*, *Crown EMAK Partners, LLC v. Kurz*, 992 A.2d 377 (Del. 2010).

aggregate share count of custodial banks and brokers does not match the total number of shares issued by the firm.²³⁷

This new system might also help deter some of the undesirable consequences of empty voting, where franchise rights are exercised without economic interest.²³⁸ By linking votes to share ownership for a longer period of time, there would be fewer situations where loose votes are available for sale or manipulation.²³⁹ To be sure, rewiring the exchange infrastructure would only address a small part of this problem. It still might be possible for an aspiring empty voter to buy and hold the actual shares, thereby retaining the vote, while hedging away the economic risks of ownership through swaps or other derivative transactions.²⁴⁰ It would take other, more comprehensive solutions to close down empty voting entirely.

Similarly, even a perfect golden ledger of owners is unlikely to be a panacea for shareholder voting concerns. Information might be sent to outdated addresses. Changes to votes might remain difficult to count, especially if votes continue to be cast though the mail.²⁴¹ Many shareholders might remain rationally apathetic, ignoring their perfectly traceable voting rights just as regularly as they ignore the current missives to submit voting instructions from custodial brokers.²⁴² More generally, large mutual funds and other institutional holders could continue to cast votes according to a prearranged formula—perhaps hewing to the advice received from third-party proxy advisory firms. If so, this could drown out much of the impact

²³⁷ See *supra* note 121 and accompanying text.

²³⁸ See Jordan M. Barry et al., *On Derivatives Markets and Social Welfare: A Theory of Empty Voting and Hidden Ownership*, 99 VA. L. REV. 1103, 1120–24 (2013); Hu & Black, *New Vote Buying*, *supra* note 10, at 828–36 (describing the concerns with empty voting); Robert B. Thompson & Paul H. Edelman, *Corporate Voting*, 62 VAND. L. REV. 129, 160–62, 174–75 (2009) (arguing for a ban on share voting by parties with no economic interest).

²³⁹ Relatedly, the wisdom of allowing shareholder votes to be sold in public or private markets has been debated for some time. For more on this topic, see Henry G. Manne, *Some Theoretical Aspects of Share Voting: An Essay in Honor of Adolf A. Berle*, 64 COLUM. L. REV. 1427–28 (1964) (advocating unrestricted vote selling), and Thompson & Edelman, *supra* note 238, at 162–66 (doubting the wisdom of vote sales).

²⁴⁰ This was the strategy employed in the now-famous Mylan–King merger, where a large shareholder in the target firm purchased shares in the acquiring firm so he could vote for the transaction on both sides to increase the odds of approval and thereby realize a large premium on his target shares. See Thompson & Edelman, *supra* note 238, at 153–54. In implementing this strategy, the shareholder hedged away his economic interest in the acquiring firm—calling into question whether his ability to vote was really in the best interest of the acquiring firm’s owners. *Id.*

²⁴¹ If shareholders are still able to switch positions by revoting their shares, then processing firms will need to establish which vote came last. Arguably, allowing shareholders to change their minds by revoting shares might be less important with traceable shares because it is easier to wait until the date of the vote, but it may still be beneficial to offer this flexibility in the event that, say, a new suitor emerges in a corporate takeover situation.

²⁴² See *supra* note 113 and accompanying text.

of voting with traceable shares in an era when more and more shareholding occurs through intermediaries.²⁴³

Nevertheless, tighter voting links should chip away at the problem of voter apathy. As weak as the incentives are for some shareholders to vote, they are generally far worse for *former* shareholders. Eliminating the record date gap might also spark buying sprees where hedge funds or other activist purchasers seek to obtain meaningful positions in a firm in order to exercise franchise rights and influence an election as the voting date nears.

B. Shareholder Lawsuits

Traceable shares will also offer clarity in situations where legal rights are linked to an earlier disposition of specific shares and shareholders must prove this link to exercise their rights. Again, Section 11 litigation and appraisal valuation claims provide useful examples that illustrate the effect that adopting distributed ledger technology would have on shareholder lawsuits.

