

Introduction

The Banking in the Era of Distributed Ledgers

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Distributed ledger technology (DLT) refers to a decentralised and distributed digital system for recording and verifying transactions where multiple parties have access to the same database and can validate transactions without the need for intermediaries. A network of nodes maintains and updates the database, and transactions are secured through cryptography.

The conceptualisation of DLT can be traced back to the 1990s, but the first practical application of DLT was the creation of Bitcoin in 2009. Since then, DLT has evolved and expanded and is now being used in a wide range of industries. Among other sectors, the financial system as a whole, and banking in particular, have started to apply DLT to improve financial transactions and processes and to offer new products and services to their customers. In this sense, the financial system is going to be reshaped from the inside, in a process managed by the institutions that belong to it, exploiting the following main straight of DLTs:

- Security: DLT systems use cryptography to secure transactions and ensure that data cannot be altered retroactively.
- Transparency: They provide a shared ledger that is publicly accessible, making it easier to track transactions, and detect fraudulent activity.
- Efficiency: They can automate many manual processes, reducing errors and saving time.
- Decentralisation: They do not rely on a single central authority, reducing the risk of downtime and increasing the system's resilience.
- Cost savings: They can reduce the need for intermediaries, reducing the cost of financial transactions and improving accessibility.
- Traceability: They provide a clear and transparent record of transactions, making it easier to track the movement of assets and prevent money laundering.

By improving the efficiency, security, and transparency of financial transactions, this technology has the potential to (i) streamline payment processing: DLT is being used to automate and streamline payment processing, reducing the time and cost of transactions; (ii) reduce redundancy of roles: DLT is being used to eliminate intermediaries in financial transactions, reducing the cost and increasing the efficiency of these transactions; (iii) improve security: DLT is being used to improve the security of financial transactions, reducing the risk of fraud and hacking; and (iv) provide more access to financial services: DLT is being used to create new financial services and to provide access to financial services to those who previously lacked access, such as the unbanked and underbanked populations.

Due to the potential to provide significant benefits to the financial system, many traditional banks, stand-alone or joining a consortium, are exploring ways to use DLT to improve their services and remain competitive. At the same time, DLT has the potential to pose a threat to the traditional banking system for several reasons. First of all, by enabling decentralised and peer-to-peer transactions, DLT may reduce the need for intermediaries and disrupt the traditional business models of banks. Furthermore, being a decentralised technology, DLT takes away from banks the control they traditionally exert on the financial system. Moreover, DLT, equally to the other disruptive technologies that are reshaping banking models in recent years, has the potential to create new players in the financial services industry, increasing competition for traditional banks.

Security concerns are a key issue in evaluating the threats of DLT in the financial sector. While this technology can improve the security of financial transactions, there is still a risk of cyberattacks and other security breaches, which could threaten the financial system's stability. Finally, banking faces many regulatory challenges. Often, DLT operates outside of the traditional regulatory framework, and there are still questions about how this technology will be regulated and what impact this will have on traditional banks.

In light of the above, the position of DLT in banking can be seen as controversial as it is a rapidly evolving technology with both potential benefits and challenges. It is crucial for individuals and organisations to carefully evaluate the potential impact of DLT on the banking industry and to make informed decisions based on their risk tolerance and business objectives. Even current

literature is unable to provide a definite answer. The academic literature on DLT in banking typically takes a multi-disciplinary approach, incorporating computer science, finance, economics, and law insights. Some of the key themes that the academic literature addresses include:

- Technical aspects of DLT: many studies focus on the technical aspects of DLT, exploring how this technology can improve the efficiency, security, and transparency of financial transactions.
- Economic implications of DLT: other studies focus on the economic implications of DLT, exploring how this technology is changing the financial landscape and what this means for traditional banks and other financial intermediaries.
- Regulatory challenges: the academic literature also addresses the regulatory challenges posed by DLT, exploring the need for new regulatory frameworks to ensure that this technology is used safely and responsibly.
- Social and ethical implications: some studies also focus on the social and ethical implications of DLT, exploring the impact this technology has on society, and considering the ethical and social issues that must be addressed.

To explore the impact of DLT in the banking sector (as of December 2022), we offer the reader the opportunity to exploit different points of view of contributors pertaining to different disciplines. In doing so, the book attempts to combine theory and practice in two ways: (i) by involving academic contributors of international relevance, authors from regional and international institutions, and practitioners active in the financial system and (ii) by trying as much as possible to represent the topic in each chapter from both a theoretical and practical point of view, also highlighting concrete applications with the help of boxes. Aiming to create a more effective and engaging experience for the reader, the book is divided into the following five parts:

- (i) Why pay attention to Distributed Ledger Technology in the banking? (Chapters 1–2)
- (ii) Opportunities and Challenges in Crypto-Asset Regulation (Chapters 3–5)
- (iii) The Power of Distributed Ledgers in Payments (Chapters 6–9)

- (iv) Enabling Financial Inclusion and ESG with Distributed Ledger Technology (Chapters 10–11)
- (v) A Further Look at DLT in Banking: Lessons Learned, Current Applications, and Future Scenarios (Chapters 12–13).

Going deeper into the book's content, Chapter 1, authored by Di Ciccio, recalls the technical aspects of DLT and blockchain and their economic implications, which helps address and better understand the technical aspects addressed in the following chapters. Particular attention is paid to the technical features, essential procedures and guarantees, and implementation in a decentralised way. The advantages and disadvantages of this technology are also highlighted.

