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**BLOCKCHAIN AND PUBLIC COMPANIES: A  
REVOLUTION IN SHARE OWNERSHIP  
TRANSPARENCY, PROXY VOTING AND  
CORPORATE GOVERNANCE?**

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# Blockchain and Public Companies: A Revolution in Share Ownership Transparency, Proxy Voting and Corporate Governance?

## Abstract

Under the traditional paradigm, the shareholder was the one in whose name company shares were registered. However, for public companies in the US, this system became highly inefficient by the 1960s due to high numbers of transactions. As a result, shares began to be “immobilized” at central securities depositories (“CSD”s) and held through the Indirect Holding System (“IHS”), with share transactions settled through “book entries,” first in the US and then in other major markets. Although market liquidity benefited, the system broke the direct relationship between companies and shareholders, introducing also a discrepancy between “recorded shareholders” and “beneficial shareholders.” Communication solutions were developed to bridge this discrepancy and allow “beneficial shareholders” to cast their votes through proxies. However, they currently rely on highly intermediated “pass-it-along” architectures, which cause several inefficiencies, the costs of which are borne by the shareholders themselves and raise questions in the context of collateralization. By increasing share “ownership transparency,” blockchain has the capacity to streamline the entire share ownership architecture. Indeed, blockchain could enable the tracking of share ownership through the complete settlement cycle, enhancing the “shareholder democracy” of listed companies, and benefiting their corporate governance and the market in their shares. However, blockchain also brings risks, including those related to greater ownership transparency. Consequently, a management system for the digital identity of share transactions is necessary to foster the benefits of such blockchain-based voting architectures, while reducing the risks.

## I. Introduction

According to the theory of corporate law, shareholders are the owners of a company and control it through the exercise of voting rights. Traditionally, shareholders are the ones whose names are registered on the register of members of a company. Registration would follow the delivery of paper certificates relating

to shares. However, for public companies, this system of settling share transactions became highly inefficient by the 1960s in the US due to high volumes of trading. As a result, shares began to be “immobilized” at Central Securities Depositories (“CSD”s) and held through intermediaries within the Indirect Holding System. Henceforth, share transactions were settled through “book entries.” In time, other major financial markets adopted similar systems. Although market liquidity benefited from the IHS, it broke the direct relationship between companies and shareholders, and introduced a discrepancy between “recorded shareholders” and “beneficial shareholders.” Communication solutions were developed to bridge this distance and allow “beneficial shareholders” to cast their votes through proxies. However, these communication solutions currently rely on highly intermediated “pass-it-along” architectures that cause several inefficiencies, the costs of which burden the shareholders themselves and raise concerns in the context of securities collateral. By increasing share “ownership transparency,” blockchain can streamline the entire share ownership architecture. Indeed, blockchain could enable the tracking of share ownership through the complete settlement cycle, enhancing the “shareholder democracy” of listed companies. As a result, their corporate governance and the market in their shares should benefit. However, blockchain also brings risks, including those related to greater “ownership transparency.” Consequently, a management system for the digital identity of share transactions is necessary to foster the benefits of such blockchain-based voting architectures, while reducing the risks.

This paper analyzes the evolution of the reality of share ownership in listed companies in Section II. Section III considers the negative externalities of the system which has developed to address the logistical problems of share transfers and focuses on its conflicts with the core ideal of company ownership and shareholder voting. Section IV discusses the potential use of blockchain to build better systems, and highlights how it could not only address efficiency challenges, but also bring the reality of share registration back in line with its intended operation. Sections V and VI respectively address how such systems could deal with many issues but also pose new risks and concerns. Section VII concludes.

## **II. Background and Context: The Settlement of Share Transactions and Shareholding in International Financial Markets Today**

The theory of corporate ownership and control is based upon the fundamental premise that shareholders are the owners of a company. Firstly, shareholding attributes the right to distribute profits resulting from the corporate activity. Secondly, while the company is ongoing, shareholders exercise their ownership through voting and direct the corporate activity itself.

### **A. The reality of share ownership (as opposed to the theory)**

Shareholders regularly change during a company lifecycle. When shares are transferred, the new shareholder must be defined. According to corporate law,

the shareholder is not the person who merely has title to the shares of a company (i.e. the real shareholder) but the one who fulfills a set of information-producing rules that crystallize the shareholding (i.e. the legal shareholder). Historically, this set of rules is in the registration on the register of members.<sup>1</sup> Indeed, only this registration allows shareholders to exercise the rights conferred by shares, namely the above-mentioned rights to dividends and to cast votes in shareholder meetings.<sup>2</sup>

Consequently, becoming a shareholder is always a two-step process. In the case of both the allotment and transfer of shares, the contract (the first step) must be followed by the registration (the second step). A buyer acquires legal title to shares only when his or her name is entered on the register.<sup>3</sup>

Similarly, the transfer of shares can be depicted as a two-step process. Here, the first step (generally referred to as “trading”) involves the buyer and the seller concluding a contract of sale (i.e. agreeing on the price and other terms of the transaction). The second step is then referred to as “settlement.” Settlement is the process by which the seller is paid, and the buyer is registered as the owner of the shares purchased.<sup>4</sup> Thus, both trading and settlement are at the heart of any transfer of shares.

The settlement of shares was traditionally achieved through the physical delivery of the transfer form (the contract) and the share certificates to the buyer. The substitution of the transferee’s name for the transferor’s name on the register of shareholders (the registration) came after this delivery. Thanks to this process, a company could control the transfer of shares to new holders acquiring the (legal) title, and a direct relationship between companies and shareholders would ensue.<sup>5</sup> However, as the following paragraphs highlight, drastic changes have arisen over the years mainly due to settlement efficiency and security. In current international financial markets, it is common that when someone purchases shares, his or her name is not registered on the register of members, with the result that real and legal shareholders differ. Nonetheless, both legitimately co-exist and take part side-by-side in the ownership and control of listed companies.

## **B. The U.S. “paper blizzard” (1967-1970) and the choice to “immobilize” shares**

The physical settlement of share transactions inevitably requires “back office” paperwork (i.e. processing and record keeping of transfers), of which the intensity is directly affected by trading volumes; its costs can be massive. A clear example is the market failure in the US during the late 1960s, which culminated in the financial meltdown generally referred to as the “paper blizzard.”<sup>6</sup> Although now rarely remembered relative to other contemporary financial crises, at the time the “paper blizzard” was the greatest challenge to US securities exchanges since the Crash of 1929.<sup>7</sup>

The roots of the crisis go back to the early 1950s, when the US stock markets finally shook off the lingering effects of the Great Depression,<sup>8</sup> the American middle class was becoming prosperous, and expectations of easy capital gains

(aggressively advertised by brokerage firms and stock exchanges) abounded. Thanks also to the investments of new financial players such as insurance companies and pension funds, and the rise of mutual funds, the number of Americans owning securities skyrocketed from half a million to over twenty million between 1952 and 1965.<sup>9</sup>

Such an increase was happily welcomed by the securities industry focused, as it were, on increasing sales.<sup>10</sup> However, securities firms were not equipped to sustain this growth: they lacked sufficiently skilled management, adequate levels of capitalization, and most of all proper back-office processes.<sup>11</sup>

More specifically, firstly, transactions were processed by low-skilled and low-paid clerks who physically delivered the share certificates to the issuer's transfer agent, which recorded the change in ownership and issued new certificates in the name of the buyer. These new certificates were then delivered to the buyer. Since certificates for more than 100 shares were rare, the quantity of paper that clerks delivered daily was immense.<sup>12</sup> Secondly, record-keeping of transactions was extremely complex. Securities firms maintained two sets of books, one for cash and another for securities. In the latter, firms listed the securities held and traded by the firm. This information had to balance for each individual issue. Moreover, since securities were constantly traded for money, at the end of the day these two sets of books had to agree.<sup>13</sup>

When trading volumes peaked, the complexities of these processes made the settlement of all transactions impossible. Consequently, delivery delays lengthened, and many obligations remained unperformed. Until cash flow was strong, firms used to cover their positions through short-borrowing. However, when the market turned downward, firms defaulted on outstanding obligations (where securities were lost or misplaced) as well as on dividend or interest payments. To conceal such defaults, frauds such as "Ponzi" schemes became frequent.<sup>14</sup> Interestingly, some instances of fraud also followed attempts at replacing manual back-office processes with automated computer systems. For instance, in 1968 McDonnell & Company invested in a computer firm to design and install a computerized system for the settlement of transactions. Once designed, the system was full of glitches and left McDonnell & Company with millions of securities unable to be located. To solve its financial problems, the firm arranged an IPO fraud that ensured a very brief period of stability. However, over time, McDonnell & Company finances were insufficient to replace the lost and misplaced securities, and its bankruptcy became inevitable.<sup>15</sup>

US exchanges tried to find remedies to the "paper blizzard." For instance, trading days and trading hours per day were reduced. However, securities firms were overwhelmed by paperwork and bankruptcies increased. After a season of hectic mergers and private bailouts, in June 1970 the leadership of the securities industry concluded that it needed help from the government.<sup>16</sup> This decision allowed the US government to introduce new legislation, which altered the securities industry dramatically.<sup>17</sup>

Since the Securities Acts Amendments of 1975,<sup>18</sup> the settlement of securities transactions has rested on more efficient systems characterized by the “immobilization” of shares at CSDs, regardless of the existence and location of the underlying paper certificates.<sup>19</sup> In these settlement systems, issuing companies open accounts on an electronic accounting system maintained by the central depository and, if need be, deposit their share certificates into it. Transactions are settled by “book entries,” which consist of crediting and debiting the transferee’s and transferor’s accounts.<sup>20</sup>

Such a settlement system is highly beneficial for the safety and efficiency of transactions, because it eradicates the risk of shares getting lost or misplaced.<sup>21</sup> Moreover, it ensures that the payment for and delivery of shares occur relatively simultaneously, reducing the counterparty risk for the transferee and transferor.<sup>22</sup> In addition, by “immobilizing” shares at a central depository, economies of scale are leveraged, and market liquidity increases.<sup>23</sup>

