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**Tokenized
deposits**

Opportunities, Risks and
Regulatory Challenges
in the Digital Financial
System

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*Alla mia famiglia,
ai miei amici.*

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Introduction

Thanks to the development and spread of digital technology, in the last years, the global financial landscape has changed dramatically. In particular, the emergence of blockchain, the use of cryptocurrencies, and the rising curiosity in central bank digital currencies (CBDCs) have fundamentally transformed the dynamics of conventional economics and banking.

In this panorama, tokenized deposits represent one of the most promising innovations, since they successfully combine the stability of conventional banking with the flexibility and efficiency introduced by blockchain technologies.

A tokenized deposit is a type of bank deposit represented by a digital "token", based on blockchain technology. This mechanism digitizes traditional deposits, enhancing their security, efficiency, and transparency while concurrently reducing management costs and increasing access to financial transactions. Meanwhile, this technology raises several issues when taken into existing financial systems: questions of security, regulation, and customer implications.

A crucial aspect of tokenized deposits is the interaction with other innovations, including stablecoins and Central Bank Digital Currencies (CBDCs). While stablecoins are cryptocurrencies linked to a stable asset (such as a traditional currency or a commodity) to lower volatility, CBDCs are digital currencies issued by central banks meant to be an alternative to conventional fiat currencies. Many legal and technological discussions revolve around the interaction among these three instruments: tokenized deposits, CBDCs, and stablecoins since they could significantly affect data privacy and access to credit, ultimately influencing financial stability.

In the European context, the integration of these instruments into the conventional financial system is mostly dependent on an evolving regulatory framework. Considering the risks connected with these new digital assets, European institutions are working to create rules that can encourage creativity without endangering the stability of the financial system. However, the regulation of tokenized deposits, CBDCs and stablecoins is still an uncertain terrain, with many open challenges in terms of compatibility between existing regulations and the needs of new digital markets.

This work aims to explore the concept of tokenized deposits, analyzing their distinctive features, potential and the issues related to their implementation. Furthermore, the relationship between tokenized deposits, CBDCs and stablecoins will be explored in depth, with a particular focus on the regulatory implications and systemic risks that these instruments may entail. The final objective is to understand how these developments could redefine the banking and financial system, particularly from a regulatory and economic perspective.

The growing importance of digital technologies, combined with the progress of fintech regulations, forces us to consider the future of the banking system not only in terms of innovation, but also of responsible regulation. In this context, it will be essential to analyze how European regulation is trying to respond to the new challenges offered by tokenized deposits and the growing digitalization of the banking sector.

Thesis Objective

The main objective of this thesis is to analyze in detail tokenized deposits, with a particular focus on their regulatory aspects and the implications for the financial system.

Starting from a clear and structured definition, we will investigate their relationship with other digital instruments, such as CBDCs and stablecoins, and then explore the regulatory challenges related to their implementation.

With an eye toward the European regulatory environment, this study will give a summary of the possibilities presented by tokenized deposits together with an outline of the dangers involved.

Research Issues

This thesis seeks to address a set of important issues to grasp the consequences of tokenized deposits in the framework of European rules and in the scene of global financial life. In particular:

- How should tokenized deposits be regulated?

We will examine how current (European) regulatory frameworks can be adapted or transformed to accommodate this new form of deposit.

- What are the regulatory differences with respect to stablecoins and other forms of digital currency?

Through a direct comparison, the regulatory and operational peculiarities of tokenized deposits will be highlighted compared to already consolidated instruments.

- How can authorities balance technological innovation with the protection of financial stability and consumers?

We will explore the ways in which regulators can support technological development without compromising security and trust in the financial system.

1.1 Historical Context

In this chapter we will explore what tokenized deposits are, beginning with the examination of the historical road that preceded their invention. Although the overall structure of the evolving financial landscape has already been discussed in the introduction, this section will focus on the specific features that distinguish these instruments.

A brief history of financial evolution

Historically, the banking system operated with traditional methods: deposits were managed through centralized infrastructures, based on electronic registers and, originally, on paper.

In the 1990s, with the spread of the Internet and the beginning of the digitalization of internal processes, banks began to use computer systems to optimize the management of accounts and transactions. These earliest stages of digitalization, however, did not fundamentally alter the highly centralized design of financial systems.

The actual turning point arrived between 2008 and 2009 when blockchain technology first emerged and Bitcoin started to take shape. This invention proved that a distributed, transparent ledger may be managed for transactions without depending on a central middleman under security and openness. The prospect of distributed "recording" money allowed one to consider deeply: if blockchain might transform the flow of value, why not also apply it to bank deposits?

From traditional deposit to tokenized deposit

Tokenized deposits represent precisely this evolution: they are traditional bank deposits "converted" into a digital form. With this transformation, money retains the typical guarantees of bank deposits, such as the security and protection offered by the financial system, but is associated with a digital token that can be managed and transferred in real time through networks based on blockchain or similar systems.

This solution allows for more transparency and speed in transactions, generating new vistas of interoperability, automation for processes via smart contracts, or simply a general and more vivacious integration of the realms digital finance would like to tread with.

Why should this topic be explored?

The technical and operational characteristics of tokenized deposits will be covered in great length in this chapter together with their variations from conventional deposits and underscore the evolution process leading to their discovery. From aspirations for more transparency and more efficiency to a drive toward a more inclusive and agile banking system, the idea outlines not only a new financial instrument but also its possible for transformation.

1.2 What are Tokenized Deposits?

A "tokenized deposit" refers to a traditional bank deposit that has been transformed into a digital token using blockchain or similar distributed ledger technologies. This digital representation allows the deposit to be transferred and managed on decentralized networks, aiming to combine the security and trust of conventional banking with the efficiency and transparency of digital assets. *"BCE definition on tokenized deposit"*

Tokenized deposits refer to traditional bank deposits that have been converted into digital tokens on a blockchain network. It involves the conversion of traditional financial assets such as certificates of deposit, savings account into a digital token which can be tradable in the digital economy. This means that instead of holding physical cash or keeping money

in a bank account, individuals can hold digital tokens representing their deposit amount on a secure and decentralized ledger.

Those new instruments, in contrast with ordinary deposits, have similar capabilities, both embody a bank's liability and a credit for a depositor. What sets tokenized deposits apart is its format that allows them to pass between entities in a virtual format and in real-time, free of traditional go-between entities. Tokenized deposits are a hybrid instruments blending bank solidity with operational efficiency and access through blockchain technology.

In summary, certain important aspects differentiate tokenized deposits from standard deposits:

- **Digital format:** transactions are kept on distributed ledgers which provide both transparency and security.
- **Interoperability:** These can be used across various decentralized environments such as smart contracts and DeFi applications and can be exchanged across multiple platforms.
- **Automation:** Automated execution of set conditions is possible with tokenized deposits due to smart contracts which helps in curtailing costs and increasing productivity.

These deposits, although they are still in their infancy stages of practical utilization, they are garnering the interest of authorities and financial institutions for their transformative prowess in payments systems and capital markets.

1.3 Enabling Technologies

Tokenized deposits stem from a technological change which has emerged from three concepts: smart contracts, tokenization, and blockchain technology. The combination of these technologies is forming an infrastructural basis for the application, transfer, and management of tokenized deposits which simultaneously provides new possibilities for innovations within the banking and finance sector.

1.3.1 Blockchain technology: the base of tokenized deposits

Blockchain or distributed ledger technology (DLT) is the primary technology that enables the effective management of tokenized deposits.

Blockchain can be defined as: “Information technologies and protocols that use a shared, distributed, replicable, simultaneously accessible, architecturally decentralized ledger on a cryptographic basis, such that data can be recorded, validated, updated, and stored both in the clear and further protected by encryption that is verifiable by each participant, cannot be altered, and cannot be modified.”

In terms of tokenized deposits, blockchain technology brings some important benefits:

- The first benefit is the **security and integrity of information**; data is immutable and incapable of being removed or altered. Each transaction is recorded in a permanent and auditable way guaranteeing the information cannot be changed.
- The second benefit is **transparency**, all registered transactions can be watched and checked by every stakeholder in real time.
- The third one is **resilience**: blockchain DLT's are well known to have a stronger system in case there are cyber-attacks.

