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The Historical Context of Stock Settlement and Blockchain

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The Historical Context of Stock Settlement and Blockchain

*George S. Geis**

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INTRODUCTION

In 1968, the U.S. stock market collapsed.¹ It did not flatline, of course, but major markets closed every Wednesday in an event now known as the “Wall Street Paperwork Crisis.”² This seizure was not caused by problems at the front end of a trade; brokers and dealers could easily keep up with the various client orders to buy or sell stock. Rather, the difficulties arose from back-end bottlenecks that occurred during the clearing and settlement process—the method by which a share of stock is transferred from seller to buyer.³ This two-step process is necessary because the initial moment of contracting—the trade—is not executed on an instantaneous basis. The shares are exchanged later, thereby fulfilling the contractual commitment, via a settlement and clearing process that is often described as the “back-office plumbing” of securities markets.⁴

The Wall Street Paperwork Crisis of 1968 led to a fascinating Congressional investigation and the establishment of a novel second-generation system for clearing trades.⁵ This solution finessed the paperwork problems arising from first-generation clearing, reopened markets for the full workweek, and made good sense at the time. It remains largely in place today, more than fifty years later, even as our financial markets encompass vastly different trading structures and exponential trading volume.

In 2021, however, sectors of the U.S. stock market stumbled again. Early in the year, investors flooded into GameStop stock on a surprisingly rapid basis, driving up the price of the stock from \$17.25 per share at the start of the year to \$347 per share by January 27, 2021.⁶ On Thursday, January 28, however, several trading firms, including the popular broker Robinhood,

¹ See JOEL SELIGMAN, *THE TRANSFORMATION OF WALL STREET: A HISTORY OF THE SECURITIES AND EXCHANGE COMMISSION AND MODERN FINANCE* 412 (3d ed. 2003).

² See, e.g., *id.*; VIRGINIA B. MORRIS & STUART Z. GOLDSTEIN, *GUIDE TO CLEARANCE & SETTLEMENT: AN INTRODUCTION TO DTCC* 4 (2009).

³ See MORRIS & GOLDSTEIN, *supra* note 2.

⁴ See Seligman *supra* note 1.

⁵ See *infra* Part II.A–B.

⁶ See, e.g., Oscar Gonzalez & David Priest, *Robinhood Backlash: What You Should Know About the GameStop Stock Controversy*, CNET (Mar. 17, 2021, 3:42 PM), <http://www.cnet.com/personal-finance/investing/robinhood-backlash-what-you-should-know-about-the-gamestop-stock-controversy/> [<http://perma.cc/DC8A-8YZR>]; Nikhilesh De, *What Really Happened When Robinhood Suspended GameStop Trading*, COINDESK (Feb. 16, 2021, 8:03 AM), <http://www.coindesk.com/markets/2021/02/16/what-really-happened-when-robinhood-suspended-gamestop-trading/> [<http://perma.cc/FGD5-GKVY>]; Statista Rsch. Dep't, *Daily Stock p-Price of GameStop Corporation from December 30, 2020 to March 22, 2023*, STATISTA (Mar. 23, 2023), <http://www.statista.com/statistics/1199882/gamestop-daily-stock-price/> [<http://perma.cc/6P3P-WACZ>].

told customers that they could no longer sell shares of GameStop or several other hot companies.⁷ The backlash was angry and loud—especially as GameStop’s shares plummeted in value. Some investors felt that they were locked into a position from which they could not escape.

Again, there was a Congressional inquiry into the problem.⁸ What had happened? Some conspiracy theorists alleged that the halt had been the result of a secret plot between Robinhood and hedge fund traders who were losing money from the rise in GameStop’s shares.⁹ But the problem was again connected to the back-office plumbing of stock settlement processes. This time, the second-generation clearing system could not keep up with the desires of traders, and an unexpectedly large capital call by the central clearinghouse that ran the back-office forced brokers like Robinhood to stop their clients’ trading (more on this exact process shortly).¹⁰ This trading halt was not as pervasive as the 1968 crisis, but it was a signal (and just one of many) that the second-generation system was showing its age.

Is a third generation of stock settlement possible? For several years now, commentators and entrepreneurs have promoted blockchain technology as a possible strategy for modernizing stock settlement and mitigating trading and governance concerns that can arise with our current clearing system.¹¹ Numerous experiments have resulted, and some countries have even promised

⁷ See Gonzalez & Priest, *supra* note 6.

⁸ See *Game Stopped? Who Wins and Loses When Short Sellers, Social Media, and Retail Investors Collide, Part I: Virtual Hearing Before the H. Comm. on Fin. Servs.*, 117th Cong. 2–224 (2021) [hereinafter *Game Stopped: Part I*]; *Game Stopped? Who Wins and Loses When Short Sellers, Social Media, and Retail Investors Collide, Part II: Virtual Hearing Before the H. Comm. On Fin. Servs.*, 117th Cong. 5–80 (2021). The unusual situation also led to some unexpected political consensus. For example, Democratic Representative Alexandria Ocasio-Cortez tweeted, “This is unacceptable. We now need to know more about @RobinhoodApp’s decision to block retail investors from purchasing stock while hedge funds are freely able to trade the stock as they see fit.” See Alexandria Ocasio-Cortez (@AOC), TWITTER (Jan. 28, 2021, 8:36 AM), <http://twitter.com/aoc/status/1354830697459032066> [<http://perma.cc/K8LY-E3LR>]. Republican Senator Ted Cruz responded, “[f]ully agree,” and Donald Trump Jr. added, “[t]his is what a rigged system looks like, folks.” See Ted Cruz (@tedcruz), TWITTER (Jan. 28, 2021, 8:47 AM), <http://twitter.com/tedcruz/status/1354833603943931905?lang=en> [<http://perma.cc/8KQS-FL8M>]; Donald Trump Jr. (@DonaldJTrumpJr), TWITTER (Jan. 28, 2021, 6:07 AM), http://twitter.com/DonaldJTrumpJr/status/1354793103090212865?ref_src=twsrc%5Etfw [<http://perma.cc/4N29-TQRN>].

⁹ See *Game Stopped: Part I*, *supra* note 8, at 45.

¹⁰ See *id.* at 45–46.

¹¹ See, e.g., Brandon Ferrick, *Modernizing the Stockholder Shield: How Blockchains and Distributed Ledgers Could Rescue the Appraisal Remedy*, 60 B.C. L. REV. 621 (2019); George S. Geis, *Traceable Shares and Corporate Law*, 113 NW. U. L. REV. 227 (2018); Kevin V. Tu, *Blockchain Stock Ledgers*, 96 IND. L.J. 223 (2020).

to move their entire stock market infrastructure to the blockchain.¹² Yet despite this enthusiasm, progress towards stock settlement systems on the blockchain has been slow in the United States. Why?

One plausible explanation is that market participants are risk averse. The current, second-generation clearing system seems to work out okay—most of the time—and incumbents are naturally worried about the possibility that exchanging a seemingly adequate system for the shiny new model might lead to structural collapse. Moreover, recent turmoil in cryptocurrency markets and infrastructures has undoubtedly led some to question whether the promise of underlying blockchain technology has been overhyped.

The thesis of this Article, however, is that the historical context for stock settlement has slowed experimentation with reform via blockchain technology. Ironically, some of the same rules that were promulgated to enforce modernization efforts for second-generation clearing and settlement five decades ago now seem to stand in the way of a potentially better system.¹³ Said differently, ossified laws and a limited awareness of the historical rationale for current regulatory requirements may be hindering technological updates to stock settlement and clearing. Moreover, the resulting institutional structure of settlement has led to a relatively slow-moving and risk-averse bureaucracy where some players have suboptimal incentives to update settlement technology.

This Article traces the history, politics, and policy of stock settlement regulation. It highlights the transition to our current system, evaluates legal barriers to innovation, and discusses the possibility of technological, regulatory, or market reforms that could facilitate transition to a blockchain-based settlement platform. The organization is chronological: Part I describes the first-generation system for clearing stock trades, focusing on Wall Street in the 1960s and the breakdown in settlement processes. Part II looks at the second-generation fix, how it works, and why it can sometimes lead to legal and business problems in today's economy. Finally, Part III examines the promise of the third-generation settlement technology, surveys some of the lingering barriers that slow experimentation, and offers a few suggestions for moving forward. A brief conclusion summarizes the discussion.

¹² See, e.g., Jackie Range, *New Australian Securities Exchange Chief Defends Blockchain Plans*, FIN. TIMES (Sept. 4, 2016), <http://www.ft.com/content/45851b58-62d1-11e6-8310-ecf0bddad227> [<http://perma.cc/DP97-B45Q>].

¹³ See *infra* Part III.B.

I. FIRST GENERATION: PEN & PAPER

Our mental model for corporate governance often envisions a stable body of shareholders who keep an eye on key decisions and cast their votes year after year. But we do not live in a static world, of course, and ownership patterns often change as investors buy and sell on secondary markets. How exactly do the firms, shareholders, and various exchange intermediaries keep track of all this and conduct this transfer of rights? And as importantly, how does the efficacy of settlement systems impact corporate governance and other goals of corporate law? To understand these questions, one must go back in time. The history of back-office stock settlement remains relevant for modern analysis, so let us turn to Wall Street in the 1960s.

A. Wall Street in the 1960s

Stock trading in the 1960s looked almost nothing like it does today.¹⁴ Even many of the key players are now long-forgotten and mysterious names: Auchincloss, Redpath & Parker; F.I. Dupont & Co.; Hayden, Stone & Co.; Dempsey-Tegeler; and Goodbody & Co., just to name a few.¹⁵ Shares typically traded on one of several exchanges—the New York Stock Exchange (“NYSE”) was the most important, but the American Stock Exchange (“AMEX”) offered a viable alternative.¹⁶ Smaller companies in Boston or Chicago or California might use regional exchanges, such as the Pacific Stock Exchange.¹⁷ And the upstart over the counter (“OTC”) exchange had recently begun to knit together a virtual community of traders doing business over the phone.¹⁸

Putting aside the OTC for the moment, exchanges relied on the presence of human traders who would arrive at the pits each weekday in their colorful jackets to buy or sell some dedicated array of stocks. Not just anyone could saunter into the trading pits, of course; one had to belong to an exchange to trade, and membership was limited.¹⁹ The dominant NYSE, for instance, had about 650 member firms, each of whom owned a “seat” on the exchange.²⁰ Roughly 400 of these firms served as representative

¹⁴ See Wyatt Wells, *Certificates and Computers: The Remaking of Wall Street, 1967 to 1971*, 74 BUS. HIST. REV. 193–94 (2000).

¹⁵ See JOHN BROOKS, *THE GO-GO YEARS: THE DRAMA AND CRASHING FINALE OF WALL STREET'S BULLISH 60S* 281, 318 (1998).

¹⁶ See Wells, *supra* note 14, at 196–97.

¹⁷ See *id.* at 197.

¹⁸ See *id.*

¹⁹ *Id.* at 196.

²⁰ *Id.*

agents for individual or institutional investors.²¹ If you wanted to sell 1,000 shares of Ford at market prices, for example, then you would contact your personal broker at, say, Hayden, Stone & Co., who would then direct another Hayden partner in the trading pits to find a buyer. If the timing was good and a buyer could be found for the shares, then a trading match would be made at the designated location in the NYSE. If no corresponding buy order stood ready for execution, however, then eventually a market maker might step in to fill the order (probably paying less than the last quote for the stock). That was the primary role of the other 250 NYSE members (known as dealers), who traded, often on their own accounts, to smooth markets.²² By buying on a dip during slow markets and selling at a premium during hot ones, these dealers could perhaps make a profit.