### **C. The Indirect Holding System**

The choice to “immobilize” shares at CSDs implies that shareholding is always intermediated. Indeed, in current financial markets, securities are either issued in the name of central depositories, their nominees or the participants in the settlement system, or at least credited in favor of them. Therefore, most shares are not held in the name of the ultimate investors, but in that of intermediaries.<sup>24</sup> In those jurisdictions in which shares are not issued in the names of intermediaries, they are nonetheless credited to their accounts.<sup>25</sup>

Thus, in today’s markets, intermediaries constitute a multi-tier chain that links ultimate investors to CSDs and, indirectly, to issuing companies. Because intermediaries hold shares on behalf of investors, such a structure is generally referred to as the Indirect Holding System.<sup>26</sup> Since its creation in the US with the above-mentioned Securities Acts Amendments of 1975, the IHS has been established in most developed financial markets.<sup>27</sup> Over the course of its implementation, the jurisdictions of these markets did not put effort in reforming their legal frameworks extensively, but simply adapted doctrinal rules already in place.<sup>28</sup> Thanks to its worldwide extension and the countless “links” that CSDs have with each other, the other layers within the IHS can always access the securities markets of different countries, regardless of the legal differences between those countries. In this way, an unprecedented degree of financial integration has ensued.<sup>29</sup>

In addition to holding shares on behalf of investors, the other main trait of an IHS is that financial institutions regularly make use of accounting structures commonly known as “omnibus accounts.” In “omnibus accounts,” shares are pooled although owned by different investors, who therefore are considered to have “interests in securities.”<sup>30</sup> “Omnibus accounts” ensure a high level of operational efficiency for the financial institutions that constitute the IHS, because they can access global financial markets using only one account per market and avoid the costs generated by opening separate accounts for each client.<sup>31</sup>

However, because assets are commingled in “omnibus accounts,” identifying the ultimate investors is not an easy task.<sup>32</sup> For instance, consider three subjects within the chain—an “omnibus account” provider (A), one of its clients (B) and the client’s customer (C). A may know the total number of shares owned by C, but never has segregated and detailed information (i.e. on an individual basis) about the shares held by C through B. This information is kept only in the accounting system used by B.<sup>33</sup> Thus, the IHS inevitably lacks complete transparency in shareholdings.<sup>34</sup>

Against this background, very few financial markets differ. The exceptions conceptually belong to a system that is transparent and in which ultimate investors having their own accounts directly in the CSD. Unlike the IHS, in the transparent system, intermediaries simply act as operators of these accounts and never hold securities on behalf of investors. Although enabling more transparency, such a system is not suitable for transnational shareholdings because operating accounts in a CSD are highly integrated with each national framework. Indeed, except for China, only some minor financial markets have such transparent holding systems.<sup>35</sup> China of course is notable in that its securities markets developed only in the 1990s, and thus were “digitally native” from the beginning, highlighting a very real contrast with the path-dependent evolution of securities holding and registration systems in older paper-derived “developed” markets such as those in the US and Europe.

### **III. The Negative Externalities of the IHS on the Corporate Governance of Public Companies**

While in the last few decades, financial markets have developed settlement systems more efficient than the physical delivery of certificates, the accounting structure currently used for the safekeeping of securities increases the opacity within the shareholding system. Moreover, this system introduces a distance between issuing companies and their shareholders that inevitably breaks the direct relationship between them and dilutes shareholders rights and control over their shares.<sup>36</sup> Such distance engenders an “intermediated security challenge” that also concerns how to facilitate shareholders exercising their ownership and control over companies through voting.<sup>37</sup> This challenge reaches its peak any time shares are issued in the name of intermediaries, because only their names appear on the register of members of issuing companies. Indeed, in these circumstances, a shareholder “discrepancy” inevitably arises: those intermediaries whose names are on the register of members are “recorded shareholders,” while those who have a real economic interest in the company shares and a title on them are “beneficial shareholders.”<sup>38</sup> This discrepancy between “recorded” and “beneficial” shareholders implies that the latter always interact only with the intermediaries holding the record on the register of members, while exercising the rights attached to the shares only to (and through) them. Moreover, every transfer of shares is registered only on the record of intermediaries and never on the register of issuing companies.<sup>39</sup> A chain of entitlements easily evokes, in



the picturesque words of Joanna Benjamin, “the image of a series of Russian dolls, one inside the other, with the smallest doll containing a jewel. Each doll is different from every other doll, although the value of all the dolls derives alike from the jewel. The jewel equates by analogy to the underlying securities, and each doll to a different interest in securities.”<sup>40</sup>

Lastly, a further consequence of the distance between companies and their shareholders is that financial institutions within the IHS now become intermediaries not only of trades in shares and share ownership, but also of a set of complementary services, such as information flows between issuing companies and ultimate investors, corporate announcements and the exercise of voting rights. The more testing the “intermediated securities challenge,” the more fundamental the role of intermediaries is.<sup>41</sup>

**A. Bridging the gap between companies and “beneficial shareholders”: The need for communication systems and proxy rules**

Considered from the company’s point of view, the discrepancy between “recorded” and “beneficial” shareholders undermines the traditional role of registers of members, as they no longer provide relevant information in relation to the ultimate investors.

However, from the shareholders’ point of view, this discrepancy has even more important consequences. As already briefly anticipated, corporate law teaches that investor ownership is composed both of the right to receive the firm’s net earnings and the right to control the firm. This control is fundamental to the life of a corporation because it is necessary to avoid (or at least reduce) the agency problems that exist in corporate settings and limit their related costs. The right to control the firm is exercised through voting rights of shareholders on the appointment (and removal) of the members of the board of directors, while, in turn, the board is supposed to oversee management, particularly when management decisions may be suboptimal because its interests are misaligned with those of shareholders.<sup>42</sup>

The distance inevitably introduced between companies and shareholders by the establishment of the IHS makes the exercise of these rights more difficult. Indeed, the physical attendance of individual shareholders at company meetings is, most of the time, cumbersome; moreover, such a distance increases the shareholders’ dispersion, raising information and coordination costs among them. Consequently, shareholders can struggle to overcome the obstacles to collective action.<sup>43</sup>

Therefore, demands for communication systems between companies and shareholders (as well as between shareholders themselves) have increased in tandem with the rise of the IHS. Because of these demands, a set of proxy rules governs such communications and establish proxy voting mechanisms that facilitate shareholders’ exercise of their voting rights.<sup>44</sup>

Nonetheless, shares being indirectly held by intermediaries greatly complicates

voting processes. Indeed, before votes are cast (or proxies assigned), identifying and locating beneficial shareholders is necessary.<sup>45</sup> This identification process typically requires several steps: firstly, issuing companies send enquiries to CSDs asking for lists of IHS participants that hold share records on their accounts. Secondly, when this information is received, companies send “search cards” to the identified IHS participants, asking for the number of proxy materials needed.<sup>46</sup> Then, IHS participants identify the corresponding depositories holding share records on their accounts, and indicate the approximate number of beneficial shareholders directly linked to the corresponding depositories. This step is repeated for each corresponding depository that is positioned along the IHS until it reaches the final layer, the direct relationship with beneficial shareholders. Only when the beneficial shareholders are identified can issuing companies provide intermediaries with proxy materials. Eventually, materials are distributed to the beneficial shareholders, who can finally cast their votes or assign proxies.<sup>47</sup>

### **B. Proxy voting: Theoretically correct, practically inefficient**

Current proxy voting architectures are therefore very intricate. Because of the different layers of intermediaries (both holding shares and managing corporate communications), proxy voting can be exercised only after the relationship between companies and shareholders is re-established. Consequently, relevant information is typically shared through a complex “pass-it-along” process.<sup>48</sup> Because of this, proxy voting systems still suffer from several inefficiencies that increase their costs and those of “shareholder democracy.” These costs are ultimately borne both by shareholders and, indirectly, the market.

Such inefficiencies fall into three main categories. The first category includes inefficiencies related to the complexity of current architectures.<sup>49</sup> For instance, because of the high numbers of shareholders, beneficial shareholders often do not receive proxy materials on time or at all. Consequently, shareholders cannot cast their votes and are irremediably deprived of their rights.<sup>50</sup> Moreover, such complexity is also the main reason for uncounted or miscounted votes.<sup>51</sup>

The second category of inefficiencies derives from the lack of transparency in the ownership of shares. This often happens when shares are lent in the securities lending market, and the record date is due. In this case, confusion over who is entitled to cast votes can easily arise and lead to over-voted ballots, which heavily undermine the reliability of decisions made at meetings.<sup>52</sup>

Under the third category, some financial players may take advantage of both the complexity and opacity mentioned above, increasing the inefficiencies for shareholders. For instance, hedge funds at times are able to practice “decoupling.” “Decoupling” involves intentionally separating voting rights from the economic interest of shares, and especially if combined with short selling, can be a strategy by which to profit by devaluing a company’s shares.<sup>53</sup>

## **IV. Blockchain: A Potential FinTech Solution to the “Discrepancy Problem”**

In the aftermath of the 2008 Global Financial Crisis (“GFC”), FinTech and RegTech increasingly have reshaped finance and financial market infrastructure.<sup>54</sup> Among the various technologies involved in FinTech, blockchain is receiving substantial attention in the financial world, including in the context of the clearing and settlement of transactions.<sup>55</sup>

In considering the applicability of blockchain in any given context, the focus must be on its three core features of security, transparency and immutability as well as on the positive and negative consequences associated to them. In the last few years, financial institutions and exchanges worldwide have been investigating whether blockchain may provide an alternative to current systems and technologies underlying financial market infrastructures, because registration and transfer of ownership should benefit particularly from blockchain’s core attributes.

