7-2020

Stakeholder Survey Preliminary White Paper

Program in the Law and Economics of Capital Markets

Columbia-IBM Center for Blockchain and Data Transparency

Program in the Law and Economics of Capital Markets
New Special Study of the Securities Markets

Columbia-IBM Center for Blockchain and Data Transparency

Stakeholder Survey Preliminary White Paper
July 2020

I. Executive Summary and Background

With a generous grant from the Columbia-IBM Center for Blockchain and Data Transparency, the Columbia Law School/Business School Program in the Law and Economics of Capital Markets (the "Program") is conducting a survey of domestic and international securities markets regulators, entrepreneurs, private industry leaders, legal practitioners, academics, and other stakeholders in the securities markets (the "Survey"). The Survey is designed to provide a deeper understanding of what these stakeholders consider to be the most important issues raised by distributed ledger technology ("DLT") for the securities markets and their regulation. DLT is an integral part of the larger revolution in computing, communication, and data storage that has transformed securities markets over the last few decades[1] and promises further radical change in the years to come.[2]

II. Commencing the Survey

As a starting point, the Program organized a Roundtable in June 2019 to test and discuss a set of draft questions to be included in the Survey. With backgrounds in law, finance, and computer science,[3] the participants focused on how data, blockchain, and smart contract technologies are affecting economics, law, and policy in the securities markets. The Roundtable was critical in shaping the Survey, helping to determine who would be interviewed and the questions they would be asked.

Following the Roundtable, interviews began late last summer and have thus far been conducted with 49 persons, including current and former SEC commissioners and other regulators, heads of FINRA, and general counsel and economists at national stock exchanges and prominent

---

[1] *See* MERRITT B. FOX, LAWRENCE R. GLOSTEN, GABRIEL D. RAUTERBERG, THE NEW STOCK MARKET: LAW, ECONOMICS, AND POLICY (2019, Columbia University Press).

[2] *See* MERRITT B. FOX, LAWRENCE R. GLOSTEN, EDWARD F. GREENE, & MENESH PATEL, SECURITIES MARKET ISSUES FOR THE 21ST CENTURY (2019).

[3] The attendees at the Roundtable are listed in Appendix I.

legal practitioners and persons from the broker-dealer community.[4] Two more people have agreed to be interviewed, but dates have not yet been set.[5] The interviews conducted thus far have been especially valuable because of the interviewees' enthusiasm and their willingness to connect us with additional interviewees. In total, we anticipate interviewing about 100 persons.

The COVID-19 pandemic has affected the Survey in important ways, forcing us to change how we conduct our interviews and when we will hold the final academic conference on Survey results. (The conference is now scheduled for Spring 2021 rather than in the Fall 2020 as originally planned. The pandemic's enormous economic impact and the associated uncertainty also serve as a sort of stress test that could reveal what is and is not working in our securities markets. Finally, the pandemic will probably accelerate changes to how various securities market participants do business. Thus, although the pandemic may prolong the project, it will also make the results even more valuable. More specifically:

Interview Format. Until recently, we preferred to conduct interviews in person so that interviewees would be more candid. Since March 2020, however, we have conducted all interviews by video over Zoom. Despite losing some intimacy, we have gained scheduling flexibility and the ability to do more interviews.

Interview Content. When we began the Survey last Summer, the U.S. economy was experiencing robust growth, and our interviews reflected thoughts about the world as it existed then. The world has, of course, changed drastically since, and our current interviews are capturing the thinking of market participants, regulators, and academics as they come to grips with unprecedented market turmoil and regulatory challenges. The extended interview schedule enables us to take full advantage of the opportunity presented by this otherwise unfortunate change of circumstances. It allows us to document the new thinking that is emerging from the crisis and to return to prior interviewees once the impact of COVID-19 is more fully understood. In fact, multiple interviewees have already said they are eager to speak with us again, citing concern that the pandemic is forcing a re-examination of fundamental assumptions about market structure and functions, the results of which will be much clearer in six months or so. No one knows whether

[4] The persons interviewed so far are listed in Appendix II.
[5] The persons scheduled to be interviewed in the near future are listed in Appendix III.

the current economic crisis will have anything approaching a similar impact, but out of the Great Depression came the Securities Act of 1933 and the Securities Exchange Act of 1934, statutes that dramatically changed securities regulation and still form the backbone of our regulatory structure.

As has always been our plan, we will evaluate the results of this research in a final white paper, which will be presented at a conference of securities academics and practitioners in Spring 2021 relating to DLT, advanced information technology, and the future of securities regulation. Surveys have always been regarded as a fundamental research tool in law and economics.[6] The Columbia Business Law Review (CBLR) has agreed to use this conference as the basis for a symposium issue. Nearly twenty of the world's top securities law scholars have agreed to participate in the conference and have their papers published in the symposium issue.[7]

III. Preliminary Survey Results

Below is a preliminary summary of the most important topics and themes that have emerged from the interviews thus far. Broadly speaking, even as interviewees expressed a wide variety of opinions about a DLT-filled future, a significant number acknowledged the potential of DLT to transform securities markets. Key questions remain, however, about implementation and the appetite for it among regulators and market participants.

As our interviews have highlighted, DLT is only the most recent manifestation of how advanced information technology has rapidly accelerated innovation in securities markets. While DLT has significant potential to transform many aspects of our securities markets, it must be understood in the context of broader technological change that our markets are experiencing today. The application of DLT and these other advances in information technology to the securities markets will substantially disrupt how business is done. As in any regulated industry, that disruption will force regulators to adapt and inevitably prompt a basic reexamination of the goals of the regulatory system. This will bring to the fore underlying conflicts among the different types of market participants that have only simmered in the background when debates have only involved more minor changes in established ways of doing business. More idealistically, such a

[6] *See, e.g.,* the highly cited article, Graham and Harvey, "The Theory and Practice of Corporate Finance: Evidence from the Field," *Journal of Financial Economics*, 2001.

[7] A list of the scholars who have agreed to participate are listed in Appendix IV.

disruption could remake the world anew from a regulatory and business point of view. All of this means that an intelligent discussion of the implications of these technologies for the securities markets requires an understanding of what different types of market participants think the goals of securities regulation should be and how they think those goals are being met. As a result, we also asked our interviewees about these subjects.

Below, we synthesize our learning from discussion of the following topics that have emerged from the interviews thus far: (A) the overall potential of DLT (broadly conceived), (B) stock trading on DLT, (C) market structure concerns, (D) private vs. public markets, (E) the role of the ordinary investor, (F) the role of intermediaries, (G) wrongdoing in the markets, (H) digital coins, (H) regulatory responses to innovation, and (J) the impact of COVID-19.

A. The Overall Potential of DLT

Multiple interviewees said using DLT in the securities markets might have significant benefits. These could include lower clearing and settlement costs, an indelible and unified record of transactions that would make it far easier for enforcement officials to survey and trace transactions in order to detect and prove violations, enhanced data privacy and monitoring capabilities, and, as discussed below, even a platform for trading at least some, and perhaps all, stocks. Broadly speaking, as one member of the broker-dealer community put it, anything that reduces the costs and enhances the operational effectiveness of the securities markets' payments system is inherently valuable. Another member of the regulatory community said blockchain might generally be used to make recordkeeping more efficient and for avoiding the expense of a trusted intermediary where one would otherwise be necessary.

Yet just as frequently, interviewees expressed substantial concerns about whether the markets and regulators were ready for DLT. As one member of the regulatory community stated, fully functioning DLT-based markets would require near-universal adoption of DLT, which seems very unlikely unless regulators come up with a long-term plan for creating incentives to adopt it and guidance on implementing it.

Misgivings about whether implementation would in fact on balance be positive also emerged as a theme in many of the interviews. As one interviewee pointed out, even if right now

DLT could facilitate audit trails and recordkeeping, an entity would still be needed to bring buyers and sellers together and using DLT to create a trading platform that would substitute for stock exchange was a much more ambitious task. Interviewees also commonly noted the obstacles of scaling up the functionality of DLT for widespread use as a trading platform in markets where a huge volume of transactions occurs in microseconds.

B. Public Trading and Offering of Stocks on DLT?

Publicly trading and offering stocks on DLT would have a number of advantages. But how practical would it be? Much depends on the scalability of DLT and the market's and regulators' appetite for a more disintermediated system.

1. Potential advantages. In the current system of trading stocks publicly on an exchange or other venue, a buyer and a seller anonymously agree to transact a given number of shares for a given price. Then, two days later, the promised money is exchanged for the promised stock in what is known as clearing and settlement. It is very important for the functioning of this anonymous market that buyers and sellers feel confident that their deals will be honored. Currently, this confidence is established by a complex system that requires every buyer or seller to place its order through a broker who then acts as a backup should its customer fail to perform. The system in turn includes a clearing and settlement system whereby other brokers in essence back up the customer's particular broker in case the broker itself fails. It is in clearing and settlement that the actual exchange of stock for money occurs.