1.3.2 Tokenization: transforming deposits to digital assets

The European Commission defines **tokenization** as *"the digital representation of financial instruments in distributed ledgers or the issuance of traditional asset categories in tokenized form to enable their issuance, custody, and transfer on a distributed ledger."*

Tokenization has unique qualities like:

- **Programmability**, smart contracts let tokens include rules or conditions.
- **Fractionability**, financial assets can be broken out into smaller unities, therefore improving access for a larger audience.
- **Interoperability**, tokens can be moved between several technology systems, therefore enabling more fluidity in financial transactions.

Tokenization is a means of increasing efficiency in the case of tokenized deposits, therefore facilitating faster and more automated processing than in conventional banking systems.

1.3.3 Smart contracts: automation and reliability

"Smart contract is a computerized transaction protocol that executes the terms of a contract." Nick Szabo, 1994.

With the utilization of smart contracts, tokenized deposits can be managed in a transparent and independent way, reducing risks of human error and operational costs. A tokenized deposit, for example, may be programmed to transfer funds electronically to a recipient without requiring a specific condition to be met (for example, payment of a benefit or service).

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a recipient without requiring a specific condition to be met (for example, payment of a benefit or service).

There are several advantages to using smart contracts, including:

- **Operative efficiency:** Transactions can be processed automatically without any human involvement, thus saving time and cost.
- **Reliability:** because agreements are automatically executed, there are no possibilities for manipulations from humans
- **Programmable compliance:** may embed regulations/normative directly into the contract.

When combined, these technologies make tokenized deposits a promising innovation that has the potential to change how banks and clients communicate.

1.4 Benefits and Opportunities of Tokenized Deposits

After analyzing the technology behind tokenized deposits, and quickly treated benefits they can give, we now summarize and better analyze their key advantages in order to better understand their impact on the financial landscape.

1.4.1 Transparency and auditability

One of the most distinctive features of tokenized deposits is the transparency aspect of blockchain. A blockchain provides an unmodifiable record of every transaction on a distributed ledger that is accessible to all authorized parties.

This offers several advantages:

- **Real-time auditing:** operations/transactions can be instantly verified; therefore, costs and time associated with auditing processes are significantly reduced.

- **Increased trust:** Both consumers and institutions can trust the system because all transactions conducted within it are visible.
- **Decreased risk of fraud and manipulations,** every operation is verifiable and unalterable.

Transparency in the system is critical for increasing financial control and mitigating fraud and data manipulation concerns.

1.4.2 Operational efficiency and costs reduction

Thanks to blockchain and smart contracts, financial operations can be optimized. In particular:

- **Process automation,** with smart contracts, tokenized deposits can perform payments and settlements automatically, without human intervention.
- **Elimination of intermediaries,** the blockchain in its decentralized form makes it possible to bypass traditional third parties, lowering costs resulting from the prospect of fees and delays.
- **Real-time processing,** the transmitting of tokenized deposits occurs quickly and, therefore, the chronic delays of traditional banking systems are eliminated.

The flow of resources within the economy from this could be faster, smoother and less costly.

1.4.3 Security in the financial system

Another characteristic of tokenized deposits is their security. The application of blockchain together with smart contracts provides considerable resistance against cyber-attacks and fraud:

- **Advanced cryptography:** Information and transactions are protected by cryptographic techniques with a very high level of security.

- **Network resilience:** The distributed nature of blockchain ownership enhances resistance to failures and attacks. The absence of a point of vulnerability enables decentralized solutions for the system.

Those aspects make tokenized deposits safer respect to traditional ones, enhancing the security and stability of the entire financial system.

1.4.4 Fractionability and inclusivity

Another advantage of tokenized deposits is their ability to fractionate assets into smaller units and make them accessible to a larger number of users, this translates to:

- **Financial inclusivity:** Even people with limited resources can access sophisticated financial tools.
- **Enhanced liquidity:** Fractionability augments market liquidity by expanding trading alternatives.

This feature promotes economic equity by broadening access to financial services.

Conclusions on chapter 1

This chapter has presented the basics of tokenized deposits detailing and examining its features, enabling technologies and benefits. In the next chapter, we will delve into their interrelations with CBDCs and stablecoins, to better understand the European digital financial landscape and the ensuing legal and regulatory challenges which the world of crypto has to offer.

CHAPTER 2: TOKENIZED DEPOSITS, CBDC AND STABLECOINS

2.1 Introduction: Background and Current Situation

The adoption of digital instruments such as Stablecoins and Central Bank Digital Currencies (CBDCs) comes from many decades of progress in technology as well as economic change across the globe. Those are being developed to resolve particular problems like payment digitization, increased access to finance world-wide, and the need for more transparent and clear systems.

“Stablecoins are a form of crypto-assets that aim to maintain stable value by anchoring to a reference asset, such as a fiat currency or commodity. These crypto-assets seek to reduce the volatility typical of traditional cryptocurrencies, making them more suitable for payments and as a store of value.”

Stablecoins are the product of the earliest stage of blockchain development, while the birth of Bitcoin in 2009 made it possible to create fully decentralized digital currencies, the extreme volatility of cryptocurrencies, including Bitcoin's, curbed its adoption as a payment method.

Tether, the first widely used stablecoin, debuted in 2014, is anchored to the US dollar to prevent extreme volatility.

The stablecoin industry has rapidly grown since its founding and now spans several products including algorithmic, fiat-backed, and cryptocurrencies based on branched-out technologies. This development has consistently increased its usage in cross-border trade, access to distributed finance (DeFi), and value storage has been much raised by this evolution.

They can be classified mainly into two categories, depending on the method used to stabilize their value:

- Stablecoin with collateral, the value is guaranteed by reserve assets, such as fiat currencies or other crypto assets.

- Algorithmic stablecoins, value is stabilized through algorithms that adjust supply in response to changes in demand.

CBDCs symbolize an institutional and sovereign response to the rise of stablecoins and cryptocurrencies and can be defined as *“a digital form of currency issued by the central bank. A CBDC represents a liability of the central bank and is denominated in the sovereign currency of the country or economic area. The main objective of a CBDC is to provide a secure and reliable digital means of payment, complementary to physical cash.”*

As the global economy increasingly goes digital, central banks around the world understand the need to update their monetary systems while still retaining control over their currencies.

CBDC can be classified as:

- Retail CBDC, intended for the general public (citizens and businesses) as a digital alternative to cash that can be used for everyday payments.
- Wholesale CBDC, reserved for banks and financial institutions to make interbank payments and transactions between financial institutions more efficient.

One example can be the E-krona Project in Sweden, that was one of the first experiments aimed at this goal and was started in 2017, laying the groundwork for a central bank controlled digital currency to be issued, targeting the retail sector. Other projects like China’s DCEP (Digital Currency Electronic Payment) have broadened the function of CBDCs to include instruments designed for international and domestic markets.

Currently, more than one hundred countries are exploring or testing CBDC projects driven by the objective of developing efficient, safe, and transparent payment systems while reducing dependency on banking institutions.

Important questions are raised by this variety of instruments: how do their many functions interact? What potential tensions or harmonies might arise? In order to answer

these concerns, this chapter will compare and contrast how technological, economic, and regulatory variables interact with these three instruments.

2.2 Comparative analysis

In order to fully comprehend Tokenized Deposits, CBDCs, and Stablecoins, it is essential to examine their key characteristics. To conduct this comparison, three dimensions will be taken into account: core technologies and architecture, issuance and trust, and the purpose and intended uses of the products.

2.2.1 Core technologies and architecture

The technology and the architecture of the three instruments are similar under certain aspects, but they differ in the implementation details and goals.

Similarities: The use of DLT, which offers transparency, security and transactions tracking, and of smart contracts, for the automatization of certain process.

Differences:

- **Tokenized deposits:** these are typically based on permissioned blockchains, where the network may only be validated and used by authorized entities (such banks and financial institutions). Traditional banking systems incorporate these deposits and settle them as financial instruments.
- **Stablecoin:** they are issued on both public (such as Ethereum) and private blockchains. Their architecture is different according to the degree of decentralization: some stablecoins, like Tether (USDT), are centralized, while projects like DAI are decentralized, algorithmic models.

- **CBDC:** they can be hybrid model, having both public and private blockchain characteristics. Their design is determined by monetary policy and regulatory requirements. Some designs like Digital Yuan are based on centralized technologies but can work with decentralized platforms.

