

Distributed ledger technology: What impact on the financial infrastructure?

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Abstract:

There has been much talk about how distributed ledger technology (DLT), in particular blockchains, will transform the financial infrastructure. Why has the financial sector been prudently enthusiastic about this new technology? By focusing on payment systems and the market infrastructure, light is shed on the problems of adopting DLT and the hesitations about doing, in particular the presupposition of a new paradigm, “coopetition”. This concise description of recent initiatives by payment institutions, banks (in particular central banks) and international institutions explores the possibility of putting DLT into production. The prospects...

Although pundits use the phrases “distributed ledger technology” (or DLT) and “blockchain” interchangeably, the latter is, strictly speaking, a particular case of the former. A blockchain stems from the regular updating of a distributed data base via the gradual formation of a series of blocks of information cryptographically chained to reflect their chronological order.¹

The recent development of cryptocurrencies, such as bitcoins, and derivations from the protocol described in the seminal paper by Satoshi Nakamoto (2008) have aroused strong interest in the financial community. The deliberate intent expressed by the first-comers among bitcoiners was to do without financial intermediaries in general and without banks in particular. This did not leave financial institutions indifferent. Furthermore, this technology’s characteristics (traceability and immutability, in particular) could but attract an industry where transactions are proliferating and the cost of managing data is crucial.

¹ This article has been translated from French by Noal Mellott (Omaha Beach, France).

At the start, institutions were quite wary of bitcoin-related technology. The latter was often associated with the claim to eliminate trusted third parties or with fraudulent activities, notably after the bankruptcy of Mt. Gox (a platform for bitcoin transactions) or the closing of Silk Road (a site on the dark Web). Nonetheless, it was soon seen that blockchain technology probably had advantages that economic agents in the financial community could put to use, in particular, to reduce infrastructure costs — a study by a bank and a management consulting firm has mentioned savings of \$15-20 billion by 2022 (SANTANDER *et al.* 2015).

What do financial institutions expect?

When asked about their interest in this technology, financial institutions have brought forth several reasons. A recent study by the US Federal Reserve (MILLS *et al.* 2016:19) lists the following:

- reduce complexity, *“especially in multiparty, cross-border transactions”*;
- improve processing speed and the availability of assets and funds (thus decreasing their immobilization and increasing liquidity);
- lessen the (often considerable) need for reconciliation procedures between different record-keeping structures and ledgers;
- increase the transparency and immutability of transaction records by making sure that the data cannot be falsified;
- make networks more resilient by introducing distributed data management; and
- diminish operational and financial risks.

All these aspirations for more efficiently organizing the financial infrastructure clearly figured among the recommendations made by the Bank for International Settlements and the International Organization of Securities Commissions (2012).

Let us admit, however, that the context has fortified the attraction for blockchain technology in financial circles: on the one hand, the demonstration of the resilience and efficiency of the Bitcoin network for international payments; and on the other hand, security problems in the SWIFT network. Bitcoin network users emphasize its advantage for making fast international transfers at a low cost (leaving aside the fees for converting fiat money into bitcoins for the sender and then bitcoins into fiat money for the receiver). Meanwhile, the SWIFT network was not spared negative publicity owing to a few cases of wide-ranging fraud (*e.g.*, approximately \$80 million with the implication of the central bank of Bangladesh in early 2016).²

² <http://www.reuters.com/article/us-cyber-heist-swift-idUSKCN11600C>

Out of all the reasons listed, expectations with regard to “disintermediation” and fewer reconciliation procedures are probably the most important, in particular for international transactions, which often involve several intermediaries.³ These hopes for simplification reach beyond international payments, out to various complicated procedures, such as crossborder trade finance.

The prospects of simplifying financial channels and making them more efficient are promising to both financial agents and users (in particular, firms). Regional banks, which do not yet have the possibility of making direct international transfers, should benefit from better access to a DLT infrastructure. Bigger banks thus hope to significantly reduce the costs of middle and back offices, as already pointed out. Let us not forget that the reconciliation procedures between the big players in finance are still mostly carried out manually with the help of Excel tables. Evidently, the automation resulting from the rollout of DLT is of interest to these establishments. As for the users (whether firms or private persons) of financial services, they expect fewer fees in a simplified system.