In Chapter 2, Leo and Delle Foglie, with a purely academic approach, conduct a thorough literature review to define the shape of research carried out by researchers on the topic, in the belief that scientific research can significantly contribute to finding solutions to address critical issues arising from banking, given its fundamental role in the growth of today's market economies.

Chapters 3 – authored by Annunziata – and 4 – edited by Daly – present two different views on regulatory issues, the former more academic, the latter from a banker's point of view. More in detail, Annunziata focuses on major concerns posed by the Markets in Crypto-assets Regulation (MiCA), and Daly underlines how regulatory uncertainty, stemming mainly from confusion regarding the legal classification of crypto-assets, hinders the provision of services by banks and increases risks for consumers and investors. Chapter 5, written by Adinolfi and Gaeta, discusses how the nature of Virtual Asset Service Providers (VASPs) can be used for criminal purposes; in this scenario, authors point out how regulation is necessary for the uncontrolled development of the illicit exploitation of a DLT as an upstream subject of VASPs, and the role of the Financial Action Task Force (FAFT) in orienting international actions to counteract cyber laundering phenomenon throughout VASPs.

DLT is largely used to transform the payment system. Chapter 6, co-authored by Agnoletti and Sfolcini, discusses how flexibility, transparency, and rapid scalability of DLT and cryptographic resources could revolutionise the finance and payments industry. The authors assert that the payments industry has an opportunity to innovate, particularly in cross-border, micro, and conditional payments.

Moreover, how, for this innovation to reach its full potential, existing high levels of risk and uncertainty must be addressed and a clear and shared regulatory framework developed between national and cross-border authorities. The authors post on the case of Nexi, which drives a safe and easy transition to a better society by promoting widespread inclusion, protecting all private and public stakeholders, and regulatory clarity.

The use of DLT allows for a decentralised and secure system for issuing and managing Central Bank Digital Currencies (CBDCs). Consequently, we devoted Chapters 7–9 to address the issue from several points of view.

Chapter 7, written by Civelli, Georg, Grassano, and Ihsanullah, covers three main themes. First, it identifies the difficulties a CBDC might respond to and reasons for understanding them better. Second, it examines ideal CBDC design concepts based on interviews with central banks, national and supranational authorities, market actors, and academics in different jurisdictions. Finally, it presents an Algorand-based retail CBDC system that fits these design standards. Chapter 8, written by Attanasio and Del Vitto, through an illustration of the Spunta DLT project, discusses how the Italian Banking Association has concretely brought licensed blockchain to the Italian banking sector through an infrastructure for banks operating in Italy that will be able to host other applications. Then, the chapter discusses the European Central Bank's (ECB) ability to issue a CBDC and the Associazione Bancaria Italiana's (ABI) position. This competition illustrates an experiment of the digital euro based on the DLT experience. While Chapter 9, by Taiji and Wataru, argues for introducing an Asian digital common currency (ADCC) as a multi-lateral synthetic currency that coexists with local currencies in the region. Using DLT, the issuance of ADCC is relatively simple, similar to how central banks today receive physical banknotes produced at the printing office. Each country's central bank would then issue ADCC as its liability secured by ADCC-denominated bonds because ADCC is not each central bank's legal tender and is distributed to national economies through commercial banks to be used for cross-border payments.

The book then focuses on the role of DLT in financial inclusion in Chapter 10, authored by Natarajan and Bossone. The authors analyse this potential, using the literature on the underlying reasons for

financial exclusion and what has worked, juxtaposing them with the benefits of DLT and how they might be relevant in addressing the underlying causes. The chapter describes the challenges in realising DLT's potential and risks.

Ho, in Chapter 11, focuses instead on the fact that the popularity of digital assets and blockchain solutions is accelerating, exploring the environmental, social, and governance (ESG) impact of digital assets due to the growing participation of retail and institutional investors. For the author, blockchain technology can help financial institutions achieve favourable corporate ESG outcomes.

Chapter 12, co-authored by Panetta and Leo, looks into the metaverse's intermediaries. The authors investigate that the metaverse is receiving significant attention from the banking industry because of its endless possibilities for virtual consumer interactions. As a natural progression of their sector, banks are interested in seeking the metaverse to develop stronger ties with their customers as they increasingly use technology to deliver their services. However, the value added for banks needs to be thoroughly analysed, and the absence of precise regulation may create reluctance. In addition, the metaverse may increase concerns about cybercrime in the financial and banking sectors. In the chapter, the authors examine banks' approaches to the metaverse as a new method of using the promise of DLT and provide a framework summarising the development prospects (and risks) for financial intermediaries.

Finally, in Chapter 13, Leo and Panetta provide an overview of DLT in the banking sector, highlighting current problems and fundamental changes in the industry. To this aim, the chapter examines the major DLT projects and implementations in the banking sector, classifying them into two main categories based on the type of need being met—that is, products and services designed to meet the needs of customers of financial institutions and internal processes and operations aimed at meeting the needs of financial intermediaries. The authors, in the chapter, focus on the main characteristics of the prevalent use cases in the industry, highlighting strengths and weaknesses.

In light of the above, we hope the book could be a valuable source of knowledge and information on the role of DLT in the banking system. Unlike others in this contribution, we want to emphasise how DLT can be used to respond to new user needs and pressures from

competitors. DLT can represent an opportunity and not a threat to the banking system.

In a nutshell, the book looks at DLT not as a threat (as it did for banks in the first instance), not as a panacea (as it does for cypher-punks and blockchain enthusiasts), but as an exciting opportunity to bring the banking/financial system in the future (as scholars and academics should see it).