In theory, at least, a DLT-based system could both perform the function of the trading venue, matching potential buyers and sellers who could directly submit their orders to it, and then instantaneously provide for the exchange of stock for money. This could lead to substantial cost savings. Brokers, the exchanges and the clearing and settlement entity would no longer be necessary, and making the exchange of stock and money instantaneous would free up the capital currently required to back a two-day lag. The DLT system could also manage each corporation's stock ledger more efficiently. Unlike today's system, which promotes easy trading by making broker-provided nominees the record holders of most stock, DLT would identify the actual shareholders at any given moment. This would simplify distribution of dividends and required shareholder notifications and bring order to the currently chaotic system of shareholder voting.

Many of these advantages, on a one-time basis, would also accompany being able to do public offerings of stocks utilizing DLT. And doing an offering in this fashion would lay the groundwork for the secondary trading of the stock to be DLT based as well. [8]

2. Views of interviewees as to the potential for trading and offering stock using DLT. A number of interviewees raised the possibility of trading stock on blockchain technology. For example, one member of the regulatory community believes that the ability to use blockchain for detailed audits without intermediaries could persuade markets to trade stock on blockchain technology.

Even if moving all publicly traded stocks to an exclusive DLT platform proves impractical in the near future, one member of the regulatory community raised a narrower possibility: Some tier of equities (smaller companies' stocks, for example, which have a lower volume of trading) could trade solely on their own, single DLT-based market, thereby eliminating the need for central clearing of these stocks. A member of the nonprofit community pointed out that the SEC is already experimenting with placing stock on a blockchain (though he noted that this would be illegal under current regulation). The Boston Security Token Exchange has sought to become a listing exchange

[8] Recent pilot projects involving the primary offering or secondary trading of very specific securities suggest that the hopes of those imagining wide-spread DLT-based offerings and trading are not entirely fanciful. *See, e.g.*, Vanguard, *Vanguard Advances Blockchain Technology Pilot To Streamline Asset-Backed Securities Markets* (June 11, 2020), https://pressroom.vanguard.com/news/Press-Release-Vanguard-Advances-Blockchain-Technology-Pilot-061120.html ("Vanguard, in partnership with technology provider Symbiont, announced today the completion of the first phase of a blockchain pilot designed to digitize the issuance of asset-backed securities (ABS). In close collaboration with a large US ABS issuer, as well as BNY Mellon, Citi, and State Street, Vanguard successfully modeled the full lifecycle of an ABS settlement on distributed ledger technology (DLT) network by replicating end-to-end transaction flows."); *SIX Digital Exchange launches DLT-based trading and settlement prototype* (Sept. 23, 2019), https://www.finextra.com/newsarticle/34460/six-digital-exchange-launches-dlt-based-trading-and-settlement-prototype ("Swiss stock exchange SIX has launched a prototype of its distributed ledger technology-based digital exchange and central securities depository. Meanwhile, trading has started on Boerse Stuttgart Digital Exchange."); *Societe Generale issued the first covered bond as a security token on a public blockchain* (April 23, 2019), https://www.societegenerale.com/en/newsroom/first-covered-bond-as-a-security-token-on-a-public-blockchain ("On 18 April 2019 Societe Generale SFH, a subsidiary of Societe Generale Group, issued EUR 100m of covered bonds as a security token, directly registered on the Ethereum blockchain."); *Advancing Capital Markets with Blockchain Technology* (April 2019), *https://pages.consensys.net/advancing-capital-markets-with-blockchain-technology* ("In April of this year, CapBridge announced 1exchange (1X), a private securities exchange built on the public Ethereum blockchain in collaboration with ConsenSys and regulated by the Monetary Authority of Singapore. 1X will tokenize securities, creating an immutable digital representation of investments on the blockchain that are easier, cheaper, and more secure to manage. Moreover, the standardization and universality of public Ethereum mainnet ensures 1X is aligning itself to a growing, global, borderless liquidity pool—positioning itself to connect with other blockchain-based exchanges in the future. 1X will provide optimized tracking ability of securities traded on its platform by investors. Additionally, investors will have real-time and ongoing visibility into their investments without having to mediate with an exchange or third party.").

for equities as tokenized securities, relying on the Ethereum public blockchain for certain recordkeeping.[9]

Various interviewees saw benefits to particular features of a DLT-based trading system. One member of the financial services industry thought DLT could transform clearing and settlement if deployed in a widgetized, confidential matter (analogizing this to the move toward a cashless society). Recordkeeping is another important potential application of DLT. A member of the financial services industry pointed out the importance of tracking information, noting that a factor contributing to the 2008 financial crisis was flawed recordkeeping in the derivatives market, which caused problems when credit issues arose and participants could not determine their actual positions. Also, the increased clarity of DLT was commented upon as useful for tracking the current ownership of shares in real time, alleviating concerns about the tally of proxy votes actually corresponding to the choices of a firm's beneficial shareholders. [10]

Other members of the broker-dealer community speculated that DLT could be particularly useful in markets for securities where title or ownership structures were less clear.

3. Problems implementing DLT-based systems for securities. The discussion above highlights a theme: We have heard regulators, industry participants, and academics praise the potential of DLT to facilitate transparency and recordkeeping and reduce the need for trusted intermediaries. Yet those same interviewees expressed major concerns about the technological

[9] For more information, *see* https://www.bstx.com/; https://www.sec.gov/comments/sr-box-2019-19/srbox201919-7004560-214855.pdf.

[10] *See Proxy Voting by Blockchain* (April 11, 2017), https://www.marketsmedia.com/proxy-voting-blockchain/ ("Broadridge Financial Solutions, Inc. (NYSE:BR), J.P. Morgan, Northern Trust and Banco Santander today announced the successful completion of a pilot which employs a blockchain technology to enhance global proxy vote transparency and analytics"); *Advancing Capital Markets with Blockchain Technology* (April 2019), *https://pages.consensys.net/advancing-capital-markets-with-blockchain-technology* ("We can also initiate template-driven smart contract generation of new assets with the listing requirements based on previously captured issuer data, like a smart prospectus. This has the potential to reduce fees as well as mechanical reliance on third parties. This can also enhance shareholder voting and governance in general, as automation of registry data improves certainty of beneficial ownership and to whom an entitlement or right is due without extensive research or reconciliation. A common registry of ownership associated with an ID means the issuer or issuer's agent will know exactly who has which rights."); Spencer J. Nord, *Blockchain Plumbing: A Potential Solution for Shareholder Voting?*, 21 J. Bus. L. 706 (2019), Available at: https://scholarship.law.upenn.edu/jbl/vol21/iss3/4.

and economic challenges to implementation, as well as the hurdles to changing existing regulation and the resistance of parties vested in current practices.

Scalability is a significant obstacle to widespread use of a DLT-based trading system, particularly for the stocks of the largest 500 or 1000 public companies. Multiple interviewees stressed that such equities markets see a huge volume of transactions, which occur in microseconds. Currently Bitcoin can handle four transactions per second while over one thousand transactions occur per second on the U.S. stock exchanges. Even if this problem were fixed, the system would undoubtedly require significant levels of financing. Moreover, there is the question of how the payments system would be set up. As one member of the financial services industry explained, the system's basic reliance on financing means that if the benefit of DLT is that it allows transactions to occur instantly, enormous amounts of money would also need to be moved instantly. Using digital coins rather than dollars as payment might appear to solve this problem, but the value of currently available coins is highly volatile, and they have a history of being stolen from digital wallets. There are also problems with how such a system would deal with error trades, though one interviewee did note that perhaps this problem would be minimal in an auction setting and hence DLT might be more easily applied there.

Beyond these questions of technological and economic feasibility, there is, as noted by multiple interviewees from the regulatory and broker-dealer communities, the matter of legacy firms having a technological "debt." In other words, even if the benefits to society of switching now (assuming everyone did it at once) might outweigh the costs, the private benefits to firms would not. Switching would require them to abandon investments in existing ways of doing things, and those investments earn substantial returns that new competing entrants using DLT-based technology are unlikely to erode substantially, at least in the short run. These interviewees contrast this situation with AI and machine-learning, which can be scaled up much more easily (AI and machine learning is increasingly used successfully in the robo-advising context, for instance).[11]

[11] *See, e.g.*, Fidelity, *AI to Enhance Investment Decision-Making* (Feb. 3, 2020), https://institutional.fidelity.com/app/item/RD_9889536/ai-to-enhance-investment-decision-making.html ("When surveying 900 institutions across 25 countries for the Global Institutional Investor Survey, Fidelity found three-quarters of respondents think it's unlikely the industry will be the same in seven years. Many cited potential disruption by artificial intelligence (AI), but optimism is generally high around the world about its potential incorporation into many high-value investing functions such as evaluating portfolio performance and risk and determining optimal asset allocation strategy. When it comes to this application, evidence from our survey responses suggests that many of these

Moreover, the current system of stock trading is generally perceived as functioning well and at a lower cost per trade than ever before. In sum, these interviewees feel that there are neither strong market incentives nor significant regulatory pressures to transition soon to a DLT-based system for the various entities that jointly operate the current system of trading and clearing and settlement.