### **A. The Delaware Blockchain Initiative and the Act to Amend Title 8 of the Delaware Code**

Blockchain has significant potential in the context of managing information related to company shareholders, an issue directly related to securities settlement. Indeed, as both the recent Delaware Blockchain Initiative and the amendments introduced to Title 8 of the Delaware Code demonstrate, blockchain can provide companies with distributed registers of members.<sup>56</sup> Under this approach, companies would be able to issue digital shares (or “smart securities”) that allow transactions to be settled potentially on a real-time basis, further reducing the current settlement latency as well as transaction costs.<sup>57</sup> In addition, and most of all, blockchain could allow corporations to maintain a single and comprehensive register of members which is secure, transparent and immutably reflective of ownership. Such an innovation should then finally eradicate the discrepancy between “recorded” and “beneficial” shareholders.<sup>58</sup> Thus, thanks to blockchain, issuing companies should be able to retake control of the transfer of their shares and know who their shareholders are. In a nutshell, blockchain could enable the direct relationship between issuing companies and shareholders to be finally re-established, while the IHS (with its negative externalities for corporate governance) in time vanishes.<sup>59</sup>

### **B. The financial market’s path-dependence, the need for an alternative solution for listed companies, and the learnings from the Nasdaq e-voting blockchain platform projects**

Distributed registers of members have the potential to transform the foundational structure of corporate finance and replace the current system of settling share transactions.

However, several factors stand to impede this development in the short-term.<sup>60</sup> After all, it would be a drastic change, and the time and costs required will be very substantial. Indeed, if real-time settlement of share transactions can be considered a straightforward solution for new companies incorporating in a blockchain environment and issuing all their shares digitally, the same is not true for companies that already exist and whose shares have been issued in compliance with current settlement systems.<sup>61</sup> In this case, a technological issue arises with respect to the impossibility of digitizing end-to-end all of the workflows relating to the shares.<sup>62</sup>

Moreover, there are both legal and economic obstacles. In jurisdictions which have not already undertaken processes of full dematerialization, although legally allowed, transforming shares from certificated into uncertificated securities generally requires a resolution of the board of directors that cannot be completely put into effect until all share certificates are surrendered to the corporation.<sup>63</sup> This problem can be easily managed when corporate ownership is concentrated, such as in the case of private companies, but it becomes much greater with widely-held public companies. For these companies, the length and complexities of the whole process could prove to be extremely expensive.<sup>64</sup> In many jurisdictions which have previously undertaken full dematerialization, this process has required general legislation to deal with the various issues.<sup>65</sup>

Nonetheless, recent experiments demonstrate the impressive and achievable short-term opportunities that blockchain offers beyond settlement and irrespective of the replacement of the whole IHS. A project launched by Nasdaq and the Republic of Estonia deserves particular attention.<sup>66</sup> It aims to leverage e-Residency (the current Estonian electronic identity system that enables both residents and those with business interests in the country to access some services after digital authentication) to provide the shareholders of companies listed on Nasdaq's Tallinn Stock Exchange with a blockchain-based voting platform that increases efficiency in voting processes. The proof of concept for the project has been successfully completed, and it has already piqued the interest of other countries, such as South Africa. Indeed, Nasdaq recently agreed with Strate (the South African CSD) to deliver this solution to South African companies so that voting processes can become less labour-intensive and beneficial shareholders can finally exercise their voting rights more easily.<sup>67</sup>

In like manner with these projects, the Australian Securities Exchange ("ASX") intends to implement a blockchain-based system to replace its current system. Indeed, ASX aims to take advantage of the technology to replace the clearing and settlement system for the Australian cash equity market.<sup>68</sup> The current system now performs the three post-trade functions of central clearing, delivery-vs-payment ("DvP") settlement and registration of share ownership, employing an efficient but siloed data-recording architecture. The goal of ASX is to replace such infrastructure with a cryptographically-empowered platform that allows the mutualization of the entire financial market infrastructure across the distinct financial institutions partaking in the Australian Exchange.<sup>69</sup>

More specifically, the project aims to establish a “private blockchain,”<sup>70</sup> a network that only licensed participants can access and designates ASX as the only actor that can write and update the distributed ledger. In contrast, a public blockchain can be accessed by anyone.<sup>71</sup> By adopting a private blockchain, the new system gives up higher degrees of decentralization in favor of efficiency, to fully accomplish the fundamental interest of financial markets of scalability. At the same time, it preserves the above-mentioned technological features of security, transparency and immutability.<sup>72</sup>

Indeed, the project considers that ledgers always suffer from an inevitable “trilemma” that impedes their satisfying the three properties of correctness (security), efficiency (scalability), and decentralization at the same time.<sup>73</sup> The persistence of ASX as central keeper of the ledger ensures the system will keep up with the high volumes of cash equity trading. Consequently, it can successfully provide the services related to the registration of share ownership, as well. Moreover, unlike many open and public blockchains, the platform is designed to segregate data to preserve information confidentiality.<sup>74</sup> Private, permissioned systems, like the system being developed by the ASX, are thus far more likely than public and permission-less systems to be used in financial market blockchains. Although some delays may be expected, the process to implement this new blockchain-based system for clearing and settlement is underway and is anticipated to be one of the first ground-breaking adoptions of the technology within regulated financial markets in the short-term future.<sup>75</sup>

Exchanges around the world are watching this process very closely, particularly as they consider the need for replacement of their own systems approaching the end of their lifecycles.

### **C. Blockchain and the “ownership transparency” revolution: Streamlining the current proxy voting architecture through real-time identification of beneficial shareholders**

Blockchain basically enables the digitization of assets and transactions in a highly secure and transparent environment, which provides for clear definition of ownership.<sup>76</sup> This digitization carries the potential for blockchain to revolutionize the IHS: indeed, share ownership can be constantly tracked throughout the whole settlement cycle.<sup>77</sup> Therefore, the lack of “ownership transparency” that currently characterizes the holding of shares through intermediated accounts can be drastically reduced.<sup>78</sup> Thus, simple real-time identification of beneficial shareholders can be achieved.<sup>79</sup> When the settlement cycle is complete, blockchain can nonetheless increase transparency regarding both interests in intermediated accounts and securities collateral, the practice of offering interests in securities as collateral to one’s creditors.<sup>80</sup> Moreover, because collateralized securities are often “pledged for reuse,” collateral takers normally employ the same securities as security for their obligations to other third parties. This practice—also known as “rehypothecation”—increases available collateral, positively expanding credit and lending activities within financial markets. However, the abuse of “rehypothecation” can lead to liquidity illusions as well as compli-

cated ownership knots that endanger systemic financial stability and obstruct the orderly resolution and insolvency proceedings of financial institutions. The increase of transparency that blockchain offers securities collateral markets can enable financial supervisors to identify and monitor these risks and prevent their realization, making financial supervision more prophylactic than it used to be.<sup>81</sup>

Thanks to such “ownership transparency,” better proxy voting architectures can be built.<sup>82</sup> More specifically, the use of blockchain platforms leads to systems in which voting rights can be exercised directly and simply by their owners. In one model, firstly, assets are issued and securely stored in asset wallets as soon as the transaction details are recorded on the blockchain platform. Secondly, the voting rights attached to such assets are matched with corresponding beneficial shareholders through a KYC identification process.<sup>83</sup> Thirdly, voting tokens can be generated and given to shareholders. These tokens can then be used either to cast votes at, or assign proxies before, the company meeting. Other models are available as well, but all are characterized by a secure and transparent digital register of share ownership, providing for direct exercise of shareholder rights.

In this way, by disintermediating the “pass-it-along” model and reducing its complexities, blockchain can decrease the existing fragmentation and allow the ultimate shareholders to regain control over traded shares.<sup>84</sup> This repatriation of control to where it belongs should allow shareholders to cast votes much more quickly and effectively, bringing reality back into line with the theory that states that shareholders not only own the company, but also control it through the exercise of voting rights. Moreover, due to its distributed nature, blockchain increases transparency within the whole voting process and shareholders can leverage it to better monitor their proxy assignments as well as their votes. A blockchain-based system may also be structured to immutably record both assigned proxies and companies’ voting history so that data can be accessed at any time by way of specific authorization.<sup>85</sup>

## V. The Benefits of Blockchain Technology in Proxy Voting

By increasing ownership transparency of shares within the IHS, blockchain lays the groundwork for a better proxy voting architecture, with benefits extending to several stakeholders, and in particular brings the operation of the system back into line with the common understanding of how it is supposed to function. Three groups of benefits are outlined below: (a) reduction of costs in voting procedures; (b) higher accuracy of ballots and stronger legitimacy of decisions; and (c) increased transparency between stakeholders in corporate governance.

### A. Benefits for shareholders and the market: Reduction of errors and costs

Firstly, blockchain reduces the complexities of processing the identification of beneficial shareholders from the omnibus accounts adopted within the IHS.<sup>86</sup> Moreover, this processing can be done in virtually real-time. Thus, distributing voting entitlements to beneficial shareholders is simplified, voting processes

become faster and their costs are substantially reduced.<sup>87</sup> Moreover, the risk that beneficial shareholders are deprived of their voting rights (due to mistakes or delays) is minimized, especially when important deadlines (such as a record date) are approaching.<sup>88</sup>

In addition, it is now well-known that such delays and errors mostly affect the voice of individual investors.<sup>89</sup> Consequently, blockchain can also help to increase their participation in company decision-making processes.<sup>90</sup> Higher investor turnout rates are beneficial for the market, as well. Indeed, they strengthen shareholders' control of boards of directors and help to reduce agency problems, eventually reducing the costs of (equity) capital and increasing its liquidity.

### **B. The benefits for “shareholder democracy”: more voting accuracy and decision legitimacy**

Secondly, share ownership transparency is the basis not only for more pre-voting accuracy but also for better post-voting systems of verification. Such systems directly affect the quality of any voting process because they ensure accuracy of results. Consequently, when they are effective, both the reliability of reported results and the legitimacy of corporate decisions increase.<sup>91</sup>

Blockchain enables knowledge of the precise identity of who is entitled to vote so that all actions carried out during the voting process are easily verified back to their origin.<sup>92</sup> Consequently, counting votes should become far more accurate.