Besides the classical reasons related to reduced costs, there are more stimulating prospects having to do with societal changes and economic growth. The G20’s Global Partnership for Financial Inclusion (GPII) insisted, in 2014, on the need to lower the cost of international payments and use innovative technology so as to bring into the financial system the 2.5 billion adults excluded from it. It has also placed emphasis on funding small and medium-sized businesses, which have an estimated “credit deficit” of \$2000 billion that could be covered.⁴

Finally, DLT technology also has attractive prospects for regulatory authorities. We can imagine a DLT system selectively granting permission (mainly read-only) to auditors and regulators to consult parts of the ledger.

What is holding this technology back?

Plans for rolling out DLT are not, of course, free of problems. First of all, some financial institutions will find it hard to imagine replacing proprietary data bases with a distributed ledger. Doing so creates a strange situation, one that requires cooperating with competitors (“coopetition”) and sharing data (even if the scope of confidentiality could probably be precisely delimited via coding). Each institution has to trust the system as a whole so that, for example, the pooling (via the adoption of a digital identification standard) of KYC (know-your-customers) procedures benefits everyone. For this, it will be necessary to see to it that an institution consulting the ledger does not cause the list of its new clients to be disclosed to other institutions.

Open blockchains (as on the Bitcoin or Ethereum networks) are a cause of concern to institutions used to exercising control over their activities and infrastructure. It hardly comes as a surprise that financial firms are turning toward permissioned systems, as in RC3’s Corda Partner Network, which more than sixty companies have joined.⁵

³ The role of financial intermediaries has already been studied by well-known academics (such as MERTON 1995).

⁴ <http://www.gpfi.org/>

⁵ <http://www.r3cev.com/>

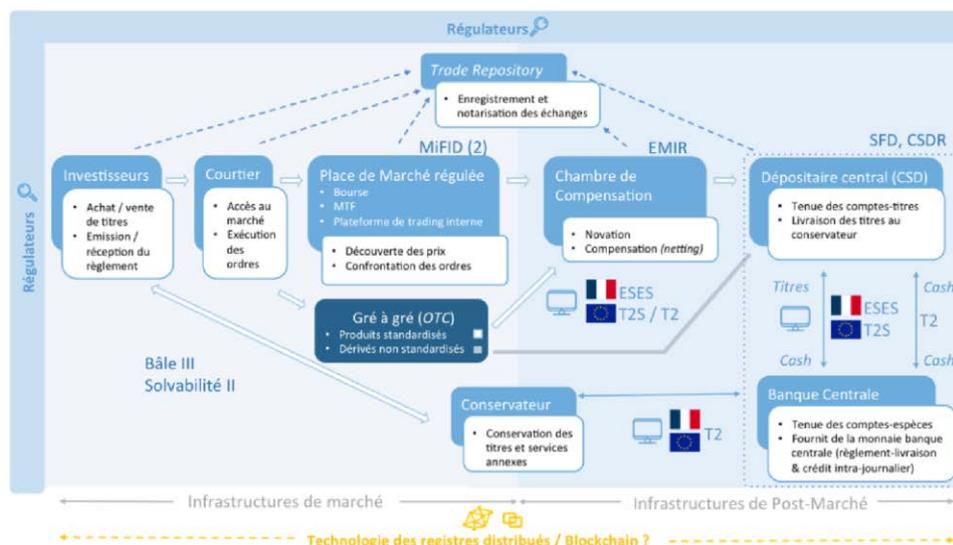


Figure 1: The possibilities of blockchain technology in relation to regulations for the financial sector (trading and post-trading).
 Source: COLLOMB & SOK 2016:37.

Another problem is how to incorporate regulations in blockchains. The sets of regulations currently in effect can be closely matched with structures in financial markets, as Figure 1 shows (COLLOMB & SOK 2016:37). According to the European Securities and Markets Authority (ESMA 2017), the EU's regulatory framework has no major impediment to keeping DLT from being adopted in the short run. For all that, existing regulations could cause legal problems for distributed ledgers.⁶

There are also other problems in a shared infrastructure, such as governance and liability. Such problems have already cropped up on open (public) blockchains,⁷ but they can also arise for consortiums, in particular for the drafting of standards.

Furthermore, the rollout of DLT should go in hand with the adjustments being made in procedures for assessing and consolidating risks (whether related to credit, liquidity or operations).