Multiple interviewees also raised privacy concerns. For example, as one member of the legal community suggested, there may be a tradeoff between privacy and the transparency and accuracy of an immutable, decentralized record of transactions that DLT may offer. Investors – especially fundamental value traders – usually prefer to hide their trades for strategic reasons, a view echoed by a member of the broker-dealer committee. The current system preserves privacy quite reliably: A customer gives its order to a broker, which has legal duties to keep the order confidential and to refrain from trading for itself or other customers based on its knowledge of the order, and the broker in turn submits the order to an impersonal exchange. Another member of the broker-dealer community also said that, in a truly DLT-based system, the full transparency of all transactions may not be a good thing. While any such system would provide records of transactions in anonymous form, anyone might be able to observe a sequence of transactions by a single entity. Hacking and cybersecurity also present significant concerns, as ensuring the integrity of the data (assuming it is stored in a single location) could prove costly and difficult.

Some interviewees, including one from the regulatory community, said brokers would, at least in the short term, probably continue to facilitate actual trades, which would still occur on exchanges in their current form, but that clearing and settlement could happen on a DLT-based system.[12] Using DLT for clearing and settlement seems technologically feasible. As one member of the financial services community put it succinctly: If Walmart can put its supply chain on blockchain, JP Morgan can settle trades on blockchain. The problem lies in the existence (or

services are expected to be utilized as a tool to augment work, not fully supplant the roles of analysts or institutions' investment partners.").

[12] *See Technical difference between Ethereum, Hyperledger fabric and R3 Corda,* Medium.com (March 16, 2018), https://medium.com/@micobo/technical-difference-between-ethereum-hyperledger-fabric-and-r3-corda-5a58d0a6e347#:~:text=Corda%20is%20a%20permissioned%20blockchain,organisations%20participating%20in%20the%20transaction.&text=Corda%20supports%20smart%20contracts.&text=The%20virtual%20machine%20selected%20for,is%20the%20Java%20Virtual%20Machine (analyzing the differences between Ethereum, Hyperledger, and Corda).

absence) of an insurgent/challenger bank with a vested interest in unseating highly entrenched current systems.

Also, as one member of the regulatory community cautioned, even this modest reform would probably not eliminate completely the trusted intermediary involved – currently The Depository Trust & Clearing Corporation ("DTCC"). Getting rid of DTCC or its equivalent would also eliminate the oversight that such an entity offers, and so the SEC would likely insist that the new platform include a trusted person. Then, by declaring that trusted person to be a broker-dealer, the SEC could continue to exercise oversight. This interviewee also said he believed that brokers would have little incentive to participate in any such platform because the SEC has cast doubt on brokers' ability to maintain adequate custody and control of assets on a distributed ledger. This interviewee also believed that the SEC's desire to have a trusted person in charge was wise – even though it would mean continuing the resource costs and rents associated with a trusted party that a trustless DLT system would eliminate. His broader point was that using DLT for clearing and settlement would not make an entity such as the DTCC obsolete anytime soon, a view shared by other interviewees. And, even if DLT could create real efficiencies, the current incumbent may not have much incentive to make the change to DLT or feel much pressure to do so from regulators.

4. Summation and questions going forward. In sum, interviewees thus far expressed some appetite for using DLT for stock trading; however, significant concerns over scalability and oversight remain. As one regulator put it, even if DLT helps with audit trails and recordkeeping, a market still needs some mechanism for bringing parties together. Any real change would require everyone to use blockchain, which will not happen unless regulators come up with some years-long plan for implementing it. As noted, perhaps a middle ground would still involve brokers placing orders on exchanges, but clearing and settlement would occur exclusively on the blockchain. But again, the brokers and exchanges would all need to be in the blockchain environment for this to truly work.

As we continue interviews, a few questions will guide our discussions: What is being done to think through the implications of a truly trustless system? Even as technology is developed to facilitate a DLT-based trading world, what additionally will need to occur in order to increase

market and regulatory appetite for that world? What incentives would lead firms to adopt technology such as DLT, which is extremely costly and difficult to implement on a large scale?

C. Market Structure

How well are today's markets operating? Can DLT improve or address concerns about market structure? One broad theme emerged from our interviews: There is wide disagreement about which interests our markets should promote and which interests current market structures in fact serve. It is thus important to understand these different points of view in order to see what a DLT-based system might offer and how it should be designed. Understanding these issues also helps us understand what economic and political obstacles may impede adoption of a DLT-based system even if, from society's point of view, the benefits would appear to exceed the costs.

Some interviewees, spanning the regulatory and investment communities, felt that the markets were overall operating well and fairly. Different interviewees stressed different positives. One member of the regulatory community believes they are working relatively well at least with respect to price discovery. Another said insiders do not have an advantage over ordinary investors, and buy and hold investors have never been better off, given low trading costs and instantaneous executions. Other interviewees, however, expressed concerns about current market structure – and especially the prices that exchanges charge for proprietary data, the fee and rebate policies of the stock exchanges,[13] and the paradox of trading venues being both too fragmented and insufficiently competitive.

1. Fees for proprietary data. Data concerning best available quotes and transactions occurring on each exchange are available to market participants in a consolidated, SEC-mandated feed referred to as the SIP. There is a slight delay, however, between when a transaction or change in a quote occurs and, after processing, its appearance on the SIP. Each exchange charges a fee for access to this data at the same moment it is sent to the SIP. The data obtained this way is referred to as proprietary data. The customers are liquidity supplying market makers and other high speed traders as well as sophisticated brokers. They are all able to put this access to use in

[13] *See* Memorandum, *Maker-Taker Fees on Equities Exchanges*, Securities and Exchange Commission ("SEC") Division of Trading and Markets (Oct. 20, 2015), https://www.sec.gov/spotlight/emsac/memo-maker-taker-fees-on-equities-exchanges.pdf.

ways that permit them to act more quickly than they could if they relied on the SIP – sometimes to the disadvantage of others in the market.

A market maker provides liquidity by submitting to exchanges quotes in the form of limit orders. A limit order, until cancelled, commits the submitter to buy or sell a given quantity of shares at a stated price (the buy price being the "bid," and the sell price being the "offer" or "ask"). For the market maker, being able to act more quickly also means being able to cancel old quotes and submit new ones faster in response to new transactions or changes in quotes of others. This allows the market maker to better protect itself from costly adverse selection, i.e. selling to someone with information that the stock is worth more than the market maker's offer, or buying from someone with information that it is worth less than the market maker's bid. With competition among market makers, this reduction in a cost of doing business presumably lowers the effective "price" (half the spread between bid and ask) that market makers "charge" for their liquidity-supplying services. But, despite this drop in price, many informed traders are worse off as a result of the market makers' access to proprietary data. This is because the traders find the market makers' quotes moving against them more quickly when they begin trading on a piece of private information that suggests that a security is mispriced.

High speed traders can also use proprietary data to engage in profitable arbitrage that takes advantage of persons who do not change their quotes as quickly in response to new orders or quotes of others. Brokers can use the information to trade for their clients with less impact on price.

The SIP does not contain information about quotes that are inferior to the best quotes on each market, referred to as "depth of book" information. This information may contain hints about what the persons who posted the quotes might know. And it is valuable to brokers because often the best quote is only for the purchase or sale of a small number of shares, and so filling a larger order quickly will require transacting against these inferior quotes as well. Access to this depth of book data is also sold by exchanges and referred to as proprietary data.

A number of interviewees felt that prices for proprietary data were too high. One member of the investment industry, who otherwise lauded the markets' functioning, felt that prices at current levels created persistent inefficiencies. Although proprietary data at current prices appears very profitable for the exchanges, their practices vary, and not all members of the exchange

community defend the current arrangements. One member of the broker-dealer community stated that the cost of proprietary data was like a tax on investors. As another member of the exchange community pointed out, relying solely on the SIP for market data is insufficient for best execution, which essentially forces brokers to pay the very high price for data that most exchanges charge. And at least one member of the exchange community explicitly expressed a desire for additional regulation around market data pricing – as they and others worried that exchanges had more incentive to serve the interests of HFTs and brokers than the interests of longer term investors – and for better enforcement of existing regulations.

2. Rebates and user fees. Most exchanges pay a rebate per share for every standing limit order that is executed against (thus rewarding the person making liquidity) and charge a somewhat larger fee per share for every marketable order that executes against a standing limit order (thus charging the person who takes liquidity). This is the "maker-taker" fee system. A few exchanges do the opposite, known as. the "taker-maker" fee system: And one exchange charges the same smaller fee to both the liquidity maker and taker. Importantly, in all these arrangements, the rebates go to, and the fees are charged to, the broker submitting the order, not the customer for whom the order is being submitted.

The maker-taker and taker-maker systems raised concerns among some interviewees about brokers' conflicts of interest: The broker, rather than seeking best execution of the transaction that its customer wishes to undertake, might send its orders to an exchange with, say, the largest rebates or lowest fees. As one interviewee noted, it is very difficult to see which brokers are receiving rebates for which trades and thus to monitor brokers to see if the rebates and fees are inducing them to violate their duties of best execution. Some interviewees worried that such violations are occurring. As one member of the broker-dealer community told us, brokers would continue to trade on exchanges that offered them rebates, regardless of client execution – and those exchanges would continue to offer rebates in order to attract business, creating a conflict of interest. While acknowledging the difficulty of quantifying differences in execution quality, this interviewee suggested that a system for more efficiently aligning incentives would require everyone that places an order that executes, whether they are the party who has made the liquidity or the one taking it, to pay a set per share fee for using the exchange based on some kind of cost-plus formula. Concern over conflicts of interest in part prompted interest from at least a few interviewees in MEMX, a

new exchange that the SEC approved in May, is due to begin operations in September, and is being backed by institutional investors. MEMX, according to is proponents, is designed to cost less and be more transparent than existing exchanges.

