Capital Markets and Blockchain: Assessing the Current State and Potential of the Technology

Cho, Sung Hoon*

Blockchain technology is expected to transform capital markets, financial services and further society as a whole. However, there is still much room for improvement despite various attempts underway to adopt and use blockchain. More specifically, for efficient blockchain-based capital markets to work well from a corporate finance perspective, the primary and secondary markets are facing key challenges that they must address: For the primary market, a solution needs to be found to address the absence of functions to monitor issuers and reduce information asymmetry. For the secondary market, major challenges include improving scalability, providing price discovery functions for market efficiency, removing restrictions on arbitrage, and adding the functionality to cancel or correct transactions. Also, some investors would not want to trade on blockchain-based platforms. Hence, the practical applications of blockchain in capital markets require technological advances that can tackle the limitations and requirements described earlier. Moreover, cool-headed and swift actions are important for the adoption and use of blockchain, as with other key Fourth Industrial Revolution technologies.

* All opinions expressed in this paper represent the author's personal views and thus should not be interpreted as Korea Capital Market Institute's official position.

* Ph.D., Senior Research Fellow, Financial Services Industry Department, Tel: 82-2-3771-0876, E-mail: buckeye@kcmi.re.kr

Introduction

Being recognized as 'one of the most disruptive technologies that could change the world' since the advent of the Internet, blockchain[1] is also currently the focus of a great deal of attention as one of key Fourth Industrial Revolution technologies. Following high expectations surrounding blockchain, many discussions and attempts are being made to adopt and implement the technology. Capital markets and financial services among the first to adopt blockchain are widely believed to be the areas that will benefit the most from the new technology. NASDAQ announced the development of Linq, a blockchain-based trading platform for unlisted securities. Australian Stock Exchange (ASX) unveiled its plan to replace its clearing and settlement system, known as CHESS with a new blockchain-based system. They are good examples of blockchain adoption and applications in capital markets. In Korea, the Korea Financial Investment Association (KOFIA)-led consortium, which includes 11 securities companies, announced the development and launch of a blockchain-based joint authentication system called "Chain-ID" in October 2017.[2] Taken as a whole, however, uses of blockchain in capital markets are still in their infancy. Among other things, it remains uncertain how the technology could be applied to capital markets functioning primarily as a place where companies raise funds from investors by issuing and selling securities.

This article attempts to assess the current blockchain technology, and explores the possibility of blockchain adoption in capital markets from a corporate finance perspective. Then, it summarizes important considerations when building a blockchain-based capital-raising platform for companies in capital markets.

Assessing blockchain technology

Generally, security is the most talked-about important benefit offered by blockchain. Here, its security advantage comes from the fact that it is very difficult to forge a digital ledger called blockchain. Transaction records stored in the ledger seem nearly impossible to falsify due to the following two key structural features of blockchain. First, blocks containing transaction records are linked and secured through strong encryption (chained). Second, the ledger is not centralized but is scattered across a large number of participants. This is totally a different matter from the

1) Although blockchain and distributed ledger are sometimes considered distinct in blockchain literature, this article uses the term, "blockchain" to refer to both.

2) KOFIA, 31 October 2017, KOFIA to launch the world's first blockchain-based joint authentication service, press release.

security of digital wallets that individuals or intermediaries use to store crypto assets like virtual currencies.[3] Leaking or stealing private keys from digital wallets cannot be prevented by the blockchain data structure. In reality, there are often media reports on cyber attacks on digital wallets. Moreover, most transactions between individual investors and intermediaries occur off the blockchain. Recently, some are raising questions about the security of distributed consensus mechanism, which is the key to the blockchain operation, as well as the integrity of the ledger.[4]

