EUROPEAN CENTRAL BANK

EUROSYSTEM

Distributed Ledger Technology: role and relevance of the ECB

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Introduction

Today's discussions have revolved around digitalisation and new technologies and how they might change the banking business of tomorrow. Roy Charles Amara, a researcher and scientist, once said that "we tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run". The internet is a case in point. Some of the wilder predictions during the "hype" phase never came to pass. That said, no one can deny how powerfully it has insinuated itself into our daily lives, fundamentally changing how we communicate and process information, and no one can know where it will take us next.

Whether or not we will overestimate distributed ledger technology (DLT) in the short run and underestimate it in the long run remains to be seen. However, I am sure we can agree that DLT currently stands in the limelight. A lot has been said about the potential impact of DLT on the roles and services of central banks. In particular, questions related to whether or not central banks should move central bank money to DLT and whether there is a need for issuing central bank digital currency. Consequently, I think it's time to frame the discussion. This speech will:

1. outline the ECB's position on DLT;
2. discuss possible scenarios for adoption; and
3. shed light on the global interaction between central banks in the field of DLT.

Financial innovation transforming market infrastructure services

The internet, mobile phones and tablets have changed the way we communicate, the way we shop, the way we store information – frankly, the way we live. The financial industry is experiencing similar change. We refer to it as FinTech – innovations that could result in new business models or products with disruptive potential in the financial sector. DLT is a focal point in FinTech as its perceived opportunities are the key motivation for market participants, infrastructure providers and central banks to explore the technology.

In our reflections around DLT, we need to bear in mind that the possible impact of DLT depends on how market players ultimately decide to embrace it. In the abstract, three scenarios can be imagined: (i) individual market players try to use DLT mainly to improve their internal efficiency. This would not have large effects on the financial ecosystem; (ii) a group of core market players adopt DLT and gain a critical mass enabling whole market segments to shift to DLT; or (iii) a more revolutionary scenario of a peer-to-peer world without intermediaries emerges. Many discussions around the benefits of DLT had the third scenario in mind, but from what we observe, real use cases on DLT seem to focus mainly on the first and

second scenarios.

There is not the shadow of a doubt that the journey has started, but from today's perspective, it is difficult to assess the magnitude of the impact DLT could have on the financial sector and what the time frame for implementation could be. Some see DLT having substantial impact on the financial ecosystem within the next five to ten years. While I don't want to join the club of crystal ball gazers, allow me nevertheless to stress that the implementation of a DLT environment may be a multifaceted endeavour. From the experience gained with the implementation of TARGET2-Securities, we are aware that functional, business, harmonisation, governance, legal and regulatory aspects are of key relevance and need to be thoroughly considered.

Embracing change in the financial market infrastructure

Let me start by saying that the exploration of technological innovation is high on the ECB's strategic agenda. The ECB is always on the lookout for ways to improve the efficiency and lower the costs of its market infrastructure. It considers how best to respond to and take advantage of technical innovation and meet new user needs, while staying ahead of evolving risks such as cyber risk. Work is conducted in close cooperation with the market and revolves around making liquidity management, within the fields of payment transfers, securities settlement and collateral management, more efficient.

Let me illustrate with two examples of how the ECB embraces change. Last year the Eurosystem, which comprises the ECB and the national central banks of the euro area, launched a central bank service called TARGET2-Securities (T2S). Just like DLT, it was called "a game changer". T2S is changing the European post-trade landscape not only by offering an integrated settlement service in central bank money for securities transactions, but also because it has brought post-trade harmonisation beyond what has been seen before. Together with TARGET2, the Eurosystem's cash transfer system, T2S forms the cornerstone of financial markets in Europe.

My second example is the strategic reflections on the future of the Eurosystem market infrastructure. Investigative work has started in three key areas: (i) the consolidation of TARGET2 and T2S; (ii) settlement services to support instant payments; and (iii) a Eurosystem collateral management system. Work in those three areas is closely interconnected. It revolves around making liquidity management within the fields of payment transfers, securities settlement and Eurosystem collateral management more efficient. Efficiency and innovation are the drivers for the future market infrastructure.