Regulatory implications: the technologies are accompanied by major regulatory risks. Smart contracts are critical to automate the processes; however, they need strong security standards to avoid cyber vulnerabilities. Also, the cross-interface between public and private blockchain systems needs coordinated regulatory development to prevent fragmentation of financial market.

2.2.2 Release, assurances and confidence

Regarding modalities of issuing and guarantee systems, three instruments differ considerably from one another.

Similarities: stability and acceptance of the instrument itself depend much on confidence in the issuer in all cases. Tokenized stablecoins, CBDCs, and tokenized deposits rely on an impression of the issuer's financial dependability and soundness.

Differences:

- **Tokenized Deposits:** They are issued by regulated banks and tied to traditional deposit accounts. They benefit from deposit insurance and the reliability of banks.
- **Stablecoins:** Mostly are issued by private parties. The trustworthiness of stablecoins is based on the quality and transparency holding their reserves (be it fiat currency, cryptocurrencies, or other assets). Algorithmic ones, instead, do use market mechanisms to stabilize them, but have exhibited serious vulnerabilities during times of stress.

- **CBDC:** These are issued directly by central banks. They are not backed by reserves of private origin, thus guaranteeing their strength is the authority of the sovereign that issues them, rendering them instruments of trust on their own.

Normative implications: stablecoins, particularly, depend on a clear legislative environment to guarantee openness, soundness of reserves, and user safety. Although the European Union's Markets in Crypto-Assets (MiCA) marks a progress in controlling stablecoins, cross-border monitoring and worldwide regulatory convergence still provide difficulties.

2.2.3 Intended Purposes and Uses of Instruments

The intended purposes and uses of the three instruments stems from their difference in origins and objectives.

All three instruments aim at increasing payment efficiency and decreasing the transaction costs to promote increased economic activity. Every instrument also shares the purpose of exploit the aspects of digitalization to improve upon the challenges faced by traditional financial systems.

Tokenized deposits were originally created to serve the wholesale markets, that is, the interbank and institutional payments sector. In these transactions, security and efficiency is their primary consideration.

To appeal to a wider audience, stablecoins can be utilized as they enable everything from cross-border payments to access to decentralized finance. They are at their most effective in areas that do not have ready access to traditional fiat currency.

As CBDCs are made to accompany the national monetary policy to foster economic sustainability, they serve a more general and strategic purpose. While wholesale CBDC will focus on improving interbank business processes, retail CBDC will serve end users.

It is crucial to be clear on the varieties of instruments to be used for overcoming the challenge of delineating jurisdictions and stepping into a borderless digital economy.

2.3 Interactions and coexistence situations

2.3.1 Payments and market: complementarity

Tokenized deposits, Central Bank Digital Currency (CBDCs), and stablecoins can work together within sophisticated financial systems from the top-down, each providing unique complementing features.

- **Tokenized Deposit and Wholesale CBDCs**

Interbank settlements could be enhanced with the combination of tokenized deposits and wholesale CBDCs.

Distributed ledger technologies (DLT) based segmented economies could reduce settling times and increase clarity for business activities which would, in turn, improve resiliency within the financial markets. Particularly, commercial banks may use tokenized deposits internally for payments and transfers, but central banks may rely primarily on wholesale CBDCs for liquidity.

- **Stablecoins and Retail CBDCs**

Stores and ATMs could accept CBDCs and stablecoins as payment methods. However, stablecoins would be appropriate for international payments and decentralized finance (DeFi) usages, whereas CBDCs would be reserved for local transactions and monetary policies. This mix would increase financial inclusion and help to make world payment systems more efficient.

- **Tokenized Savings and Stablecoins**

In a digital economy, tokenized deposits and stablecoins can serve different functions. While tokenized deposits are digital bank deposits that can be used for domestic transactions, they are supported by regulatory insurance which reduces risk.

On the other hand, stablecoins are preferred for international remittances and use in most DeFi projects because they offer greater flexibility. There might be new ways of improving payment systems by using tokenized deposits for local transactions and stablecoins for international and innovative transactions.

European Attention

The Digital Euro project marks a first step towards including retail CBDCs into the digital economy across Europe. Simultaneously, European Commission-promoted regulatory sandboxes let commercial banks explore tokenized deposits alongside stablecoins, so forming a possible hybrid digital payment environment.

2.3.2 Tensions and possible conflicts

Like every other thing, there might be some conflict regarding semi-cooperation with the systems where the risk of disintermediation and competition for adoption arise. Setting these facts aside, some cooperation might also be possible in the industry.

- Retail CBDC And Stablecoins.

Retail payments might incorporate the mixture of stablecoins and retail CBDCs. For local remittances, the privacy and regulation of CBDCs coupled with its safety while having global reach and access during local remittances makes stablecoins more appealing. On the other hand, very intense competition may fragment the digital payment space and reduce inter-system operational effectiveness and interoperability.

- CBDCs wholesale and Tokenized Deposits

The first risk lies in the supposition of one problem: the likelihood of banking institutions being disintermediated appears to be more profound. Central banks concentrating on wholesale CBDC could also harm commercial banks. In essence, private stablecoin issuers seeking to expand payment systems for greater efficiency in the wholesale market would also be able to go beyond the tokenized deposit markets.

Legal Consequences

These disputes emphasize the paramount importance of the harmony of regulation. MICA regulation and other relevant pieces of the capital markets must be such that allow these instruments to constructively incorporate rather than assigning regulatory competition.

2.3.3 Future Scenarios: projections and impacts

In imagining Tokenized Deposits, CBDCs, and Stablecoins in their anticipated interactions and possible co-integration, several scenarios come to mind.

Hybrid Systems

It is within reason to expect that:

- CBDC will serve as basis for macroeconomic control and management of monetary policies.
- Stablecoins will be used for cross border and private sector innovation.
- Tokenized deposits, through greater effectiveness of traditional banking systems, reduce settlement time and costs.

Legal Function

Supporting security, interoperability, and innovation through regulation will foster the realization of this ecosystem.

- In order to interact with stablecoins and set limitations on their use, CBDCs have to be implemented in a range of existing laws.
- Stablecoins, especially algorithmic ones, should be highly regulated in terms of reserves and transparency.
- A robust legal framework is needed for tokenized deposits to guarantee their security and acceptance by banks.

Worldwide viewpoints

Avoiding too great fragmentation of the global financial scene will depend on international cooperation among governments, central banks, and commercial players. Initiatives aiming at this shift can help the Financial Stability Board and the BIS Innovation Hub as well as others.

Chapter 3: The European Regulatory Perspective on Tokenized Deposits

3.1 Introduction to the EU legal framework

The European Union has increasingly sought to manage financial innovation over the past years in order to ensure an equilibrium between technological progress and economic stability.

The creation of a harmonized legal framework will be vital to the adoption of new technologies, such as blockchain, while guaranteeing the protection of consumers and the soundness of the banking system. Tokenized deposits are a virtual or digital representation of traditional bank deposits and thus fit within this scenario but also raise several regulatory challenges.

Specifically, the EBA has outlined that tokenized deposits fall under the existing Capital Requirements Directive (CRD) and Capital Requirements Regulation (CRR) as compared on a par with traditional deposits (for the time being).

Therefore, the MiCA framework does not cover the issued tokens, as they are not reputed as crypto assets. This means that these tokens are as transparent as all other banking assets, hence the issuer of tokenized deposits is subjected to the same prudential requirements, thereby contributing to consumer protection and European Union's financial stability.

The three fundamental pillars of the European Union's regulatory policies are: consumers protection, financial system stability and normative harmonization.

All these concepts can be applied to tokenized deposits, which have to respect the same criteria as bank deposits in regard to safety and reliability, but with the advantage of DLT. In this context, it is necessary to avert regulatory divergence between member states in order to foster an efficient and integrated financial system.

Distinction between tokenized deposits and others digital instruments

This aspect of the EBA has more to do with differences between traditional tokenized deposits and different classes of crypto assets such as Electronic Money Tokens or Asset References Tokens.

Tokenized deposits always remain attached to the issuing financial entity. Therefore, it is not possible to transfer tokenized deposits amongst users like cryptocurrencies even when MiCA provides regulatory cover to EMTs and ARTs. In other words, tokenized deposits are preloaded with a continuously linked restriction to a controlled bank institution that guarantees protection to depositors without digital paying changing the process of master account inflation.