While the business model of each broker-dealer might differ according to its relative emphasis on client services²³ or internal trading, most entities were legally structured as partnerships.²⁴ This was not necessarily because a partnership entity made the most sense for broker-dealers; one can imagine that many firms might have preferred the benefits of broadly held corporations. But exchange membership rules limited their degrees of freedom.²⁵ The NYSE, for instance, required its members to use either a partnership or a corporation that limited stock ownership to those who worked at the firm.²⁶ And while this type of arrangement was common fifty years earlier, by 1960 it seemed an outlier.²⁷ Many other industries had moved to Berle-Means corporations—where widely dispersed investors put money into businesses controlled by centralized management teams.²⁸ One likely explanation for this anachronistic legal structure is that the member firms worried that opening the NYSE's doors to broadly capitalized firms would quickly swamp the smaller players.²⁹ But this self-protection strategy also had an unfortunate consequence: it would

²¹ *Id.* at 196–97.

²² *Id.*

²³ The most obvious source of client revenues arose via broker commissions on trading transactions. But firms could also generate substantial interest from lending activities such as margin facilities that allowed clients to make leveraged trades.

²⁴ Wells, *supra* note 14, at 198.

²⁵ *Id.*

²⁶ *Id.*

²⁷ *Id.*

²⁸ ADOLF A. BERLE & GARDINER C. MEANS, *THE MODERN CORPORATION AND PRIVATE PROPERTY* 4–5 (1932).

²⁹ BROOKS, *supra* note 15, at 312–15.

be difficult for distressed firms to raise more capital when the business cycle turned down.³⁰

So far, we have been focusing on the visible, front-end of the trade. Continuing the example above, when your Hayden broker sold your Ford stock, the economic effect of this exchange could be noted quickly. One thousand Ford shares were decreased on your account, and your cash balance rose from the anticipated proceeds. But this was just a way to account for the expected result of your contractual commitment. Said differently, the traders did not actually hand your stock certificates over for cash when they executed your trade. How then did back-end clearing and settlement work circa 1960?

The process took time because legal ownership of stock was typically evidenced by a paper stock certificate.³¹ Indeed, in many states, corporate law statutes required as much.³² Thus the sale of stock by your New York broker was analogous to the sale of your car by an agent in another state. The contract might be executed immediately, but the actual closing would need to be delayed until legal evidence of ownership could be transmitted to the new buyer. Some individual investors would keep their stock certificates in a personal filing cabinet or in a safety deposit box at a local bank. This meant that the selling investor might need to drive down to their bank the following Monday, pull out the right stock certificates, and mail these to their broker. The broker would then find a notary to evidence the sale and send the certificates along to the corporation's transfer agent.³³

This transfer agent served as the central hub of the stock clearing process. Individual firms, like Ford, would typically outsource the processing of secondary market stock sales to these agents because it was cumbersome to track and process all the transfers.³⁴ Thus, Ford's transfer agent might receive the certificates and instructions from a seller's broker, match this up against the cash received from the buyer's broker, cancel the old stock certificate, and issue a new one in the name of purchaser. Buyer and seller might get their new property a few days later. Ford itself would probably not even be aware of this transfer at

³⁰ See *infra* notes 120–151 and accompanying text.

³¹ See MORRIS & GOLDSTEIN, *supra* note 2, at 4.

³² See, e.g., Martin J. Aronstein, *The Decline and Fall of the Stock Certificate in America*, 1 J. COMPAR. CORP. L. & SEC. REGUL. 273, 274 (1978) (discussing the legal move away from requiring paper certificates in state corporate law).

³³ See Wells, *supra* note 14, at 201.

³⁴ *Id.*

that exact moment, but it could always ask its transfer agent for a tabulation of current shareholders at any given point in time.

It should quickly be apparent that this was not an instantaneous process. A seller might get sidetracked and take a few days to deliver the certificates. A broker might get busy as volume grew high and fall behind on sending instructions or obtaining the necessary notarizations. And transfer agents could also get swamped. Moreover, the example above assumes a perfect match of shares moving from one seller to one buyer. Often, however, several buyers might purchase a smaller portion of the seller's shares. In that case, the seller's single certificate would need to be canceled and splintered into multiple new certificates.³⁵ Stock clearing and settlement in 1960 could take time.

To be sure, not all transactions had to undergo such extensive processing. Some individual investors were comfortable having their shares held in "street name."³⁶ Under this arrangement, the broker was listed as the registered owner of the stock and the actual investor was considered the beneficial owner.³⁷ Usually this would occur when an investor was a frequent trader (who did not wish to continually mail in paperwork) or a margin trader (who might be required by their broker to keep the certificates in street name as collateral).³⁸ This meant that the stock certificates could be kept in a broker's office, and these agents could settle trades more quickly.³⁹ The most obvious source of efficiency came from the simple fact that actual investors would not have to find and mail in their certificates. But there were several other time saving features of street name ownership. For instance, the process of "netting" might be used to minimize the actual delivery requirement.

The concept of netting is grounded in the fact that slightly delayed batch processing can sometimes be more efficient than immediate piecemeal processing.⁴⁰ With stock settlement, a broker might not send over a certificate to a buyer immediately upon sale—even if it held the shares in street name. Rather, it would wait until markets had closed for the day and then have its accountants add

³⁵ *Id.*

³⁶ *See id.* at 202; *see also* Marcel Kahan & Edward B. Rock, *The Hanging Chads of Corporate Voting*, 96 GEO. L.J. 1227, 1237–38 (2008) (describing the concept of street-name holding in more detail).

³⁷ *See* Geis, *supra* note 11, at 232–33.

³⁸ Wells, *supra* note 14, at 202.

³⁹ *Id.*

⁴⁰ *See, e.g.*, Steven L. Schwarcz, *Central Clearing of Financial Contracts: Theory and Regulatory Implications*, 167 U. PA. L. REV. 1327, 1351 (2019).

up the net effects of all trades.⁴¹ If it turned out that (1) the broker had represented both buyers and sellers of a given stock that day; (2) a counterparty broker also happened to be the same entity for multiple trades; and (3) the traded stock was held in street name, then there was an opportunity for a “net settlement.”⁴²

To illustrate, come back to our Ford stock sale, but now assume that all the 1,000 shares are held by Hayden, Stone & Co. in street name. Suppose that Hayden sells the shares to a buyer represented by a different broker, Goodbody & Co. And suppose further that later in the day a different investor represented by Goodbody happens to sell 1,000 shares of Ford to someone represented by Hayden for the exact same price. How should this trade be cleared? With netting, the brokers might work out a nice arrangement: the Ford stock certificates can stay in Hayden’s vault, under its name, without a need to retitle through Ford’s transfer agent. Instead, Hayden can just mark its accounts to take the stock away from the first seller in exchange for a cash increase in their account. The account for Hayden’s later client can be used to balance this out by decreasing their cash balance and noting that Hayden’s shares are now being held for the benefit of this new owner. And Goodbody can do the same thing for its two investors.

This all assumes, of course, that the new buyers are comfortable with street name ownership; otherwise, the broker may need to move shares out of its name and into the name of the purchaser. Moreover, the example is a best-case scenario of perfect netting. In the real world, fewer transactions will match up exactly, but adjustments could still be made that sidestepped the need to retitle at least some stock certificates. If the later buyer paid a higher or lower price, for example, then a straight cash payment from one broker to the other could true up the exchange. Or perhaps multiple lots of smaller transactions could be aggregated to create a match for the initial 1,000 shares. There might need to be a residual exchange between each pair of brokers, but netting everything out and batch processing at the end of the day often seemed a lot easier than retitling all the certificates.⁴³

⁴¹ See, e.g., Wells, *supra* note 14, 202 (describing how exchange members submitted records of transactions at the end of each trading day to the “net out” trades).

⁴² See *id.* at 202 (giving an example of “netted out” trades).

⁴³ It is worth noting that the OTC market worked a bit differently. On the front end, traders were not physically proximate. Instead, they sat in distributed offices around the country and traded over the phone. In the earliest days of the exchange, when an OTC brokerage house received a buy or sell order for stock traded on this exchange, they would call around to find a counterparty and make a deal over the phone. Wells, *supra* note 14, at

One final topic will finish setting the stage: the regulation of stock exchanges. Federal securities laws from the 1930s gave the Securities and Exchange Commission (“SEC”) ultimate authority in this space.⁴⁴ But much of the SEC’s focus during this time was centered on the detection and elimination of fraud.⁴⁵ Accordingly, many of the detailed operational rules were left to the exchanges themselves.⁴⁶ The NYSE and other exchanges promulgated a series of membership rules that purported to regulate market operations.⁴⁷ This self-regulation was justified, in part, based on the significant resources of the NYSE—which were understood to exceed even those of the SEC at this time.⁴⁸ One can also imagine how the political influence of Wall Street might reinforce this arrangement.

In any event, such was the stock market of the 1960s. The overall structure may not have reflected an optimal arrangement—manual clearing with pen and paper is hardly a scalable system. But processes generally seemed to work out during the first half of the decade. Indeed, stocks continued to build on the prosperity of the 1950s.⁴⁹ Dividend yields were steady.⁵⁰ Interest rates were low.⁵¹ Individual investors continued to enter the market, attracted by Wall Street advertisements, a strong economy, and the expectation of capital gains.⁵² New institutional players also emerged as insurance companies, pension funds, and mutual funds charged into stocks.⁵³ Prices responded accordingly, and everything seemed terrific.⁵⁴ But deep within the system there was a growing problem: the back-office clearing and settlement processes could not

197. By the early 1970s, the development of an automatic quoting system, NASDAQ, would streamline this process. *Id.* at 213.

44 Specifically, the Securities Exchange Act of 1934 created the SEC and established its authority over many aspects of the securities industry. See 15 U.S.C. § 78d(a).

45 See generally Seligman, *supra* note 2, at 349.

46 See *id.*; see also Roberta S. Karmel, *The Future of Corporate Governance Listing Requirements*, 54 SMU L. REV. 325, 326–30 (2001); Wells, *supra* note 14, at 197–98. For a more modern assessment of regulation by stock exchange listing rules, see Geeyoung Min & Kwon-Yong Jin, *Relational Enforcement of Stock Exchange Rules*, 47 BYU L. REV. 149, 157 (2021).

47 See Wells, *supra* note 14, at 197.

48 *Id.* at 197–98.

49 See *id.* at 194.

50 See *S&P 500 Dividend Yield by Month*, NASDAQ DATA LINK, http://data.nasdaq.com/data/MULTPL/SP500_DIV_YIELD_MONTH-sp-500-dividend-yield-by-month [<http://perma.cc/GRV9-G37Y>] (last visited Jan. 18, 2023).

51 See *Monthly Interest Rates 1937–99*, SOC. SEC. ONLINE, <http://www.ssa.gov/oact/progdata/interestrates1937-99.html> [<http://perma.cc/F275-BPZD>] (last visited Jan. 18, 2023).

52 See generally ROBERT SOBEL, *N.Y.S.E.: A HISTORY OF THE NEW YORK STOCK EXCHANGE, 1935–1975* 314 (1975); Wells, *supra* note 14, at 194.

53 See Wells, *supra* note 14, at 194.

54 See *id.*

keep up with such rapid growth.⁵⁵ In 1950, the total volume of stock exchanged on the NYSE was about two million shares per day.⁵⁶ By 1967, that number was closer to ten million shares—and climbing.⁵⁷ Eventually, something had to give.