The benefits of blockchain also include efficiency and cost reduction. In existing centralized systems that need third parties, costs are incurred to set up and operate third parties, and charges and fees payable to them are also incurred. By contrast, these costs and expenses are not incurred in blockchain-based systems. On top of cost reduction, blockchain enables all transactions to take place on a peer to peer (P2P) basis, without involving a third party, which makes transactions more efficient. To be exact, however, no cost incurrence related to the establishment and operation of third parties should be understood as distribution of such costs across (voluntary) network participants around the world. That is to say that blockchain appears to rely on crowdsourcing resources necessary to handle transactions and manage the ledger, which have been carried out by a central authority in the current system, from network participants across the globe. This could be very inefficient. Given the computing power and electricity required for mining, the sizable complete ledger file stored by a large number of nodes locally, and data traffic generated in the process of approvals and updates of the ledger, the aggregation of resources mobilized for maintaining a blockchain system is highly likely to be greater than the aggregation of resources needed for running the current system with third parties involved. From the perspective of the existing system that pursues to gain efficiency through the involvement of third parties, blockchain moves in the opposite direction. Nevertheless, blockchain is considered efficient because the marginal cost of running a blockchain system has approached zero. This is made possible by rapid technological developments, which have removed most restrictions and limitations imposed by computing power and storage capacity, and network speed and bandwidth. Accordingly, the P2P structure without a third party becomes technically and economically justified. If blockchain is combined

3) Virtual currency platforms are often referred to as virtual currency exchanges. This article instead uses the term, “intermediaries” according to Chun, Changmin and Bae, Seungwook (2018). Chun, Changmin and Bae, Seungwook, 2018, Virtual Currency Regulations in Major Countries and Their Implications, KCMI Issue Report 18-03.

4) Song, Sooyoung, 2018, Blockchain: A pipe dream or a dream to be come true, presentation materials for the Spring Policy Symposium hosted by Korea Finance Association.

with technologies such as the Internet of Things (IoT) and 5G networks, blockchain will be able to provide more efficiency.

One important issue in relation to blockchain is governance. The 'hard-fork' of Bitcoin Cash from Bitcoin underscores challenges with public or 'permissionless' blockchains (like Bitcoin's) where there is no central authority responsible for decision-making on system or platform operation. Thus, almost all blockchains, with which financial institutions are experimenting, have a governing body for the system or platform. They are private or 'permissioned' blockchains which require permission from incumbents for a new member to be added to the network. A growing number of people agree that a governing body is needed even for public blockchain. However, the existence of a governing body itself appears to compromise the entire point of 'decentralization' envisioned by the pioneers of blockchain.

The ledger maintained and possessed exclusively by a third party is very important and invaluable information for that institution. There are little incentives for third parties to replace the current system with blockchain-based one because such transition means the sharing of the ledger with blockchain participants. Thus, if they choose to adopt blockchain, a new system would likely be private or 'permissioned', to ensure they have complete control over the system. Otherwise, they would use blockchain to build an unprecedented new service platform. New platforms based on blockchain could emerge to compete with the current platforms run by third parties.[5)]

Potential use of blockchain for new corporate finance platform

Now suppose a P2P market (platform) where companies looking for finance are directly connected to investors without intermediaries. In case of capital markets, we can think of a corporate funding market via which companies issue crypto-securities on the blockchain, and investors use virtual currencies[6)] to buy crypto-securities. Yermack (2017) points out that the potential corporate governance benefits of a blockchain-based stock market are more transparent stock ownership, increased stock market liquidity, transparency and accuracy in exercise of voting rights, and real-time accounting, which ultimately lead to more reliable corporate management and disclosures. In the paper, he also discusses how these benefits will shape corporate governance in the future.[7)] However, there are a number of challenges to

5) A case in point is Ripple emerging as a rival to existing funds transfer system via banks and SWIFT connection.

6) 'Virtual currencies' used in this case, unlike 'tokens', must display the characteristics of money as means of payment.

7) Yermack, D., 2017, Corporate governance and blockchains, Review of Finance 21, 7-31.

address for blockchain-based capital markets to take shape in reality, delivering the expected benefits. The current initial coin offering (ICO) market has implications in this regard.