Such a degree of accuracy also becomes a powerful means of avoiding the confusion generated by some of the processes outside of voting (mostly securities lending and short selling) that negatively affect ballots. Since voting rights can be represented on blockchain by tokens that are strictly created at the authorized nodes holding relevant position information, the current risks of incorrect vote counting (such as “overvoting”) are mitigated.<sup>93</sup>

### **C. Benefits for corporate governance: Enhancing a transparent level playing field for competition among corporate stakeholders**

In addition to the previous benefits, increased share ownership transparency sets the grounds for a level playing field in corporate governance, enhancing fairness between different stakeholders.

More specifically, regardless of the debates on their legitimacy, as mentioned above, “decoupling” practices (for instance, “empty voting” through “record date capture”) need to leverage the opacity that characterizes the current shareholding system to be high-profit strategies. Indeed, they are carried out in secret and culminate in investors appearing with more votes than expected at voting meetings.<sup>94</sup> Due to the increase in share ownership transparency, keeping these practices secret until voting will become much harder. Consequently, other company stakeholders (for instance, a group of shareholders or the board of directors) can promptly counteract and arrange opposing strategies to prevent them from being effective.<sup>95</sup>

Similar impact can be seen in cases of all markets which lack transparency of beneficial ownership of companies, but in particular in listed companies. This raises issues beyond the corporate governance context, particularly as highlighted by the use of non-transparent structures of beneficial ownership in the Panama Papers, resulting in agreements at the G20 and OECD to eliminate non-transparency in corporate beneficial ownership. There is a clear role for blockchain, as well.

## **VI. The Risks of Blockchain and “Ownership Transparency”**

Of course, adopting blockchain as the technology underlying the new proxy voting architecture also presents some risks. Three main areas of risk are generally considered to be: (a) cyber risks (for instance, tampering with data before it is stored); (b) operational risks (including insufficient or erroneous coding); and (c) risks from increased levels of transparency.<sup>96</sup> Specific attention to risks of the third kind is given below.

### **A. The risks of “ownership transparency” for privacy of shareholders’ identities**

Firstly, increased levels of share ownership transparency can compromise data privacy of beneficial shareholders. Except for the rules regarding the mandatory disclosure of major shareholdings,<sup>97</sup> according to corporate law, companies do not necessarily have the right to know the identity of beneficial shareholders. Indeed, proxy voting regulation generally provides beneficial shareholders with the choice of being completely anonymous.<sup>98</sup> In such a context, operating as informational buffers, intermediaries ensure that beneficial shareholders’ anonymity is preserved. As noted above, this is an issue which is now receiving concerted international attention, and blockchain provides one relevant avenue towards addressing related issues of non-transparency: international forums and organizations such as the G20 and the OECD are leading a major international process around the world to increase transparency concerning the beneficial ownership of companies.<sup>99</sup>

However, blockchain typically functions in the context of a distributed network and operates by spreading relevant information over multiple nodes so that data can be shared among the authorized members of the network. Used in this way, blockchain applications present the risk of facilitating access to private data.<sup>100</sup> Consequently, the violation of shareholders’ privacy is a problem that must be carefully considered,<sup>101</sup> and regulations must be designed or amended as necessary to implement transparency of beneficial ownership while at the same time maintaining an appropriate level of privacy and data protection.

Of course, blockchain-based systems would increase financial transparency and integrity, being highly supportive in preventing the risks of money laundering, corruption and tax evasion from materializing. Therefore, the need for regulation to strike a balance to both preserve shareholding privacy and preclude



these crimes is more than ever compelling.

### **B. Blockchain immutability and the risk of incorrect ballots**

Since blockchain is an append-only database, it creates a “golden copy” of data, removing the need for further reconciliation.<sup>102</sup> Theoretically, once cryptographically stored on the ledger, data cannot be altered or modified. However, the combination of blockchain immutability with share ownership transparency can turn out to be a source of incorrect voting outcomes. For instance, if shares are mistakenly transferred, it will take time before the transaction is declared null and void by a judicial authority, the transaction is reversed on the ledger, and the data is thereby updated.<sup>103</sup> To avoid such a mistake being replicated throughout the voting system (and the consequent risk that some voting rights are exercised improperly), specific governance solutions must be developed. For instance, it might become necessary to code precautionary measures into the blockchain voting platform, so that ballots are not negatively affected. In this way, more flexibility is ensured within the voting system. Such issues are central to the systems being developed by ASX.

### **C. “Ownership transparency” and malicious activities against shares’ digital identity: Risks for shareholders and the market**

Lastly, both the increase of digitization within the system and of share ownership transparency can facilitate malicious activities; for instance, digital identity theft.

Although digital identity theft is already commonplace,<sup>104</sup> it can lead to new problems in the context of share ownership and voting rights. For instance, if security firewalls fail or private keys are stolen, meeting decisions can be hacked and manipulated by ill-intentioned third parties. Such events are detrimental for the interested company and shareholders, and highly destabilizing for financial markets.

Similarly, due to a systemic increase in transparency and data-centricity, illegal practices of data exploitation and criminal activities of data monetization can be realized more easily.<sup>105</sup> Consequently, preventing unfair practices such as insider trading and market manipulation becomes even more essential.<sup>106</sup>

## **VII. Conclusion: The Task for Blockchain Regulation**

As we have pointed out, the journey towards the current financial markets infrastructure has created winners and losers.<sup>107</sup> Although current systems for settling transactions and holding shares roughly serve the safety and efficiency of financial markets, the direct relationship between issuing companies and shareholders has been severed, and voting rights can now be exercised only through the intermediaries constituting the IHS. More specifically, proxy voting mechanisms have developed so that beneficial shareholders can participate in corporate governance and “shareholder democracy” is preserved. However, these mechanisms suffer deeply from the lack of share ownership transparency within

the IHS. Moreover, due to the high level of intermediation, they end up being extremely complex. Consequently, major inefficiencies arise, and demands for change are compelling.

The rise of blockchain technologies now offers the opportunity to increase share ownership transparency within the IHS and sets the grounds for creating a more efficient proxy voting architecture. With blockchain-based voting, processes can be dramatically streamlined and costs reduced, with significant benefits not only for the shareholders but also for corporate governance, and ultimately, the market. However, blockchain also carries some risks which must not be underestimated. In addition to creating new losers, these risks can also result in a loss of confidence in blockchain, obstructing the next logical improvement to current proxy voting mechanisms. For this reason, real change cannot be driven only by technology. Regulation will be fundamental in assisting and supporting such change.<sup>108</sup> This is where blockchain and the law need to meet and cooperate.<sup>109</sup>

Thus, while blockchain is already demonstrating its great potential, the task for financial regulation is to support and guide an effective implementation of blockchain as well as to address the governance issues related to possible conflicting interests, including information security and data confidentiality.<sup>110</sup> Achieving this target will inevitably require the development of a legal framework for the digital identity management of share transactions. This legal framework can mitigate some of the risks of using blockchain and provide the next proxy voting platforms with the right level of security and privacy, which will be essential for their widespread trust among shareholders.<sup>111</sup> If financial regulation carries out such a task, the effect of the “blockchain revolution” on the corporate governance of public companies will be optimized, and proxy voting as we know it will finally be changed for the better.

## Footnotes

1. *See, e.g.*, in the UK, Companies Act 2006 § 112 (2) (“Every other person who agrees to become a member of a company, and whose name is entered in its register of members, is a member of the company”). In Australia, Corporation Act 2001 (Cth) s 231 clearly states “[a] person is a member of a company if they: [...] (b) agree to become a member of the company after its registration and their name is entered on the register of members.” In Italy, a civil law country, registration in the register of members (art. 2421 Codice Civile [c.c.]) is necessary to the effects vis-à-vis the company when the articles of association rule out the issuance of share certificates (art. 2355 co. 1 c.c.); *see* GIAN FRANCO CAMPOBASSO, DIRITTO COMMERCIALE 222 (2013). Otherwise, the transfer of shares follows the rules concerning chattels (*see* art. 2355 co. 2 and 3 c.c., and, more in general, art. 1992 c.c. and following) because the shareholder rights merge with the certificate. So, when the certificate is legitimately transferred, the

buyer not only acquires the certificate, but also the rights it relates to.

2. Regarding voting rights, *see, e.g.*, Title 8 of The Delaware Code § 219(a): “The corporation shall prepare, at least 10 days before every meeting of stockholders, a complete list of the stockholders entitled to vote at the meeting [...]” and “(c) The stock ledger shall be the only evidence as to who are the stockholders entitled [...] to vote in person or by proxy at any meeting of stockholders.”
3. PAUL L. DAVIES & SARAH WORTHINGTON, *PRINCIPLES OF MODERN COMPANY LAW* § 27 (9<sup>th</sup> ed. 2012). The rule applies whether shares are held in certificated or uncertificated form.
4. *Id.* at § 27. “Clearing”—a step halfway between trading and settlement—is customary when shares are listed and exchanged in regulated financial markets. Clearing is performed by Clearinghouses (“CCH”s), “risk management mechanism[s] which enable [...] market-wide pooling of post-trading liquidity” helping contracting parties to lower their individual and aggregate exposures to each other. For insights into the function of Clearinghouses, *see* Emiliios Avgouleas & Aggelos Kiayas, *The Promise of Blockchain Technology for Global Securities and Derivatives Markets: The New Financial Ecosystem and the “Holy Grail” of Systemic Risk Containment* 10 and following (University of Edinburgh School of Law Research Paper Series, No. 2018/43), <https://ssrn.com/abstract=3297052>.
5. *Id.* at § 27.
6. This crisis is also known as the “paper crunch” or, more simply, the “paperwork crisis.”
7. David C. Donald, *Heart of Darkness: The Problem at the Core of the U.S. Proxy System and its Solution*, 6 *VIRGINIA L. & BUS. REV.* 41 (2011).
8. Wyatt Wells, *Certificates and Computers: The Remaking of Wall Street, 1967 to 1971*, 74 *THE BUSINESS HISTORY REVIEW* 193, 194 (2000).
9. *Id.* at 195.
10. *Id.* at 203 (reporting the words of a participant in the securities industry of those years, who stated that “the industry’s leaders had been brought up in the depression years, when sales were the important thing. You survived if you had sales. You didn’t survive if you didn’t have these, regardless of how efficient or good was your back office.”).
11. *Id.* at 198 and following. *See also* SECURITIES EXCHANGE COMMISSION, *STUDY OF UNSAFE AND UNSOUND PRACTICES OF BROKERS AND DEALERS* 11 (1971),
12. *Id.* at 200 and following.
13. *Id.* at 201.