B. The Paperwork Crisis of 1968

On March 31, 1968, Lyndon B. Johnson appeared on national television to announce that he would not seek another term as president and that he would be halting some American bombing in Vietnam.⁵⁸ This decision shocked and exhilarated the nation, even as it solidified differences between various social groups during this turbulent era in U.S. history.⁵⁹ On Wall Street, Johnson's abdication triggered a stock buying frenzy.⁶⁰ The next day saw a record seventeen million shares trade hands on the NYSE.⁶¹ The AMEX and OTC markets exploded in volume as well during the ensuing weeks.⁶²

All this euphoria placed even greater pressure on back-office settlement practices, and the system began to buckle.⁶³ The length of time needed to clear and settle trades grew larger and larger, sometimes extending into weeks.⁶⁴ Brokers were supposed to settle trades and get new certificates to buyers within five days; the inability to meet this deadline would be termed a delivery “fail.”⁶⁵ In April 1968, amid growing concern, the NYSE conducted an examination of fail volume and concluded that its members were sitting on about \$2.7 billion worth of fails (in all markets).⁶⁶ By December of that year, NYSE member fails had risen to \$4.1 billion.⁶⁷

⁵⁵ *See id.* at 203.

⁵⁶ *See id.* at 194.

⁵⁷ *See id.*

⁵⁸ *See* Lyndon B. Johnson, *March 31, 1968: Remarks on Decision Not to Seek Re-Election*, U. VA. MILLER CTR., <http://millercenter.org/the-presidency/presidential-speeches/march-31-1968-remarks-decision-not-seek-re-election> [<http://perma.cc/BD2C-2CHB>] (last visited Jan. 18, 2023).

⁵⁹ *See* Matthew Dallek, *LBJ Announced He Wouldn't Run Again. Political Chaos Ensued*, HIST., <http://www.history.com/news/lbj-exit-1968-presidential-race> [<http://perma.cc/482Y-CDNH>] (last updated Sept. 10, 2018).

⁶⁰ Wells, *supra* note 14, at 195.

⁶¹ *See* Sobel, *supra* note 52, at 315.

⁶² *See* Wells, *supra* note 14, at 196.

⁶³ *See id.* at 203.

⁶⁴ *See id.*

⁶⁵ *See id.*

⁶⁶ *See id.*

⁶⁷ *See id.*

This was a real problem because exchange fails would not necessarily work themselves out over time. They might be caused by clerical errors, rather than just delays, and some mistakes might never be rectified. Indeed, because Wall Street brokers were intertwined with each other, mistakes made in one broker's back office could create accounting problems for their counterparties. In some cases, a transaction would just be labeled with a "DK," for "don't know," when the counterparty's records did not match.⁶⁸ Moreover, undelivered securities lingered as a contractual obligation of the broker, and in some cases, the extent of these liabilities began to approach (or exceed) some firms' capital levels.⁶⁹ Clients might understandably refuse to pay for their stock until it was actually delivered—causing brokers to effectively provide bridge financing for the transaction (because the brokers had most likely already paid for the stock that was not yet delivered from the seller's broker).

How could Wall Street solve these problems? The most obvious answer was to hire more back-office clerks, and extend the hours of current employees, to chase down failed exchanges and process the flood of ongoing trading.⁷⁰ The working day for clerks moved from eight hours to ten or twelve-hour days, and weekend work become routine.⁷¹ Brokers began to run night shifts where roomfuls of clerks would scramble to process the previous days' trades. And the search for new employees surged.⁷² But it still did not seem like enough. As the armies of clerks expanded, quality control decreased, mistakes increased, employee morale plunged, and the tasks grew Sisyphean.⁷³ Annual turnover for the back-office workers approached fifty percent.⁷⁴

The upshot of all this was a nightmare situation where many stock trades would simply not clear. One government report described the situation as "a trackless forest."⁷⁵ But a Lehman Brothers report from May 1968 perhaps offers the best insight into the struggle: it stated after a comprehensive internal review that the firm discovered "it had \$473 million in securities whose owners

⁶⁸ *See id.* at 206.

⁶⁹ *See id.* at 204.

⁷⁰ *See* SEC. & EXCH. COMM'N, STUDY OF UNSAFE AND UNSOUND PRACTICES OF BROKERS AND DEALERS, H.R. DOC. NO. 92-231, at 14 (1971) [hereinafter "UNSAFE AND UNSOUND"].

⁷¹ Wells, *supra* note 14, at 205.

⁷² *See id.* By one account, employment listings in the New York Times for clerk positions regularly stretched into 100 columns of "help wanted" advertisements. *Id.*

⁷³ *See id.* at 205–06.

⁷⁴ *Id.* at 206.

⁷⁵ UNSAFE AND UNSOUND, *supra* note 70, at 13.

it could not locate, and that it owed clients \$219 million in securities that it could not find.”⁷⁶ The problem had become existential.

C. Regulatory Pressure to Reform

Early in 1968, the SEC did not seem too bothered by all this, apparently viewing the back-office problem “as confined to individual firms and not posing a threat to the viability of the industry as a whole.”⁷⁷ Eventually, broker-dealers might catch up when stock volumes fell. But the firms themselves were worried. A month before Lehman’s shocking report, in April of 1968, the exchanges and several large banks decided to create an ad hoc committee to evaluate the paperwork crisis and plan a response.⁷⁸ Then, in June 1968, the committee decided that it had no other choice but to halt all stock trading on Wednesdays.⁷⁹

Closing the stock markets to let clearing and settlement catch up with recent trades was not a new idea. It had been tried during the summer of 1967, when markets were closed ninety minutes early for nine days.⁸⁰ Similarly, stock markets closed early for six weeks in early 1968.⁸¹ But shutting down the exchanges for an entire day each week, without an end in sight, represented a far greater escalation of events and a clear sign that the system was broken. Even worse, it soon seemed clear that the Wednesday closings were not doing much to help solve the problem. Investors who wanted to buy or sell just shifted their trades to other days of the week, pushing up the volume on Tuesdays or Thursdays—and continuing to deluge the back office.⁸²

Could anything else be done? By now, the SEC was growing concerned. It was especially troubled by the possibility that the exchanges’ policy of self-regulation had caused them to go soft on delinquent member firms. This is not to say, however, that the exchanges had done nothing: the NYSE had been pressuring its members to clean up their settlement practices and backed up these threats with sanctions.⁸³ These penalties included advertising bans, limits on the amount of business that a

⁷⁶ Wells, *supra* note 14, at 206.

⁷⁷ *Id.* at 207 (quoting S. REP. NO. 92-1519, at 10 (1972)).

⁷⁸ *Id.*

⁷⁹ *See id.* at 207–08.

⁸⁰ *Id.* at 207.

⁸¹ *Id.*

⁸² *Id.* at 214.

⁸³ *Id.* at 208.

delinquent firm could accept, and, in extreme cases, an order to reduce business volume through branch office closures.⁸⁴

Over the next month, the SEC decided that it had to act directly. It announced that any broker who purchased stock for a client when they had “reason to believe that [they] will not be able to deliver the security . . . promptly” would be in “violation of the anti-fraud provisions of the federal securities laws.”⁸⁵ This sent a very clear signal that the SEC was upset—by linking the paperwork crisis to the strong antifraud mandate of the agency. But while the announcement might have scared some individual brokers, it probably had little overall effect. The SEC did not have the resources to investigate even a small portion of the delivery fails, and most brokers could respond that at the time of the trade they genuinely thought that everything would clear.⁸⁶ All the SEC could really do was put more pressure on the exchanges by threatening to end self-regulation.

One of the greatest risks from the paperwork crisis was the possibility that a thinly capitalized broker would be unable to meet its obligations to clients. If this occurred, it could spark a run on other brokers by investors who feared a similar outcome. Although bank deposits were federally insured (up to a certain limit) through the Federal Deposit Insurance Corporation (“FDIC”), assets deposited with securities brokers remained uninsured as of 1968.⁸⁷ Investors had to trust that money or securities deposited with a broker would not disappear in a crisis. The NYSE was acutely aware of this concern, and it had investigated a smaller member, Pickard & Co., earlier in 1968 as rumors began to swirl about Pickard’s insolvency.⁸⁸ Despite initial assurances that Pickard could meet its obligations, the NYSE was eventually forced to bail out the firm—using its own money to shut down Pickard and pay out the clients.⁸⁹ The eventual loss to the NYSE was relatively small, but bail outs were clearly not a replicable, long-term solution to the problems posed by chaotic paperwork.

⁸⁴ *Id.*

⁸⁵ *The Administration of the Laws Pertaining to the Regulation of the Securities Markets by the Administrative Agency and by the Self-Regulatory Agencies Involved, Hearings Before the Subcomm. on Com. and Fin. of the Comm. on Interstate and Foreign Com. H.R.*, 91st Cong. 49 (1969) [hereinafter *1969 Congressional Hearings on Securities Market*].

⁸⁶ See Wells, *supra* note 14, at 209.

⁸⁷ See *1969 Congressional Hearings on Securities Markets, supra* note 85, at 90.

⁸⁸ See Wells, *supra* note 14, at 209.

⁸⁹ See *id.* In addition to paperwork problems and uncertainty about the extent of the firm’s obligations, it seems that Pickard’s partners also took an unauthorized capital withdrawal. See *id.*

New computing technology seemed like a plausible answer. Some investment had already occurred, and the NYSE member firms did lean heavily on computer investments during 1968 to 1970.⁹⁰ But this was still not a magic bullet to solve the settlement and clearing backlog. There was a limit to what computers could really do. They might help make and balance bookkeeping entries—and thereby reduce the possibility of human tabulation or recording errors.⁹¹ But computers could not alleviate bad or incorrect information that was sent over from another broker-dealer.⁹² And sometimes software glitches or under-trained human operators could cause additional problems.⁹³ There was promise in computing technology, but it was no panacea.

In short, by the end of 1968 the situation on Wall Street had grown desperate. Markets remained closed on Wednesdays.⁹⁴ There were rumors of rampant drug use among some Wall Street workers.⁹⁵ The United States Attorney General, in a subsequent Senate investigation of the crisis, even estimated that organized criminals had taken advantage of the chaos to steal more than \$400 million in securities.⁹⁶ Something had to be done, and the best possibility seemed to lie in a fundamental reconceptualization of the way that stock trades should be settled and cleared.

II. SECOND GENERATION: IMMOBILIZED FUNGIBLE BULK

A. Addressing the Paperwork Crisis

The origins of a second-generation settlement system could already be found in the street-name stock holding alternative that some investors used in lieu of personal vesting.⁹⁷ Recall that much of the paperwork problem arose from individually titled stocks that had to be notarized, delivered to brokers and transfer agents, retitled, and redistributed. When a certificate was held in street name, things were simplified. Each pair of brokers could net their positions at the end of the day and make a transfer of stock to true up all trades made by their clients in a firm's stock during that period.⁹⁸ The other changes were settled with internal bookkeeping

⁹⁰ See UNSAFE AND UNSOUND, *supra* note 70, at 13–14, 19.

⁹¹ See Wells, *supra* note 14, at 210.

⁹² See *id.*

⁹³ See UNSAFE AND UNSOUND, *supra* note 70, at 13–14, 19.

⁹⁴ See BROOKS, *supra* note 15, at 205–06.

⁹⁵ See *id.* at 200–04.

⁹⁶ See Marjorie Hunter, *Big Board Too Busy to Stop 1968-69 Thefts*, N.Y. TIMES, June 24, 1971, at 53.

⁹⁷ See *supra* notes 36–39 and accompanying text.

⁹⁸ See generally *supra* note 40 and accompanying text.

adjustments. If this idea could be extended, it might form the backbone of a second-generation clearing system that could further alleviate the paperwork crisis.