While EBA acknowledges the innovative possibilities of tokenized deposits, it has emphasized that no specific regulatory reform is needed due to current regulations being adequate.

However, matters such as the application of the smart contracts, which might bring new difficulties regarding security and reliability, and the need for continued interaction with the traditional banking system, require further investigation.

Systemically important banks are anticipated to adopt tokenized deposits while avoiding operational risks and without compromising regulation and transparency.

The Importance of Regulatory Harmonization in Europe

The European regulatory framework is important in avoiding competition fragmentation, which could detract from the adoption of blockchain technology and the EU's competitiveness in comparison to other world economies. In addition to fostering innovation, investment funds being deposited in the form of tokens are assured global

treatment by all member states, which makes it easier for interfacing with the traditional banking sector and European digital payments like SEPA.

Market developments will be monitored by the EBA and other supervisory authorities to enable swift changes to regulations ensuring tokenized deposits can be added to the current legal framework without compromising the safety and stability of the banking system within the Union, which has already put in place laws permitting such deposits.

The subsequent parts will analyze the critical European regulatory frameworks associated to tokenized deposits, emerging regulatory challenges, and the impact that European institutions have on the development and adoption of this new financial technology.

3.2 Existing regulatory framework and relevance to tokenized deposits

Tokenized deposits, maintaining their nature as a bank deposit, are subject to the Capital Requirements Directive (CRD) and Capital Requirements Regulation (CRR), according to the European Banking Authority (EBA), these instruments reflect a digital form of a claim with a financial institution.

Other European regulations/directives, however, either directly or indirectly affect these instruments, therefore creating problems with regulatory harmony and compliance.

3.2.1 CRD/CRR

The European Banking system is regulated through the Capital Requirements Directive (CRD) and the Capital Requirements Regulation (CRR) which are said to guide the banking sector in terms of setting up criteria for liquidity alongside mitigating risks.

These laws seek to provide security to depositors and ensure control over the system's stability.

The European Banking Authority (EBA) argues that blockchain-recorded deposits do not change the underlying legal nature of traditional bank deposits. As such, they remain subject to the same reasonable controls under the CRD/ CRR framework.

The CRD and the CRR set out in a single document precise requirements regarding banks' capital and liquidity provisions. As a buffer against unexpected losses, banks have to, amongst other things, hold a certain amount of quality capital relative to risk-weighted assets, for example.

Moreover, the CRR sets liquidity requirements like the Net Stable Funding Ratio (NSFR) and the Liquidity Coverage Ratio (LCR) that assure liquid assets are available to meet stress events while ensuring a sound funding profile over the longer term.

In addition to detailing the risk management system and corporate governance structure of the bank, these provisions seek to create a limit to additional borrowing in the form of a leverage ratio.

Most importantly, these kinds of restrictions should also apply to digital deposits kept in blockchain so that these technological improvements in deposit taking do not allow institutions to bypass these critical safeguards.

Financial stability is also ensured by limiting the application of capital requirements and liquidity regulations to digital deposits, which guarantees that the banking system's credentialing standards will continue to be high.

This is done to ensure that rules of limited restraint won't cause a technological revolution to result in a decline in the fundamental financial stability of the entire system.

3.2.2 Markets in Crypto-Assets Regulation (MiCAR)

The MiCAR legislation is the first comprehensive regulatory framework for crypto-assets and their related.

Regulation (EU) 1114/2023 (so-called “MiCAR”, Markets in Crypto-Assets Regulation) regulates the issuance, offering and admission to trading of crypto-assets and, in particular, asset-referenced tokens (so-called “ART”), e-money tokens (so-called “EMT”) and crypto-assets other than asset-referenced tokens or e-money tokens (so-called “Other Than”).

MiCAR also regulates the authorization and operating conditions for crypto-asset service providers as well as the prevention and prohibition of market abuse relating to crypto-assets.

Legislative Decree no. 129/2024 implemented Regulation (EU) 1114/2023 and identified Consob and Banca d'Italia as competent authorities pursuant to the regulation, outlining their respective competences based on the types of crypto-assets (electronic money tokens, asset-linked tokens, tokens other than electronic money tokens and asset-linked tokens).

In particular:

a) Asset-linked tokens (ART): Banca d'Italia and Consob are the competent authorities pursuant to Title III of the MiCAR. In particular, Decree 129/2024 provides that supervision of the aforementioned Title III is exercised by Consob, with regard to transparency, correct conduct, orderly conduct of negotiations and the protection of holders of asset-linked tokens and by Banca d'Italia, with regard to risk containment, capital stability and sound and prudent management.

b) Electronic money tokens (EMT): the Bank of Italy is the competent authority to supervise Title IV of the MiCAR.

c) Tokens other than electronic money tokens and asset-related tokens (Other Than): Consob is the competent authority to supervise Title II of the MiCAR.

Legislative Decree no. 129/2024 provides that supervision of crypto-asset service providers is exercised by Consob, with regard to transparency, correct conduct, orderly

conduct of trading and customer protection, and by the Bank of Italy, with regard to risk containment, capital stability and sound and prudent management.

The MiCAR regulates the provision of services for crypto-assets both by new specifically authorised entities (specialised CASPs, i.e. providers of services for crypto-assets that are not already subject to special regulation by virtue of their status as already supervised entities) and by financial intermediaries.

Exclusion of tokenized deposits from MiCAR

For the MiCAR framework, everything already regulated in another framework don't fall in its boundaries, such as financial instruments provided by MiFID II or payment services covered by PSD2, to be within the ambit of existing regulations.

As a matter of fact, EBA made it clear that tokenized deposits, as a digital form of a bank loan, are indeed within the purview of bank, CRD/CRR, and do not need any additional specific oversight under MiCAR.

Interpretive Components and Associated Issues

It is still controversial to classify tokenized deposits in the context of crypto-assets, especially when it comes to whether or not they ought to be handled similarly to e-money tokens (EMT).

Practical difficulties arise from the inherent ambiguity of tokenized deposits, even when regulatory frameworks such as MiCAR purposefully exempt them from some restrictions on the grounds that they are already subject to regular banking regulations.

Regarding the abovementioned matter at hand, on one part, tokenized deposits are essentially replicas of standard bank deposits, concerned with the same aspects as CRD/CRR. Unlike other non-fiat linked crypto-assets, these as well as other similar types of

crypto deposits have two important features, which are: surety and support from regulations.

While, it is possible that these types of deposits operating on a blockchain would be more or less equivalent to e-money tokens, blurring the lines between traditional financial instruments and innovative digital products.

The participants in the market are faced with essential questions related to the gray space about crypto law: does the emulation of tokenized deposits warrant a distinct limb of regulation that takes into account the traditional banking model, or should they just fall under normal consumer protection and market conduct rules that apply to EMT? This makes compliance more challenging as ominous uncertainty will lead to social consumer protection gaps and enable regulate arbitrage where businesses cherry picks the jurisdictions without P2D rules.

In conclusion, to achieve a balanced regulatory framework that does not stifle innovation, but, on the other hand, does not permit fragmentation of the market, where all parties are treated equally, there is need to get clarity on the interpretive question.

3.2.3 PSD2/PSD3 and SEPA

The PSD2 regulatory framework, effective as of 2018, introduced **open banking**, which allows third parties to access customer financial data to provide innovative services, including access to traditional bank accounts, that, for tokenized deposits, is translated to better interoperability between fiat currency and digital tokens, as well as advanced security through Strong Customer Authentication (SCA).

In PSD3, security and transparency were enhanced through the establishment of stricter cybersecurity requirements, standardized transparency and security standards for providers/operators of distributed ledger technology (DLT). Those improvements would

allow better tracking of online payments and more effective implementation of AML obligations.

SEPA role

The Single Euro Payments Area (SEPA) is the area where everyone, including citizens, public institutions and every other operator can make/carry out and receive payments, this area comprehend the 28 EU nations, including those which do not have the euro as a common currency.

The integration of SEPA with tokenized deposits would speed up the (immediate) conversion of tokens to fiat currency, and this will bring confidence to the users and consequently, to the system.