14. Donald, *supra* note 7, at 51 and following.
15. *Id.* at 52 and following; Wells, *supra* note 8, at 210.
16. Wells, *supra* note 8, at 223.
17. Such legislation also includes the Securities Investor Protection Act (“SIPA”) of 1970, which established the Securities Investor Protection Corporation, a non-profit, private membership corporation to which most American registered brokers and dealers are required to belong. Its fund constitutes an insurance program specifically designed to protect the customers of brokers or dealers subject to the SIPA from loss in case of financial failure of a member. Its role is similar to that of the Federal Deposit Insurance Corporation in the banking industry (see <http://www.uscourts.gov/services-forms/bankruptcy/bankruptcy-basics/securities-investor-protection-act-sipa>).
18. The Act can be found at <https://www.gpo.gov/fdsys/pkg/STATUTE-89/pdf/STATUTE-89-Pg97.pdf>.
19. RUBEN LEE, *RUNNING THE WORLD’S MARKETS: THE GOVERNANCE OF FINANCIAL INFRASTRUCTURE* 34 (2010). If paper certificates still exist, the shares are certificated; otherwise, they are uncertificated. Of course, this settlement system regards only listed public companies.
20. GEOFFREY YEOWART & ROBIN PARSONS (with EDWARD MURRAY, HAMISH PATRICK), *YEOWART AND PARSONS ON THE LAW OF FINANCIAL COLLATERAL* 790 (2016); Donald, *supra* note 7, at 45; Lee, *supra* note 19, at 34. The process replacing paper documents by book entries is referred to as “dematerialisation.” Even in the UK, a paperwork crisis caused the dematerialisation of listed shares. Indeed, from the late 1970s onwards, securities sold at the London Stock Exchange were transferred by means of paper certificates and transfer forms within the settlement system known under the acronym “TALISMAN.” The crash of the stock markets of 1987 made clear the need to move beyond paper-based settlement processes and encouraged the reform of the entire settlement system. In the following years, the London Stock Exchange launched a project under the acronym TAURUS aimed at dematerialising shares. However, the project failed because of the pressure from those parties involved to maintain as far as possible from their role (namely, the company registrars). Then, the Bank of England stepped in and created the current British settlement system: CREST, which went live in 1996. Initially, it was only a service center to match electronic instructions and forward them to the issuer. Later, the Uncertificated Securities Regulation 2001 transformed the records kept by CREST into the register of members of listed companies. As a result, the delay between the time of matching instructions centrally with CREST and the transfer of shares was avoided (for a more comprehensive analysis of the evolution

of the settlement system in the UK, *see* EVA MICHELER, PROPERTY IN SECURITIES - A COMPARATIVE STUDY (2007), at 62 and following).

21. HAL S. SCOTT & ANNA GELPERN, INTERNATIONAL FINANCE: LAW AND REGULATION 614 (3<sup>rd</sup> ed. 2012); Donald, *supra* note 7, at 51. For similar reasons of efficiency, CSDs for security certificates were already established in Vienna in 1878 and in Berlin in 1882. Philipp Paech, *Market needs as paradigm - breaking up the thinking on EU securities law, in* INTERMEDIATED SECURITIES: THE IMPACT OF THE GENEVA SECURITIES CONVENTION AND THE FUTURE EUROPEAN LEGISLATION 28 (Pierre-Henri Conac et al. eds., 2013).
22. *Id.* at 615.
23. Donald, *supra* note 7, at 57.
24. Renato Costantini, *Client Asset Segregation - Much Ado About Nothing or the End of the World as We Know It?*, CAPLAW (Sept. 1, 2012), <http://www.caplaw.ch/2012/client-asset-segregation-much-ado-about-nothing-or-the-end-of-the-world-as-we-know-it>. For instance, in the US most shares are issued in the name of “Cede & Co.” (“Cede” being short for certificate depository), which originally was the nominee of The Depository Trust Company (“DTC”), later The Depository Trust & Clearing Corporation (“DTCC”). *See* Donald, *supra* note 7. Likewise, the Canadian Depository for Securities immobilizes legal ownership on the register in the name of its nominee: CDS & Co (Computershare, George-son, *Transparency of Share Ownership, Shareholder Communications and Voting in Global Capital Markets* (Mar. 2015),
25. These jurisdictions include civil law countries such as France, Germany and Italy. Although neither CSDs nor other intermediaries have legal interest or rights on shares, they hold them on behalf of their client-shareholders through book-entries. Here, it is the holding which is intermediated rather than the asset itself. France Drummond, *Intermediated securities: reflections on a new concept in French financial markets law*, 1 LAW & FINANCIAL MARKETS REVIEW 435, 435 (2007). Moreover, in these cases, shareholders can access their shares only through their account providers, not through upper intermediaries. *See also* Paech, *supra* note 21, at 32-33.
26. David C. Donald, “Market Quality” and Moral Hazard in Financial Market Design, *in* RECONCEPTUALISING GLOBAL FINANCE AND ITS REGULATION 226, (Ross P. Buckley et al. eds., 2016). As Paech, *supra* note 21, at 50 highlights, the terminology “Indirect Holding System” has raised questions about what it exactly means, especially concerning those jurisdictions—such as France, Germany and Italy—in which the rights of ultimate investors “are termed ‘property’ in one form or another.” The author points out that as long as the title (either a root entry or the certificate) is relatively remote from ultimate investors, and CSDs credit

their accounts in favour of intermediaries, shareholding is indirect. Of course, this leads to the consequence that intermediaries have the *de facto* power to dispose of shares, although not allowed. Thus, if *bona fide* safeguards buyers, liability rules apply. Francisco J. Garcimantín Alférez, *The UNIDROIT Project on Intermediated Securities: Direct and Indirect Holding Systems*, INDRET 3 (2006), <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.852.9352&rep=rep1&type=pdf>.

27. It is worth highlighting that the “exportation” of the IHS began in the 1980s, when US banks introduced it in London. JOANNA BENJAMIN, INTERESTS IN SECURITIES: A PROPRIETARY LAW ANALYSIS OF THE INTERNATIONAL SECURITIES MARKETS 224 (2000). In recent years, its main characteristics were also transplanted into two international conventions, the *Convention on the Law Applicable to Certain Rights in Respect of Securities Held with an Intermediary* (2006) and the *Convention on Substantive Rules for Intermediated Securities* (2009).
28. Such adaptation of doctrinal rules is evident when considering the IHS and the law concerning share ownership in different jurisdictions. On the one hand, common law countries implemented the IHS grounding it on the arrangement of trust. As mentioned before, in the UK and other common law countries listed companies are legally owned by intermediaries, whose names are registered into the registers maintained by the CSDs. Simultaneously, these intermediaries are trustees towards beneficiaries who can claim on equitable ownership against them. Each beneficial owner always turns out to be a trustee for its account holder until the ultimate investor, which has equitable ownership in previous equitable ownership. Indeed, each equitable ownership overlaps that of the tier next below. This is likewise in the US and Canada, although beneficiaries can claim security entitlements instead of equitable ownership. The difference is that security entitlements do not overlap: every security entitlement against an account holder is distinct from that the account holder itself has. Conversely, in continental Europe, the IHS has been implemented while grounded in the idea that property is undivided. Therefore, in France and Italy, ultimate investors are full owners of their shares. In civil law systems, property can yet exist shared. In Germany, ultimate investors have shared interests in the pool of securities that an issuing company entrusts in the form of one global certificate to the CSD. More specifically, “investors have joint possession of, and are co-owners of, the only one underlying certificate.” When securities are transferred, each “transferee is considered to acquire joint possession of, and co-ownership right of, the underlying global certificate upon credit of the securities to her account.” MICHELER, *supra* note 20, at 189. Of course, “[i]t is a sui generis type of shared property” between the CSD and every shareholder, “which only exists in this precise context.” A similar shared property model can be found in Japan, too. Paech, *supra* note 21, at 14 and following, 31 and following.

29. Delphine Nougayrède, *Towards a Global Financial Register? Account Segregation in Central Securities Depositories and the Challenge of Transparent Securities Ownership in Advanced Economies* 11 (draft) (Mar. 2017),
30. See JOANNA BENJAMIN & MADELEINE YATES, *THE LAW OF GLOBAL CUSTODY - LEGAL RISK MANAGEMENT IN SECURITIES INVESTMENT AND COLLATERAL* (2<sup>nd</sup> ed. 2002), at 27 and following; Benjamin, *supra* note 27, at 5; Lee, *supra* note 19, at 35. “Omnibus accounts” were introduced on a large scale in Germany (and Austria) in the mid-1920s, “when years of hyperinflation forced banks to find a more cost efficient mechanism of holding securities.” Eva Micheler, *The Legal Nature of Securities: Inspirations from Comparative Law*, in *INTERMEDIATED SECURITIES: LEGAL PROBLEMS AND PRACTICAL ISSUES* 132 (Louise Gullifer & Jennifer Payne eds., 2010). More specifically, when the price of fixed-income securities dropped, keeping them on an allocated basis became uneconomical, and banks encouraged their clients to agree that they held securities on an unallocated basis. “The clients who felt unable to give their consent were advised that they had to expect a significant increase in fees for deposits kept on an allocated basis.” MICHELER, *supra* note 20, at 184-185.
31. Georgios P. Kouretas & Christina Tarnanidou, *Shareholding in EU: is “indirect holding” approach appropriate in achieving financial integration?*, 22 *JOURNAL OF FINANCIAL REGULATION AND COMPLIANCE* 18 (2014); Dominic Hobson, *The Future of the Omnibus Account* (Sept. 2014),
32. Matthew J. O’Toole et al., *The First Block in the Chain: Proposed Amendments to the DGCL Pave the Way for Distributed Ledgers and Beyond*, *HARVARD LAW SCHOOL FORUM ON CORPORATE GOVERNANCE AND FINANCIAL REGULATION* (Mar. 16, 2017), <https://corpgov.law.harvard.edu/2017/03/16/the-first-block-in-the-chain-proposed-amendments-to-the-dgcl-pave-the-way-for-distributed-ledgers-and-beyond>.
33. Karlo Kauko, *Interlinking Securities Settlement Systems - A Strategic Commitment? - Working Paper Series No. 427*, EUROPEAN CENTRAL BANK (Jan. 2005),
34. Kouretas & Tarnanidou, *supra* note 31.
35. Consequently, in China, both domestic and foreign investors must hold the record on the register maintained by China Securities Depository & Clearing Co. (“Chinaclear”) to be legitimately considered shareholders. In addition to China, Greece and the European Nordic countries are among those minor financial markets relying on the transparent system. Outside Europe, the Brazilian financial market resembles such a system. For a broader analysis of the transparent holding system, see Paech, *supra* note 21, at 34; Kouretas & Tarnanidou, *supra* note 31, at 17.
36. Donald, *supra* note 7, at 227; Avgouleas & Kiayas, *supra* note 4, at 45.