The key was to take the concept one step further by creating a centralized clearing entity that could serve as the record holder of stock for brokers.⁹⁹ Then, instead of executing periodic certificate transfers between pairs of brokers, this central entity could simply make another bookkeeping adjustment. This would reflect the net change in the security position between all the clients of each broker and eliminate a need to ever retitle the stock certificates. In short, the goal would be to hold most stock certificates in “immobilized fungible bulk” at a central depository.¹⁰⁰

The NYSE had already been working on this concept for several years. In 1964, it launched an entity known as the Central Certificate Service (“CSS”) to hold securities on account for individual broker-members.¹⁰¹ CCS would invest heavily in computing technology and start out by accepting several hundred million shares of the roughly 1,200 companies that traded on the NYSE.¹⁰² Over time, the plan was to extend CCS’s activity by expanding the immobilized pool of NYSE stocks and moving into the companies that traded over other exchanges.¹⁰³

How exactly did it work? Suppose you ran a medium sized NYSE brokerage house that held a total of 500,000 shares of General Electric (“GE”) stock in street name for several hundred clients. Before the establishment of CCS, you would execute a sale of GE stock for your clients by finding a trading partner on the exchange and booking the sale. Then you would decrease your client’s account by the number of GE shares that they sold and increase their cash balance by the proceeds (less your commission). If no other transaction in GE stock took place that day involving the buyer’s broker, you would arrange to transfer and retitle your client’s share certificates (held in your name as broker) to the other broker in exchange for a cash payment from that broker (thus effectively funding your client’s cash increase). But if there were other GE trades that day involving both brokerage houses, you could net the trades and transfer only the residual shares. Suppose you had ten clients sell 7,500 shares of GE and twenty clients buy 10,000 shares of GE—and suppose that Lehman Brothers took the

⁹⁹ See Kahan & Rock, *supra* note 36, at 1227.

¹⁰⁰ See *id.*

¹⁰¹ See Wells, *supra* note 14, at 211.

¹⁰² See *id.*

¹⁰³ See *id.* at 212.

other side of every trade. If all the shares were held in street name, then at the end of the day Lehman could just send you 2,500 shares. By contrast, if none of the shares were held in street name, thirty sets of stock transfers would need to occur (between all the pairs of buyers and sellers).

With CCS, however, the clearing process became even easier. Before any trades occurred, your brokerage and Lehman would have moved the record ownership of all GE stock to CCS—which would continually remain as the formal record owner. Then, on the day of the GE stock trades, there would be no need to engage in certificate transfers. CCS would simply adjust its accounts to show that 2,500 shares of the GE stock it had been holding on Lehman’s account were now being held for your brokerage account.¹⁰⁴ There was no need to designate which specific shares had transferred—leading to the “immobilized fungible bulk” descriptor. You would then send Lehman the net cash spent by your clients to purchase the incremental 2,500 shares. Finally, you and Lehman would adjust all the various buy and sell positions of your clients via internal transfers. This assumed, of course, that your clients would not insist on individually titled certificates. And things would grow more complicated with additional broker pairs. But if it worked, central clearing could lead to a faster settlement process and clear up the back-office bottlenecks and mistakes.

Yet while this all sounded good in theory, CCS got off to a slow start. One problem arose from state corporation laws. At the time, almost every state required a stock certificate to be issued as evidence of investor ownership.¹⁰⁵ The CCS system flouted that obligation, and state laws had to be changed to support centralized record holding in fungible bulk.¹⁰⁶ In addition, brokers who extended investors’ credit for margin investing wanted the stock certificates in their vaults as collateral for these loans.¹⁰⁷ And state laws required large bank trustees who managed stock investments for institutional investors, such as mutual funds and insurance companies, to keep the certificated stock in their own vaults.¹⁰⁸ CCS would not work unless legal changes took place in every state. By 1968, four years after the

¹⁰⁴ *See id.*

¹⁰⁵ *See* Aronstein, *supra* note 32; *1969 Congressional Hearings on Securities Markets*, *supra* note 85, at 265.

¹⁰⁶ *See 1969 Congressional Hearings on Securities Markets*, *supra* note 85, at 265.

¹⁰⁷ *See* Wells, *supra* note 14, at 212.

¹⁰⁸ *Id.*

birth of CCS, all fifty states had finally changed their corporate laws to sanction centralized certificate holding and CCS bookkeeping transfers of stock ownership.¹⁰⁹ The margin loan and bank trustee problems took a little longer to resolve, but by February 1969, CCS was open for business.¹¹⁰

This second-generation clearing system was not an immediate success. Technical glitches arose, and CCS stopped accepting new certificate deposits a month after opening.¹¹¹ It was able to clear the stocks that had already been deposited, but CCS did not expand further until August 1969.¹¹² As the months wore on, however, and more legal barriers fell away, the new system blossomed.¹¹³ CCS began to accept stock certificates from AMEX firms in 1970 and from some popular OTC companies the following year.¹¹⁴ By 1971, CCS estimated that it was clearing more than three billion shares annually and had cut approximately seventy-five percent of the certificate transfers that would have been required under the former system.¹¹⁵

As centralized clearing kicked in, Wall Street's paperwork crisis began to abate. Delivery fails, which had reached \$4.1 billion in December 1968, began to drop steadily during 1969.¹¹⁶ The NYSE elected to reopen markets on Wednesdays of that year, despite a strongly worded SEC "suggestion" not to do so.¹¹⁷ And while the NYSE did shorten trading hours by ninety minutes each day, as 1969 wore on, it was able to return to a normal closing time.¹¹⁸ The CCS plan seemed to be working—aided, perhaps, by lower trading volumes that accompanied a market downturn.¹¹⁹

Before long, however, the forces pushing this transition to a new framework for stock settlement would also contribute to vast changes in the early 1970s relating to the both the market structure of Wall Street and regulatory protections for investors. Let us consider each development in turn.

¹⁰⁹ *See id.*

¹¹⁰ *See id.*

¹¹¹ *See id.* at 211–12.

¹¹² *Id.*

¹¹³ *Id.* at 212.

¹¹⁴ *Id.*

¹¹⁵ *Id.*

¹¹⁶ *See 1969 Congressional Hearings on Securities Markets, supra* note 85, at 10.

¹¹⁷ *See Wells, supra* note 14, at 214.

¹¹⁸ *See id.*

¹¹⁹ *See BROOKS, supra* note 15, at 204–06.

B. Wall Street Transformed

New stock settlement methods required brokers to overhaul their back-office processes, typically through investments in computing technology.¹²⁰ The expense could be painful, especially for smaller brokers. Some firms also suffered from the need to clean up damage under the old settlement system.¹²¹ They discovered new debt positions in the wreckage, indicating that they owed substantial amounts of cash or securities to a Wall Street counterparty or private investor.¹²² Some apparent obligations were phantoms that disappeared with further research, but other unexpected obligations were genuine. One recurring problem seemed to be that brokers had failed to pay investors dividends on stock held in street name.¹²³ The SEC later estimated that the need to sort out various obligations would collectively cost Wall Street brokers over \$100 million during this period.¹²⁴

Many brokers might have been able to bear these expenses if the economy had remained strong. But in 1969, the Federal Reserve boosted interest rates, in a response to emerging signs of inflation, and the business cycle turned.¹²⁵ Stock prices fell, and investors abandoned equity investments for higher-yield savings accounts.¹²⁶ The lighter trading volume probably helped the nascent CCS system gain traction, but it also led to a fall in commission revenue for brokers.¹²⁷ Even worse, by 1970 the U.S. economy had fallen into a serious recession.¹²⁸ Stock prices dropped, and many investors abandoned the markets entirely.¹²⁹ Facing steep losses, most NYSE brokers tried to cut costs, but dozens now found themselves without enough capital to keep going—or even to make good on current liabilities.¹³⁰

The NYSE was in a tough spot. On the one hand, it did have a “special trust fund” of \$25 million, that had been established in the wake of a member’s failure back in 1964.¹³¹ This fund could now be used to help reassure individual investors that a broker’s failure

¹²⁰ See Wells, *supra* note 14, at 215.

¹²¹ *Id.*

¹²² See *id.* at 215.

¹²³ See *id.*

¹²⁴ See UNSAFE AND UNSOUND, *supra* note 70, at 100.

¹²⁵ See *S&P 500 Dividend Yield by Month*, *supra* note 50; see also *Monthly Interest Rates 1937–99*, *supra* note 51.

¹²⁶ See Wells, *supra* note 14, at 214–17.

¹²⁷ *Id.* at 216.

¹²⁸ *Id.* at 214–17.

¹²⁹ *Id.*

¹³⁰ See UNSAFE AND UNSOUND, *supra* note 70, at 11, 14, 27, 100.

¹³¹ See Wells, *supra* note 14, at 217.

would not cause them to lose their money.¹³² This was vital because while the Federal Deposit Insurance Corporation had been created by Congress in 1933 to provide deposit protection to savers if their bank failed, there was no analogous form of insurance in 1970 for securities investors.¹³³ If a broker stumbled—and the NYSE could not fix the problem—then investors would bear personal losses. This, in turn, could create a public relations disaster and possibly spark a run on other brokers. Yet with dozens of members now facing some type of trouble, it was becoming clear that the NYSE's \$25 million trust fund was inadequate.¹³⁴

One obvious solution involved consolidation: encouraging the larger, healthier brokers to buy up and absorb insolvent smaller ones. The NYSE's leaders worked, with some success, to arrange suitable matches.¹³⁵ They also established a crisis committee to keep an eye on flare-ups and respond accordingly.¹³⁶ By the middle of 1970, the NYSE's crisis committee had taken over ten troubled brokers, all of whom had suffered severe back-office settlement problems.¹³⁷ The estimated bailout bill exceeded \$50 million, but this was just a guess.¹³⁸ The NYSE leaders decided to move \$30 million that they had been saving for a new building into the trust fund, bringing their cushion up to \$55 million.¹³⁹

The overall economy rebounded during 1971, and the outlook for Wall Street brokers started to brighten.¹⁴⁰ Some feared a resurgence of the paperwork problems from the late 1960s, but the back-office troubles remained manageable.¹⁴¹ The market structure of Wall Street, which had already become more concentrated with the 1970 rescue mergers, continued to consolidate.¹⁴² Some of this seemed to be caused by increased costs from greater trading volume and the new settlement system.¹⁴³ Wall Street firms also diversified into new lines of business—including corporate finance underwriting, the pursuit of institutional investor clients, expansion into the management of pension funds and money market accounts, and an emphasis on

¹³² *See id.* at 217–18.

¹³³ *See id.* at 224.

¹³⁴ *See id.* at 217–18.

¹³⁵ *See id.* at 219–20.

¹³⁶ *See id.* at 220–21.

¹³⁷ *See id.* at 221.

¹³⁸ *Id.* at 221–22.

¹³⁹ *Id.* at 222.

¹⁴⁰ *Id.* at 224.

¹⁴¹ *Id.*

¹⁴² *Id.*

¹⁴³ *Id.*

internal trading position in options and commodities.¹⁴⁴ Increasingly, size was beginning to matter a lot on Wall Street, and the smaller firms could not keep up.

As these trends continued over the next few decades, Wall Street brokers evolved into the concentrated market structure that is more familiar to today's investors. Smaller players merged and sold stock in their new, larger entities to the public to increase capitalizations even further.¹⁴⁵ By the year 2000, large public investment banks (including Goldman Sachs, Merrill Lynch, and Morgan Stanley Dean Whitter) and bank custodians (including The Bank of New York, Mellon, and State Street Bank) led the industry.¹⁴⁶ These players could handle trading volumes that vastly exceeded that of 1969.

The back-office strategy for stock settlement continued as the primary system for clearing trades and remains largely in place today.¹⁴⁷ CCS was succeeded by the Depository Trust Company ("DTC") in 1973—a subsidiary of Depository Trust & Clearing Corporation ("DTCC")—and this organization now holds the majority of corporate stock certificates in the name of its subsidiary "Cede."¹⁴⁸ Today, most stock certificates are digitally held in secure DTCC warehouses, and the ownership name on each share does not change with every sale.¹⁴⁹ Similarly, a corporation does not adjust its official stockholder lists to reflect routine trades; the same record holder persists as the formal owner of the stock.¹⁵⁰ Rather, the brokers and DTCC transfer beneficial ownership electronically from seller to buyer via bookkeeping adjustments.¹⁵¹

This remains a complicated ecosystem, and other players, such as Broadridge Financial, have emerged as critical outsourcing vendors that help manage the complex array of governance activities that result from stock holding in fungible bulk.¹⁵² Before returning to modern times, however, it is important to understand how the paperwork crisis impacted market regulations in this area.

