

# Digital transformation of securities markets

## 1. State of play of the use of technologies in securities markets and future prospects

### 1.1 Ongoing digital transformation in securities markets

The Chair highlighted the wide-ranging impact of technologies, including Distributed Ledger Technologies (DLTs, such as the blockchain), smart contracts and artificial intelligence (AI), which are increasingly integrated in the financial sector<sup>1</sup>. While these innovations can deliver important benefits, such as through efficiencies and productivity improvements, they also carry challenges and risks for the markets and their participants, and require responsible and safe integration in securities markets.

A Central Bank official noted that, over recent years, experimentation of blockchain, digital assets and smart contracts has significantly increased in the European securities markets, with projects led by international public institutions, national central banks and market participants. This trend is driven by three main factors: a better understanding of the technologies and their use cases, increasing experimentation with wholesale central bank digital currencies (CBDCs) worldwide and the implementation of more innovation-friendly regulatory frameworks.

Central banks in particular are playing a key role in experimenting with blockchain-based systems to support the execution of securities transactions. Several Eurosystem central banks, including the Bundesbank, Banca d'Italia and Banque de France are conducting exploratory work aimed at testing new technologies for settling wholesale transactions in central bank money. The Deutsche Bundesbank's trigger solution for example connects DLT platforms with the existing Eurosystem TARGET2 payment system, enabling the direct settlement of DLT-based financial market transactions in central bank money, without creating CBDC. There have been successful trials for such use cases as digital corporate bond issuance and digital commercial paper settlements and the trigger solution will be extended to payment versus payment (PvP)<sup>2</sup> use cases.

An industry representative stressed that tokenisation has moved beyond the pilot stage, becoming a tangible reality for the digitalisation of securities markets. Traditional financial institutions are progressing faster

than expected. Research shows that over 50% of banks are exploring tokenisation to improve efficiency and speed, with between 10% and 12% already in the commercialisation phase. Steps have also been taken to tokenise exchange-traded funds (ETFs), which is a significant milestone towards increased efficiency in the asset management sector.

A second industry representative agreed that, during the past 15 years, there has been significant change in the securities market due to the development of blockchain-based systems and services, such as crypto-asset exchanges. Such exchanges act as a bridge between traditional finance and crypto markets, facilitating the trading and custody of digital assets. A recent development in the crypto market are cryptocurrency ETFs, which track via benchmarks the value of digital assets like Bitcoin, simplifying the investment process by removing the need for investors to manage wallets or private keys. These ETFs allow investors to gain exposure to crypto without direct engagement in the ecosystem.

Crypto ETFs also represent a significant step forward in institutional adoption, facilitating the participation of traditional investment structures such as hedge funds, family offices and registered investment advisors in the digital asset market. The influx of institutional capital not only deepens market liquidity but also contributes to the overall maturation of the industry. The launch of Bitcoin ETFs in the US by major asset managers in 2023 was the most successful in history reaching \$17 billion in net inflows by August 2024 and was followed by the introduction of Ethereum ETFs in 2024.

### 1.2 Future prospects

A Central Bank official emphasised the importance of implementing a cash leg on the blockchain, to reap the full benefits of digital asset innovation. Innovation on the cash leg has not kept pace with progress on the asset side. Realising the long-term advantages of DLT will take time, as it requires global interconnected systems to evolve and a widespread participation of market actors across financial instruments to provide sufficient financial intermediation. Different regulatory regimes also add complexity.

Another Central Bank official observed that wholesale transaction settlement solutions being tested by Eurosystem central banks should contribute to providing a solution for the cash leg on the blockchain. In addition, significant changes are likely to happen in Europe's settlement infrastructure in the future. The concept of a

1. See for example OECD (Regulatory approaches to Artificial Intelligence in finance, September 2024), OECD (Generative artificial intelligence in finance, December 2023).

2. PvP is a settlement mechanism that ensures that the final transfer of a payment in one currency occurs only if the final transfer of a payment in another currency takes place.

European unified ledger proposed by the ECB and mentioned in several reports on the future steps of CMU could be a gamechanger. Though discussions are in their early stages and more work is needed to reach a concrete solution, a unified ledger could unlock the potential of the digital euro, wholesale CBDC and asset tokenisation and improve efficiency and innovation in European securities markets. Harmonised standards and regulatory frameworks will be essential.

A regulator recognised the transformative potential of blockchain in the securities market. The ecosystem's evolution will be gradual, and potential risks must be carefully managed during this transition. In contrast, AI is evolving in a different manner. With lowered barriers to entry, most financial institutions are already utilising AI, mainly to reduce costs. Institutions must now consider broader use cases and design comprehensive AI strategies to maximise its benefits. However, in contrast to blockchain and DLT, AI is not expected to fundamentally reshape financial markets but will instead contribute primarily to optimising processes and services.

An industry representative noted that new developments are expected in the crypto market, such as Ethereum ETFs exploring the integration of staking rewards. This would allow clients to benefit directly from staking via the infrastructure provided by centralised cryptocurrency exchanges. Decentralised finance (DeFi) should also drive innovation going forward, offering an alternative to centralised platforms.