1. Section 11 Litigation

Recall the primary problem with Section 11 litigation: plaintiffs who purchase shares on the secondary market are allowed to sue for fraudulent registration statements, but only if they can prove (with absolute certainty) that they bought shares issued during the tainted filing.²⁴⁴ In a trading system that relies on fungible bulk, it is usually impossible to trace downstream shares back up to the problematic registration statement.²⁴⁵

With traceable shares, however, the inquiry should become routine. A plaintiff would run a query on each of her shares to examine the chain of title and determine which ones qualify for a Section 11 claim. Notions of statistical tracing, heritage tracing, or obscure legal methods for tracing

²⁴³ Concerns related to the voting of mutual funds and other aggregate and large yet passive institutional owners present a host of important and difficult governance questions. *See, e.g.*, Kahan & Rock, *supra* note 146, at 1426–30. Other commentators have chronicled how increased voting obligations for these firms have led to increased reliance on proxy advisory firms—who are happy to advise (sometimes reluctant) mutual fund managers on how to cast votes. *See, e.g.*, George W. Dent, Jr., *A Defense of Proxy Advisors*, 2014 MICH. ST. L. REV. 1287. This can have a large influence as more and more investors purchase market index funds through large intermediaries. One interesting question, beyond the scope of this Article, is whether it might be possible and worthwhile for individual mutual funds to use distributed ledger technology to “pass through” proportional voting rights to their ultimate investors. For instance, an investor who owns 1000 shares of Vanguard’s Total Market Index Fund might see this position translate into voting rights for two shares of Apple stock. It is not clear that pass-through voting is practical or desirable, for a variety of reasons (including an increase in shareholder apathy upon receiving hundreds of fractional voting rights), but the topic is worth considering.

²⁴⁴ *See supra* notes 46–57 and accompanying text.

²⁴⁵ *See supra* Section I.C.2.a.

shares would become obsolete because no inferences are needed.²⁴⁶ Indeed, a plaintiff could conceivably bring a class action on behalf of all shareholders who currently own the stock issued by the offending registration statement.²⁴⁷ The practical effect of this development, then, would be to resurrect Section 11 liability for secondary market purchasers. This may be a desirable policy because it would offer proportional deterrence for fraud.²⁴⁸ That is, firms would not be able to evade liability by invoking impossible tracing obligations, but they would also not face excessive liability from all downstream secondary market purchasers. Only the exact number of shares issued via the fraudulent registration statement would be eligible to recover.

2. Appraisal Claims

Turning to the appraisal context, recall that these claims are not allowed for shares that vote in favor of a triggering transaction, even though it is often impossible to determine how any given share has been voted.²⁴⁹ Courts must therefore rely on aggregate vote counts by the record holder (typically Cede) to set an upper limit on the number of shares that will qualify for appraisal.²⁵⁰ Apportioning eligible shares among multiple claimants is indeterminate.

By contrast, traceable shares would offer a clean solution to the appraisal identity problem. The first benefit would arise through the narrowing of the voting gap, as described above. Because purchasing shareholders could obtain the vote much closer to the actual date of a decision, there would be less need to argue about how late-purchased shares had been voted by others. Instead, dissenters could buy shares, retain the vote, and offer evidence that their shares qualified for appraisal because they had voted no. Moreover, a reduction in custodial processing should eliminate both agency errors, as seen in the *Dell* case,²⁵¹ and disputes about whether a plaintiff's *specific* shares qualified for appraisal rights where Cede formally casts a large cluster of fungible share votes. In other words, there would be no need to debate whether a custodial record holder had cast enough nonpositive votes to support all claims or to worry about how to allocate a limited pool of qualified shares among multiple appraisal claimants. Plaintiffs acquiring shares after a merger announcement, but before the vote, *could* vote directly on the deal.

²⁴⁶ See, e.g., Sean Belcher, Note, *Tracing the Invisible: Section 11's Tracing Requirement and Blockchain*, 16 COL. TECH. L.J. 145 (2017).

²⁴⁷ For additional discussion of the history and evolution of Section 11 litigation claims, see Steinberg & Kirby, *supra* note 64, at 1–31.

²⁴⁸ Cf. Grundfest, *supra* note 55, at 56–58 (discussing the optimal scoping of Section 11 liability).

²⁴⁹ See *supra* Section I.C.2.b.

²⁵⁰ See *supra* notes 92–98 and accompanying text.

²⁵¹ See *supra* notes 82–89 and accompanying text.