37. Alférez, *supra* note 26, at 3. The other concern of this challenge is how to prevent custody risk, namely the risk of losing securities upon the insolvency, negligence or fraudulent action of the intermediary that holds them.
38. Donald, *supra* note 7, at 46. Thomas G. Ward, *How The Indirect Holding System Affects Investor Suits*, LAW 360 (Sept. 29, 2015), <https://www.law360.com/articles/708861/how-the-indirect-holding-system-affects-investor-suits>. Consequently, these shareholders are not owners “in absolute terms as it would be in a civil law system [because their ownership] exist[s] as a relative entitlement” against the intermediary holding the record on the register of members. MICHELER, *supra* note 20, at 85.
39. Roy Goode, *The Nature and Transfer of Rights in Dematerialised and Immobilised Securities*, in THE FUTURE FOR THE GLOBAL SECURITIES MARKET: LEGAL AND REGULATORY ASPECTS 111 (Fidelis Oditah ed., 1996).
40. Benjamin, *supra* note 27, at 30. According to Kouretas & Tarnanidou, *supra* note 31, at 18, in the IHS the rights of “beneficial shareholders” are transformed from proprietary rights (rights *in rem*, which can be exercised *erga omnes*) to contractual rights (rights *in persona*). This transformation comes from the consideration of securities deposits as irregular deposits. In irregular deposits, the ownership of assets temporarily passes from the client to the depository, which is obliged to return to the depositor the same quantity and quality of assets deposited. According to Goode, *id.* at 111, the term “entitlement” —coming from Article 8 of the Uniform Commercial Code and referring both to the rights held by an intermediary for its client as a “financial asset” and the client’s interests in those rights as a “security entitlement”—is “helpful in making it clear that what an account-holder has is not an interest in the underlying security but a sub-interest in the rights held by its intermediary.”
41. Donald, *supra* note 7, at 227. *See also* Benjamin, *supra* note 27, at 225 (“global custody has sometimes been described as an information service.”).
42. For a wide and clear analysis of agency problems, agency costs and legal strategies in corporate governance, *see* John Armour et al., *Agency Problems and Legal Strategies* and John Armour et al., *The Basic Governance Structure: The Interests of Shareholders as a Class*, in THE ANATOMY OF CORPORATE LAW: A COMPARATIVE AND FUNCTIONAL APPROACH (Reiner Kraakman et al. eds., 3<sup>rd</sup> ed. 2017).
43. *Id.*
44. Kevin Kearney, *Proxy.gov: A Proposal to Modernize Shareholder Lists and Simplify Shareholder Communications*, 37 HASTINGS COMM. & ENT.



- L. J. 391, 395 (2015). The first kind of these rules was adopted in the US in 1975, as part of the amendments of the US Securities Exchange Act of 1934 (see Rule 14a3-(d) of Exchange Act, Release No. 34-11079 (Oct. 31, 1974); Donald, *supra* note 7, at 63; LOUIS LOSS et al., FUNDAMENTALS OF SECURITIES REGULATION 6C 6 (2000).
45. Marcel Kahan & Edward Rock, *The Hanging Chads of Corporate Voting*, 96 GEO. L. J. 1227, 1243 (2008).
46. At this stage, another layer of intermediation is added to the described chain. Indeed, since the 1980s, financial institutions have constantly outsourced proxy processing (and the remaining corporate communications business) to specific service providers, which manage the information flow with issuing companies as agents for financial institutions. Among these, Automatic Data Processing (“ADP”) entered the business very soon and quickly became one of the leading companies. In 2007, Broadridge Financial Solutions was spun-off from ADP and now dominates the market of corporate communication services.
47. Kahan & Rock, *supra* note 45, at 1243 and following. Even the proxy materials distribution is generally performed by communication service providers. In general, two models of spreading relevant information to shareholders stand out. Firstly, the “push method,” in which shareholders are provided with relevant information on an individual basis and in a manner that ensures them fast and easy access to it. Secondly, the “pull method,” in which companies make information available to shareholders, disseminating it indiscriminately at pre-determined platforms, such as newspaper and websites (see Dirk Zetzsche, *Shareholder Passivity, Cross-Border Voting and the Shareholder Rights Directive*, 8 J. Corp. L. Stud. 289 (2008)). Although more expensive, the “push method” should benefit shareholder democracy through more participation and exercise of voting rights. This method is the prevailing model in international financial markets. In the US, the “push method” is strictly adopted: shareholders rely on a “full set delivery option” and never have to seek relevant information. The “push method” is widespread in Europe, as well. In the UK, intermediaries identify and locate beneficial shareholders mostly on a voluntary basis, due to the lack of rules mandating the transfer of relevant information to shareholders. In France and Germany, “push” and “pull” methods co-exist. More specifically, in France, companies must publish information on their websites only when they issue bearer shares. Otherwise, companies communicate with shareholders individually. The same goes in Germany, where companies announce general meetings via *Bundesanzeiger*, the Federal Gazette. Moreover, although no longer mandatory, some issuers still publish relevant information on the *Wertpapier Mitteilungen*, which is a medium used by banks. Among European countries, Italy is an exception because it relies on the “pull method.” Moreover, even the EU legislation—namely, the Shareholder Rights Directive (Directive

2007/36/EC)— is based mostly on the “pull method,” allowing companies not to publish relevant information only if they communicate it to shareholders individually. Matteo Gargantini, *Identificazione dell’azionista e legittimazione all’esercizio del voto nelle s.p.a.* quoted 124 (2012) and following; *see also* Computershare, Georgeson, *supra* note 24, at 14 and following.

48. Donald, *supra* note 7, at 47 and following.
49. The complexity of current proxy voting architecture is also well-known by financial authorities. *See, e.g., Concept Release on the U.S. Proxy System*, SECURITIES AND EXCHANGE COMMISSION 7 (July 2010), <https://www.sec.gov/rules/concept/2010/34-62495.pdf>, stating “[t]he manner in which proxy materials are distributed and votes are processed and recorded involves a level of complexity not generally understood by those not involved in the process. This complexity stems, in large part, from the nature of share ownership in the United States, in which the vast majority of shares are held through securities intermediaries such as broker-dealers or banks; this structure supports prompt and accurate clearance and settlement of securities transactions, yet adds significant complexity to the proxy voting process.”
50. Kahan & Rock, *supra* note 45, at 1249 and following.
51. Although it did not affect the ballot’s outcome, a clear example of the magnitude of some errors is the 2008 proxy fight to control the board of Yahoo, which was very intense. After voting, Yahoo announced that two of its directors received approval from 80% of shareholders. However, an investor holding a high percentage of shares asked Broadridge to double-check the ballot’s outcome. After the check, Yahoo announced that almost 20% of the votes were misattributed. Of course, such errors can be very “troubling.” *See* Vice Chancellor J. Travis Laster, *The Block Chain Plunger: Using Technology to Clean Up Proxy Plumbing and Take Back the Vote*, COUNCIL OF INSTITUTIONAL INVESTORS (Sept. 2016), [http://www.cii.org/files/09\\_29\\_16\\_laster\\_remarks.pdf](http://www.cii.org/files/09_29_16_laster_remarks.pdf). Moreover, this is even truer if it is considered that current proxy voting architectures generally lack efficient vote verification systems as well as end-to-end audit trails. Unfortunately, difficulties in verifying ballots are also caused by some bank practices, such as combining accounts in voting proxies. Even “piggybacking” is quite common: banks give one account number to different shares, regardless of the number of “beneficial shareholders.” This results in bank proxies with the same account number bearing varying numbers of shares. Kahan & Rock, *supra* note 45, at 1253.
52. *Id.* at 1255 and following. As the authors explain, it is worth highlighting that this category of inefficiencies is aggravated when custodian banks outsource securities lending to third-party specialists. In this case, the one “with responsibility for voting the shares may not be even aware that

the shares are out ‘on loan.’”