Use of DLT in market infrastructures operated by central banks

It is important to note that there is no single DLT, that we are speaking of a variety of different fabrics, the design of some solutions being tailored to the specific needs of the financial industry. There is no "single blockchain to rule them all". The ECB has considered a range of DLT models currently under development. These differ in a number of dimensions, including the way updates are validated, network architecture and permissions, the level of data sharing and replication, and the set of cryptographic tools used to ensure integrity. That said, question marks over implementation remain. There are substantial functional, operational, governance and legal aspects that need to be weighed very carefully before thinking about possible mass adoption in the field of market infrastructure services. Indeed, DLT is still in its relative infancy as a technological development and it is too early to say with any certainty whether and how it could change the financial ecosystem.

It cannot be stressed enough that any technology-based market infrastructure service needs to be mature enough to meet high requirements in terms of safety and efficiency. These requirements are taken very seriously by the ECB, not only in its role as operator but also as one of the European authorities overseeing the safety of financial markets. Against this background, the ECB cannot, at this stage, consider basing our market infrastructure on a DLT solution. However, in its role as operator of TARGET2 and T2S, it remains open to considering innovative solutions in the field of DLT and beyond, if and when such technologies are proven and they are adopted by the users of the Eurosystem infrastructure. With this in mind, and as DLT solutions are constantly evolving, we continue to assess, also through the conduct of practical DLT use cases, whether advances in DLT-based solutions could lead to service levels on a par with or maybe even higher than TARGET2 and T2S. In doing so, we focus on concrete questions

(e.g. can today’s liquidity-saving features be offered through smart contracts) in contrast to following a greenfield approach.

In order to lead the way the ECB has engaged in international collaboration. Together with the Bank of Japan, we agreed to launch a joint research project which studies the possible use of DLT for market infrastructure. The project is expected to release its main findings next year. This work can help define how new technologies can change the global financial ecosystem of today and ensure that central banks are adequately prepared.

However, we will certainly keep market developments and market needs in mind. Many players have been vocal on the need for efficient use of central bank money in a DLT environment. Ideas have been sparked and generic concepts are being developed by market players, sometimes in cooperation with central banks, on how to "inject" central bank money into the DLT world.

These initiatives sometimes seem to go beyond the idea of a central bank bringing its settlement services on DLT and maybe they could alter or even call into question the role the central bank currently plays as operator. Some initiatives allocate the role of a "notary" to the central bank – controlling the amount of central bank money circulating in a DLT environment. Others foresee that a trustee ensures that the values circulated in a DLT-based solution are fully backed by a corresponding amount of central bank money held "off-chain". For this discussion, it is important to clarify that a payment can be considered to be in central bank money if – and only if – the beneficiary has a claim on the asset of the central bank – either directly or by means of an explicit commitment of the central bank. Anything else remains commercial bank money regardless of the technology used.

Depending on how potential solutions to bring central bank money onto distributed ledgers are designed, they go beyond functional, operational and legal questions around DLT. They touch upon questions of monetary policy implementation and the role of central banks as infrastructure providers. Against this background, the Eurosystem jointly needs to assess the matter from the various angles as far as it concerns the euro as settlement asset.

The discussion around central bank money on DLT is closely linked to the question of who should have access to such money. Issuing central bank money on a distributed ledger for settlement among current holders of TARGET2 accounts could be done in a way that changes little of how central banks perform their functions. Nevertheless, broadening access, possibly even to the man or woman on the street, is often discussed under the heading “digital central bank currency”. It would change the way different actors interact in financial markets and requires multidisciplinary research. We are considering various facets such as: What should be the features of digital central bank currency (to what extent should it resemble cash, e.g. feature of anonymity)? To what extent should convertibility of digital central bank currency into commercial bank deposits and cash be restricted, if at all? (If conversion were unrestricted, bank runs may evolve faster and impact the funding base of banks.) How would it impact banknote production costs and seigniorage income? How would it impact monetary policy transmission, and what would it mean for (non-standard) monetary policy measures?