Some tricky situations could persist. Imagine, for instance, that a shareholder votes yes on a merger but then sells the share before the deadline to process votes. The new purchaser should retain rights to revoke this share against the deal and, thereby, resurrect an appraisal claim. In order to retain these rights, however, the verification protocols for determining how this specific share voted would need to screen out the earlier selling shareholder's vote. This would require the creation of additional screening protocols to match up the full slate of votes against the final golden ledger of shareholders.

Interesting trading events might also arise if a gap remains between the period when votes are due and the deadline for filing an appraisal claim. I have suggested above that this gap may be short, but it is still possible that bifurcated markets would emerge where some buyers seek to find traceable shares that did not vote in favor of a transaction to amplify their pending appraisal claims. This development could present new marketing and pricing questions (would shares linked to different voting positions trade for different amounts?), while also creating new opportunities for brokers looking to obtain specific types of shares for their clients. Other interesting situations might occur with the fragmentation of share markets. To the extent that the record date gap can be minimized or eliminated with better clearing technology, however, these puzzles will disappear.

C. Shareholder Proposals, Proxy Fights, and Information Transparency

Traceable shares and the creation of a centralized, real-time shareholder database would also likely impact some other levers of corporate governance, including shareholder proposals and proxy contests. Currently, it can be difficult to lead successful shareholder initiatives that either moot a contentious issue or advocate a rival slate of directors. Some of this expense stems from the need to comply with detailed requirements governing proxy communications with shareholders.²⁵² But another category of expense arises through the practical need to conduct a political campaign by hiring advisors (typically lawyers and proxy solicitation firms) to track beneficial owners through labyrinths of intermediary owners and lobby for marginal votes.²⁵³ A

²⁵² The primary regulatory framework arises under Section 14(a) of the 1934 Securities Exchange Act, which prohibits parties from soliciting proxies (defined broadly) in violation of SEC rules. These rules go on to require anyone soliciting a proxy to prepare and distribute a proxy statement to shareholders. See 17 C.F.R. §§ 240.14a-3 to -5 (2018) (codifying Rules 14a-3, 14a-4, and 14a-5).

²⁵³ One recent contest, for example, cost an estimated \$60 million or more. See Julie Creswell, *An Epic, and Costly, Boardroom Battle at Procter & Gamble*, N.Y. TIMES (Oct. 8, 2017), <https://www.nytimes.com/2017/10/08/business/economy/an-epic-and-costly-boardroom-battle-at-procter-gamble.html> [<https://perma.cc/7LNF-GVTP>] (“[T]he two sides will have spent at least \$60 million, and probably tens of millions more, as they try to sway investors to their point of view.”).

centralized database of owners might help to cut these transaction costs and increase the practical use of shareholder initiatives for a wider range of qualified governance concerns.²⁵⁴

A renewed interest in shareholder governance initiatives, including the important battlegrounds of bylaw modifications and proxy fights, seems likely. As mentioned earlier in this Article, it is possible that uncertainty about the integrity of voting has prevented legal reforms aimed at creating broader shareholder governance.²⁵⁵ Lawmakers might be willing to rethink elective or mandatory investor governance initiatives in the wake of cleaner voting infrastructure.

While it is difficult to know whether the use of alternative governance strategies would really increase with traceable shares, decisions about what information regarding current shareholders is provided to the public will impact any evolution in this direction. On one extreme, we can imagine that distributed ledgers might make shareholder information fully transparent. They could offer real-time data about the identification and ownership stake of all shareholders to anyone. This would allow disgruntled shareholders to easily contact other influential owners, while also providing information about changes in insider holdings. On the other hand, this level of transparency may introduce privacy concerns, and it is possible that any golden ledger of shareholders might only be made visible to managerial insiders. If this latter path is taken, then very interesting questions will arise about the circumstances under which an outside shareholder (or other party) should be able to access this data.²⁵⁶

D. Corporate Liability and Shareholder Responsibility

Finally, the development of traceable shares might even allow lawmakers to rethink fundamental principles of shareholder responsibility for corporate misdeeds. To date, holding former shareholders directly accountable for any corporate offenses that arose during their ownership tenure has been exceedingly rare.²⁵⁷ In light of the new information that

²⁵⁴ Indeed, I would predict that one implication of easier coordination among shareholders will be an emphasis on the availability of proxy access for board elections.