¹⁴⁴ *Id.*

¹⁴⁵ *See, e.g.,* Andrew F. Tuch, *The Remaking of Wall Street*, 7 HARV. BUS. L. REV. 315, 323–25 (2017).

¹⁴⁶ *See generally* SELIGMAN, *supra* note 2; Kahan & Rock, *supra* note 36, at 1238.

¹⁴⁷ *See* Kahan & Rock, *supra* note 36, at 1237.

¹⁴⁸ *See id.* at 1237, 1254.

¹⁴⁹ *See id.* at 1238–40.

¹⁵⁰ *See supra* Part II.A.

¹⁵¹ *See* Kahan & Rock, *supra* note 36, at 1239.

¹⁵² *See id.* at 1244–48.

C. The Regulatory Aftermath

It seems reasonable to assume that regulators watched the paperwork crisis with some degree of dread. The SEC's cautionary "advice" not to reopen on Wednesdays had been ignored.¹⁵³ And while the exchanges and brokers had eventually sidestepped catastrophe, many lawmakers began to feel that self-regulation by the exchanges might not be the best way to promote functional stock markets. Some brokers also recognized that they had barely escaped disaster and sought additional laws to protect their markets.¹⁵⁴ Finally, seeking to tame an unruly Wall Street could also play well in some political circles. The regulatory reckoning was soon underway.

1. The Securities Investor Protection Act

The first step taken by Congress was to establish a new law that could reassure investors that personal funds would be protected if their brokers went bankrupt. As mentioned above, individual investors lacked FDIC-like protections during the 1969 paperwork crisis. Instead, a basic need to preserve confidence in trading markets by the brokers and exchanges served as the primary form of investor protection.¹⁵⁵ The NYSE's crisis committee had been able to work through the most demanding situations and avoid meltdown.¹⁵⁶ But when the smoke cleared in the early 1970s, many felt that this was no longer the best approach to investor protection.

The most obvious regulatory strategy was to replicate the FDIC's depository insurance for securities investments.¹⁵⁷ If an investor's assets could be guaranteed by the federal government if their broker became insolvent—at least up to a certain level—this might go a long way towards promoting trust in the stock market. A bill to that effect had been introduced in Congress during the 1968 crisis, but Wall Street brokers had fought against this idea.¹⁵⁸ They feared that the insurance plan would also bring new regulatory obligations—and thus spell the beginning of the end for self-regulation.¹⁵⁹

¹⁵³ See Wells, *supra* note 14, at 214.

¹⁵⁴ See *id.* at 223.

¹⁵⁵ *Id.* at 224–25.

¹⁵⁶ *Id.*

¹⁵⁷ See UNSAFE AND UNSOUND, *supra* note 70, at 3–4, 37–39.

¹⁵⁸ See Wells, *supra* note 14, at 224.

¹⁵⁹ *Id.* at 224–25.

By 1970, however, the calculus of some brokers had started to change.¹⁶⁰ The NYSE trust fund seemed inadequate to absorb all losses, and some members feared new surprises.¹⁶¹ A loss of public confidence also seemed likely; many investors seemed to be on the brink of rejecting street-level ownership of their stock.¹⁶² A mass request to retitle and withdraw shares held by CSS or the brokers themselves could spark a run on the brokers and undermine the second-generation clearing system that was now seen as critical to back-office operations. A federal insurance scheme seemed like the best way to head off these fears.¹⁶³

The planning and negotiations for what would eventually emerge as the Securities Investor Protection Corporation (“SIPC”) focused on how the protections would work, who would control the administrative bureaucracy of the system, and whether any additional regulatory strings would be attached to the plan.¹⁶⁴ Wall Street brokers proposed an independent government agency that would levy a small tax on security transfers and have recourse to a large line of credit at the U.S. Treasury for emergencies.¹⁶⁵ They argued that this agency should be run by the SEC and the exchanges themselves—not established as a separate organization (as the 1968 Congressional bill had proposed).¹⁶⁶ Finally, they suggested that the creation of this system should come with no other broker obligations.¹⁶⁷

Congress eventually agreed that there was no need to create a new agency, but it wanted more government control.¹⁶⁸ The brokers had proposed a twelve-member governing board with ten members coming from exchange appointments and two members coming from the President.¹⁶⁹ Both Congress and President Nixon said no way.¹⁷⁰ If most of the financial reassurance was coming from the U.S. Treasury, and if the taxpayers would be on the hook for an emergency bailout, then the federal government was going to control operations at the SIPC.¹⁷¹ The final bill provided for a seven-member board appointed as follows: one

¹⁶⁰ *Id.* at 225.

¹⁶¹ *See id.* at 225.

¹⁶² *See id.*

¹⁶³ *See* UNSAFE AND UNSOUND, *supra* note 70, at 3.

¹⁶⁴ *See id.* at 11.

¹⁶⁵ *See* Wells, *supra* note 14, at 225.

¹⁶⁶ *See id.*

¹⁶⁷ *See id.* at 226.

¹⁶⁸ *See id.*

¹⁶⁹ *Id.*

¹⁷⁰ *Id.*

¹⁷¹ *Id.*

member named by the Chairman of the Federal Reserve; one member named by the Treasury Secretary, and five members named by the President (with three of these members needing to come from the securities industry).¹⁷²

With this economic model and governance plan in place, the last question was whether Congress would demand additional regulatory oversight on Wall Street as a condition of the investor insurance protections. The NYSE and most Wall Street brokers did not want anything more; they liked the self-regulation approach.¹⁷³ But Congress was unwilling to backstop the SIPC protections without more oversight.¹⁷⁴ Accordingly, the final bill stipulated that the SEC would have the final authority to establish rules related “to the financial responsibility and related practices of brokers and dealers.”¹⁷⁵ It was possibly a redundant clause, given existing laws, but the SEC’s ultimate authority over broker capital requirements, audit obligations, and the like was not always explicit. With the new Securities Investor Protection Act of 1970, signed into law by President Nixon in late December, there was no doubt that the SEC now possessed the power to exercise oversight in these areas.¹⁷⁶ And it quickly moved to tighten capital requirements and mandate stricter audits—which had sometimes been implemented in a casual way by the NYSE to prop up troubled brokers during the crisis.¹⁷⁷

2. Congressional Hearings

While the SIPC’s insurance program was enacted relatively quickly, it took more time for lawmakers to conduct a thorough post-mortem of the paperwork crisis. But the inquiry would come. A provision in the Securities Investor Protection Act had instructed the SEC to report to Congress on any “unsafe or unsound practices” of broker-dealers within twelve months, and this report was released at the end of 1971.¹⁷⁸ It explored the causes of the breakdown and argued that “a modernized, nationwide system for effecting securities transactions must be

¹⁷² Securities Investor Protection Act of 1970, 15 U.S.C. § 78ccc(c)(2).

¹⁷³ Wells, *supra* note 14, at 226.

¹⁷⁴ *Id.*

¹⁷⁵ *Id.*

¹⁷⁶ *See, e.g.*, 15 U.S.C. § 78ccc(e)(3) (“The Commission may, by such rules as it determines to be necessary or appropriate in the public interest or to carry out the purposes of this chapter, require SIPC to adopt, amend, or repeal any SIPC bylaw or rule, whenever adopted.”).

¹⁷⁷ *See UNSAFE AND UNSOUND, supra* note 70, at 3.

¹⁷⁸ *See* 15 U.S.C. § 78kkk(g).

created.”¹⁷⁹ Quoting extensively from Tolstoy’s *War and Peace*, the introductory letter by SEC chairman William Casey described the chaos of the stock market battlefield and stated fourteen different problems that had contributed to the paperwork crisis.¹⁸⁰ This included many of the factors described above, such as inadequate broker-dealer capital, poor controls, a lack of early-warning systems, insufficient back-office talent and training, premature adopting of computing technology without the retention of old records for backup purposes, and the clogging of delivery, clearing and transfer systems due to increased trading volume.¹⁸¹

The SEC’s report then outlined twenty-one different steps that the SEC had already taken to avoid a repetition of the paperwork crisis.¹⁸² These included heightened capital requirements, stricter physical examination and count of all securities held by a broker, expanded personnel at the SEC and at the exchanges, and the installation of a uniform, monthly operational report by every broker-dealer.¹⁸³ Notably, the SEC also stated that, “[t]he securities industry working with several large banks . . . has made progress in immobilizing the stock certificate by establishing a central depository for securities held in street and institutional name.”¹⁸⁴ This of course was the CCS/DTCC project described above.

Finally, the SEC asked Congress to adopt legislation that would grant it oversight authority in four new areas: (1) “the processing of securities transactions;” (2) “the rule making authority of self-regulatory organizations;” (3) “the enforcement of the rules of the self-regulatory organizations;” and (4) “the administration of disciplinary proceedings conducted by the self-regulatory organizations.”¹⁸⁵ The first request was necessary, in the SEC’s view, because tasks like “the transfer and registration of transfer of certificates” were not clearly within the SEC’s regulatory ambit.¹⁸⁶ Similarly, while the SEC had limited power to nudge existing exchange rules, it lacked explicit authority to block new rules or abrogate existing rules.¹⁸⁷ Likewise, it could not directly enforce SRO rules against offending members but had to

¹⁷⁹ See UNSAFE AND UNSOUND, *supra* note 70, at 1.

¹⁸⁰ *Id.* at 1–3 (quoting from LEO TOLSTOY, WAR AND PEACE (1869)).

¹⁸¹ *Id.* at 2–3.

¹⁸² *Id.* at 3–5.

¹⁸³ *Id.*

¹⁸⁴ *Id.* at 5.

¹⁸⁵ *Id.*

¹⁸⁶ *Id.* at 5–6.

¹⁸⁷ *Id.* at 6–7.

rely on the private exchanges themselves for enforcement.¹⁸⁸ In short, the SEC felt that a broader grant of authority by Congress would allow the agency to improve on its overall mission of promoting sound business practices in the securities industry and thereby better protect investor interests.¹⁸⁹

A few months later, the Senate's Subcommittee on Securities (part of the Committee on Banking, Housing, and Urban Affairs) opened three days of hearings on the settlement of securities transactions.¹⁹⁰ The goal was to evaluate the Wall Street paperwork crisis and consider several proposals for avoiding this type of problem in the future. In the opening words of the subcommittee's Chair, Senator Harrison A. Williams:

Today [we] begin hearings on three bills concerning the clearance and settlement of securities transactions. Each of these three bills is designed to avoid a recurrence of the paperwork log jam and recordkeeping problems which plagued the securities industry and its customers from 1968 through 1970.

....

[W]e in the Congress were not satisfied with merely insuring the public against brokerage house failures [with the SIPC]. We began to exercise a closer and continuing scrutiny of the securities industry. . . . [I]n June of 1971, the Senate authorized this subcommittee to conduct a far-reaching study of the securities industry.

....

We must not forget the chaotic conditions which prevailed in the industry at the time the Congress considered the [SIPC]. The SIPC legislation was only the first step Legislative action which will alleviate the basic recordkeeping problems—the real cause of the crisis—is of the utmost necessity.¹⁹¹

The subcommittee called about thirty-five witnesses, including the Chair of the SEC, leaders of stock clearing organizations, members of various Wall Street associations, lawyers, auditors, and other professionals.¹⁹²

One of the most sensational statements came from Senator Charles Percy of Illinois, who asserted that over \$225 million in securities had been lost in 1970 through theft.¹⁹³ He suggested

¹⁸⁸ *Id.*

¹⁸⁹ *Id.* at 5–6.