53. “Decoupling” can be distinguished from “empty voting,” which is obtaining voting rights greater than their economic interest, and “hidden (morphable) ownership,” which is its opposite—obtaining an economic interest greater than their formal voting rights, although with the ability to “morph” economic only-stakes to outright ownership of shares). Such practices have constantly increased in the years after the “derivative revolution” because, in addition to the complexity within the IHS, they also take advantage of the complexity and opacity characterizing current financial products. Rigorous analyses already have been conducted. *See, e.g.*, Henry T. C. Hu & Bernard Black, *The New Vote Buying: Empty Voting and Hidden (Morphable) Ownership*, 79 Southern California Law Review 811 (2006); Henry T. C. Hu & Bernard Black, *Empty Voting and Hidden (Morphable) Ownership: Taxonomy, Implications, and Reforms*, 61 Business Lawyer 1011 (2006); Henry T. C. Hu & Bernard Black, *Equity and Debt Decoupling and Empty Voting II: Importance and Extensions*, 156 U. Pa. L. R. 625 (2008); Henry T. C. Hu, *Financial Innovation and Governance Mechanisms: The Evolution of Decoupling and Transparency*, 70 Business Lawyer 347 (2015).
54. The term “FinTech” refers to the new financial industry that applies technology to improve financial activities. Patrick Schueffel, *Taming the Beast: A Scientific Definition of Fintech*, 4 Journal of Innovation Management 32 (2016), <http://www.open-jim.org/article/view/322>. For further analysis of the evolution of FinTech over time, *see* Douglas W. Arner et al., *The Evolution of FinTech: A New Post-Crisis Paradigm*, 47 Geo. J. Int’l L 1271 (2016).
55. *See, e.g.*, Euroclear, Oliver Wyman, *Blockchain in Capital Markets - The Prize and the Journey*, OLIVER WYMAN (Feb. 2016),
56. Precisely, the efforts of the Delaware Blockchain Initiative. *See* Andrea Tinianow & Caitlin Long, *Delaware Blockchain Initiative: Transforming the Foundational Infrastructure of Corporate Finance*, HARVARD LAW SCHOOL FORUM ON CORPORATE GOVERNANCE AND FINANCIAL REGULATION (Mar. 16, 2017), <https://corpgov.law.harvard.edu/2017/03/16/delaware-blockchain-initiative-transforming-the-foundational-infrastructure-of-corporate-finance>, which led in August 2017 to the Act to Amend Title 8 of the Delaware Code Relating to the General Corporation Law (<https://legis.delaware.gov/BillDetail/25730>). According to the Act, for the purposes of Chapter I of Title 8 (General Corporation Law), “stock ledger means one or more records administered by or on behalf of the corporation in which the names of all of the corporation’s stockholders of record, the address and number of shares registered in the name of each such stockholder, and all issuances and transfers of stock of the corporation are recorded in accordance with § 224 of this title.” The new § 224 states: “Any records maintained administered by a or on

behalf of the corporation in the regular course of its business, including its stock ledger, books of account, and minute books, may be kept on, or by means of, or be in the form of, any information storage device, or method, or one or more electronic networks or databases (including one or more distributed electronic networks or databases), provided that the records so kept can be converted into clearly legible paper form within a reasonable time.”

57. Dario de Martino & Spencer Klein, *Don't Want To Be The Next Kodak? Embrace Blockchain*, THE CLS BLUE SKY BLOG (Sept. 6, 2017), <https://www.law360.com/articles/960825/don-t-want-to-be-the-next-kodak-embrace-blockchain>. The Act amending Title 8 of the Delaware Code coincides with the trend of the US federal securities regulation towards the achievement of a “certificateless society,” which interestingly started with the choice of “immobilizing” shares at a central securities depository. LOUIS LOSS & JOEL SELIGMAN, FUNDAMENTALS OF SECURITIES REGULATION 751 (5<sup>th</sup> ed. 2004).
58. *Id.* See also Laster, *supra* note 51.
59. Tinianow & Long, *supra* note 56, at 2. The benefits of real-time settlement of share transactions (as well as real-time updating of company registers) go far beyond the area of proxy voting. For instance, class action litigations can clearly benefit from it. Indeed, as the recent *Dole Food Company Inc. Stockholder Litigation* demonstrates, current clearing and settlement systems cannot always determine correctly all of the share trades and, consequently, who owns them. Thus, when a class action is followed by a settlement (such as in *Dole Food*), it might occur that multiple owners submit claims for shares involved in unsettled transactions. More specifically, CSD participants that hold the shares as reflected on the CSD records can submit their claims, but so can the beneficial owners who are clients of the participant who has acquired the shares and owns them as of a due date. Therefore, both claims appear valid at first glance, although they involve the same underlying shares. See also Vice Chancellor J. Travis Laster, *Memorandum Opinion in re Dole Food Company, Inc. Stockholder Litigation* (Feb. 2017), <https://courts.delaware.gov/Opinions/Download.aspx?id=252690>.
60. J. O’Toole et al., *supra* note 32.
61. John Hintze, *A Blockchain Move You Can Use Now*, ITREASURER (July 31, 2017), <http://www.itreasurer.com/A-Blockchain-Move-You-Can-Use-Now.aspx>.
62. *Id.*
63. See, e.g., § 158 Title 8 of The Delaware Code, stating that the “shares of a corporation shall be represented by certificates, provided that the board of directors of the corporation may provide by resolution or resolutions that

some or all of any or all classes or series of its stock shall be uncertificated shares. Any such resolution shall not apply to shares represented by a certificate until such certificate is surrendered to the corporation.”

64. Hintze, *supra* note 61.
65. Similarly, Donald, *supra* note 7, at 88 and 96, writes that the option to move from transferring claims on certificated shares (the current depository-based model) to transferring uncertificated securities “runs against many deeply entrenched interests” of an industry “in which the interested parties have a *de facto* monopoly.”
66. *Nasdaq’s Blockchain Technology to Transform the Republic of Estonia’s e-Residency Shareholder Participation*, NASDAQ (Feb. 12, 2016), <http://ir.nasdaq.com/releasedetail.cfm?releaseid=954654>.
67. *Nasdaq to Deliver Blockchain e-Voting Solution to Strate*, NASDAQ (Nov. 22, 2017), <http://ir.nasdaq.com/releasedetail.cfm?releaseid=1049610>. In addition to these trials, it is worth highlighting that other financial players are also working on “blockchain technology [specifically the Ethereum blockchain platform] to enhance global proxy vote transparency and analytics.” A pilot has been successfully completed: *see* Broadridge Press Release, Broadridge, J. P. Morgan, Northern Trust and Banco Santander Successfully Complete Pilot of Blockchain-Based Proxy Vote Solution (Apr. 11, 2017), <https://www.broadridge.com/press-release/2017/broadridge-j-p-morgan-northern-trust-and-banco-santander-complete-proxy-vote-solution>. For this very purpose, Broadridge was also awarded a patent recently. For more information, *see* Broadridge Press Release - Broadridge Secures Industry-Leading Blockchain Patent for Proxy Processing and Repo Agreements (May 10, 2018), <https://www.broadridge.com/press-release/2018/broadridge-secures-industry-leading-blockchain-patent>.
68. *ASX’s Replacement of CHESSE for Equity Post-Trade Services: Business Requirements - Consultation Paper*, ASX (Sept. 2016), <http://www.asx.com.au/documents/public-consultations/ASX-Consultation-Paper-CHESSE-Replacement-19-September-2016.pdf>. On December 7, 2017, the ASX announced its intention to replace CHESSE with DLT developed by its technology partner Digital Asset Holdings. To read the full market announcement, *see* ASX Media Release - ASX selects distributed ledger technology to replace CHESSE (Dec. 7, 2017), <https://www.asx.com.au/documents/investor-relations/ASX-selects-distributed-ledger-technology-to-replace-CHESSE.pdf>.
69. To better understand the shift from siloed to mutualised architectures, it is worth seeing Dirk Zetsche et al., *The Distributed Liability of Distributed Ledgers: Legal Risks of Blockchain*, 2018 U. Ill. L. Rev. 1361 (2018), at 1370 and following (also *available at* <https://illinoislawreview.org/wp-content/uploads/2018/10/BuckleyEtAl.pdf>). *See also* *The Digital*

- Asset Platform - Non-technical White Paper*, Digital Asset (Dec. 2016), <https://hub.digitalasset.com/hubfs/Documents/Digital%20Asset%20Platform%20-%20Non-technical%20White%20Paper.pdf>.
70. For a quick look at the different categories of blockchain-like database applications, see Vitalik Buterin, *On Public and Private Blockchains*, ETHEREUM.ORG (Aug. 6, 2015), <https://blog.ethereum.org/2015/08/07/on-public-and-private-blockchains>.
  71. Zetzsche et al., *supra* note 69, at 1373.
  72. See Masafumi Kondo et al., *The Trend of Exploring the Use of Distributed Ledger Technology in the Capital Market*, Japan Exchange Group (Sept. 14, 2017), [https://www.jpx.co.jp/english/corporate/research-study/working-paper/b5b4pj000000i468-att/E\\_JPX\\_working\\_paper\\_Vol20.pdf](https://www.jpx.co.jp/english/corporate/research-study/working-paper/b5b4pj000000i468-att/E_JPX_working_paper_Vol20.pdf).
  73. Joseph Abadi & Markus Brunnermeier, *Blockchain Economics* (Dec. 19, 2018), [https://scholar.princeton.edu/sites/default/files/markus/files/blockchain\\_paper\\_v6g.pdf](https://scholar.princeton.edu/sites/default/files/markus/files/blockchain_paper_v6g.pdf).
  74. See Kondo et al., *supra* note 72, at 10, stressing confidentiality “to be crucial in the financial industry.”
  75. The new system is currently planned to go live in March-April 2021. See ASX, *CHESSE Replacement: New Scope and Implementation - Plan Response to consultation feedback* (Sept. 2018), <https://www.asx.com.au/documents/public-consultations/response-to-chess-replacement-consultation-feedback.pdf>.
  76. Euroclear, Oliver Wyman, *supra* note 55, at 11.
  77. See also George S. Geis, *Traceable Shares and Corporate Law*, 113 NW. L. REV. 227 (2018).
  78. Such a “revolution” can be further appreciated when it is considered that the SEC clearly identifies this problem in the US system: “Because the ownership of individual shares held beneficially is not tracked [...] imbalances occur.” Unfortunately, even the methods for reconciling these imbalances generate important problems. In short, reconciliation is currently entrusted to intermediaries that can opt for pre-mailing or post-mailing reconciliation. The former involves adjusting the voting instruction forms (“VIF”s) downward to match the number of shares whose votes can be casted. In the latter, intermediaries wait for receiving VIFs first and then check if their number corresponds with the shares. Only if it does not, downward adjustments are made. Although pre-mailing reconciliation allows shareholders to know the exact number of votes they can cast, this method is more expensive. Consequently, post-mailing reconciliation is preferred. However, the client does not know from the voting card how many shares it may vote. Moreover, in the case of securities lending, shares are first assigned to accounts whose customers have not returned voting instructions. Consequently, the higher the number of shares lent out, the

lower the haircut on votes, with the result that the number of votes cast is systemically higher than when there is no securities lending. So, every time a failure to vote or submit instructions is considered as a “no” vote, obtaining the votes to approve a decision (such as a merger) becomes easier. Thus, trust in the ballot outcomes is compromised. SECURITIES AND EXCHANGE COMMISSION, *supra* note 45, at 31 and following; MARCEL KAHAN, EDWARD ROCK, *supra* note 47, at 1262 and following. By allowing the tracking of share ownership, blockchain can eradicate, or at least reduce, these problems.