²⁵⁵ See *supra* Section I.C.3.

²⁵⁶ In Delaware, it is likely that this information could be obtained under a shareholder books and records request governed by Title 8 § 220 of the Delaware Code. DEL. CODE ANN. tit. 8, § 220 (West 2006). But the constantly changing ledger of shareholders might raise new questions. For example, would a firm have an ongoing obligation to provide current ownership updates to an outside shareholder for a given period of time (as opposed to a static snapshot) if a proper purpose is established?

²⁵⁷ The primary exception, of course, is found in a claim to pierce the corporate veil. See, e.g., Robert B. Thompson, *Piercing the Corporate Veil: An Empirical Study*, 76 CORNELL L. REV. 1036 (1991). These lawsuits mostly arise in the context of tort or contract claims by outside parties against current

traceable shares could offer, however, established notions of corporate and shareholder liability might need to be reexamined. For instance, the ability to trace shares could address the allocation of shareholder liability in the context of 10b-5 fraud on the market claims.²⁵⁸

One of the more important developments in corporate liability arose when the Supreme Court accepted fraud on the market in connection with a 10b-5 misrepresentation claim.²⁵⁹ Reaffirmed in 2014,²⁶⁰ this doctrine allows shareholders to sue for corporate misrepresentations in connection with a trade, even when the investor did not hear the misleading statement.²⁶¹ The premise is that plaintiffs should be able to rely on the integrity of the market itself and the idea that prices will quickly react to the release of public corporate misstatements.²⁶² As a practical matter, fraud on the market facilitates class action securities litigation because plaintiff shareholders no longer need to demonstrate common issues of individual reliance.²⁶³

This theory has generated controversy.²⁶⁴ One set of concerns arises from the complex economic effects that can result from a judgment against the firm. Consider an illustrative fact pattern: the head of investor relations issues a press release stating that something really good has occurred—perhaps the firm has struck oil in a remote location. The firm’s share price leaps from \$30 to \$50 in response, but the statement is a total lie. One shareholder, Albert, decides to sell 100 shares for unrelated reasons and pockets the \$5000. Another shareholder, Byron, doesn’t learn of the statement, but he decides to buy the 100 shares for \$5000. A third shareholder, Constance, has owned 100 shares of the firm for years, and she holds her stock throughout this time period. Several weeks later, with the shares still trading at \$50 per share, the lie is revealed, and the price falls back to \$30 per share. Byron files a 10b-5 action against the firm, alleging fraud on the market.

shareholders; they do not typically involve shareholder lawsuits and transfers from former to current shareholders, as discussed in this Section.

²⁵⁸ See generally 17 C.F.R. § 240.10b-5 (2018).

²⁵⁹ This took place in 1988 with *Basic Inc. v. Levinson*, 485 U.S. 224, 243–45 (1988). For a contemporary assessment of the case and its impact, see Jonathan R. Macey & Geoffrey P. Miller, *Good Finance, Bad Economics: An Analysis of the Fraud-on-the-Market Theory*, 42 STAN. L. REV. 1059 (1990).

²⁶⁰ *Halliburton Co. v. Erica P. John Fund, Inc.*, 134 S. Ct. 2398, 2408 (2014).

²⁶¹ *Id.*

²⁶² *Id.*

²⁶³ *Id.* at 2412.

²⁶⁴ See, e.g., William W. Bratton & Michael L. Wachter, *The Political Economy of Fraud on the Market*, 160 U. PA. L. REV. 69 (2011); Macey & Miller, *supra* note 259; Paul G. Mahoney, *Precaution Costs and the Law of Fraud in Impersonal Markets*, 78 VA. L. REV. 623, 663 (1992).