3. Order protection rule. Under the SEC's NMS Rule 611, in most circumstances, a marketable buy or sell order sent to an exchange whose best quote for the stock is inferior to the best quote on some other exchange must be sent on to that other exchange. When the rule was introduced, it was justified as both assuring retail investors that they would get best execution and helping the competitive position of new entrant exchanges, which , because they were initially small, might not have their quotes executed against – even when those quotes were the best – and hence not attract many quotes in the first place. Multiple institutional investor interviewees criticized the rule, however, for complicating the filling of larger orders. One such interviewee, who did not like the order protection rule because it created risks when sourcing liquidity, suggested that applying the rule differently to institutional and retail order flows could help. This interviewee's enthusiasm for the MEMX exchange, which is being set up by a consortium of institutional investors, in part reflected the role that this exchange could play in such an approach.

4. Fragmentation. As recently as the early 1990s, trading the stock of any significant, publicly traded company was still largely confined to a *single venue,* either NASDAQ or the New York Stock Exchange (NYSE). Today, any given stock is potentially traded on each of almost sixty competing venues: more than a dozen exchanges and almost fifty dark pools. This transformation is a product of both the huge increases in the speed of communication and calculation that have arisen from the information-technology revolution and deliberate choices in the way stock trading is regulated. Going back as far as the 1970s, Congress and the SEC anticipated that developing technology could, on the one hand, achieve the advantages of competition – lower prices, better customer service, and more innovation – while, on the other hand, because markets would be better connected, decreasing the risk that a buyer and seller, each willing to transact for a given price, would not find each other because they were searching for a counterparty in different venues.

A number of interviewees felt that this proliferation of trading venues has gotten out of hand, i.e., that there is too much "fragmentation." One member of the broker-dealer community, for

example, suggested that today's level of fragmentation did not create more competition but just spread participants across more venues. In his view, this benefited market makers, proprietary traders, and exchanges, at the expense of longer term investors. Fragmentation may help make the U.S. a cheap place to operate for the small trader, he suggested, but it raises costs for brokers and for institutional clients trying to move large amounts of stock. Notwithstanding this claim, one interviewee from the market maker community was also unhappy with the current level of fragmentation and stated that having more venues made it more difficult for market makers to use one exchange to undo a transaction on another. It also made the task of market making more random. A member of the broker-dealer community suggested that regulators needed to determine the inflection point at which additional trading venues become a drag on execution quality (this interviewee speculated that four or five venues might be the sweet spot).

Fragmentation raises interesting issues for any application of DLT to stock trading.[14] To obtain the full measure of DLT's potential cost savings, all trading of any given stock would occur on one DLT-based venue, which, in addition to replacing all the current trading venues, would automatically do the work of all the various entities currently devoted to clearing and settlement, transferring shares, maintaining custody, and managing firm corporate stock ledgers. Such a transformation within a regulated industry such as securities would be no easy task: All these incumbents would lose the rents they currently enjoy and would likely mount stiff political resistance. Moreover, any market structure established by the DLT trading venue would have to mediate the same conflicts of interest among different types of traders that we see in today's market. And, as one interviewee noted, a single DLT-based venue would be a monopoly, meaning it would lack competitive pressure to provide customer service and to innovate and would likely require some kind of rate regulation to avoid monopoly pricing.

5. Special regulatory status of the stock exchanges. The current regulatory structure governing the securities markets was established back in the 1930s. At that time, each U.S. stock exchange was a non-profit with considerable authority over the practices of its broker-dealer members. The federal securities laws required each exchange to register with the SEC and become subject to its supervision and rules. But each exchange retained its special status as a "self-regulatory organization" (SRO),

[14] *See* David C. Donald & Mahdi Miraz*,"Multilateral Transparency for Securities Markets through DLT*, Fordham Journal of Corporate & Financial Law, 25: 97-154 (2019).

allowing it to continue much of its traditional regulatory role, now essentially delegated to it by the SEC, and entitling it to certain protections not available to broker-dealers. Starting in the 1990s, the stock exchanges all converted to for-profit institutions, but they were allowed to keep their status as SROs. As pointed out by one member of the regulatory community, the relationship between the exchanges and the SEC continues to deteriorate and is characterized by extensive legal battles over the very authority of the SEC. Also, another member of the regulatory community noted that Reg NMS succeeded in promoting competition, but now trading venues are competing on their regulatory burdens, and differences in such burdens need to be closely examined.

Any DLT-based system would, for both regulatory and speed-of-transactions reasons, probably need a trusted party, and this trusted party would raise the same kind of regulatory issues as the exchanges do today. These include whether the system should be a non-profit with broker-dealers as members or a for-profit entity, and whether it should have SRO status.

6. The technological arms race. As noted earlier, various market participants – market makers, other high frequency traders, and sophisticated brokers placing orders for investors – seek to get, and act upon, as quickly as possible data about changes in existing quotes and new transactions. In their world, victory goes to the swift. This prompts a technological arms race that the current level of fragmentation fuels by requiring each such entity to have an advanced computer located close to each exchange's matching engine (so called "co-location") and a high-speed communications network linking all these co-located computers. These computers then use algorithms to decide what quotes to make or cancel and what trades to make, all based on the information each receives from its own exchange and from the other co-located computers in its network. One member of the financial services industry pointed out that market makers spent hundreds of millions of dollars simply to remain defensive and able to quote – a form of competition between HFT market makers that is viewed by at least one member of the exchange community as wasteful. Another interviewee expressed a similar concern for the costs it imposes on fundamental value traders. As a member of the broker-dealer community put it, if a broker updates its technology once a year, it's going to be far behind by the eleventh month. Having a

stock trade exclusively on a single DLT-based platform would make much of this costly effort unnecessary.

7. The quality of the market for large issuer stocks versus that for smaller issuer stocks. One member of the exchange community expressed concern that the secondary trading markets function well for large corporations but not as well or as smoothly for smaller issuers, which have a much lower trading volume and less liquidity. The prospect that their shares, if publicly traded, would lack high liquidity discourages many startups and smaller corporations seeking capital from going public. So tech giants such as Apple and Google dominate the innovation segment of the market. Why smaller firms have so much less liquidity is hotly debated. The exchange community member referred to above suggested that, under current arrangements, broker-dealers gain much of their profits from trades of these smaller issuers and so tend to resist reform. One member of the broker-dealer community attributed the problem to a lack of information about smaller issuers. He gave an example: The prohibition on advertising through testimonials in the Advisor Act has disadvantaged innovators, who cannot afford to spend as much as incumbents on advertising but cannot rely on testimonials, which would be the most cost-effective means of advertising.

The prospect of DLT-based trading raises interesting possibilities here. As noted earlier, the scalability issues of DLT-based trading are less relevant for smaller, lower trading-volume issuers and so the trading of such issuers' shares is a good starting point for DLT. At the same time, designing the system to ameliorate the market structure issues that may contribute to the problems these issuers have on the exchanges might make public offerings more attractive to them.

8. Debt markets. Finally, many interviewees expressed concerns about inefficiency and lack of transparency in the debt markets. For example, one member of the financial services industry blamed the lack of such transparency for Lehman's collapse: More transparency would have increased liquidity and given the market more faith that the realizable underlying fundamental value of Lehman's assets was sufficient for it to meet its obligations. Illiquidity also contributes to volatile pricing. This interviewee observed that the large margins enjoyed by broker-dealers due to the lack of transparency reduces any incentive to invest in electronic markets or technology, ultimately hurting consumers. Any move toward electronic markets is also slowed by the lack of homogeneity in bond markets with tens of thousands of individual issues, as a member of the

broker-dealer community pointed out. These concerns were echoed by a member of the regulatory community, who worried that Americans tend to turn to debt markets as they get older, but very high markups and spreads make getting cash in our out expensive.

9. Summation and questions going forward. In sum, while some agreement emerged that equity markets are generally functioning well, at least with respect to price discovery, concerns were expressed about a number of issues that any development of DLT-based market systems will need to carefully consider.

A few questions will continue to guide our interviews: As markets become increasingly fragmented and complex, are the interests that past and present structures were designed to serve still being served? Should they be? To the extent that DLT transforms structural operations in markets, can it alleviate some of the issues identified in this section?

D. Public vs. Private Markets

Private, rather than public, markets are increasingly providing capital: Startups now amass millions, even billions, of dollars in venture capital or private equity funding before, if ever, considering an IPO.[15] Indeed, many no longer go public for the traditional reason: The high liquidity of publicly traded shares makes them more valuable and hence the offering of shares that will enjoy that liquidity is an attractive way of raising capital. Instead, they go public for reasons related to the fact that, with the growth of the firm, it has issued stock to so many employees.[16]

1. The potential impact of DLT on the relative size of private versus public markets. How might DLT play a role in this divide? In a sense, there may be a horserace here, with DLT enhancing the attraction of both staying private and going public. On the one hand, DLT could significantly improve private market liquidity by making it cheaper and easier for qualified buyers and sellers – accredited investors – to find each other and have their trades cleared and settled. It could also make private markets more transparent, a concern touched upon in many discussions.