An official observed that the pace of technological change in cryptocurrency, tokenisation and AI is rapid. These innovations could be gamechangers in the securities markets, but there must be careful consideration of both opportunities and risks.

### 1.3 The need to move beyond the experimentation phase

An industry representative emphasised that the industry must move beyond the experimentation phase to unlock the potential efficiency gains offered by blockchain and tokenisation, which could eventually move the entire market on-chain. Products and services must be launched to test the technology's feasibility and impact. Tokenisation should be applicable to a broad range of financial instruments and real-world assets. BIS's Project Mariana also demonstrated the technical feasibility of an automated FX market maker using smart contracts.

A Central Bank official noted the importance of building on Europe's regulatory framework for digital assets, which includes the markets in crypto-assets regulation (MiCA), the DLT pilot regime and domestic requirements like Germany's electronic securities law, to practically apply tokenisation in the market. Central banks can support the adoption of tokenisation by offering short-term solutions for the payment leg like the trigger solution, to provide a bridge between tokenised assets and existing financial systems. The opportunity of expanding such pilot solutions into production must be assessed at the European level to avoid market fragmentation.

## 2. Opportunities and challenges of digital transformation in securities markets

### 2.1 Main opportunities and benefits

The Chair noted the opportunities offered by digital transformation for both securities market participants and investors. Efficiency, as well as choice and access for investors, can be increased.

A Central Bank official highlighted the potentially transformative effects of DLT and blockchain in securities markets that may benefit all market participants. DLT can reduce back office friction through the automation of manual and sequential processes like trade reconciliation and ownership recording and broaden the range of assets available. By reducing settlement times and back office processing costs, DLT can minimise counterparty credit risk and generate savings for market participants. The absence of cash netting on blockchain-based platforms, however, might introduce new liquidity risks, necessitating more cash for settlements. This issue could be partly offset through an increase in market liquidity, facilitated by the lowering of costs and reduced barriers to entry for new market participants. Faster settlement times may also lead to the development of new use cases, such as intraday repo, which in turn could offset liquidity risk with a faster turn-around of liquidity, and impact collateral markets, enabling a wider range of assets to be used and increasing resilience. DLT also could enable more personalised transactions for end users.

Another key innovation is the shared, programmable ledger, which allows the building of pre-agreed verification rules into financial contracts. Smart contracts can be used to automatically pay coupons on bonds and their composability allows them to be combined to automate more complex chains of financial actions. For example, a smart contract paying bond coupons could be combined with another contract that automatically reinvests such payments into a designated portfolio.

A Central Bank official and an official agreed on the transformative potential of these technologies in securities markets, emphasising that asset tokenisation and blockchain may increase the efficiency and reduce the complexity of these markets.

### 2.2 Blockchain and digital asset challenges

The Chair noted that the introduction of innovative technology in markets also poses challenges and risks that require careful assessment by regulators, the possible introduction or adaptation of policies and regulatory frameworks, the building of new skills and coordination at the international level. The FSB, IOSCO and the OECD have been working on these issues for a number of years (e.g. crypto-assets and DeFi; tokenisation; AI).

An official emphasised the global nature of challenges from DLT, tokenisation, and cryptocurrency. IOSCO has also been working in these areas, applying a 'same activities, same risks, same regulatory outcomes' approach. Collaboration with CPMI has also been valuable, particularly on stablecoins.

The official highlighted IOSCO's 2023 recommendations on cryptocurrency and digital assets, which address risks associated with both centralised and DeFi platforms across six key areas, including conflicts of interest, cross-border custody risks, operational and cyber threats, market manipulation, insider trading and fraud. Conflicts of interest are of particular concern in vertically integrated crypto asset service providers (CASPs) that combine multiple roles. All such risks apply to both centralised and decentralised platforms, but DeFi presents some additional challenges. For instance, some DeFi platforms claiming to be decentralised may not be so and there are asset pricing challenges.

IOSCO is examining the use of tokenisation across the capital markets value chain and evaluating its potential risks. Three key challenges have been identified: legal challenges relating to the issuance and transfer of tokenised securities, operational challenges such as interoperability and cyber risks, and market functioning challenges, related to liquidity fragmentation, market manipulation and settlement. Tokenisation does not yet pose a systemic financial stability risk, but may as the market grows.

An industry representative noted that regulation is vital to ensure crypto ecosystem growth. There is more to be done in this regard on digital assets.

### 2.3 AI-related risks in financial markets

An official referenced IOSCO's 2021 recommendations on asset managers and market intermediaries' use of AI and machine learning (ML), which addressed potential concerns in terms of governance, oversight, algorithm development and testing, data quality and bias, transparency and explainability, outsourcing and ethics. The rise of generative AI has led IOSCO to revisit these recommendations and assess new use cases, including in customer support, operational efficiency, transaction processing and reg-sup tech for compliance and fraud detection. There are key risks to be considered in this context, including explainability and model drift risks, concentration risks due to reliance on third-party providers and pre-trained models, and also operational, cybersecurity, fraud, privacy, deepfake and hallucination risks. Herding behaviour in AI models and talent scarcity in the field could pose further challenges.

