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While digital currency has the potential over the long term to disrupt the global payments system, it is the innovative digital ledger technology (DLT) underlying digital currency that has recently gained attention for its potential to enhance the systems used for the settlement of financial transactions. DLT could benefit financial markets by reducing the time and cost of settling financial transactions, but proponents must show that DLT is consistent with global regulatory standards.

BNA INSIGHTS: Distributed Ledger Technology Faces Challenge of Global Standards

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Bitcoin is a digital cryptocurrency that is generated by solving complex algorithms and that can be used as a means of payment.[1] The "blockchain" is the distributed ledger on which transactions in bitcoin are recorded. While digital currency has the potential over the long term to disrupt the global payments system, it is the innovative digital ledger technology (DLT) underlying digital currency that has recently gained attention for its potential to enhance the systems used for the settlement of financial transactions.

DLT is a hot topic right now, and for good reason. DLT could benefit financial markets by reducing the time and cost of settling financial transactions. How-

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ever, for DLT to be accepted by the regulators with responsibility for the financial market infrastructures (FMIs) underlying the global financial system, the proponents of DLT must show that DLT is consistent with global regulatory standards. Depending on the manner in which DLT is deployed, satisfying these regulatory standards could be more challenging than perfecting the technology itself.

Distributed Ledgers

The decentralized ledger in which all transactions in bitcoin are recorded, and the network through which that record is distributed, are collectively referred to as the blockchain. The blockchain is a type of DLT.

The ledger can be viewed by any participant in the network, and it includes every transaction in bitcoin, recorded in a series of ''blocks,'' back to the first ''genesis block.'' There is no single, definitive master version of the ledger. Instead, there are many copies of the ledger that are distributed to each of the nodes on the network.

In a sense, the blockchain is like DNA, except that the blockchain is constantly being edited and updated with new information. Anyone can participate in the blockchain network by downloading the open-source software on which the bitcoin protocol operates, and anyone on the network can edit the transaction record. However, edits that are not legitimate are rejected through a process of shared consensus.

DLT has become a magnet for venture capital and is attracting the attention of established banks, financial institutions and regulators that are interested in uses of DLT throughout the global financial system. DLT is no longer a niche technology. Because DLT is, in essence, a system for recording and verifying transactions, the potential applications of DLT are broad, going far beyond the world of digital currency.

Global Regulation of Financial Market Infrastructures

Many financial markets are global, but each jurisdiction has its own laws and regulations that govern the actions of market participants within that jurisdiction. In some jurisdictions, there are multiple market regulators, often with overlapping authority. For example, in the U.S., there are multiple banking regulators, including the Federal Reserve Board of Governors, multiple securities market regulators at both the federal and state level, including the Securities and Exchange Commission (SEC), and multiple derivatives market regulators, including the Commodity Futures Trading Commission (CFTC) and the SEC, as well as a number of other regulators with authority over markets in particular financial instruments.

For a particular version of DLT to be deployed broadly throughout the global financial system, the proponents of that DLT must reconcile aspects of DLT against applicable domestic regulatory requirements in the jurisdictions in which the technology will be used. This could be challenging, as the computer networks on which the technology operates are essentially borderless, while the regulators of the FMIs using the technology may be quite focused on borders.

Given this challenge, a good starting point in evaluating the regulatory environment for an implementation of DLT is evaluating the DLT against certain high-level international regulatory norms that have been adopted since the global financial crisis.

In April 2012, the Committee on Payment and Settlement Systems (now known as the Committee on Payments and Market Infrastructures or CPMI) and the International Organization of Securities Commissions (IOSCO) published the ''Principles for financial market infrastructures'' (the PFMIs).[2]

The PFMIs set forth new and more onerous international standards for payment, clearing and settlement systems. The PFMIs were designed to ensure that the infrastructure supporting the global financial markets was more robust following the global financial crisis.[3] The PFMIs are not binding law — no regulator or private party can bring an action to enforce the PFMIs. However, the PFMIs represent international regulatory norms, and they are the basis for implementing regulations in many jurisdictions, including the U.S.

Domestic implementations of the PFMIs are binding, and violation of domestic implementing regulations could have serious adverse consequences for the violator. For example, certain aspects of the PFMIs have been adopted in the U.S. by the Federal Reserve Board, the CFTC and the SEC, and those implementations are binding on various parties in the United States.

Principles for Financial Market Infrastructures

The PFMIs apply to financial market infrastructures.[4] An FMI is a multilateral system among participating institutions, including the operator of the system, used for the purposes of clearing, settling or recording payments, securities, derivatives or other financial transactions.

In some cases, the PFMI report refers to FMIs as being composed of the multilateral systems, including their participants, and in other cases, the PFMIs refer only to the legal entity created to carry out the relevant functions.[5] It is therefore important to carefully parse the PFMIs in determining how they are implicated by a particular instance of DLT.

The PFMIs apply to payment systems that are ''systemically important,'' central securities depositories, securities settlement systems, central counterparties and trade repositories.[6] These FMIs are expected to adhere to the PFMIs. The PFMIs are not intended to apply to less significant payment systems or to bilateral relationships between parties, such as correspondent banking relationships. However, the PFMIs recognize that ''the operational reliability of an FMI may be dependent on

[2] Committee on Payment and Settlement Systems and Technical Committee of the International Organization of Securities Commissions, Principles for financial market infrastructures (April 2012).