Finally, these distributed ledgers will have to be a legally recognized source of authority. This is still far from evident. In France, a legislative bill on *"the definitive nature of settlements in payment and securities systems using the technology called 'blockchain'"* failed to pass in 2016. Its intent was to define blockchain operations as authentic electronic instruments like the written instruments *"signed with a notary"*.⁸

⁶ See the discussion between two attorneys from a global law firm on a difficulty stemming from the Dodd-Frank Act for using a distributed ledger for swaps: <http://www.coindesk.com/distributed-ledger-cftc-post-trade-dodd-frank/>,
⁷ An example being the DAO misadventure. Cf. [https://en.wikipedia.org/wiki/The_DAO_\(organization\)](https://en.wikipedia.org/wiki/The_DAO_(organization)).
⁸ <http://www.assemblee-nationale.fr/14/amendements/3785/AN/227.asp>

Many initiatives... mostly feasibility studies

The initiatives for studying or deploying this new technology, though numerous, are still in the proof-of-concept (feasibility) phase.

For payment systems, a start has been made by the big credit card companies (such as Visa with B2B Connect or MasterCard with Mastercard Blockchain) and big Web firms (such as PayPal with its subsidiary Paypal Braintree, which allows merchants to accept bitcoins in payment). Likewise, firms specialized in international transfers (such as Western Union) have invested in blockchain technology. Even SWIFT, a member of the Hyperledger Foundation, has developed a proof-of-concept blockchain.

At the same time, more and more bridges are being built between cryptocurrencies and fiat currencies. Glidera, a startup that offers users to buy and sell bitcoins from their banking account, has been acquired by Kraken, a platform that uses SWIFT for deposits in US dollars or British pounds, and for transfers in euros within the Single Euro Payments Area (SEPA).⁹ Mention should also be made of RippleNet, which can now be used to make international and interbank payments in nine countries.¹⁰

For financial markets, there are several initiatives, but mostly limited to private security transactions (as under Nasdaq's Linq) or niche markets. The most advanced project seems to be the one undertaken by the Australian Securities Exchange (ASX) along with Digital Asset Holdings. It foresees replacing the clearing and settlement services of the Australian equity market (known as CHES) with a distributed ledger. Other initiatives, such as those by SETL, Clearmatics and Euroclear, seem less accomplished.

As for central banks, they are not lagging behind. Nearly all of them have projects for studying this new technology. The Bank of France set up, at the start of 2017, a blockchain laboratory.¹¹ The Bank of England has formed a partnership with Ripple for developing an international (multicurrency) payment system. It wants to demonstrate *"how this kind of synchronization might lower settlement risk and improve the speed and efficiency of crossborder payments"*.¹² The People's Bank of China, having studied bitcoins since 2014, is on the point of experimenting with its own cryptocurrency linked to a platform for transactions on commercial bills in Shanghai — this is happening even as, in parallel, bitcoin transactions have come under tighter supervision since the start of the year.

The use of blockchain technology for issuing "official cryptocurrencies" was a key theme at the 16th international conference on "Policy Changes for the Financial Sector" hosted by the Federal Reserve, International Monetary Fund and World Bank in Washington, DC, in June 2016.¹³

⁹ <https://www.kraken.com/>

¹⁰ <https://ripple.com/>

¹¹ See the speech by François Villeroy de Galhau, governor of the Bank of France and chairman of the Autorité de Contrôle Prudentiel et de Résolution, to the Paris FinTech Forum on 25 January 2017.

¹² <https://ripple.com/insights/ripple-selected-to-participate-in-the-bank-of-england-fintech-accelerators-exploration-of-the-use-of-blockchain-for-global-rtgs/>

¹³ <http://www.worldbank.org/en/events/2016/06/01/16th-annual-international-conference-on-policy-challenges-for-the-financial-sector>

Conclusion

We would be naive to think that distributed ledgers will eliminate financial intermediaries. The first blockchain (Bitcoin) bred new middlemen from the very start, namely the new platforms for transactions.

Scenarios can be imagined for introducing this technology in clearing, settlement or safekeeping services; but there is not yet a consensus among experts. In these post-trading services, blockchains might be gradually accepted in parallel with the automation of processes (PINNA & RUTTENBERG 2016). However this technology will probably have a much more rapid impact on payment systems.

The interoperability of ledgers will be crucial. Whether open or private blockchains, the capacity of different systems to interact and to set norms and standards is likely to be decisive for the development of this technology — a condition necessary to its success (THOMAS & SCHWARTZ 2016). Although we should (in the short run) be conservative when assessing the probability of a wide deployment of distributed ledgers, this technology — which now seems to be maturing out of the hype phase¹⁴ — will draw attention to the growing impact of the digital transition. For sure: this transition is not ready to stop!

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¹⁴ With reference to Gartner’s typology of emergent technologies. Cf. www.gartner.com/technology/research/methodologies/hype-cycle.jsp

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