[15] *See, e.g.*, McKinsey's Private Markets Annual Review (2020), https://www.mckinsey.com/industries/private-equity-and-principal-investors/our-insights/mckinseys-private-markets-annual-review.

[16] The very number of employee shareholders, if high enough, triggers federal securities law disclosure obligations anyhow, making the disclosures connected with a public offering much less of an additional burden. Even without that trigger, these employees will be pushing for their shares to be publicly traded so that it is easier for them to cash in.

In support of this view, one interviewee involved in private markets noted that blockchain technology – through smart contracts, for example – can speed any given trade and that smart contracts are already being used to facilitate liquidity in private markets.[17] The underlying technology of DLT, which mediates complex transactions efficiently, could also be used to restrict transfers of private securities to those allowed by law or by corporate provisions to acquire them.

On the other hand, as we have noted above in the discussion of market structure, there are many ways that a DLT-based system might help the public securities markets. DLT might persuade companies to go public earlier in their lives, given that, for scalability reasons, smaller firms are the better initial candidates for DLT-based trading. Also, as some interviewees noted, DLT could make being a public company more attractive generally by reducing the mechanical costs of distributing dividends and announcements to, and soliciting and counting the votes of, the much larger number of shareholders that accompanies being a public company.

DLT could also help the public markets by improving the disclosure required of public companies. Broadly, the backbone of the regulation of publicly traded securities has been the mandatory issuer disclosure rules. Although they are often justified as protecting investors, most scholars believe disclosure's more important function is the promotion of accurate share prices, which in turn enhances the efficiency of the larger economy in a number of ways, including by improving corporate governance and reducing insider trading, which in turn enhances liquidity in the markets.

The prime consumers of disclosure have been professional securities analysts who use it to guide the investment funds that employ them. Traditionally, this disclosure has come in the form of answers to SEC form questions. The issuers publish these answers periodically in SEC filings. New technology related to DLT may allow analysts direct and continuous access to raw data from within issuers. This could both enhance share price accuracy and reduce the trading advantages of corporate insiders. The question, though, is whether these gains outweigh the costs. In

[17] *See, e.g.*, *Advancing Capital Markets with Blockchain Technology* (April 2019), *https://pages.consensys.net/advancing-capital-markets-with-blockchain-technology* ("Smart contracts are automated actions that can be coded and executed once a set of conditions is met. They have the ability to remove some of the more manual components of the financial industry—such as the process of distributing dividends—by placing the execution of the action on the blockchain via automated code, instead of in the hands of human operators. Corporate actions: the complex process of paying out dividends, splits, issue of rights, warrants, pay-ups, and so on, now can be automated, resulting in more confidence from investors and a much lower margin of error.").

particular, how could issuers protect proprietary information from their competitors? And would making this data available to highly sophisticated analysts be unfair to other investors? To the extent that these factors are indeed problems, can new methods of disclosure be designed to minimize them?

One interviewee from the issuer community suggested that, if DLT made private markets more attractive by making shares more liquid, private and public markets might be more complements than competitors. The idea is that greater liquidity in the private market would make the prices there more accurately reflect the true value of a firm's shares. This in turn would make a subsequent public offering simpler and less risky. Indeed, if the firm and the public market both viewed the price discovery capabilities of the private market as good enough, the firm might be able to do the public offering directly into the market, without the intermediation of an investment bank. This is because an important function of the bank in such an offering is to reduce the risk associated with choosing the initial price – one that is neither too low and hence leaves money on the table, nor too high so that many of the offered shares go unsold – and doing so in a way that puts the bank's money where its mouth is.[18]

2. Issues related to the public/private market divide. To fully understand how using DLT in private or public markets might affect the divide between the two requires a discussion of how the divide is currently viewed. Because private firms are not subject to mandatory disclosure requirements, some interviewees with regulatory experience expressed the fear that, with larger and larger firms staying private, we lose the corporate governance benefits of public markets. One member of the investment industry argued, however, that private markets were actually better at creating value and strengthening corporate governance. The argument is that index funds typically pay little attention to corporate governance but hold an increasing percentage of public company shares, so companies are generally being subject to less shareholder monitoring. In contrast, private equity firms play a much greater role in running a company and improving corporate governance, largely because they are not burdened by liquidity concerns and friction (no MNPI concerns, lock up periods, etc.). As a result, there are fewer principal-agent issues, which

[18] In a firm commitment underwriting, the investment bank buys all the shares being offered from the issuer at the offering price minus a discount. Thus the bank takes the risk if the price is too high and the offering does not sell out.

incentivizes has incentivized many companies to remain private—rather than going public with absentee shareholders. Moreover, this interviewee believed that competition between private equity firms and investors made valuations more robust in private markets.

But other interviewees disagreed, saying some private valuations are illogical and citing WeWork as an example. A member of the investment community blamed venture capital for contributing to price inaccuracy, noting that venture funds were trying to undercut competitors at an unsustainable level. If relatively inefficient private markets are growing more than relatively efficient public markets, that could lead to problems for society, the interviewees said with inferior projects receiving scarce capital that could have gone to more promising ones. going to in.

Whether private markets or public markets produce higher returns was another point of disagreement. For example, one member of the regulatory community thought private equity generally earned higher returns, even after adjustment for higher risk, while another member of the regulatory community did not think so. This disagreement is important because, as discussed below, one of the main arguments for giving ordinary investors more access to private markets is that they are currently being denied these higher returns.

Interviewees also disagreed about why the private markets were growing. Two members of the investment and exchange communities believed that costs were a significant deterrent to going public. A member of the regulatory community said that, while individual disclosure requirements were justifiable, in total they could be so burdensome that they also deterred companies from going public. Similarly, a former regulator said that "overregulation" in public markets, and the ubiquity of litigation, slowed progress and innovation. Yet another regulator expressed the opposite view: It is not the SEC's job to encourage additional IPOs, and, in any event, choosing to go public is an existential decision for a firm and the amount of regulation or legal paperwork is not a true obstacle to doing so. A member of the investment industry agreed that disclosure and compliance costs were not a meaningful burden and said that, in fact, heads of corporations hid behind this complaint when what they really did not like was the scrutiny that they received as a result of the rules. Interestingly, one member of the issuer community suggested that, although his firm viewed required disclosure as simply a cost worth incurring when it went public, preparing periodic disclosures actually helped the firm manage its affairs. Coming at the

issue from the other side, one interviewee from the legal community felt that the SEC, in an effort to promote startups and the like, went too far in allowing firms to raise capital without engaging in a registered public offering and its extensive disclosure requirements.

Interviewees also raised questions about the kinds of information that public firms are required to disclose. At least one member of the legal community acknowledged the importance of forward-looking disclosures, while also acknowledging their drawbacks—e.g., their potential to mislead. Another interviewee, a member of the regulatory community, thought that some disclosure requirements might be irrelevant to investment decisions and further cluttered already dense disclosure documents.

A member of the regulatory community suggested that the growth of the private markets helps to hold the SEC accountable. The SEC is concerned that some firms are losing out on the improved liquidity of the public markets because they view the accompanying regulation as too burdensome to be worthwhile. This puts pressure on the SEC to redesign certain regulations like "random" rules about pay ratio and conflict minerals that can discourage companies from going public.

Another member of the financial services industry suggested that DLT could allow regulators to "look under the hood" of private markets where are variety of new approaches are a source of concern to many commentators. Information about those markets has traditionally been hard to come by because of the very fact that they are private. For example, with DLT, it could become much easier for regulators to determine whether private-market investors actually qualify as accredited investors. One member of the regulatory community, however, played down concern with what is going on in the private markets, stressing that the many of the new approaches to capital raising and trading that disturb some commentators are still largely funneled through broker-dealers, who remain subject to SEC scrutiny.

3. Summary and questions going forward. In sum, there is significant disagreement about whether the rise of private markets is desirable. Some applaud private markets for their value-creation potential, while many others are concerned about their lack of transparency and requirements for issuer disclosure and would alter regulations to encourage more companies to go public. As we continue interviews, a few questions in particular will guide our discussions. Can

DLT narrow differences in the amount of information available in private and public markets? Can DLT alleviate concerns around private market growth and access to investors, and can it streamline disclosure obligations for companies considering going public?

E. The Ordinary Investor

Closely tied to the above discussion is the role of ordinary "unsophisticated" investors, who have long had a fraught history with equity investing. As multiple interviewees have observed, DLT could either ameliorate or significantly exacerbate these problems. What happens depends largely on whether DLT can expand ordinary investors' access to information.

All else equal, access to a broad range of equities is good for an investor because it improves her range of investment and savings options. All is not equal, however, because most ordinary investors lack much relevant information and the time and skill to analyze the information they do have – a concern raised, for example, by one member of the broker-dealer community. A former regulator went further, questioning the wisdom of letting retail investors participate in non-index-fund markets given their ignorance of the complexity of modern markets, especially in light of technological changes such as the rise of HFTs and algorithmic trading.