3.2.4 E-Money Directive (EMD2/EMD3)

EMD regulates the issuance and use of electronic money in the European Union. According to the current version, EMD2, e-money is considered value that is electronically issued and stored as a unit of credit on the issuer's account, and which can be used for payment to third parties.

Despite the unique characteristics that tokenized deposits possess, they are to a certain extent similar to e-money due to their reserves and ability to be converted into fiat currency.

But, unlike EMTs, smart contracts and restricted transferability do, however, suggest that there is a need for an adjustment in the law in order to keep pace with technological advancements.

Finally, the proposal of EMD3, has the purpose of modernize the normative framework including elements pertaining to digital tokens.

These changes would include the inclusion of programmable and blockchain based technologies so that the regulation can capture more accurately the features of the

tokenized deposit. This would bring to an enhanced security and consumer protection, enables to minimize chances of loss associated within the digital money management space. Moreover, this would bring to an alignment with MiCAR that will prevent fragmentation and will provide consistency in oversight across Europe.

3.2.5 Regulatory sandboxes and experimental techniques

With the aim of integrating in our system new technologies, the European Union has devised specific experimental regulations_which allow the adoption of innovative technologies, by permitting their usage in a limited scope with the objective of minimizing risks to the financial system.

The DLT Pilot Regime, was introduced by the EU Regulation 2022/858 as an experimental setting for blockchain operators to construct and testing market infrastructure based on DLT technology.

The advantages that this regime offers in relation to tokenized deposits are several, but all coming from the possibility to have a controlled system where testing and assess how tokenized deposits interact with the traditional system.

Regulatory sandboxes

EU member states have adopted regulatory sandboxes with the aim of stimulating financial technology innovations.

These areas of innovation restriction enable firms to launch new products and services without immediately facing all the legal requirements.

Sandboxes enable participants to get immediate responses from authorities which reduces the risk of noncompliance.

From the European perspective, the concept of transnational sandboxes is viewed as balancing diversity of innovations which justifies an innovation strategy that can subsequently be applied at the digital single market level.

Conclusions on 3.2

The link with other rules, including MiCA, PSD2/PSD3, and EMD2/EMD3, leads to some interpretational challenges. However, for the moment, the existing regulatory framework suggests that tokenized deposits are predominantly within the sphere of influence of the classical banking system (CRD/CRR).

New experimental methods such as the DLT Pilot Regime and regulatory sandboxes are effective ways to bridge these gaps and experiment with the adoption of new technologies into the financial system. However, to ensure competitiveness and stability across markets, there still must be collaboration and integration at the European level.

3.3 Regulatory challenges for tokenized deposits

Even though tokenized deposits are quite effective in terms of flexibility, transparency, and financial innovation, they are problematic from a regulatory perspective. The issues stem mainly from the need to reconcile the new technological possibilities offered by blockchain and the use of smart contracts with the traditional nature of bank deposits, which are inherently bound by the rules of the CRD/CRR system in terms of prudential and consumer protection.

Particularly in two broad areas: gaps in the law regarding the characterization/legal definition of tokenized deposits and problems related to the legal framework of fractional reserves and capital requirements are the areas of focus. These issues are further explored in the following sections.

3.3.1. Uncertain legal framework

The precise classification and legal understanding of tokenized deposits poses one of the biggest challenges in their acceptance.

A bank deposit has conventionally been conceived as a claim that arises from an allocation of money into an account, which is governed by a contract between the contributor and the banking institution.

With the emergence of tokenization, the basic premise still stands to be a bank deposit, however, the digital form on a distributed ledger technology (DLT) gives rise to some attributes that may have potential ambiguities.

Hybrid elements

Tokenized deposits combine traits of traditional instruments (bank deposits) with those of crypto-assets since tokenizing entails the digitalization of law and occasionally the use of programmable features (smart contracts).

While, as the EBA notes, the tokenized deposit does not change the legal content of bank credit and remains subject to the prudential regime (CRD/CRR), the possibility of partial transfer or automation of certain functions-not typical of traditional deposits-may lead to considering them similarly to e-money tokens (EMTs) or other types of crypto-assets regulated by MiCAR.

Regulatory ambiguity

Since tokenized deposits are presumed to already be governed by banking regulations, they are expressly excluded from the MiCAR requirements. However, there are issues with how the E-Money Directive and PSD2/PSD3 regulations interact with payment instruments.

European definitions increase the likelihood that member states will interpret them differently, which raises the hurdles to cross-border integration caused by regulatory fragmentation.

Impacts on consumers

The legal definition of tokenized deposits is vague and poses direct risks for upholding consumer protection laws.

Due to the absence of a clear classification, consumers may find themselves in situations where the applicable clauses are not self-evident. For example, traditional bank deposits are covered by the Deposit Guarantee Schemes (DGS), however, such protective coverage would not necessarily be afforded to tokenized deposits which are not specifically defined in regulatory terms.

All things considered, ambiguity in the legal framework of tokenized deposits results mostly from the challenge of harmonizing the conventional character of the bank deposit with the new elements (programming, limited transferability, smart contracts) brought by tokenizing.

This uncertainty could influence not just operators' compliance but also the degree of consumer protection provided, hence European regulatory definitions should be reviewed and more harmonized.

3.3.2 Fractional reserves and capital requirements

The problem of fractional reserves

An important question is related to reserve management and the suitability of capital needs for tokenized deposit issuers. In compliance with directives and laws such the CRD and CRR as well as Basel Committee principles, banks are historically obliged to keep reserves and satisfy capital requirements depending on the volume of deposits acquired.

Aspects of reserve management

In a traditional model, every bank deposit is supported by actual reserves; so, the capacity to function with fractional reserves is limited by strict regulations meant to prevent insolvency risks and guarantee the stability of the financial system.

Tokenization allows the issuer to be tempted to employ fractional models, in which tokens are issued more than the actual reserves kept.

If not explicitly controlled, this option could magnify the chances of a crisis of trust in the system, much as prior observations of other financial sectors show.

Lack of Clear Regulations

In their current format, European legislations do not relate clearly to tokenized deposits regarding fractional reserve policy.

Banks operating such instruments shall be bound by existing rules applicable to traditional deposits.

However, and in view of the digital and programmable nature of tokenized deposits, especially when the functionality of smart contracts allows for or even enables automation of transactions with an impact on both reserve management and liquidity, various interpretations and lapses in the implementation of current rules may arise.

Uncertainties about capital requirements

The second crucial factor relates to capital needs. Particularly Basel III applied in the CRD/CRR environment, European rules set rigorous criteria for the capital banks must retain with respect to the risks they expose.

Adequate capital and default risk

Insolvency issues may develop if a credit institution adopted a tokenizing strategy allowing the issuing of more tokens than the value of reserves truly had.

Lack of sufficient capital coverage could cause crisis conditions under extreme market pressure or in the case of a sudden liquidity outflow, with effects on the financial system level.

Therefore, the problem is two-fold: first, to make sure the tokenization model does not create additional vulnerabilities compared to conventional deposits; second, to update (if necessary) the regulatory framework so it contains particularities connected to digitization and programmability.

Regulatory viewpoints and future interventions

As of right now, no particular guidelines specifically control the treatment of fractional reserves for tokenized deposits. Although the lack of such rules can be considered as a regulatory gap, it is noteworthy that the EBA follows a strategy of observing market movements and gathering empirical data prior to significant legislative intervention. Minimum reserve requirements and the creation of liquidity criteria applicable especially to tokenized products could be part of future regulatory action thus guaranteeing that digitalization does not threaten the capital stability of institutions.

Overall, two of the key regulatory issues for tokenized deposits are fractional reserve management and suitability of capital requirements.

While banks already follow the same guidelines as for conventional deposits, the creative and programmable character of digital deposits creates potential weaknesses that might call for future focused legislative intervention.

Ensuring that the acceptance of tokenized deposits does not jeopardize the stability of the financial system will depend mostly on constant monitoring by the EBA and comparison with international norms (such as those defined by the BCBS).

3.3.3 AML/CFT (Anti-Money Laundering and Countering the Financing of Terrorism) Compliance.

The difficulty of blockchain environment transparency

Adoption of blockchain technology in tokenized repositories presents major benefits in terms of transparency and immutability, but, it also creates particular difficulties in the AML/CFT context. Though every transaction is permanently logged on Distributed Ledger Technology (DLT), the pseudonymous character of digital keys can make it challenging to find the real token holders.