Byron seems to have a good case, under the theory that he paid too much for the stock. True, he did not hear the false claim, or purchase his stock in direct reliance on the statement, but fraud on the market should allow Byron to win a lawsuit against the firm. He recovers \$2000 (100 times \$20), reflecting the higher amount that he had to pay when the market price rose in response to the firm's lie. Economically, however, this money does not materialize from thin air. The \$2000 in damages is effectively borne by other current shareholders, as residual claimants of the firm's assets. If there are 1000 total shares, for instance, then each share should decline by \$2 to reflect the decrease in cash. This general phenomenon—and the fact that corporate liability must ultimately be borne by residual owners who may have had absolutely nothing to do with the firm's misdeeds—is a perennial concern.²⁶⁵

This problem becomes especially salient if we consider the plight of our other individual investors. Constance owned shares worth \$3000 at the time of the lie. Her position briefly jumps to \$5000 but then drops to \$2800 after the shares return to \$30 per share when the lie is revealed, and then drop to \$28 per share when Byron wins and the damages are paid out by the firm. Given that Constance was a shareholder when the shareholders elected the firm directors, who in turn, appointed the rogue managers, a case might be made for holding her responsible for the misdeeds of the insider managers under a principal–agent relationship. Many people, however, would consider her a victim of the agency cost problem; any culpability is highly attenuated.

Albert, on the other hand, should be delighted by this turn of events. He was expecting to receive \$3000, but when the stock price jumped to \$50 per share right before his liquidation, he was able to cash out at a much higher price.

Historically, the law has never worried much about benefits to shareholders like Albert.²⁶⁶ Investors who benefit from corporate misrepresentations—whether by selling too high in the presence of false good news (like Albert) or by buying too low in the presence of false bad news—are simply allowed to keep their profits. At least part of the reason for this approach seems to come from an administrative inability to trace shares. We might be able to determine, in a rough sense, the timing of when someone changes their economic position, but no losing party could link shares back to an individual gaining investor.

The presence of traceable shares, however, might conceivably change the way that lawmakers think about corporate liability and shareholder

²⁶⁵ See *supra* note 2.

²⁶⁶ See Bratton & Wachter, *supra* note 264, at 93–94; Frank H. Easterbook & Daniel R. Fischel, *Optimal Damages in Securities Cases*, 52 U. CHI. L. REV. 611, 635 (1985).

responsibility. Should we be willing to claw back the gains from Albert in this example? Indeed, holding the benefitting investor responsible might represent a classic case of restitution.²⁶⁷ A full exploration of this possibility, and the wisdom of invoking restitution doctrines in similar circumstances, is beyond the scope of this Article. Still, the example should begin to illustrate how profound structural changes related to corporate and shareholder responsibility will become possible with traceable shares.

CONCLUSION

Traceable shares may seem like a minor development for corporate law. Indeed, many people probably assume that we already track individual ownership histories. Yet this is not the case. New technology that creates traceable shares would therefore represent a significant change and offer some intriguing possibilities for improved corporate governance. Indeed, it may even prompt lawmakers to reconsider fundamental notions of corporate liability and shareholder responsibility.

More accurate stock clearing and settlement systems should also influence scholarly debates about the optimal structure of corporate governance. Many commentators continue to focus on the right way to balance power between shareholders and managers. Shareholder rights advocates push for reforms, like increased proxy access and disarmed antitakeover defenses, to bolster shareholder power. Advocates of director primacy continue to assert that shareholder activism brings strategic ignorance and sows dysfunctional leadership teams. They insist that most governance matters should be left to inside managers. Moderates see ills in both extremes and work to design better checks and balances via corporate law reforms. The availability of a more accurate system for tabulating votes and parsing out other legal rights might cause some scholars to reconsider their positions.

Moreover, all commentators should agree on one principle: a well-functioning system of corporate voting is critical to any healthy governance regime. Proponents of shareholder democracy cannot argue for greater participation rights if the legitimacy of resulting tallies is suspect. And those who advocate for board deference do so on the bedrock of authority that reliable shareholder elections supposedly confer. The proper scope of

²⁶⁷ The law of restitution seeks to avoid unjust results under the general principle that “unjust enrichment must be disgorged.” See Douglas Laycock, *The Scope and Significance of Restitution*, 67 TEX. L. REV. 1277, 1278 (1989). According to Laycock, this body of law “consists largely of blank spaces with undefined borders and only scattered patches of familiar ground.” *Id.* at 1277. Restitution might therefore provide an intriguing remedy to recoup “undeserved” benefits from ex-shareholders, but the theory would require more extended analysis.

governance power is subject to debate and centers on disagreements about managerial agency costs and shareholder information deficits. What matters to everyone, however, is the fitness of the underlying system used to stuff the ballot boxes. Traceable shares cannot put these longstanding corporate governance debates to rest, but they will open an important new chapter for corporate law.