Ordinary investors have relatively open access to stocks trading in the public markets. These markets, and the issuers of the stocks that trade in them, are heavily regulated, in part to protect ordinary investors from fraud and risks they otherwise might not anticipate. The private markets are much more lightly regulated, but access to them is restricted, and they exclude many ordinary investors. Debate continues over whether this structure gets things right. Does it, for example, unnecessarily exclude ordinary investors from the most lucrative investment opportunities? One former regulator worried that it does and therefore disserves the American public. Or are these superior opportunities a myth? Would investors benefit from wider access to the private markets or simply be exposed to more fraud and unanticipated risk? Both a regulator and a member of the investment community thought that giving ordinary investors more access to private markets might create an adverse selection problem, allowing venture and private capital firms to pick off the better offerings and leave retail investors with the rest. That regulator and another one expressed serious reservations about brokers who connect investors with private market offerings, noting that they were the brokers subject to the most complaints. The recent

expansion of private markets – where some "unicorn" startups have rewarded their venture capitalist and private-equity firm investors astonishing returns — makes answering these questions increasingly urgent.

A few interviewees – ranging from investment industry individuals to legal professionals and regulators – thought retail investors might safely participate in private markets by investing in publicly traded funds that in turn invest in the private market.[19] Retail investors would get access to private markets but delegate the choice of assets to better informed fund managers. This investment vehicle could be structured as either an open-end or closed-end mutual fund. At least one member of the investment community was skeptical of the open-end option, which would allow the investor to redeem her investment at any time for what the fund deemed her share of the fund's total value. This interviewee believed that the illiquid nature of investments in private companies created too much risk for the ordinary investor with a short-term horizon. Determining the fair value of the investor's share would be a problem, too. The alternative is a closed-end fund, where the investor could cash out only by selling her share of the fund in the market and not by redeeming it with the issuer. That would create its own risks. The investor would not know the quality of the fund's private investments and so would have to rely on the skills and integrity of the fund's managers, with no power to discipline them by, say, withdrawing from the fund – as she could do in the case of an open-end fund. One question would be whether a DLT-based system could somehow make more information available about these underlying investments.

Expanding the definition of an accredited investor is another potential way to open private markets to more investors. Some interviewees suggested redefining the term to include persons who establish a certain level of investment sophistication but do not meet the current income or net worth standards.[20] However, one former regulator proposed going farther and opening private

[19] *See, e.g.*, Small Business Capital Formation Advisory Committee, Expanding Retail Access to Private Markets November 2019, https://www.sec.gov/spotlight/sbcfac/expanding-retail-access-to-private-markets-finley.pdf. SS

[20] *See, e.g.*, SEC Press Release, *SEC Proposes to Update Accredited Investor Definition to Increase Access to Investments* (Dec. 18, 2019), https://www.sec.gov/news/press-release/2019-265.

markets to any investor who used a broker bound by Regulation Best Interest and fully understood the risks involved.

This discussion ties into a few broader debates about the economy. Market index funds and robo-advisors may, at affordable cost, increase the range of equities in which the savings of ordinary investors can be intelligently invested and provide vehicles for diversifying risk. Yet, whether these new features of the market are really helping ordinary investors is an open question. In particular, even if they appear to work under normal circumstances, are they prone to failure in extreme circumstances, thereby introducing systemic risk into the economy and imposing losses at the worst time on those least able to afford them? One member of the broker-dealer community in particular worried that ETFs would expose retail investors to volatility in times of stress, as they would all move together and investors would seek to exit simultaneously.

In sum, little agreement exists as to the ideal amount of access that retail investors should safely have to equities markets – private or public. While it is conceivable that their lack of access to private markets systematically excludes them from lucrative investments, this is far from clear. Many regulators and market participants questioned the feasibility of providing ordinary investors access to private markets while protecting them from fraud. More broadly, their very ability to understand the complexity of modern markets was raised as a concern.

As we continue interviews, a few questions will continue to guide our discussions: Can DLT safely increase access by retail investors to additional segments of the market? Can it facilitate their education?

F. Intermediaries

One broad theme emerges here: The future of DLT vis-à-vis intermediaries depends on our reliance on *human* intermediaries as the front-line against wrongdoing in the market. As one regulator argued, we should not give up the oversight of the markets that comes through the SEC's regulation of broker-dealers unless we are certain something better is taking its place.

Most significantly, DLT and AI could accelerate the decrease in the role of retail brokers as the main source of an individual's investment advice. Currently, all transactions in markets must be done through a broker, because the broker, which is supposed to know its customer,

provides a backstop to assure that a trade closes should the customer not follow through. As discussed earlier, DLT presents the possibility, for example, of a clearing and settlement mechanism that does not rely on a customer's broker to assure the customer's performance.[21] In that case, the fear that a trader will not perform would no longer be a reason to prevent traders from direct access to exchanges. Similarly, AI-based programs could guide investors as to what to invest in and how to execute their trades, functions also traditionally performed by brokers.[22]

Further, it is possible that DLT could completely remove the need for not only retail brokers, but also exchange-traded funds (ETFs) and mutual funds. DLT could make transacting frequently, in even slivers of investment, nearly costless. And AI-based robo-investing could guide what purchases and sales should be made and how to execute them at the best prices.

As intermediaries increasingly rely on computers to give investment advice to, and make investment decisions for, investors, questions abound as to their duties to customers.[23] In 2017, the SEC issued guidance stating that, if structured properly, a digital adviser could be a fiduciary under the Advisor's Act without the need to create new rules. The scope of such guidance still needs to be fleshed out, and markets and regulators are still learning, as one member of the broker-dealer community informed us. More existentially, that interviewee argued that a computer can know its client quite well given its ability to sort and process huge amounts of data.

However, the importance of human intermediaries should not be understated – a theme that emerged out of multiple interviews. One regulator was skeptical that the SEC would ever tolerate no role for intermediaries. That same interviewee emphasized that, for example, even with AI-based investing, mechanisms for regulatory oversight were still robust – because the humans that created the computer programs were still subject to such oversight. Another former regulator

[21] *See, e.g., Advancing Capital Markets with Blockchain Technology* (April 2019), https://pages.consensys.net/advancing-capital-markets-with-blockchain-technology

[22] It should be noted, however, that one former regulator thought that the greatest threat posed by DLT would be more to transfer agents, such as DTCC, as opposed to brokers.

[23] *See, e.g.*, Baker, Tom and Dellaert, Benedict G. C., "Regulating Robo Advice Across the Financial Services Industry" (2018). Faculty Scholarship at Penn Law. 1740. https://scholarship.law.upenn.edu/faculty_scholarship/1740; Jake G. Rifkin, Robo-Advisers Jumping on the Bandwagon: Yet Another Cry for a Uniform Standard, 97 N.C. L. Rev. 673 (2019). Available at: https://scholarship.law.unc.edu/nclr/vol97/iss3/4.

acknowledged that it was reasonable that the SEC might want to retain intermediaries as the main points of regulation.

These debates occur against a broader backdrop of uncertainty around a broker's duty. For example, multiple interviewees thought the concept of best execution needs clearer guidance. One member of the exchange community specifically thought that best execution was too vague a concept, hampering FINRA's enforcement, and expressed the view that Regulation Best Interest should go further. So one question is whether DLT could provide needed transparency and clarity?

On a separate front, one member of the legal community expressed concerns about the growth of intermediaries in the form of private equity funds, which raise their funds pursuant to exemptions from the public offering disclosure regime and have sufficiently few investors to avoid most other regulations. These intermediaries receive funds from institutions or wealthy individuals and then invest that money in debt or equity securities of private companies. He suggested that the total volume of the investments of such funds exceed the total of corporate bank lending.

In sum, while interviewees acknowledged the potential of DLT to obviate the need for intermediaries, significant questions remain as to whether doing so is wise or whether regulators would be comfortable with such a world, given the traditional focus on intermediaries as the front-line target for regulators in policing wrongdoing.

As we continue interviews, a few questions will guide our discussions: Is a system entirely without intermediaries possible? Is it desirable? What concerns would need to be addressed before transitioning to such a system?

G. Wrongdoing

As alluded to in previous sections, traditional methods of discipline in the securities markets focused on disclosure and *human* intermediaries. For example, our current regulatory structure relies heavily on brokers to be the front-line soldiers in the battle against insider and manipulative trading by their customers. How might the regulatory system need to be changed if brokers drop out of the equation? Could DLT, with its recordkeeping capabilities, offer the means

for effective oversight? Could it also help in providing authorities data needed to reduce systemic risk?

The laws around insider trading and market manipulation are already rife with uncertainties. Courts lack clear legislative mandates and are instead simply guided by a small number of very generally worded anti-fraud provisions. As a result, the courts have been forced to develop in common law fashion ways of distinguishing trading-profit-motivated, but socially useful, transactions from practices that simply move money to those who are most artful in what they say or how they trade. Technological advancements expand the menu of possible transactions that need to be distinguished in these ways. For example, high frequency traders, who depend on ultra-fast communication with diverse trading venues and employ algorithmic quoting and trading decision-making, appear to have enhanced liquidity in the markets. They are also capable of a variety of socially negative trading strategies, however.