Catalyst

This leads me to my last point. Besides the ECB’s role as operator we also act as a catalyst for European market integration.

Financial market integration is high on the agenda of the ECB. Our two market infrastructure platforms – Target2 and T2S – have integrated the financial market substantially and are an essential cornerstone in the Commission’s project to build a capital markets union. With various DLT solutions emerging, there is a risk that this could lead to fragmentation, with new silos established. Therefore, it is of utmost importance to ensure that any services developed are interoperable, not only by ensuring standardisation at the technical level but also by harmonising business and legal domains.

More specifically, we see three layers of harmonisation that are useful to promote integration of financial markets:

- **Regulatory/legal harmonisation** refers to the need that a common set of rules be applied to the

provisions of any given service across jurisdictions, and to the implications that applicable domestic laws can have even on third parties.

- **Functional harmonisation** refers to the agreement over a set of business rules that allow business to be done across markets, such as market opening times or the set of information to be exchanged when a transaction is processed.
- **Technical harmonisation** refers to the detailed set of standards to be adopted when carrying out a process, e.g. messaging formats.

Each of these three harmonisation layers requires coordinated efforts among a different set of entities. The ECB, in its catalyst role, will promote innovation by involving all relevant stakeholders and thereby foster change which underpins the safety and efficiency of financial markets. In this vein, it will help facilitate a discussion to ensure that potential DLT-based solutions – of a public or industry nature – are interoperable with other market solutions based on DLT. We believe that it will benefit all prospective users of the technology, since public authorities and market participants agree that the big potential of DLT lies in its network effect.

In addition, within the ECB, we have recently established a DLT task force as part of the post-trade harmonisation agenda within the T2S governance framework. Its objective is to assess the potential impact of DLT on harmonisation, from both the T2S and the wider European perspective, with a view to supporting other T2S governance bodies advising the Eurosystem in this respect. It is vital that such work takes place in the context of T2S to allow proactive collaboration with the market. Facilitating functional harmonisation ex ante – in a coordinated effort with all relevant stakeholders – can ensure that innovations that are proven to be safe can be adopted without harming market integration. Our overriding objective will continue to be fostering integration and avoiding fragmentation.

Conclusion

New technologies will have a profound impact on the financial market. It is essential that these technologies are explored, analysed and tested to ensure that tomorrow’s market infrastructure is not only efficient and innovative but also remains safe and resilient. Exploring the potential of new technologies such as DLT is high on the ECB’s strategic agenda.

To conclude, let me recap a few key points:

The ECB considers new technologies as essential to enhancing the efficiency of our market infrastructure. However, it’s time to frame the discussion. I think the potential of DLT in the field of market infrastructures revolves around two fundamental concepts of central bank money on DLT:

- First, can central bank settlement services themselves be operated in a DLT environment? Today, DLT is not ready for mass adoption and not sufficiently mature for use in our central bank market infrastructures (given the high requirements of safety and efficiency). Future use needs to be explored, and this is what we are doing based on concrete use cases (i.e. can DLT meet the TARGET2/T2S service levels). As new technologies don’t stop at borders, we have furthermore decided to cooperate with the Bank of Japan to explore the potential future use of DLT for central banking services in a more global context.
- Second, how could a central bank interface and interoperate with DLT-based settlement services which are not necessarily offered by the central bank itself? For example, it needs to be assessed whether “a central bank could inject and control the amount of central bank money circulating in a DLT environment”. Or whether, for example, a private sector trustee could ensure that the values circulated in a DLT-based solution are fully backed by a corresponding amount of central bank money held "off-chain”. Such concepts could alter the existing central bank role as operator and impact monetary policy implementation. Therefore, joint analysis by the Eurosystem will be required.

We are on a journey which could radically alter the financial ecosystem as we know it. The ECB is committed to be part of this journey.

Thank you.

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