Although this component upholds anonymity, it can also enable illegal activity such as terrorist financing or money laundering.

From pseudonymity to traceability

Because the records on a blockchain are immutable, transactions on them provide a great degree of traceability; nonetheless, authorities have great difficulty in the absence of master data that might be readily connected with public keys. In this regard, it has become necessary to create "de-pseudonymizing" technologies that let verified digital identities link transactions without violating user privacy.

Technological innovations and digital identity

Adoption of verified and interoperable digital identification systems that would allow every blockchain transaction to be safely and verifiably linked with a genuine identity is one of the suggested answers to overcome important AML/CFT problems.

Based on electronic IDentification, authentication and trust services (eIDAS) technologies and linked with blockchain solutions, such systems could operate as a bridge between the digital and regulated worlds, hence boosting the effectiveness of AML/CFT controls.

Transparency duties and reporting responsibilities

Particularly AMLD5 and AMLD6, AML/CFT rules bind financial intermediaries to undergo increased due diligence steps, track transactions, and disclose dubious ones. But applying these responsibilities in the framework of tokenized deposits has certain oddities:

- **Change of Know Your Customer (KYC) protocols**

As with conventional banking procedures, clients do have the option to have an integrated technology-based method of customer identification and verification that is suited for deposits tokenized.

The current DLT and smart contracts may fulfil some KYC requirements automatically, however laws need to be amended to ensure that every action is properly done with regard to the existing sovereign digital identity.

- **Real-time reporting and monitoring**

Every token that gets issued has a possibility of being registered on the DLT in real time, which creates an opportunity to establish automated and continuous monitoring systems that the supervisors could utilize in order to detect unusual movements.

On the other side, such systems must be able to combine on-chain data with other information sources, for instance traditional banking data, otherwise they will not achieve their intended purpose.

Essentially, tokenized deposits correspondence to AML/CFT requirements is a bilateral issue: the pseudonymous feature of the digital realm may obstruct the determination of the actors involved, whereas blockchain technology is undoubtedly transparent and immutable. Key components to close these gaps are certified digital identification systems and the adaptation of KYC processes coupled with integrated real-time monitoring. As a sequential measure of provisions of AMLD5 and 6, FATF international standards,

supporting developments in regulation of AML/CFT requires constant checks to maintain a desired level innovation and finances.

3.3.4 Regulatory Interoperability

Fragmentation and disparity among member states

Regulatory fragmentation inside the European Union is one of the main challenges to the expansion of tokenized deposits. Harmonized banking rules (CRD/CRR) and the recent addition of MiCAR notwithstanding their presence can have quite different interpretations and applications depending on member state.

Diversity of interpretation

Lack of a consistent regulatory definition for tokenized deposits might result in significant variations in consumer protection and supervising methods.

For instance, some member states may see tokenized deposits' hybrid character as needing ad hoc control while others would consider them as just digital extensions of conventional deposits.

These differences raise questions for operators trying to operate internationally, therefore raising compliance costs and reducing European competitiveness in the worldwide market.

Necessity for a harmonized legal system.

Overcoming these challenges requires building a legal framework guaranteeing uniformity and interoperability among many European countries.

Definition standardizing

An explicit description of tokenized deposits—that which distinguishes them from other digital tools, like EMTs—would be a fundamental starting point. European agencies like the EBA or the European Commission, who have already underlined the need of interpretation uniformity in banking rules, could help to encourage such standardizing.

Coordination between national authorities and supranational bodies

Effective regulatory interoperability depends on ongoing, organized communication between national authorities and supranational bodies.

Such partnerships can help to establish uniform procedures for the application of AML/CFT rules, reserve management, and capital needs as well as the sharing of best practices. Adoption of transnational regulatory sandboxes, which have previously been tested in several member states, could be a test case for such projects, therefore lowering operating obstacles for market players.

Recommended solutions and steps ahead

To address the challenges of regulatory interoperability, it has been proposed that there is a need for a single overarching suggestion which forms a clear cut and integrated approach to regulative environment:

- **Creating an appropriate legislative framework**

One of the possible solutions is to create a new category for regulation that will be adopted at all While Member States. Such a category might require a blend of existing rules such as (CRD/CRR, MiCA, PSD3) with some new specific rules on liquidity management, transaction transparency as well as consumer protection.

- **Expanding the sandbox's regulation**

A coordinated approach would allow for the creation of sandboxes at the European level and thereby enhance the adoption of tokenized deposits and increased consistency in regulation.

- **Increase of cross-border collaboration**

Finally, increased cross-border collaboration and a European coordinating body for tokenized deposits would be a method to iron out inconsistencies in interpretation through national authority collaboration.

It would fall under the remit of such a body to monitor market developments, provide common guidance and take action if significant divergences in supervisory practices appear.

Regulatory fragmentation remains the main barrier to further develop and spread the practices of tokenized deposits within the European Union.

Standardization of definitions, harmonization of AML/CFT practices, and organization are key in light of a regulatory framework fit for innovation without compromising financial stability.

From developing a special regulatory framework to the extension of regulatory sandboxes, the proposed solutions represent a view toward a future where regulatory consistency might allow for the integration of tokenized deposits into a European digital single market.

3.4 Role of central institutions

The activities and direction given by important central institutions greatly affects the European regulatory environment for tokenized deposits. These players, in charge of supervising financial stability, guaranteeing consumer protection and advancing EU-wide regulatory harmonization, are quite important in customizing the legislative framework to fit continuous technological developments. Specifically, this procedure centers the

European Banking Authority (EBA), the European Central Bank (ECB) and the European Commission.

3.4.1 European Banking Authority (EBA)

As a Europe-wide supervisory authority, the EBA is responsible for the coordination of efforts that ensure the policies set forth in financial institutions have sensible application. The EBA is leading the charge with respect to tokenized deposits by being the most proactive in:

- **Innovation monitoring**

The EBA follows closely the progress of DLT technologies as well as developments in the banking industry.

Even if the number of active cases is low, the Report on Tokenized Deposits claims that the lending institutions appear to be increasingly interested in adopting tokenization for improving security and operational efficiency of transactions.

- **Establishment of guidelines**

The EBA produced judgements and guidelines meant to clear the regulatory treatment of tokenized deposits.

The organization particularly underlined that although the technology of deposit registration may be novel, the type of the deposit does not change and still depends on the existing prudent guidelines (CRD/CRR).

The EBA also clarified the difference between tokenized deposits and other digital instruments, such e-money tokens (EMTs), stressing how important transferability and holder identity are for correct classification.

- **Promotion of national coordination**

One of the main goals of the EBA is to encourage communication among national supervisors, hence promoting national coordination.

By means of focused surveys and frequent seminars, the EBA promotes the flow of best practices and interpretive convergence to prevent regulatory fragmentation therefore impeding the acceptance of tokenized repositories worldwide.

3.4.2 BCE

Payment systems in the euro area, management, financial stability of the euro area-all these are jobs to be performed by the ECB. The relevant roles of the ECB related to the tokenized deposits are as follows:

- **Supervisory work related to financial stability**

The ECB tries to estimate how new technologies, in this case the tokenization of deposits, might affect the liquidity and soundness of financial institutions through systematic risk evaluation.

More precisely, the acceptance of tokenized deposits must be weighed up against the foreseen capital requirements.

- **Integration of Digital Euro and a payment system**

The ECB pays special attention to the possibility of issuance of the Central Bank Digital Currency - CBDC. Special focus is paid to the interaction of the Digital Euro with the tokenized deposits because:

- The tokenized deposit in circulation brings a novel way of making and handling payments, further enhancing the capabilities of the Digital Euro. In fact, with the help of this feature, there could easily be an on-the-spot interchange between digital tokens and fiat money, which enhances cross-border payments efficiently.
- Possible regulatory conflict: If there will be both tokenized deposits and CBDC, then deeper research should be done not to face the conflict with the regulator and hence not to take risks regarding financial stability or efficiency in monetary policy function.

- Monitoring the risks associated with blockchain technology: Under the auspices of the European Central Bank, several reports and analyses have been published on the opportunities and risks associated with blockchain technology. These studies investigate the impact of tokenized deposits on the control of banking liquidity and the payment system, aiming to develop a methodology for such an investigation.