Innovation in markets is only accelerating. Just a few years ago, regulators struggled to craft responsive rules regarding the advent of these high frequency traders, and yet there are already complaints, as noted above, that our current market-structure rules are obsolete. The line has grown increasingly blurry between socially beneficial transactions that tend to make prices more accurate and markets more liquid, and transactions that should fall under our prohibitions against insider trading or manipulation.

One member of the regulatory community warned of the ensuing dangers: If regulators themselves are unsure of the line, how can market participants calibrate their behavior accordingly? A member of the investment community expressed skepticism of regulators' ability to stay on top of technological innovation, especially as so many laws around wrongdoing depend on identifying intent, an increasingly murky concept given the rise of AI. This is exacerbated, that interviewee pointed out, by the disparities in defining or reconciling wrongdoing across jurisdictions.

As we proceed with our interviews, a few questions will continue to guide our discussions: How could DLT facilitate, for example, recordkeeping and audit trails to assist with enforcement?

Would DLT, rather, interfere with enforcement by removing human intermediaries that have traditionally provided regulatory hooks for enforcement agencies?

H. Digital Coins

One already significant application of DLT with securities law implications is the digital coin. An initial wave of offerings were made by bad actors who committed rampant fraud in taking advantage of the speculative fever surrounding Bitcoin. Uncertainty around the status of cryptocurrency under the securities laws probably reduced the effectiveness of these laws in preventing such offerings. This initial wave of fraud has generated great regulatory suspicion of digital coins in general, according to one former regulator. Another former regulator expressed the concern that this suspicion could choke, or drive abroad, possibly socially-beneficial innovation in DLT. Too little attention has been paid to the potentially positive impact DLT.

Securities regulation as currently interpreted by the SEC has not recognized that digital coins are fundamentally different from equities. On the one hand, what is initially offered is very much like an equity security: The offeror is issuing the item in order to raise money for a project based on its efforts and, if the efforts are successful, the item will be worth more in the future than its offering price. Thus the initial offering itself needs to be regulated very much like an offering of stock. This way fraud can be prevented and investors can receive enough information to sort the more promising offerings from the less promising ones. On the other hand, if the coin is a success, its ultimate function is very different from that of an equity security, and the regulation of its trading, if any, should probably be outside the scope of the securities regulation regime.[24] Multiple members of the regulatory community noted this particular regulatory problem. As another put it, the SEC decided digital coins were securities because it wanted to properly regulate their public offering, but it has not fully thought through the other implications declaring them securities.

To this point, one interviewee from the regulatory community explained that, while many in that community think that the securities laws are flexible enough to accommodate coins, this interviewee disagreed. The interviewee suggested instead a regulatory safe harbor, which would

[24] *See, e.g.*, Securities & Exchange Comm'n, *Framework for "Investment Contract" Analysis of Digital Assets* (Apr. 3, 2019), https://www.sec.gov/corpfin/framework-investment-contract-analysis-digital-assets.

provide time for an innovator to build the token network until the token no longer ran afoul of securities laws.

I. Regulatory Learning

A major theme arising from our interviews with regulators and industry participants alike is that regulatory fragmentation and regulators' slow reactions are stifling potential innovation, digital coins being a case in point. Most interviewees, when asked, saw potentially significant applications of DLT technology, but noted that unclear regulations and uncertain enforcement can scare innovators and dissuade market participants from investing in socially beneficial technology. As multiple interviewees said, until regulators foster blockchain-based systems with appropriate regulatory relief, financial markets will never be able to take full advantage of blockchain technology. Regulators' attitude toward innovation needs to fundamentally change, these interviewees say. This requires, among other things, more "technologists" at higher levels in the SEC.

So how to make regulators and regulations nimbler? One regulator – while acknowledging the significant potential of DLT to transform securities markets – pointed out that SEC rules stand in the way and need to be fixed. The same regulator briefly noted that regulatory fragmentation and complexity are disproportionately burdensome for smaller innovators, who usually lack the resources to navigate such complexity.

One member of the broker-dealer community thought that technology regulations should be based more on principles and updated frequently. However, there may be a clash of cultures here. As one member of the regulatory community explained, it is not easy to convince the SEC to give prospective policy guidance – regulators may be much more comfortable making policy through ex-post enforcement. However, not every interviewee was so critical of the SEC in this regard. One member of the broker-dealer community thought that regulators had demonstrated openness to innovation and willingness to learn about new technology such as robo-advising, pointing to the SEC's approach to cybersecurity regulations as promising: publishing principles-based guidance that is then iteratively refined. Sandboxes have also been mentioned as possible ways to make regulators more comfortable with innovation. However, concerns were raised that regulators would not have adequate resources to monitor companies' activities in sandboxes.

Interestingly, one member of the investment community thought that it was more difficult to petition the SEC for permission to do something unusual in the U.S. than it was to petition regulators in other jurisdictions, and so a study of the successes and failures of sandboxes in these other jurisdictions would be worthwhile.

This also brings up a political economy point: Would the SEC, for example, want to promote technology that renders much of its role obsolete (in a blockchain-based system, for example, would registration of public offerings no longer be necessary)? This is particularly a problem for DLT in private markets – a completely decentralized, trustless trading venue in the private markets might ultimately fall completely outside the SEC's purview. Would this be allowed or even a good thing?

The industry's distrust of regulators' technological capacity is also a significant impediment to progress. The debate around source code reflects this, as one former regulator told us: Regulation Automated Trading originally proposed that HFTs reveal their source code, but this received major criticism because the industry did not trust the government with members' source code – even in light of a subpoena or court order. [25]

Looming over these issues is the failure of a fragmented regulatory system to keep pace – and the resulting negative repercussions for overall economic efficiency. For example, conversations with regulators revealed concerns that the SEC is ill-equipped to address antitrust concerns raised by the concentration of shareholder power in a few massive institutional investors – while the FTC and DOJ, America's traditional antitrust regulators, are not qualified to address securities issues. Similar problems may arise if DLT-based trading creates some kind of monopoly. Other interviewees raised the example of FINRA lacking adequate reach into the futures markets even though manipulative schemes can easily involve an interaction between the futures and securities markets. From an industry standpoint, one member of the broker-dealer community explained that, though the goal was to make sure all relevant regulators were comfortable, identifying the proper regulator was sometimes difficult. But whether regulatory consolidation would help is unclear. One regulator suggested that fragmented regulators can learn

[25] Gregory Meyer, *US regulator declares 'dead' moves to seize HFT code*, Fin. Times (Oct. 4, 2017), https://www.ft.com/content/068ce050-a922-11e7-93c5-648314d2c72c.

from each other's mistakes, and another member of the regulatory community questioned the wisdom of combining the SEC and CFTC because they regulate very different markets. Yet two other regulators thought fragmentation was clearly harmful and did not think that agencies would work together better until Congress changed its system having a different committee overseeing each agency, with each jealously guarding its prerogatives.

Other regulators raised concerns that SEC enforcement is hampered by its slow adjustment to both technological change and globalization. As one member of the regulatory community put it, very few people at the SEC are skilled in programming and handling big data or DLT and, as a result, may not realize that they can be flying blind with respect to important kinds of activities in need of regulation. Another suspected that the SEC and FINRA will need to hire technical auditors.

On an international level, technology has made it far easier to invest in the stocks of foreign issuers and, following the advice of financial economists, a larger and larger portion of U.S. individual investors' portfolios is composed of foreign stocks. But as one member of the regulatory community noted, regulators lack effective ways to obtain the audit papers of corporations in many countries in order to detect fraud against U.S. investors. Nor did this interviewee like the idea of allowing companies to simply comply with the rules of foreign jurisdictions, which he feared would lead to a race to the bottom. This raises the question of whether some kind of transnational institution could deal with such problems.

In sum, deep uncertainty about the regulatory framework around DLT and technological change impedes potentially socially-beneficial innovation. Regulators and market participants understand the problem, but are not sure how to solve it. Clearer goals are needed. Would it be desirable, for example, to encourage innovation that might reduce the oversight capacity of a regulator?

As we continue interviews, a few questions will guide our discussions: Would regulators tolerate a truly trustless system? Should they? Will regulatory fragmentation and apparent skepticism of innovation stifle development of DLT to the point where U.S. markets are at an international disadvantage? Alternatively, will the development of DLT outpace the capacity of

regulators to make and enforce rules needed for the markets to continue to function in ways that benefit society?

J. COVID-19

COVID-19 has forced market participants to focus on fundamental business risks and, as a result, may have delayed markets' adoption of innovations like DLT. But it may have also accelerated changes that some market participants have resisted.

One member of the legal community speculated that the pandemic has strengthened the trend away from maximizing shareholder value and toward also maximizing the interests of stakeholders like consumers, employees, and supply-chain participants. The long-term effects of this trend, and the continuing focus on environmental, social, and governance (ESG) factors in investing, could be substantial.