¹⁹⁰ *See Clearance and Settlement of Securities Transactions: Hearings on S. 3412, S. 3297, and S. 2551 Before the Subcomm. on Sec. of the S. Comm. on Banking, Hous. and Urb. Affs.*, 92d Cong. 1 (1972) [hereinafter *1972 Congressional Settlement Hearings*].

¹⁹¹ *Id.* at 1–2.

¹⁹² *See id.* at III–IV.

¹⁹³ *Id.* at 64–65.

that Wall Street had been infiltrated by organized crime syndicates, who had used the back-office chaos to steal millions of dollars—aided in part by the reluctance of broker-dealers to admit that their system was susceptible to such theft.¹⁹⁴ Percy reported, for example, that a man named Robert Cudak had started a job at John F. Kennedy International Airport (“JFK”) and noticed that air freight often had almost no security.¹⁹⁵ He recruited some partners, and they began stealing jewels, cash, furs, and stock certificates—mostly from JFK, but also from airports in Chicago, Florida, Los Angeles, and elsewhere.¹⁹⁶ At first, Cudak and his partners failed to recognize the value of the stock certificates and simply threw them away.¹⁹⁷ But eventually, the group allegedly made connections with the mafia and was able to convert the stock certificates to cash.¹⁹⁸ Percy also related another story where a different criminal had recruited back-office employees on Wall Street to steal certificates.¹⁹⁹ These criminals could sometimes monetize the theft by taking out bank loans where the stock was used as collateral.²⁰⁰ The scheme often worked because the “friendly [unsuspecting] banker[s]” had no easy way to check whether the securities presented by the borrowers actually belonged to them.²⁰¹

It is difficult to know the true extent of mafia theft via stock clearing chaos, but this type of testimony certainly added to the saliency and urgency of the problem for Congress. Most of the testimony focused on the various challenges of back-office clearing that we have already examined. But the testimony all pushed in one direction: lawmakers should help establish a system that minimized distributed physical certificates as evidence of ownership by setting up a centralized national depository for securities.²⁰² And preferably, these securities would migrate to a digitized format as soon as possible.

¹⁹⁴ *Id.* at 71.

¹⁹⁵ *Id.* at 72.

¹⁹⁶ *Id.* According to Cudak’s testimony, this theft was exceptionally easy. *Id.* at 67. All one needed was a pair of white coveralls, a plastic helmet, a pair of ear muffers, and a fake identification badge. *Id.* Sometimes the criminals would buy a jeep similar to the ones used by caterers to run around airports, but even that became unnecessary because most workers just left their keys in the ignition. *Id.* So attired, the thieves would drive around the airports picking up attractive freight packages left unguarded on baggage carts or mail transfer depots. *Id.*

¹⁹⁷ *Id.* at 73.

¹⁹⁸ *Id.*

¹⁹⁹ *Id.* at 75.

²⁰⁰ *Id.* at 74–77.

²⁰¹ *Id.* at 77, 80.

²⁰² *See id.* at 1–2.

3. Section 17A of the Exchange Act

Despite the sensational testimony, it took several more years for additional laws to be passed. The eventual result was the Securities Acts Amendments of 1975.²⁰³ This enactment adjusted several elements of the Securities Act of 1933 and the Securities Exchange Act of 1934. For our purposes, however, the most important change was the adoption of Section 17A in the Exchange Act.

The goals of 17A are clearly stated in the preamble to the amendment and worth considering in full:

The Congress finds that—

(A) The prompt and accurate clearance and settlement of securities transactions, including the transfer of record ownership and the safeguarding of securities and funds related thereto, are necessary for the protection of investors and persons facilitating transactions by and acting on behalf of investors.

(B) Inefficient procedures for clearance and settlement impose unnecessary costs on investors and persons facilitating transactions by and acting on behalf of investors.

(C) New data processing and communications techniques create the opportunity for more efficient, effective, and safe procedures for clearance and settlement.

(D) The linking of all clearance and settlement facilities and the development of uniform standards and procedures for clearance and settlement will reduce unnecessary costs and increase the protection of investors and persons facilitating transactions by and acting on behalf of investors.²⁰⁴

In short, lawmakers sought to avoid another paperwork crises and accelerate the transition to a modern approach for securities clearing. A full analysis of Section 17A is beyond the scope of this Article, but three main goals of the legislation should be emphasized.

First, Section 17A established a framework for the SEC oversight of the clearing agencies and transfer agents who would process the back-office trades.²⁰⁵ Both groups were now required to register with the SEC and would only be approved to operate after a comprehensive review.²⁰⁶ For example, a clearing agency would need to demonstrate that it had the “capacity to be able to facilitate the prompt and accurate clearance and settlement of securities transactions . . . to comply with the provisions of this [law and] to enforce . . . compliance [with these laws] by its

²⁰³ See Securities Acts Amendments of 1975, Pub. L. No. 94-29, 89 Stat. 97.

²⁰⁴ *Id.* § 17A(a)(1).

²⁰⁵ *Id.* § 17A(c)(1), (c)(3)(C).

²⁰⁶ *Id.*

participants.”²⁰⁷ Similarly, a transfer agent would be required to register with the SEC and be subject to continuing oversight and potential discipline for misconduct.²⁰⁸ In short, lawmakers wanted more control over who would be carrying out back-office activities.

Second, Congress clearly envisioned a world where the CCS/DTCC strategy of holding immobilized securities in fungible bulk was the proper path forward. Section 17A(e) required the SEC to “end the physical movement of securities certificates in connection with the settlement among brokers and dealers of transactions in securities [involving mail or interstate commerce].”²⁰⁹ The days of couriers scrambling around to deliver stock certificates—or of mafia criminals grabbing boxes of certificates from airport loading platforms—seemed to be over. This section might accelerate the need to transition to the immobilized second-generation clearing system that Wall Street now embraced.

Finally, Congress realized that future details of stock settlement and clearing laws would need to be worked out, and it designated explicit rulemaking authority to the SEC.²¹⁰ Some other sections of the new laws explicitly required the SEC to work out new rules. But Congress also granted general rulemaking authority to the SEC related to the “transfer of certificated or uncertificated securities” and the “rights and obligations of purchasers, sellers, owners, lenders, borrowers, and financial intermediaries” involved with stock transfers.²¹¹ This rulemaking authority was subject to several legislative guidelines and administrative procedures, but it might allow the SEC to adjust the rules of the game as time passed.

The SEC’s rulemaking authority in this area has become important in the ensuing decades. To be sure, clearing rules probably do not get as much attention as other topics like insider trading or environmental disclosure obligations. But the authority was used in 2005 to adopt Regulation National Market System (“Reg NMS”), which encompassed a series of SEC initiatives to “modernize and strengthen the national market system (“NMS”) for equity securities.”²¹² The primary focus of Reg NMS, however, was on adjustments to front-end trading practices that might

²⁰⁷ *Id.* § 17A(b)(3)(A).

²⁰⁸ *Id.* § 17A(c)(1), (c)(3)(C).

²⁰⁹ *Id.* § 17A(e).

²¹⁰ National System for Clearance and Settlement of Securities Transactions, 15 U.S.C. § 78q-1(f)(1).

²¹¹ *Id.* § 78q-1(f)(1)(A), (B).

²¹² Regulation NMS, 70 Fed. Reg. 37496, 37496 (June 29, 2005) (to be codified at 17 C.F.R. pts. 200, 201, 230, 240, 242, 249, 270).

allow investors to obtain the best prices for their trades.²¹³ Similarly, the SEC revisited the impact of trading systems on front-end investor prices near the end of 2022 with several proposals that would adjust some aspects of market operations.²¹⁴

More importantly for our purposes, on the back-end of clearing markets, the SEC also approved several technical rules that worked to accelerate the transition to DTCC's second-generation settlement strategy. We will revisit a few of these lesser-known changes shortly to consider how these rules might now hinder third-generation experiments in blockchain clearing technology.²¹⁵

Finally, it is also worth noting that the SEC has used its 17A rulemaking authority to support cries for faster clearing and settlement of securities. In 1993, it adopted Rule 15c6-1 to establish three business days as the standard period for settling transactions in most securities, T+3.²¹⁶ This rule became effective in 1995 to shorten the previous settlement standard of five business days ("T+5").²¹⁷ This was further tightened to a T+2 system in 2017.²¹⁸ And in 2022, the SEC announced that it will require firms to shorten the settlement cycle to a T+1 system some time in 2024.²¹⁹

D. Cracks in the System

On balance, the ascendancy of DTCC and the elimination of physical certificate transfer have been welcome developments. Indeed, it is difficult to imagine how the old system could support the millions of trades that now occur each day on the New York Stock Exchange. But the use of immobilized fungible bulk and intermediate agents can complicate the mechanisms that must now be used to trade stock, convey the vote, and manage other important legal rights for beneficial shareholders. Cracks in the system do occur.

²¹³ *Id.* at 37497.

²¹⁴ See *SEC Proposes Rule to Enhance Competition for Individual Investor Order Execution*, U.S. SEC. & EXCH. COMM'N (Dec. 14, 2022), <http://www.sec.gov/news/press-release/2022-225> [<http://perma.cc/U2CP-6AF4>].

²¹⁵ See *infra* notes 263–266 and accompanying text.

²¹⁶ See General Rules and Regulations, Securities Exchange Act of 1934, 58 Fed. Reg. 52891, 52903 (Oct. 13, 1993) (to be codified at 17 C.F.R. pt. 240).

²¹⁷ See *id.* at 52892.

²¹⁸ See *SEC Adopts T+2 Settlement Cycle for Securities Transactions*, U.S. SEC. & EXCH. COMM'N (Mar. 22, 2017), <http://www.sec.gov/news/press-release/2017-68-0> [<http://perma.cc/G4T6-CNZS>].

²¹⁹ See *SEC Issues Proposal to Reduce Risks in Clearance and Settlement*, U.S. SEC. & EXCH. COMM'N (Feb. 9, 2022), <http://www.sec.gov/news/press-release/2022-21> [<http://perma.cc/6284-2S4C>].

1. Corporate Governance

Corporate law might have responded to the rise of fungible bulk shareholding by altering its doctrines to provide direct legal rights to beneficial owners. But this has not happened. 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.²²⁰ Any downstream custodian relationship between banks, brokers, and clients is treated as a matter of agency and not a primary concern for Delaware corporate law.²²¹ If mistakes arise from misunderstandings between beneficial owners and their brokers (and they do), then the problems need to be taken up by the private parties; Delaware courts will not step in to make things right through equitable adjustments.²²² 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.²²³

How exactly does governance work? 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.²²⁴ 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.²²⁵ This can take some time since there may be several layers of custodial ownership, and the banks will need to obtain data from the very bottom level.²²⁶ The firm will then provide each custodian with copies of the proxy materials for distribution to beneficial owners.²²⁷

²²⁰ See, e.g., DEL. CODE ANN. tit. 8, § 212 (2020) (describing who gets to vote); *id.* § 262(a) (2022) (“[In the appraisal context] the word ‘stockholder’ means a holder of record of stock in a corporation.”).

²²¹ See *In re Appraisal of Dell Inc.*, No. 9322–VCL, 2015 WL 4313206, at *6–7 (Del. Ch. July 13, 2015) (describing the evolution of Delaware's formal treatment of shareholders).

²²² See *id.* at *47–49.

²²³ *Id.* at *16.

²²⁴ See Kahan & Rock, *supra* note 36, at 1254.

²²⁵ 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.

²²⁶ 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 36, at 1244.