For the primary market where firms raise funds through issuance and sale of securities, a pure P2P structure means a market platform without the use of a central operator and intermediaries like investment banks. That is, there exists no body in charge of monitoring issuers and reducing information asymmetry between issuers and investors. Given that these functions are public goods, small individual investors are less likely to undertake the functions because of the free rider problem. This implies that it is very hard to ensure the sufficiency and accuracy of information contained in a company's white paper or other documents. In other words, the market for lemons problem is highly likely to arise, which necessitates the existence of a centralized body acting as an intermediary.[8)]

For the secondary market, the first issue faced by current blockchain platforms is 'scalability', i.e., transaction processing speed and capacity. Since the arrival of Bitcoin, the transaction processing speeds of blockchain platforms have increased significantly thanks to continued technological advancements such as new mining algorithms. Nevertheless, there is a long way to go for a pure blockchain-based P2P platform, in which trades are approved on a trade-by-trade basis and are recorded in the blocks, in order to catch up with current stock exchange platforms in terms of transaction processing speed.[9)] The scalability issue has to do with recent attempts to adopt blockchain in the private market for unlisted securities rather than the public market.[10)]

The second issue is related to price discovery in the secondary market, more specifically, who will aggregate and post or publish price information in the market. In the current secondary market for virtual currencies, there are intermediaries through which transactions are conducted, meaning that investors are not connected on a P2P basis. Virtual currency intermediaries play the role of gathering and posting price information in the market and startups offering such services are sprouting up. A centralized body seems inevitable even in blockchain-based capital markets. It would be not just difficult but also inefficient to create pure P2P capital markets.

Moreover, arbitrage should be possible to make the law of one price work with respect to market efficiency. However, in blockchain-based capital markets, when assets such as stocks and

8) If there is an investor who is large enough to overcome the free rider problem, this investor could play a monitoring role in the market.

9) Currently, virtual currency transactions are executed through a system of intermediaries, and are recorded in the blockchain after clearing and settlement.

10) Nasdaq-Linq is a good example of blockchain adoption in the private market.

bonds are valued and denominated in fiat currency or even if they are denominated in virtual currency, arbitrage could be limited by foreign exchange regulation or other factors if the virtual currency itself is also valued in fiat currency like the US dollar. As a result, identical assets may be priced differently depending on intermediaries (or intermediary platforms).[11)]

It is also worth considering adding a functionality to cancel or rectify any errors or mistakes in any transaction. One strength of blockchain is that it is impossible to cancel, correct or forge transactions recorded in the blockchain. In practice, this strength could be a hindrance to transactions in capital markets. Accordingly, it is necessary to find ways to tackle the issue.

Lastly, the potential advantages of blockchain-based capital markets, as mentioned above, would rather become obstacles to adopting blockchain technology. For example, investors who are reluctant to disclose their trading strategies or positions would not want to trade in blockchain-based markets where all transactions are disclosed real time. For that reason, separate trading platforms for those investors are expected to remain in the future.

Conclusion

Blockchain technology is expected to transform capital markets, financial services and further society as a whole. For its promises to become reality, however, there is still much room for improvement. What is more, the fully decentralized P2P blockchain, envisaged by blockchain pioneers since the arrival of Bitcoin, poses many issues and limitations in its real-world applications. Accordingly, the attempts to build blockchain platforms for capital markets are focused on enhancing the advantages of blockchain other than decentralization. The adoption and use of blockchain in capital markets requires technological advances that can tackle the limitations and requirements described in this article. Furthermore, given the varying characteristics and needs of market participants, blockchain-based system and current third party system have clear advantages in different areas. Identifying which areas can benefit most from each of the systems will fall to the market and the industry. Technological superiority does not necessarily mean economic or social superiority. Lately, a lot of hype and overheated expectations about blockchain are beginning to cool down. The time is coming for a cool-headed analysis on the current state of blockchain and seeking the way forward. Cool-headed and swift actions are important for the adoption and use of blockchain, as with other key Fourth Industrial Revolution technologies.

11) The most notable example is 'Korea Premium' in the virtual currency markets which was seen from late 2017 to early 2018.