3.4.3 Role of the European Commission and other bodies

Legislative function and regulatory coordination

It is up to the European Commission, the executive of the EU, when it comes to proposing and implementing policy to control the industry.

Its influence is clear in many spheres.

- By means of the Digital Finance Package or the MiCAR rule, the Commission seeks to make the company's regulatory framework adequate for a rapidly developing market.
- While MiCAR does ban tokenized deposit accounts, the legislative offers are designed to at least attempt to achieve coherence across the rules dealing with the different digital instruments.
- The Commission works in conjunction with the EBA and the ECB and other bodies to track market movements and takes action to do something about emergent systemic risks or gaps in regulatory coverage.

Fostering cooperation and synergies between different institutions.

The allocative and operational efficiency of the system heavily relies on the coordination of many central institutions working with non-central ones.

- **Ongoing exchange of information and communication**

Special working groups and forums make it possible to share data, perform risk analysis, as well as share “best practices” and policies. Interaction supports mutually beneficial outcomes such as rule changing, receiving a response to the changes in technologies, and implementing best practices.

- **Formulation of Joint Standards**

Public consultations and other feedback mechanisms enable the Commission and other authorities to formulate policies which have a higher probability of being followed, thus enhancing the safety of interpretation and acceptance of tokenized deposits.

Conclusions on 3.4

In summary, the EBA, the ECB, and the European Commission, all of which are central to the institution, have mutually relayed and linked functions within the development of the regulatory framework of tokenized deposits.

This mixed approach tries to create and complete the regulation that would allow for innovation and at the same time ensures the protection of the consumers and stability of the market. This is to ensure that the creation of tokenized deposits is undertaken in a sound balance and perfect equilibrium, safe and harmonic.

Chapter 4: Operational and Systemic Risks Associated with Tokenized Deposits

Introduction

As the chapter before pointed out, many of the pragmatic hazards find a home in regulations. In this chapter, we will examine the operational, systemic, market, and legal concerns connected to the deployment of tokenized deposits, so stressing how the lack of a consistent and clear legislative framework increases these vulnerabilities.

Tokenized deposits entered the European financial system present certain difficulties. Although including new technology like blockchain and smart contracts has obvious advantages, there are also several hazards involved that can compromise market stability and transaction security. We will investigate in this chapter the key operational hazards and systematic risks resulting from the acceptance of tokenized deposits, segmenting them into technological, legal, market, and operational issues. The perception of danger with regards to the introduction of tokenized deposits might compromise the safety and sustainability of the new model. These dangers have to be taken into account so that the criteria set by European authorities are respected on the ground.

4.1 Operational Risks

Most operational risks associated with tokenized deposits stem from new methods used to deal with tokens in a digital economy. They stem from the contacts with a traditional financial system as well as the management of operational activities in a fully digital environment. These new technologies give rise to several risks that need to be mitigated in order to ensure adequate protection of the users as well as the stability of the system across a wide array of fields such as cyber security and liquidity management.

4.1.1 Online crime and data security

Cybersecurity is most likely the main issue with banking organizations engaged in tokenized deposits.

From malware to phishing and even DDoS attacks, including hacking of an exchange platform or wallets storing your digital assets, everything is part of the digital infrastructure on which such tokenized deposits would be based.

These are dangers that might compromise the integrity and security of transactions, so threatening economic damage and reputation damage.

Among which internal auditing and control processes can be somewhat hard, all these activities relate to the execution of an all-rounded cybersecurity strategy using MFA and advanced cryptographic technologies.

Apart from following the General Data Protection Regulation, imposing on the processing and management of users' personal information in tokenized deposits secure and transparent treatment; so, protection of the users' personal data constitutes still another important method.

Furthermore highly valued is the security of smart contracts applied in managing operations connected to the tokenization of deposits and transaction management.

Smart contracts may include weaknesses that attackers could find use for if codes are incorrect. Finding and resolving any problems in smart contracts depends totally on independent audits of tokenizing technologies and developers.

4.1.2 Liquidity Management and Volatility

Another crucial operational risk resulting from the liquidity of tokenized deposits is related to the volatility of the bitcoin market.

Though in actual digital financial markets volatility in values can influence dependability of these instruments, tokenized deposits are meant to be more trustworthy than other

cryptocurrencies. Users could suffer unanticipated losses in case a tokenized deposit quickly loses value because of outside events or market swings.

Platforms that handle the distribution of tokenized deposits especially provide a difficulty for liquidity management since it is necessary to guarantee that transactions might be paid fast and securely. In the lack of sufficient resources or liquidity buffers for platforms to quickly meet the needs of their users, such disturbances may coexist with investor confidence loss.

Only the institutions would be able to lower this specific risk given appropriate managing of the reserves for liquidity and sufficient monitoring of the capital flow. Most likely, platforms to guarantee the value of the tokenized deposit stays better might also be integration with fiat reserves or stablecoins as part of stabilization systems.

4.1.3. Platform Failure and Counterparty Risk

The risk of the counterparties is directly related to the dependability of the platforms which deal in the tokenized deposits. When one issuer or holder of the tokens defaults in their duties, the clients stand to lose a great deal of money. This form of risk is therefore susceptible to many different risks, such as technological disasters that could compromise the operations of the exchange websites or token-issuing companies and corporate failures of the same companies.

To mitigate this risk, a proper due diligence procedure should be conducted in the selection of collaboration platforms. It is also important that the tokenization platforms are strictly bound by rules to maintain capital reserves, sufficient insurance coverage, and transparency in their financial operations.

Regulators may further use regular stress testing to ensure that platforms could, if necessary, cope with emergency situations without detrimental effects on the safety of money held by their users.

4.2 Systemic Hazards

“Systemic risks” is defined as the risks that occur from the possible negative effects that tokenized deposits can cause to the overall financial sector mainly if they are accepted on a large scale without any measures, systems, or laws in place.

They result from tensions between conventional financial systems and decentralized financial systems, as well as volatility in cryptocurrency markets.

4.2.1 Impacts on the traditional banking systems

A significant systemic risk arises from the interaction between tokenized deposits and the existing traditional banking system. If an attempt is made to exceed the bounds of conventional bank savings in order to replace bank tokenized deposits, banks may suffer some extreme liquidity exiguity.

By far lower operating costs, blockchain's transaction speeds and efficiencies may enable harsher levels of financial services access. Withdrawals of deposits to accounts that yield non-interest-bearing token savings accounts may cause banks to face a reduction in the capital base and a greater difficulty in maintaining the credit.

Moreover, banks and other intermediaries that normally participate in the deposit management cycle may be particularly at risk of disintermediation. Tokenized deposits and cryptocurrencies, in fact, replace the need for intermediaries, which disrupts the market structure and threatens the sustainability of many financial institutions that depend on traditional deposit revenue.

Cryptocurrencies and tokenized deposits are predicted to weaken central banks' control over funds, thus rendering traditional monetary policies such as adjusting interest rates or money supply as ineffective.

European Central Bank (ECB)'s 2020 report states that this could result in losing central banks' control over financial stability. This may complicate the management of economic policy at both the national and European Union borders.

4.2.2 Market Contagious Risk and Volatility

Another potential source of such systematic risk involves the possibility of any crisis or collapse in one bitcoin market spreading and causing international reverberations. Because markets in the digital sector are interconnected, tokenized deposits are increasingly susceptible to instability and panic in financial markets by traditional investors.

With the volatility of the market and given the current low financial activity in Bitcoin exchanges, the value of crypto deposits might collapse or become unstable.

More precisely, due to the low liquidity of the account, clients will face a problem in withdrawing their savings as tokens without huge losses.

Events like that create confidence crises, and so it was with the fall of several cryptocurrency exchange companies, like FTX in 2022, with which they also underlined the self-destructive tendencies of the market that doesn't promulgate constraints.

The rapid pace of development of digital assets and cryptocurrencies is a source of concern for the banking industry, especially in view of the progressive interdependence of the cryptocurrency markets and the traditional financial system.

According to the FSB, 2023, failure of a platform could trigger a more general level crisis that would endanger the viability of fiat currencies and other players in the conventional banking system.

In any case, a meltdown triggered by the fall-off in fiat currencies or even a crypto market would indeed be a serious threat to global economic stability.