## 3. Opportunities and challenges from sandbox approaches

A Central Bank official stated that sandboxes play an important role in fostering innovation in securities markets. The EU and UK have developed approaches allowing both market participants and regulators to test ideas and develop supervisory approaches. The sandbox helps contain financial stability risk by imposing limits and requiring participants to meet specific standards before scaling up activity. The absence of major events during a sandbox's operation, however, does not guarantee absolute safety. Regulators will be required to make a judgment as to what can be considered 'safe at scale' without perfect information.

Traditionally, regulators have intervened when things go wrong, but with sandboxes and pilots the regulator is involved earlier in the development process. This requires a significant shift in the regulatory mindset. There is a need to identify and remove inadvertent barriers in existing rules that may hinder new technologies, while maintaining the principle of same regulatory outcome for the same risk. A key challenge is encouraging existing financial market infrastructures (FMIs) and new entrants to invest in new technology. This will require continuous dialogue with the industry to foster shared understanding. The UK sandbox will soon be operational, with the aim to offer a flexible rulebook with several stages of progression for participants and a glide path to ensure safe scalability.

An industry representative reiterated the importance of ongoing dialogue between market participants and supervisors, as regulation cannot be adjusted to fit every new development in the fast-evolving crypto ecosystem. A pragmatic approach will be essential. A Central Bank official agreed, observing that Central banks will also have a role to play in the adoption of new technologies in the securities market.

Another industry representative noted that the DLT pilot regime is in effect a regulatory sandbox that offers participants the flexibility to bypass certain EU regulations legally to foster innovation. However, the pilot has limitations and been slow to yield results. Participants must go through a lengthy and complex process to access the sandbox due to entry requirements. For larger incumbents, the volume caps are also too low to justify the necessary investment in infrastructure and there is an obligation to exit the sandbox after 5 years. Larger firms are therefore hesitant to participate, particularly given that similar technologies are already being used live in other jurisdictions.

Under the current DLT pilot regime, the EU risks falling behind in terms of technological innovation. Singapore, for example, is progressing rapidly with tokenisation through active industry engagement. The UK is advancing with its own regulatory sandbox. Rather than reviving the DLT pilot regime, the EU must begin to implement the necessary regulatory changes to existing frameworks required by tokenisation and assess the broader infrastructure implications of this evolution.

A regulator suggested adjusting the EU DLT pilot regime to reduce barriers to participation and make the scheme more accessible to smaller players.

The Chair highlighted the challenge regulators face in striking the balance between swift policy action and appropriate assessment of rapidly-evolving technologies. Sandboxes and pilots may be necessary to gain insight but could also mean that the industry struggles to keep pace with rapid market advancements.

## 4. Focus on implementing and adjusting existing frameworks

Answering a question from the Chair about the need for additional measures to support digital asset and crypto markets, a regulator stated that no further regulation is

currently necessary in the EU and cautioned against drafting new legislation prematurely, as the market continues to evolve rapidly. The focus should instead be on implementing and refining the regulatory technical standards (RTS) of the Markets in Crypto-Assets (MiCA) regulation, which are highly detailed. The challenge of this implementation for supervisors will be the technical complexity of crypto, requiring national competent authorities (NCAs) to recruit additional resources with technical expertise and the ability to assess risk. This is difficult for the public sector.

An active dialogue between market participants and regulators is important to take the right decisions on aspects of crypto not covered by MiCA, such as DeFi, and to fully exploit the potential of these technologies. This will help regulators to determine exactly what constitutes DeFi and, consequently, which elements need to be regulated.

A Central Bank official observed that there are some areas of securities regulation which must change, particularly with regards to accountability and settlement finality. In the EU and UK, central securities depositories regulation (CSDR) which is designed for centralised entities may need to be adapted to account for a more decentralised recording of securities ownership. An industry representative agreed that traditional frameworks and rules will need to change to align with the development of tokenisation, DLT and DeFi. The

settlement finality directive (SFD) and the markets in financial instruments directive (MiFID), in particular, need to be adapted to the changes brought by tokenisation. Achieving the potential gains in terms of speed, automation and cost reduction will also require open collaboration and shared standards and siloed working must be avoided. Tokenisation should be viewed as a tool to achieve greater efficiency and automation, rather than an end goal.

An industry representative explained that permissionless blockchains facilitate participation without permission from a central authority. This results in operational, technological, legal and regulatory challenges when using them for securities markets. Existing frameworks like MiFID and CSDR are not designed with such platforms in mind and instead support intermediated financial infrastructure. The European Commission is exploring the policy approach to address DeFi, with a report anticipated in late 2024. The European Supervisory Authorities (ESAs) and NCAs are also in an assessment phase. DeFi also has implications for centralized exchange as the latter play an important role in the trading of tokens which empower individual investors to access the DeFi ecosystems. A further consideration is the need for greater scalability and interoperability, as the sector is multi-chain and highly fragmented.