²²⁷ Most of these communication efforts with shareholders are outsourced to third party specialists. See, e.g., *In re Appraisal of Dell Inc.*, 143 A.3d 20, 22 (Del. Ch. 2016). Moreover, the SEC adopted “e-proxy” or “notice and access” rules in 2007 to allow firms to use email and the Internet for delivering these materials to willing shareholders. See Kahan & Rock, *supra* note 36, at 1246.

How are votes actually cast if DTCC retains the formal right, as record holder, to vote? Cede will execute a global proxy that allows its account holders (the custodian banks and brokers) to cast DTCC's votes in proportion to their total allocation.²²⁸ If a broker reports that its investors hold twenty-five percent of the shares, for example, then DTCC 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 additional layers as necessary) and fragment these voting rights even further. Eventually, beneficial holders can cast their votes as they wish.²²⁹ As the votes arrive, the firm can then verify proxies, tabulate votes, and report the results.²³⁰

This all sounds fine, but delay and complexity can cause problems. How, for example, can a firm ever hold a vote if it takes days to figure out who has the right to cast a ballot—and if the underlying ownership of shares is churning this entire time through subsequent sales and purchases? As soon as DTCC and the brokers have figured it out, the list of voters might be obsolete.

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.²³¹ This gives the firm time to distribute information and process the votes, even as it weakens the incentives of some shareholders to participate; after all, why vote on a matter when you no longer own the shares? For example, a firm might designate a record date forty-five days before its annual shareholder meeting. If so, an investor who buys stock after this record date cannot normally vote the late-purchased stock.²³² The same “snapshot” approach is taken with dividends: shareholders on the record date will eventually receive the payments, and the

²²⁸ See Kahan & Rock, *supra* note 36, at 1247.

²²⁹ Alternatively, the banks and brokers might just ask beneficial shareholders to supply them with timely voting instructions (rather than execute a second proxy). See Kahan & Rock, *supra* note 36, at 1247.

²³⁰ Again, it is common for firms to outsource the actual processing and tabulation of votes to a third-party provider. See, e.g., *In re Appraisal of Dell Inc.*, 143 A.3d at 22. For contested matters, such as director election contests, an independent inspector may also be retained to supervise the entire process. See *id.*

²³¹ Delaware General Corporate Law is illustrative. Under Section 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) (2020).

²³² The selling shareholder will retain voting rights, under 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.

shares trade “ex-dividend,” long before any checks are cut.²³³ 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.

Several commentators have written about these problems elsewhere, so I will only review them at a high-level here.²³⁴ The most obvious problem that can arise is over-voting—where more ballots are cast than the total number of existing shares.²³⁵ This is thought to happen through accounting and reconciliation inconsistencies.²³⁶ A shareholder might think, for example, that they bought their shares in time to vote—when the actual transfer occurred after the record date cutoff. Both buyer and seller vote, and the discrepancy is not caught as brokers combine their clients’ votes and submit them to DTCC. Over-voting does not seem to occur very often, but when it does, it should be seen as a clear indicator of a malfunctioning system. More concerning, perhaps, is a fear that the problems leading to over-voting are pervasive but that stockholder voting apathy prevents such a visible breakdown from arising very often. If the system is error-ridden, but we cannot always observe when a breakdown occurs, then that should be seen as a fundamental legitimacy problem for corporate governance.

One way to explore whether this occurs might be to hold a vote on the same decision several times and check whether the recount matches the initial vote. This is hardly practical, but do-overs occasionally happen. For example, in 2017, Proctor & Gamble fought a highly publicized director vote where Nelson Peltz, a well-known activist investor, initially lost an extremely close election

²³³ A firm will usually process dividends in four 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). Later, shares will trade without dividend rights (“ex dividend”). And finally, the firm will actually pay the dividend to all entitled shareholders. See RICHARD A. BREALEY ET AL., *PRINCIPLES OF CORPORATE FINANCE* § 16.2, at 427–28 (13th ed. 2020).

²³⁴ See, e.g., Kahan & Rock, *supra* note 36, at 1227; 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); Henry T.C. Hu & Bernard Black, *The New Vote Buying: Empty Voting and Hidden (Morphable) Ownership*, 79 S. CAL. L. REV. 811, 815 (2006).

²³⁵ See Kahan & Rock, *supra* note 36, at 1258–63.

²³⁶ *Id.* at 1254–55.

(973 million votes to 979 million votes).²³⁷ Peltz obtained a recount and prevailed when the votes were retallied.²³⁸ This type of incident is just one example of what Marcel Kahan and Ed Rock call the “hanging chads of corporate governance.”²³⁹ It cannot inspire confidence in our corporate voting system.

Beyond director elections, voting imprecision can also cause glitches for shareholders seeking to exercise some other rights. For example, I have written elsewhere about how appraisal rights—where shareholders who object to a merger transaction can seek fair value for their stock in a lawsuit—will sometimes be threatened.²⁴⁰ In a nutshell, the objecting shareholders usually need to show that their shares were voted against the merger, which is sometimes impossible to demonstrate under our current and complex system.²⁴¹

2. Credit Risk Management

A different problem can also arise with delayed clearing and settlement: the need to manage participant credit risk. If, counterfactually, brokers settled with DTCC in real-time as the collective positions of their clients' investments changed, then there should be a negligible risk. But as we have seen, this is not the case. Suppose that a broker, we will call Robinhood, represents clients buying one million shares of some company's stock at \$500 per share. A different broker named Nottingham represents the selling investors. The trade is earmarked quickly, of course, but the flow of cash from Robinhood to Nottingham and the transfer of the stock ownership the other way on DTCC's accounting ledgers will not occur for a little while longer. If the stock position is large and volatile, and if DTCC is committed to standing behind the exchange, then the clearinghouse may grow nervous that Robinhood will not be able to fork over the cash if prices plunge over the next few days. Accordingly, it may ask for Robinhood to pay more funds into a deposit account with the DTCC that might be used to backstop the exchange if any client trouble arises. The goal is to manage risk concerns between DTCC, Robinhood, or

²³⁷ 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), <http://www.wsj.com/articles/p-g-concedes-proxy-fight-adds-nelson-peltz-to-its-board-1513377485> [<http://perma.cc/4WPX-YJHK>].

²³⁸ See *id.*

²³⁹ See Kahan & Rock, *supra* note 36, at 1227.

²⁴⁰ See George S. Geis, *An Appraisal Puzzle*, 105 NW. U.L. REV. 1635, 1636 (2011). See also Ferrick, *supra* note 11, at 624. Helpful judicial discussion of this problem can also be found in the high-profile Dell appraisal case. See *In Re Appraisal of Dell Inc.*, No. 9322-VCL, 2015 WL 4313206, at *1–3 (Del. Ch. July 13, 2015).

²⁴¹ See Ferrick, *supra* note 11, at 625.

other individual brokers. A parallel concern should not arise for the net selling broker so long as DTCC can see that Nottingham “owns” the shares on his ledger—though this net position might change, of course, over the span of a day.

What happens if Robinhood cannot easily satisfy the request for a larger deposit with DTCC? Well, just as your broker might grow nervous if (1) you borrow money to buy stock on margin; (2) the price of the shares drops; and (3) you can’t scrape together the cash to meet a margin call, DTCC’s anxiety might rise when we take this problem one level higher with a centralized settlement. It might even represent a more difficult problem; at the individual investor level, your broker might eventually sell your stock and use the proceeds to mitigate credit risk. But this seems an unlikely solution for DTCC—since it is the broker’s credit risk that matters. Instead, DTCC may try to limit additional purchases by the broker until a larger deposit can be made.

Something like this seemed to have happened during the Robinhood-GameStop Crisis of 2021.²⁴² Early in the morning of January 28, Robinhood was told by the DTCC that it needed to boost its deposit by roughly \$3 billion.²⁴³ DTCC was concerned that the highly volatile GameStop stock might expose it to Robinhood’s credit risk. This was more than Robinhood’s external capital (only \$2 billion), and the broker was not in a position to send over such a large deposit.²⁴⁴ So, the only solution seemed to be to halt additional client purchases of GameStop; investors were permitted to sell their stock (which would reduce the net long position of Robinhood with DTCC and mitigate credit concerns), but they could not buy.²⁴⁵ Eventually, the deposit was lowered, and the problem was finessed, but not before outraged clients and conspiracy theorists yelled about a rigged system on Wall Street.²⁴⁶

The broader point is that delayed settlement cycles linked to unidentified securities can raise counterparty credit risks. This must be managed and may, in extreme circumstances, hinder trading strategies or even shut out some market participants. And while there is more to say about the cracks in our stock-clearing processes, hopefully, this is enough to demonstrate that the fifty-year-old settlement is showing its age. Like a patched-up 1960s automobile or mainframe computer, it usually works okay. But the

²⁴² See sources cited *supra* notes 6–8.

²⁴³ See, e.g., Gonzalez & Priest, *supra* note 6.

²⁴⁴ *Id.*

²⁴⁵ See *id.*

²⁴⁶ See *id.*

process is overly complex, relatively slow, and sometimes just plain wrong. Is there a better way?

III. TOWARDS THE THIRD GENERATION: BLOCKCHAIN?

Legal commentators, entrepreneurs, regulators, and even the DTCC are increasingly excited about the possibility of faster clearing and third-generation settlement technology.²⁴⁷ This section explores the possibilities, considers the likelihood of change in light of the historical discussion above, and offers some suggestions for the future of stock settlement.

A. The Potential of Blockchain

If we could snap our fingers and create an ideal stock-clearing platform, we would probably abandon the complicated multi-layered distinction between record and beneficial owners. Likewise, why hold stock centrally in unidentified fungible bulk? A share of stock might trade electronically, perhaps still through centralized brokers and exchanges—but a decentralized exchange could be an interesting possibility. Importantly, however, the details of each transfer would be processed by a secured and trusted protocol that specifically identifies each share exchanged. This information would be rapidly updated (ideally in real-time or close to real-time) and accessible by relevant parties with the proper clearance. In short, we would have a rapid clearing of stock trades in a way that preserves a precise chain of title.

Most experts would have dismissed this vision as fantasy five or ten years ago. It was simply too difficult to imagine how software, technology, and computing could keep up with the ongoing surge of trades. More recently, however, it has become possible to envision how blockchain and distributed ledger technology could revolutionize the settlement of stock trades.

I have written about how the mechanics of stock settlement on a blockchain might work elsewhere,²⁴⁸ so I will not delve into technical details here. But it is important to highlight a few key principles. First, blockchain technology is specifically designed to establish a secure, trusted, and precise chain of property ownership.²⁴⁹ Maintaining an exact provenance of title—especially over digital information—is exactly what blockchain is designed to do. While some have espoused payment systems as the obvious

²⁴⁷ See sources cited *supra* note 11.

²⁴⁸ See Geis, *supra* note 11, at 227.

²⁴⁹ See, e.g., Joshua A.T. Fairfield, *BitProperty*, 88 S. CAL. L. REV. 805, 808 (2015).

killer application for blockchain, tracking rapidly changing property records might be an even more compelling use of the technology.²⁵⁰ Stock settlement might not be the most obvious thing to manage on a blockchain, but it should make perfect sense.

Second, while blockchain settlement could be very rapid, it is unclear whether real-time settlement would be optimal. One intriguing possibility is to establish an instantaneous clearing system where trades are processed via smart contracts that simultaneously execute an exchange of money and stock ownership. Such a system could have many advantages over one with a built-in delay, such as eliminating governance and voting distortion, credit risk concerns for intermediaries, and so on. But there might also be some added costs to real-time settlement. For one, abandoning netting and clearing every trade could introduce additional transaction costs, especially when high-frequency investors churn in and out of a stock position. Second, there could no longer be a margin for error. One important feature of the blockchain is finality (for the most part), and errors, fraud, or mistakes would need to be sorted out on the back end. This could drive up operational costs and risks. Real-time settlement still may make the most sense in the long run, but the jury is still out.