4.3 Market Variations

Market risks for tokenized deposits pertain to volatility in prices and the innate volatility of cryptocurrency markets. Though tokenized deposits may be designed to be less volatile than other cryptocurrencies, fluctuations still pose a great risk.

4.3.1 Market Variability of Cryptocurrency

Of especial concern in relation to this latter point, for many tokenized deposits, is the volatility that can really drive such wild vacillations within value-for instance, in Bitcoin or Ethereum.

Because the value of tokenized deposits leverages these base market values for measurement, that instability can seep into those instruments and wreak quite a deal of havoc within one's invested amount.

Adoption of deposits tokenized and linked to highly volatile cryptocurrencies may expose investors to significant losses, thus deleting trust in the financial system and raising users' reticence to their use.

This is according to a research done by the European Securities and Markets Authority, ESMA, 2022.

4.3.2 Regulatory Uncertainty and Market Conventions

Another huge market risk comes with the regulatory uncertainty.

Although in its preparatory stage, the rules relating to tokenized deposits and even generally for cryptocurrencies, might bring surprises in changing legislation-such as modifications within tax laws or new regulations altogether, impacting the demand of instruments and thereby their perception of tokenized deposit risk.

Regulatory changes also risk fragmenting the market where different countries will have different and sometimes conflicting policies concerning tokenized deposits.

This can deter investors from every direction and slow the growth of the tokenized deposit market, reducing its long-term value.

4.4 Strategies and Remedial Actions

From cybersecurity to market volatility to the possibility of eventual bank disintermediation, tokenized deposits clearly create operational hazards; nonetheless, there are numerous ways to solve these important problems.

First of all, users should embrace protection options for them, including particular insurance plans for digital deposits, which can provide a buffer should issues or cyberattacks strike.

Moreover, banks may significantly help to avoid disintermediation by using sophisticated monitoring and risk management tools that enable fast identification and reaction to any system deviations.

The updating of rules represents another step forward: regulatory proposals meant to close the present gaps – with clear guidelines on liquidity management and consumer protection – would not only reassure the market but also help to enable a safer acceptance of tokenized deposits.

Basically, a coordinated approach including financial institutions, supervisory agencies, and technology developers will be necessary to turn these hazards into opportunities, therefore strengthening the general resilience of the financial system.

It is time to look ahead after closely analyzing the operational and systemic hazards connected with tokenized deposits together with the solutions suggested to minimize them. Although present issues draw attention to the need of specific measures, there are

also many chances to transform our approach to handle digital money. Chapter 5 will look at how legislative changes and technological development might help to build a more dynamic, safer, interconnected financial environment. Stated differently, we will go from analyzing the important problems to evaluating future scenarios, stressing how creativity and control can cooperate to turn today's difficulties into tomorrow's possibilities.

5. Future Perspectives and Development Scenarios

5.1 Overview of Future Scenarios

Thanks to fast technology advances, changes in market behavior and the adaption of rules in an increasingly digitalized environment, the tokenized deposit scene is expected to shift dramatically in the next years.

This chapter seeks to look ahead, investigating possibilities and patterns that can redefine the use of these tools in the worldwide financial system. We shall concentrate on four main areas without repeating what has already been examined in the previous chapters: technological evolution, possible adoption scenarios, future regulations (with particular regard to the European context) and the integration of tokenized deposits inside the current financial system.

The intention is to present a view into the future stressing the chances and difficulties that can arise during the banking sector's digital transformation.

5.2: Technological Development

Looking ahead, it is obvious that technology will keep strongly influencing the operation of tokenized deposits. Although in past chapters we have looked at modern technologies including blockchain, tokenization, and smart contracts - here we concentrate on new ideas that can improve these instruments even more.

Adoption of artificial intelligence (AI) for instance could make systems even more sophisticated and responsive. AI can help to optimize transaction verifying and monitoring procedures as well as to enhance risk management.

Imagine a method whereby, in real time, machine learning algorithms examine millions of data points to identify anomalies or possible fraud, therefore acting preventively without direct human involvement.

Quantum computing is another exciting frontier. While still in the early phases of this technology, quantum computing can revolutionize security and speed of transactions.

In a scenario in which the processing of complicated data in extremely short timeframes becomes crucial, thus strengthening the whole ecosystem, tokenized deposits could benefit from more modern encryption systems and faster validation processes.

Apart from these technologies, it is feasible to have a closer connection between blockchain and other developments including improved digital identification systems and the Internet of Things (IoT).

These advancements could enable linked items or smart devices to engage automatically with tokenized deposits, therefore creating situations whereby daily management of services and products is entwined with financial transactions.

In essence, technical development not only promises to increase the security and efficiency of tokenized deposits but also potentially change our interaction with digital money, so rendering operations even more fluid and interwoven into our daily life.

5.3 Adoption and Diffusion Sceneries

A major focus of the argument on the direction of tokenized deposits is their capacity to become a mass financial tool or, on the other hand, to remain a specialized solution limited for specific industries or organizations.

Many elements will affect this route of adoption. On the one hand, the passion for technical innovation, the faster transactions and the openness provided by blockchain could force more banks and financial institutions to try and include tokenized deposits into their offerings.

If true, we would have seen rapid diffusion since these deposits become commonplace in the financial scenario for real-time payments and hence reduced running costs.

However, there are a few issues that could restrain their wide acceptance. For example, mass adoption might be delayed by the need for regulatory changes and handling of cybersecurity concerns.

The conventional banking system, firmly anchored and generally resistant to drastic changes, could sensibly react and support a slow transition. In this case, tokenized deposits can start by being a niche commodity and used mostly in highly innovative sectors or in particular areas, such as interbank transactions.

The future of tokenized deposits will depend, therefore, on a chain of interrelated dynamics: technological evolution, the ability of institutions to safely and effectively integrate these solutions, and the speed at which the regulatory environment will be able to evolve in turn.

Only time will tell if they will stay an invention limited to particular situations or whether they will become a pillar of the modern financial system.

5.4 Potential Next Laws

Based on the legislative framework, European and international institutions will probably have to cover some voids in the present laws in the next years.

Although the present control—which consists of tools like the CRD/CRR and MiCAR—has shown to be a good beginning point, it is not totally able to solve all the problems presented by the digitization of bank deposits.

Aimed at integrating and modernizing current systems, particular rules for tokenized deposits could find their way in place. For example, such new regulations may ensure consumer protection while still keeping the door open for more stringent standards regarding technological risk management and cybersecurity.

Harmonized regulatory solutions at European and even worldwide could also result from a coordinated strategy considering the interplay between tokenized deposits, CBDCs and stablecoins.

While offering a foundation of stability that calms investors and financial institutions, this legislative evolution will be vital to help the acceptance of tokenized deposits.

5.5 Integration with the Financial System

Another crucial issue for the future of tokenized deposits concerns their integration into the traditional financial system.

The goal is not so much to replace traditional deposits, but rather to coexist with them, bringing advantages in terms of speed, transparency and reduction of operating costs.

One can imagine a future in which tokenized deposits become an integral part of the banking ecosystem: banks could use them to speed up interbank transactions, while at the same time maintaining the solidity of deposits guaranteed by consolidated regulations.

This integration will require careful coordination between financial institutions, technology operators and supervisory authorities, so that innovation translates into concrete benefits for the real economy.

In this scenario, tokenized deposits will not replace traditional deposits, but will offer a complementary solution, capable of responding to the needs of an increasingly dynamic and digitalized market.

Conclusions

This thesis has investigated in detail the idea of tokenized deposits and how these tools might show a link between the digital innovation presented by blockchain and related technologies and the consolidated banking legacy.

The first chapters have shown the concept and historical development of tokenized deposits, stressing how the arrival of blockchain and digitalization of banking procedures have offered fresh angles.

Comparing the CBDCs, stablecoins, and other digital developments with their operational and regulatory differences emphasizes the differences between them and their impact on the financial system.

The EU's legislative structure, specifically considering the present policies meant to fit this new reality.

These include operational and systemic risks that attract attention to important associated security, liquidity management, and possibly disintermediation of the conventional banking system.

We then looked to the future in Chapter 5, emphasizing that changing rules, technology development, and scenarios of acceptance may determine the fate of tokenized deposits.

Innovation comes with great potential for huge improvement in terms of efficiency, openness, and control over costs. Major obstacles can be identified but require thoughtful coordination by financial operators, technologists, and regulators.

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