79. Asx, *supra* note 75, at 8. Indeed, because of the use of “omnibus accounts” in the custody chain, now share ownership can only be tracked on an aggregated basis. See Tinianow & Long, *supra* note 56, at 2.
80. Benjamin, *supra* note 27, at 79.
81. Avgouleas & Kiayas, *supra* note 4, at 46 and following; Douglas W. Arner et al., *FinTech, RegTech, and the Reconceptualization of Financial Regulation*, 37 NW. J. INT’L L. & BUS. 371, 382 (2017); Onnig H. Dombalgian, *Preserving Human Agency in Automated Compliance*, 11 BROOK. J. CORP FIN. & COM. L. 71 (2016).
82. O’Toole et al., *supra* note 32.
83. In the e-voting project led by Nasdaq and Tallinn Stock Exchange, the identification process is based on a two-factor authentication (“2FA”), which is a method of computer access control in which users are granted access only after successfully presenting two of three types of credentials belonging to the following categories: knowledge (something they know, such as a password), possession (something they have, such as a secret token) and inherence (something they are, such as a biometric—a fingerprint, etc.). See Seth Rosenblatt & Jason Cipriani, *Two-factor authentication: What you need to know (FAQ)*, CNET (June 2015),
84. Avgouleas & Kiayas, *supra* note 4, at 49.
85. Nasdaq, *supra* note 83. Immutable transparent data also enhances auditors’ insight into voting processes, consistently simplifying their activities. Generally, different kinds of auditors can be considered. They are: regulators, auditors of the market participants and independent auditors. Of course, the degree of access to data should vary, depending on their needs. See National Settlement Depository, Strate, Nasdaq, Dvc, Six Securities Services, Swift, *General Meeting Proxy Voting on Distributed Ledger - Product Requirements v1.7 28* (July 2017),
86. ASX, *supra* note 75, at 8.
87. Christoph Van der elst & Anne Lafarre, *Blockchain and the 21<sup>st</sup> Century Annual General Meeting*, 14 EUR. COMPANY L. J. 176 (2017).

88. As explained by Kahan & Rock, *supra* note 45, at 1251. This can happen when voting is on a shareholder proposal. Shareholder proposals generally “require a majority of shares voting, so that abstentions have a similar effect as ‘no’ votes. But because shareholder proposals are typically opposed by management, an abstention on them is equivalent to a *pro-management* vote.”
89. Kahan & Rock, *supra* note 45, at 1250. Of course, low individual investor participation correspondingly increases the influence of institutional investors. This is also confirmed by data regarding voting trends. Indeed, they show that in 2015, on average, institutional investors voted 83% of their shares, while individual investors voted only 28% of their shares. Consequently, in that year, around 24 billion shares were unvoted. *See The future of financial infrastructure - An ambitious look at how blockchain can reshape financial services*, WORLD ECONOMIC FORUM 102 (Aug. 2016), [http://www3.weforum.org/docs/WEF\\_The\\_future\\_of\\_financial\\_infrastructure.pdf](http://www3.weforum.org/docs/WEF_The_future_of_financial_infrastructure.pdf); *2016 Proxy Season Preview - Looking back at the 2015 mini-season and forward into 2016*, BROADRIDGE, PWC 1 (2016), <http://proxypulse.broadridge.com/proxypulse/reports/2016/first-edition-2016.html>.
90. Van der elst & Lafarre, *supra* note 87, at 176.
91. Kahan & Rock, *supra* note 45, at 1253.
92. NATIONAL SETTLEMENT DEPOSITORY, STRATE, NASDAQ, DVC, SIX SECURITIES SERVICES, SWIFT, *supra* note 85, at 16. As explained in the text, thanks to the distributed nature of blockchain, the verification of the voting process becomes decentralized. Indeed, each voting shareholder can verify the actions that have been accomplished. Firstly, shareholders can see if their voting instructions have been properly used as well as whether the votes they cast have been included in the votes counting. Secondly, shareholders can also independently verify the outcomes of the voting process once it is completed. Thirdly, in case votes are adjusted, blockchain assures transparency in the adjustment process itself. Consequently, voting shareholders can easily detect and review both the adjustments of their votes and any additional information (such as the reasoning behind them).
93. *Id.* at 23.
94. David Yermack, *Corporate Governance and Blockchains*, 21 REVIEW OF FINANCE 7 (2017), <https://doi.org/10.1093/rof/rfw074> at 24.
95. *Id.* at 24.
96. For a broader perspective on the legal risks of blockchain, *see Zetzsche et al.*, *supra* note 69.



97. For further analysis of disclosure of major shareholdings, see DAVIES & WORTHINGTON, *supra* note 3, at 969 and following.
98. For instance, the US proxy rules distinguish between objecting beneficial owners (“OBO”s) and non-objecting beneficial owners (“NOBO”s). The OBOs/NOBOs distinction was introduced in the mid-1980s to balance the interests of issuers, brokers and shareholders, both retail and institutional. In the case of OBOs, both intermediaries are prohibited from disclosing their identity to a company, and companies cannot contact them directly. The number of OBOs is very high. Indeed, it has been estimated that more than half of all shares in US publicly traded companies are held by them. OBOs are mostly institutional investors. Differently, in the case of NOBOs, intermediaries can disclose their identity and, theoretically, companies can contact them directly. However, in practice, this never happens because the SEC rules still require that intermediaries send them proxy materials. See Alan L. Beller & Janet L. Fisher (with the assistance of Rebecca M. Tabb), *The OBO/NOBO Distinction in Beneficial Ownership: Implications for Shareowner Communications and Voting* (Feb. 2010), COUNCIL OF INSTITUTIONAL INVESTORS,
99. See, e.g., the activities of the “Global Forum on Transparency and Exchange of Information for Tax Purposes,” <http://www.oecd.org/tax/transparency>.
100. Zetsche et al., *supra* note 69, at 1375.
101. Demands for a regulatory change have already been expressed. For instance, in the US, the Shareholders Communication Coalition has proposed the elimination of the OBO/NOBO distinction to the SEC to allow more direct communication between companies and their beneficial shareholders. See *Letter from Niels Holch, Exec. Dir., S’holder Commc’ns Coal., to Elizabeth M. Murphy, Sec’y, SEC 27 24* (Oct. 20, 2010), <http://www.sec.gov/comments/s7-14-10/s71410-206.pdf>.
102. NATIONAL SETTLEMENT DEPOSITORY, STRATE, NASDAQ, DVC, SIX SECURITIES SERVICES, SWIFT, *supra* note 85, at 23.
103. Because data are immutably recorded on the blockchain, updating the ledger basically consists of recording “a new transaction,” i.e. an opposite change of state. See Adam T. Ettinger, *FinTech: Taking Stock in Blockchains*, NAT’L L. REV. (Nov. 16, 2017), <https://www.natlawreview.com/article/fintech-taking-stock-blockchains>.
104. Generally, identity theft occurs when “an attacker impersonates a victim by presenting stolen identifiers or proofs of identity” for financial or personal gain. Its impact on targeted individuals can be severe. Indeed, “the average monetary loss per victim attributed to the crime of identity theft is more than the amount attributed to bank robbery.” ELISA BERTINO & KENJI TAKAHASHI, *IDENTITY MANAGEMENT: CONCEPTS, TECHNOLOGIES, AND SYSTEMS* (2011), at 15 and following. Some

data can help to better understand the extent of this phenomenon. For instance, in just the US, 15.4 million people were victims of identity fraud in 2016, amounting to total losses of \$16 billion. In the past six years, identity thieves have stolen over \$107 billion. See INSURANCE INFORMATION INSTITUTE, *Facts + Statistics: Identity Theft and Cybercrime*, (2017), <https://www.iii.org/fact-statistic/facts-statistics-identity-theft-and-cybercrime>. Similarly, in France, it has been estimated that there are about “400,000 identity thefts per year on average.” Maryline Laurent et al., *Digital Identity*, in DIGITAL IDENTITY MANAGEMENT (Maryline Laurent & Samia Bouzefrane eds., 2015), <https://www.sciencedirect.com/science/book/9781785480041>.

105. BERTINO & TAKAHASHI, *id.* at 16.
106. *Report - The Distributed Ledger Technology Applied to Securities Markets*, European Securities and Markets Authorities (Feb. 7, 2017),
107. Donald, *supra* note 7, at 217.
108. Similarly, see Philipp Paech, *The Governance of Blockchain Financial Networks*, 6 MOD. L. REV. 1073 (2016).
109. Kevin Werbach, *Trust, but Verify: Why the Blockchain Needs the Law*, 33 Berkeley Tech. L. J. 487 (2018).
110. NATIONAL SETTLEMENT DEPOSITORY, STRATE, NASDAQ, DVC, SIX SECURITIES SERVICES, SWIFT, *supra* note 85, at 23.
111. As the evolution of the World Wide Web demonstrates, digital identity management is essential in the digital world because it enables trusted relationships between remote parties, whether organizations and/or individuals. See *Digital Identity Management - Enabling Innovation and Trust in the Internet Economy*, OECD (2011), <http://www.oecd.org/sti/ieconomy/49338380.pdf>, at 8 and following. By mitigating many trust issues, blockchain can reduce the need for further digital management processes *between* remote parties. However, digital management is still necessary to ensure trust *of* the remote parties in the system itself.