COVID-19 serves as an interesting stress test for the securities markets, the results of which are not yet fully in. Great uncertainty about the future of the economy has led to extreme swings in the markets and a high volume of trading as investors seize on each small scrap of information is a straw in the wind that takes on added significance. So far, the equity market seems to have handled these challenges well. The extraordinary efforts of the Federal Reserve to loosen monetary policy and intervene in various fixed income markets raise questions, however, as to whether these actions have inflated equity prices that may collapse when the Fed pulls back. The lockdown in response to the virus seems to have led to more speculative day trading by amateur investors, who appear to have pumped up stocks of some prominent companies involved in bankruptcy proceedings. This has created opportunities for fraud and manipulation and tempted one bankrupt company to contemplate a public offering of its apparently overpriced stock until headed off by the SEC.[26] The major rearrangement of the world and the uncertainties going forward also constitute an interesting test how well the SEC's mandatory disclosure rules succeed in their task of narrowing the asymmetries between firm managers and investors with respect to the information most valuable for predicting a firm's future. Finally, at least one interviewee

[26] *See Hertz suspends $500M stock offering amid SEC review*, Fortune (June 17, 2020), https://fortune.com/2020/06/17/hertz-stock-suspended-offering-htz-share-price-bankruptcy-sec-investigation-halted-trading/.

worried about how little we know about the investments of unregulated private equity firms, which play such a large role in our economy. If COVID-19 leads to a sharp and extended economic downturn many of those firms could fail. That could harm retirement funds, insurance companies, universities, and others that invested with the firms and prompt a reevaluation of how private equity is treated.

Precautions against COVID-19 have led several companies to experiment with virtual shareholders meetings, according to two interviewees. Those meetings could even replace some in-person versions after the pandemic is over, though one interviewee doubted they would be as effective

As we conduct more interviews, we hope to gain additional insight into how COVID-19 is affecting the securities markets and plan to speak again with some interviewees once the effects of the pandemic are clearer, in six months or so.

IV. Themes and Next Steps

Our interviews so far have introduced and explored a rich variety of issues faced by securities markets, with a focus on the impact of DLT amidst rapid innovation and technological change. While DLT could transform many aspects of the securities markets – from trading to the monitoring of human intermediaries to access for ordinary investors – its full potential will not be realized without more regulatory guidance and a greater appetite for innovation among market participants. We continue to conduct interviews and will update this paper as we learn more.

Appendix I
June 25, 2019 Roundtable Attendees

Mary Ann Callahan – *Managing Director, Office of Technology Architecture, State Street Corporation*
Robert Farrokhnia – *Adjunct Associate Professor of Business, Columbia Business School*
Yulia Guseva – *Professor of Law, Rutgers Law School*
Jared Herman – *President, Hedgebay Securities LLC*
Reynolds Holding – *Senior Fellow, Columbia Law School*
Jared Klee – *Blockchain Offering Manager, Digital Assets, IBM*
Chuin Lee – *Managing Director, Bank of America*
Pam Marcogliese – *Partner, Freshfields Bruckhaus Deringer*
Will Martino – *Founder & CEO, Kadena*

Ryne Miller – *Partner, Sullivan & Cromwell LLP*
Joshua Mitts – *Associate Professor of Law, Columbia Law School*
Justin Schmidt – *Head of Digital Asset Markets, Goldman Sachs*
Rosie Shen – *Goldman Sachs*
Drew Van der Werff – *Goldman Sachs*
David Wishnick – *Academic Fellow, University of Pennsylvania Law School*

Appendix II
Survey Interviews Conducted to Date

Ben Alden – *Former Chief Legal Officer & General Counsel, Betterment LLC*
Amar Amlani – *Executive Director, Goldman Sachs*
Brandon Becker – *Managing Director & Deputy General Counsel, The Depository Trust & Clearing Corporation*
Ken Bertsch – *Executive Director, Council for Institutional Investors*
Doug Cifu – *CEO, Virtu Financial Inc.*
Diwa Cody – *Broker, Goldman Sachs*
Robert Cohen – *Partner, Davis Polk & Wardwell & Former Chief of Cyber Unit, Former Co-Chief of Market Abuse Unit, Securities & Exchange Commission*
Bob Colby – *Chief Legal Officer, FINRA*
Benjamin Connault – *Economist, IEX*
Robert Cook – *President & CEO, FINRA*
John Cosenza – *Head of Americas Electronic Trading & Global Co- Head of Electronic Product Organization, Goldman Sachs*
Adam Fliss – *General Counsel, TPG Capital*
Amy Edwards – *Assistant Director, Division of Economic and Risk Analysis, Securities & Exchange Commission*
Shelley Eleby – *Director, Clearpool Group*
Dan Gallagher – *Partner, WilmerHale & Former Commissioner, Securities & Exchange Commission*
Frank Hatheway – *Former Chief Economist, NASDAQ OMX Group Inc.*
Jared Herman – *President, Hedgebay Securities LLC*
Bill Hinman – *Director, Division of Corporate Finance, Securities & Exchange Commission*
Melissa Hinmon – *Director of Equity Trading, Glenmede Investment Management*
Robert Jackson – *Former Commissioner, Securities & Exchange Commission*
Jim Katzman – *Former Partner, Goldman Sachs*
Mehmet Kinak – *Global Head of Systematic Trading and Market Structure, T. Rowe Price*
Dave Kling – *Deputy General Counsel, Facebook*
Jonathan Lavine – *Co-Chair, Bain Capital*
Sophia Lee – *General Counsel, IEX*
Shen Liping – *Partner, Allbright Law Offices*
Temmy Lizarzabal – *Managing Director & Co-Head of North America Financial Institutions, Citigroup*
Simon Lorne - *Vice Chairman & Chief Legal Officer, Millennium Management LLC*

Andy McCarroll – *General Counsel, Southeastern Asset Management*
Mathew McDermott – *Managing Director & Global Head of Cross Asset Financing, Goldman Sachs*
Maria Newport – *Analyst, Goldman Sachs*
Brian Nigito – *Jane Street Capital*
Eric Pan – *Former Director, Office of International Affairs, CFTC*
Troy Paredes – *Former Commissioner, Securities & Exchange Commission*
Hester Peirce – *Commissioner, Securities & Exchange Commission*
Mike Piwowar – *Former Acting Chairman, Securities & Exchange Commission*
Steve Randich – *Executive Vice President & Chief Information Officer, FINRA*
Ray Ross – *Managing Director, Clearpool Group*
Doug Schrank – *Head of Trading, Southeastern Asset Management*
Jameson Schriber – *Partner, Goldman Sachs*
Larry Sonsini – *Founding Partner, Wilson Sonsini Goodrich & Rosati*
Colin Stretch – *Former General Counsel, Facebook*
Jatin Suryawanshi – *Managing Director & Head of Global Quantitative Strategy, Jefferies Financial Group*
Ken Trippe – *Director of Private Investments, Glenmede Investment Management*
Greg Tusar – *Cofounder, Tagomi Systems*
Elisse Walter – *Former Chairman, Securities & Exchange Commission*
Joe Wald – *Managing Director, Clearpool Group*
Bill Williams – *Of Counsel, Sullivan & Cromwell*
Eddy Wymeersch – *Former Chair, Committee of European Securities Regulators*

Appendix III
Near-term Upcoming Survey Interviews

Marta Poleszczuk – *Vice President, Goldman Sachs*
Wyatt Russo – *Vice President, Goldman Sachs*

Appendix IV
Scholars Agreeing to Present Papers and Participate in the Spring 2021 Conference

John C. Coffee, Jr. - *Adolf A. Berle Professor of Law, Columbia Law School*
James D. Cox - *Brainerd Currie Professor of Law, Duke Law School*
Luca Enriques - *Professor of Corporate Law, University of Oxford Faculty of Law Commissioner, Consob (Italian Securities and Exchange Commission), 2007-2012*
Allen Ferrell - *Harvey Greenfield Professor of Securities Law, Harvard Law School*
Jill E. Fisch - *Saul A. Fox Distinguished Professor of Business Law, University of Pennsylvania Law School*
Merritt B. Fox - *Arthur Levitt Professor of Law, Columbia Law School*
Lawrence R. Glosten - *S. Sloan Colt Professor of Banking and International Finance, Columbia Business School*

Edward F. Greene - *Lecturer and Adjunct Senior Research Scholar, Columbia Law School*
Former SEC General Counsel and former Chief of the Division of Corporate Finance

Joseph A. Grundfest - *The William A. Franke Professor of Law and Business, Stanford Law School*
Commissioner, United States Securities and Exchange Commission, 1985-1990

Sue S. Guan - *Post-Doctoral Research Scholar, Columbia Law School*

Kevin S. Haeberle - *Associate Professor of Law, William & Mary Law School*

Charles M. Jones - *Robert W. Lear Professor of Finance and Economics, Columbia Business School*

Jonathan R. Macey - *Sam Harris Professor of Corporate Law, Corporate Finance and Securities Law, Yale Law School*

Adam C. Pritchard - *Frances & George Skestos Professor of Law, University of Michigan Law School*

Gabriel Rauterberg - *Assistant Professor of Law, University of Michigan Law School*

Joel Seligman – *President Emeritus, University of Rochester*

Randall S. Thomas - *John S. Beasley II Chair in Law and Business, Vanderbilt Law School*

Charles K. Whitehead - *Myron C. Taylor Alumni Professor of Business Law, Cornell Law School*