Third, from the client's perspective, blockchain settlement might not matter much—especially if the trades continue to be processed through centralized agents. For example, economic information and share positions might continue to be provided by brokers. Investor trades would settle quicker, 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. Determining how much access should be provided to historical trading data will raise interesting regulatory issues.²⁵¹ But, as discussed earlier, a new clearing system could matter a lot to investors if they need to ensure that votes are accurate or that some litigation rights are perfected.

Fourth, blockchain clearing might provide valuable information to firms and regulators, but confidentiality protocols will be important. Under our current system, a company cannot

²⁵⁰ See *id.* at 807–08.

²⁵¹ See, e.g., David Yermack, *Corporate Governance and Blockchains*, 21 REV. FIN. 7, 26–27 (2017).

know who its shareholders are at any given moment. Rather, it must launch an inquiry with the DTCC and brokers to trace through all the intermediary holders and put together the puzzle.²⁵² And by the time that has been completed, stock ownership positions have probably changed again. This makes it more difficult for firms to communicate with investors and conduct other governance outreach conversations, although the rise in large institutional managers of index funds has made this easier.²⁵³ Likewise, regulators might have many reasons to care about actual ownership positions, and blockchain records of perfect provenance could be quite valuable. That said, some investors will vehemently oppose revealing propriety trading positions in real-time. Information access protocols will need to be established.

Despite these lingering questions, the potential for a new generation of stock-clearing technology has attracted many entrepreneurs.²⁵⁴ Some want to build a better clearing platform, while others focus on streamlining communications with investors or governance processes.²⁵⁵ To date, however, only some of these initiatives have moved rapidly to transform stock-clearing.²⁵⁶ The last five years have seen much effort but fewer tangible results.

Even DTCC has heard the call for blockchain transformation. In early 2020, it announced that it was launching “Project Ion” to explore the use of distributed ledger technology for clearing public company stock trades.²⁵⁷ (It also announced a parallel “Project Whitney” to facilitate private company stock trades.”²⁵⁸) Project Ion

²⁵² See Kahan & Rock, *supra* note 36, at 1243.

²⁵³ See, e.g., John C. Coates, *The Future of Corporate Governance Part I: The Problem of Twelve* 2 (Harvard Pub. L. Working Paper No. 19-07, 2019), <http://ssrn.com/abstract=3247337> [<http://perma.cc/LB7R-BZLE>].

²⁵⁴ See *Clearing Technology*, NASDAQ, <http://www.nasdaq.com/solutions/clearing-technology> (last visited Apr. 6, 2023); Philip Stafford, *Stock clearing stalwarts face increasing threat from blockchain*, FIN. TIMES (Apr. 6, 2021), <http://www.ft.com/content/094da6cf-3619-4f0e-a60c-82f01c285347>.

²⁵⁵ See *Securities Settlement: A new Standard of Efficiency for Settlement of Securities*, PAXOS, <http://paxos.com/securities-settlement/> [<http://perma.cc/5CPT-KJ66>] (last visited Apr. 6, 2023); Stafford, *supra* note 254; BROADRIDGE, NEXT-GENERATION PROXY VOTING 2 (2022), http://www.broadridge.com/_assets/pdf/broadridge-next-generation-proxy-voting-strategies.pdf [<http://perma.cc/2KTT-8H4M>].

²⁵⁶ See *Clearing Technology*, *supra* note 254; Stafford, *supra* note 254; PAXOS, *supra* note 255.

²⁵⁷ See Kristi Morrow et al., *DTCC's Project Ion Platform Now Live in Parallel Production Environment, Processing Over 100,000 Transactions Per Day on DLT*, DTCC (Aug. 22, 2022), <http://www.dtcc.com/news/2022/august/22/project-ion> [<http://perma.cc/T44B-SLNT>].

²⁵⁸ See DTCC, *Digital Securities Management Bringing Private Markets Infrastructure into the 21st Century*, DTCC 1 (Nov. 2021), <http://www.dtcc.com/-/media/Files/PDFs/White-Paper/Digital-Securities-Management-Industry-Update-White-Paper.pdf> [<http://perma.cc/GN3D-9XUY>].

started with efforts related to proof of concept, technology assessment, and client testing. More than two years later, in August 2022, Project Ion launched a pilot experiment that processed about 100,000 trades a day in a parallel test lab.²⁵⁹ These are not actual transactions, however, but ones that mirror stock trades in a way that should test the viability of the new system.

Stepping back from all of this, I think it is fair to say that all the excitement and energy surrounding stock-clearing on the blockchain has not yet blossomed. Progress has been slow. Why? One plausible explanation is that key players do not believe that the current, second-generation clearing system really needs to be updated. Things seem to mostly work out okay—though one might speculate about the number of mistakes that arise out of the spotlight. A more likely explanation for the slow pace of progress is that cryptocurrency markets and infrastructures have cratered during 2022.²⁶⁰ I would contend that much of this turmoil has had little to do with the viability of underlying blockchain technology. But inevitably, the constant press of newspaper headlines must have led many to question whether blockchain has been overhyped.

The main point of this Article, however, is that historical context for stock settlement has also slowed experimentation with reform via blockchain technology. Let us consider the impact of history.

B. The Impact of History on Settlement Reform

The first point to make is that historical failure has likely led to some degree of risk-aversion among market participants and regulators. Even after five decades, the trauma of market closures and the inability to track trades must linger in a way that chills some interest in reform. No one wants to launch a system that re-breaks the back-office plumbing of Wall Street. So long as aging pipes can be patched up with putty, or cut out and soldered back together, some participants would prefer to keep on going. And to be fair, replacing all the plumbing in a large, fast-moving, complex, and critical system of financial architecture should not be undertaken lightly. But the memory of failure may be dampening some of the enthusiasm for innovation.

²⁵⁹ See Morrow et al., *supra* note 257.

²⁶⁰ Cheyenne DeVon, *Bitcoin Lost Over 60% of Its Value in 2022—Here's How Much 6 Other Popular Cryptocurrencies Lost*, CNBC (Dec. 23, 2022, 9:30 AM), <http://www.cnbc.com/2022/12/23/bitcoin-lost-over-60-percent-of-its-value-in-2022.html#:~:text=Just%208%25%20of%20Americans%20have,far%20below%20their%202021%20highs> [http://perma.cc/Z9KX-9VT6].

Second, the current, second-generation stock settlement system led to entrenched centralization. This did not happen by accident, of course, but was the key design feature of the solution. As we have seen, the cure to Wall Street's paperwork nightmare was to centralize all formal stock ownership and manage the actual economic ownership changes with bookkeeping adjustments. And the fix worked. But stepping back from everything fifty years later, we should recognize that the curious system now in place is a kludge—and hardly the type of architecture that would be designed from scratch. Why should a central owner keep everything locked in its vaults?

More importantly, we should consider the possibility that centralization of control has led to a situation where some vested interests might prefer not to modernize. This is not necessarily to fault DTCC; it is amazing what the centralized clearinghouse has been able to accomplish over our decades of rocketing trading volume. And, as mentioned, DTCC is conducting experiments that might lead to a new generation of clearing technology.²⁶¹ But one must question how strong the imperative for change is felt. And DTCC is not the only large organization that has resulted from centralized clearing. A handful of other players, especially Broadridge Financial, have grown enormous (and highly profitable) as solutions providers that can help corporations navigate the current complex web of stock transfers, communications, and governance.²⁶²

Finally, I would argue that ossified regulatory restrictions have also slowed initiatives in this area. What do I mean by this? Under current laws, some efforts to adopt new clearing platforms are prohibited. Ironically, the same laws enacted to help shift settlement markets from the outdated first-generation system to the current second-generation system now block experimentation with promising third-generation technology. Consider a few examples.

In 1993, the SEC approved a listing rule by the exchanges that effectively required issuers to consent to making their securities depository-eligible for DTCC book-entry services as a condition of listing.²⁶³ This effectively prevents a corporation that wants to go public from sidestepping the DTCC framework and embracing an alternative settlement system. At the time, the SEC was understandably concerned about potential harms to investors that

²⁶¹ See *supra* notes 257–259 and accompanying text.

²⁶² See Kahan & Rock, *supra* note 100 *passim*.

²⁶³ See Order Approving Proposed Rule Changes Relating to the Book-Entry Settlement of Securities Transactions, 58 Fed. Reg. 33679, 33679 (June 18, 1993).

might occur if a firm refused to work with the state-of-the-art settlement system. But today, this means that a company wishing to try blockchain settlement through an innovator cannot opt out.

Similarly, in the early 2000s, the SEC approved rules to shore up centralized settlement. In 2003, after one company sought to pull back its shares from DTCC control, the SEC approved a rule allowing DTCC to refuse an issuer request to withdraw securities.²⁶⁴ Another firm sought to address this upfront by adopting a corporate bylaw that made its shares ineligible for DTCC ownership and services. Again, the SEC said no by approving Rule 17Ad-20 to effectively prohibit this act.²⁶⁵ These changes made good sense: these efforts would have taken these firms “off the grid” and made it much more difficult for investors to trade their stock. But today, they work to lock in the status quo in ways that run counter to the fundamental goals stated in the preamble to 17A.²⁶⁶

There are other regulations that might be discussed, including, for example, the possible burden of having to register as a transfer agent if firms or their agents process stock trades on a blockchain.²⁶⁷ But, hopefully, this is enough to understand how the historical regulatory imperative to support a second-generation clearing system now seems to be blocking third-generation reforms.

To be fair, many regulatory reforms have been undertaken that bolster new settlement and clearing strategies. Many states, including Delaware, have provided specific statutory authority for corporations to use “electronic networks or databases” (including distributed ledgers or blockchain) for a stock ledger.²⁶⁸ And the SEC has sponsored experiments that could help explore whether new systems of stock trading and clearing on a blockchain might be viable.²⁶⁹ But any regulatory restriction faces the possibility that the press of time will turn good policy into bad. It may now be time to recognize some of this regulatory ossification in stock settlement and do more to free potential innovators in this space.

²⁶⁴ See Order Granting Approval of a Proposed Rule Change Concerning Requests for Withdrawal of Certificates by Issuers, 68 Fed. Reg. 35037, 35037–38 (June 11, 2003).

²⁶⁵ See Issuer Restrictions or Prohibitions on Ownership by Securities Intermediaries, 34 Fed. Reg. 49804 (proposed June 4, 2004) (to be codified at 17 C.F.R. pt. 240).

²⁶⁶ See *supra* note 204 and accompanying text.

²⁶⁷ See Securities Acts Amendments of 1975, Pub. L. No. 94-29, 89 Stat. 97, § 17A(c)(1), (c)(3)(C).

²⁶⁸ See, e.g., J. Travis Laster & Marcel T. Rosner, *Distributed Stock Ledgers and Delaware Law*, 73 BUS. LAW. 319, 327, 329–30 (2018).

²⁶⁹ E.g., Paxos Trust Co., LLC, SEC No-Action Letter, 2019 WL 8128050 (Oct. 28, 2019).

CONCLUSION

Comparing back-office stock settlement to home plumbing is apt on at least two levels: (1) both are critically important; and (2) most people do not wish to closely examine the inner workings of either system. So long as everything seems to function effectively—and share ownership rights eventually flow from seller to buyer—it is tempting to just ignore the details. But the precise mechanics of stock settlement deserve scrutiny because there is a fascinating and important history here—one that matters for corporate law and for the effective functioning of financial markets.

This Article has traced and analyzed the context of history on stock settlement reform. Failures in the past support a heightened perception that future adjustments must be risky. Large, centralized players were created that may now resist innovation. And some regulatory restrictions, sensibly established decades ago to support needed change, may now be blocking productive experimentation. I predict that we will see a new settlement system eventually; architects have drawn up plans, and construction has begun. But these players must understand and contend with historical events that still impact this critical financial infrastructure.