[3] PFMIs at p. 11.

[4] *Id.* at p. 12.

[5] *Id.* at n. 5.

[6] While the PFMIs apply to ''systemically important'' payment systems, central securities depositories, securities settlement systems, central counterparties and trade repositories, all central securities depositories, securities settlement systems, central counterparties and trade repositories are presumed to be systemically important, at least in the jurisdiction in which they are located. *Id.* at p. 18.

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the continuous and adequate functioning of service providers that are critical to an FMI's operations, such as information technology . . . providers.''[7]

The PFMIs suggest that regulators, supervisors or overseers of FMIs may wish to establish expectations for the FMI's service providers to ensure that the critical service provider is held to the same standards as the FMI itself. The PFMIs therefore are potentially relevant beyond the boundaries of an FMI.

The PFMIs are composed of 24 headline ''principles'' in the areas of general organization, credit and liquidity risk management, settlement, central securities depositories and exchange-of-value settlement systems, default management, general business and operational risk management, access, efficiency and transparency. For each of the 24 principles, the PFMIs set forth ''key considerations'' that provide further granularity on the principles, and a number of ''explanatory notes'' that describe the objectives and rationale for the principles and provide guidance on implementation.

The PFMI report is 188 pages of dense, nuanced material. A full analysis of whether a particular DLT implementation is consistent with the PFMIs would take a great deal of time and attention. Such an analysis would also require an understanding of how the DLT implementation fits in with other aspects of the FMI. It is tempting to say that such a complex analysis should wait until a DLT implementation's use case has been proven. However, back-loading the PFMI analysis raises the unappealing prospect of proving a strong use case for DLT that is inconsistent with the PFMIs.

The PFMIs themselves are not easily changed. They represent the consensus views of global regulators, and any effort to amend the PFMIs may require a sustained, multiyear advocacy effort. Domestic implementations of the PFMIs may be somewhat more readily amended, but domestic regulators may feel constrained by the international standards, so domestic amendments may only be feasible following amendments at the international level.

Therefore, the technology ultimately may be easier to change than the regulations. Accordingly, in an ideal sequence, a PFMI analysis of a proposed DLT implementation would be front-loaded and re-evaluated throughout the development cycle to ensure that edits to the DLT do not adversely affect the PFMI analysis.

Evaluating DLT Against the PFMIs

DLT has been evolving rapidly, and the versions of DLT currently in development differ significantly from the blockchain. Each DLT implementation should be evaluated on its own merits to determine its consistency with the PFMIs. There are a number of ways in which specific DLT implementations may be viewed in either a positive or negative light under the PFMIs.

The following are among the issues that should be considered in evaluating DLT under the PFMIs:[8]

- The immutability of transactions settled via DLT serves the principle of finality, but the inability to correct transaction errors could be problematic.
- Settlement time frames for DLT-based systems that interface with non-DLT-based systems may need to be evaluated based on the weakest link in the chain.
- The ability to settle transactions in real time may be seen by regulators as beneficial, but there may be nontechnological impediments to real-time settlement in certain markets.[9]
- DLT may serve the goal of efficiency, through the reduction of cost, particularly through the elimination of intermediaries. However, the FMI must retain its ability to operate effectively and otherwise in a manner that is consistent with the PFMIs. The removal of trusted intermediaries may be viewed negatively by regulators.
- DLT creates new operational risks that must be identified and mitigated, but it also serves to mitigate existing operational risks, such as cybersecurity risks.
- DLT enhances security by making it theoretically impossible to hack the transaction record, absent a massive aggregation of computing power. But DLTs may also yield new security risks, such as the risk of software bugs creating new means of attack on the network.
- The distribution of recordkeeping across a number of nodes on independently controlled computer systems may serve the goals of ensuring adequate and scalable system capacity.
- The distribution of processing power across multiple nodes may improve operational reliability and support business continuity, but the lack of central control over the relevant systems may pose challenges in planning for wide-scale systems disruptions.
- A trustless DLT, in which anyone can participate by downloading open-source software, may facilitate fair and open access, but it may also present an additional source of operational risk to be identified and managed.
- An FMI must have a sound legal basis for all aspects of its operations, but this may be difficult to establish where the system is spread out across multiple nodes that may be located in jurisdictions in which the legal basis of transactions may be called into question. Application of domestic data privacy laws and regulations may also prove challenging for the FMI.
- DLT must balance market participants' interest in anonymity with regulators' interest in transparency and market oversight.
- While a key feature of DLT is decentralization, regulators may require effective central governance.

[7] *Id.* at p. 170.

[8] This is not intended to be a comprehensive list of issues.

[9] It has been pointed out that moving to near-real-time settlement is possible with existing non-DLT technology, and in fact, real-time settlement is already the norm in certain markets. For non-real-time markets, technology is not the major obstacle to real-time settlement. Instead, there are a number of other obstacles to real-time settlement, including existing legal and regulatory requirements. *See* DTCC, Embracing Disruption: Tapping the Potential of Distributed Ledgers to Improve the Post-Trade Landscape (January 2016) at p. 10.

While DLT holds the promise of disrupting a number of financial markets, whether it is able to fulfill that promise on a large scale will depend on whether it can be implemented in a manner that is consistent with the PFMIs. The designers of DLT-leased systems should carefully consider PFMI compliance throughout the development cycle.

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