CHAPTER 1

Introduction

Maurizio Pompella and Roman Matousek

We decided to propose to the publisher this handbook on Fintech and Blockchain about a couple of years ago. The reason we had moved in this direction was the rapid development of new technologies applied to finance and financial intermediation, combined with the Blockchain spread in almost every field of economy and society. While thousands of Fintech start-ups were emerging all over the world, Distributed Ledger Technology was gaining in popularity and effectiveness, and Internet of Things was becoming part of our daily life. All this, and especially the idea that a synchronous, consensually shared database could replace many of the institutions traditionally in charge of the settlement and management of processes unchanged for decades, or maybe since "time began," was something intriguing that couldn't fail to be addressed, from our perspective. This is what we tried to do with an extensive, comprehensive, volume.

We therefore started to look for adhesions among our academic colleagues, and more experienced professionals from these fields, having a very broad, planetary horizon. The result is a volume in which more than 30 outstanding scholars and professionals from all over the world have contributed. Our

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greatest gratitude goes to them, for the energies they have dedicated to this work, especially in the adverse contingency we are now suffering from.

An affectionate thought goes out to two colleagues who unfortunately could not keep the original commitment. Namely, our great friend Professor Christopher Culp, who passed away prematurely last summer, and a young colleague who had to fight for over three months against the virus that is currently continuing to plague the planet, before she could be "on top of things" again. COVID-19 has profoundly influenced the process followed during this handbook production, actually, and imposed a series of unexpected changes. We were forced to delay any of our responses to the publisher, in fact, and to postpone delivering as a consequence. But it also offered the opportunity for a few updates, that could allow us to take into account what is going on because of the medical, and social emergency. This is the spirit of the final chapter in fact.

The handbook starts with a chapter that provides an introduction to Fintech from the historical perspective. Paul Griffiths in his contribution provides an overview of the genesis of Financial Technology and its impact on the business environment. Griffiths tries to search answers for the most relevant questions that are important for a deeper understanding of the penetration of Fintech into the business environment and the role of the Global Financial Crisis (GFC) on the development of Fintech. The author searches to answer the following fundamental questions: Why did Fintech emerge as an industrial sector, independent of banking? How is the Fintech industry organized, in terms of the services it offers and the technologies it applies to deliver those services? What is the relationship between banks and Fintechs, and how has this relationship evolved over time? The author argues, among other important issues that the GFC in 2007–2008 and immediate regulatory changes negatively affected the banking industry that lost sight of the technological breakthroughs and social changes. As a result, the industry left windows wide open for nimble companies based on ground-breaking technologies to emerge and "eat its lunch". It is further argued that the troubles of traditional and/or incumbent banks were compounded by the advent of the knowledge economy. Banks faced difficulties to keep up as selecting a new technology that will drive its processes is no minor decision for a bank and in times when so many technologies are emerging, it is hard to predict which will be the winning ones. Griffiths points out that this was aggravated by developing the business-cases for change based on criteria of the industrial economy. It seems that technology selection is not a level field. He further argues that banks as incumbents have far more to lose than Fintechs and therefore the question is whether extant strategy-technology alignment models apply to banks in times of so much disruption.

In Chapter 3, Zhuo Zhang provides an insight view on financial engineering and Information and Communication Technology (ICT). The chapter is dived into five mutually linked sections. The chapter starts with an informative

overview of the discipline, including the conceptualization of both financial engineering and computational finance. The next sections then provide a synopsis of the evolution of financial engineering from the early 1700s to the present day. The adopted analytical approach logically shows how financial engineering and ICT developed over the last three centuries with the particular emphasis on the last forty-fifty years. The following section overviews the algorithm concepts and software implementation and their significance in financial engineering. Special attention then is devoted in Sect. 3.4 to ICT that include some deeper thoughts about the rise of modern computers and the digital revolution. The chapter then concludes by exploring the importance of ICT in finance.

Rupesh Regmi and Denesh Rai in Chapter 4: FinTech and Blockchain: Contemporary Issues New Paradigm and Disruption, address several important issues. They argue that the expansion of Fintech has shown promising growth, which was not possible in the field of information communication and technology (ICT) without a thousand corrections. Furthermore, the peculiar feature of blockchain technology that disregards the middleman vastly changes the financial sector landscape. The agent-free process, customized human identification, smart digital contract, global open transaction, etc. are some of the lucrative benefits of blockchain technology that makes Fintech appealing. The path to regulation of a FinTech will be faster and less costly than large financial organizations established. As such, it will empower FinTechs to provide compliance data mapping solutions that help the customer simplify data inventory production and processing registers cheaply and efficiently. The authors also devote their discussion to blockchain. They state that blockchain concept and technology previously used for the generation of bitcoin and the transaction has expanded its area of application due to its properties such as security, privacy, traceability, original data provenance, and time-stamping. The authors also discuss the numerous benefits of blockchain, that is to secure every type of transactions, whether human-to-human or machine-to-machine. They argue that blockchain is still in its early phase, altering its features as per global demand. For data security, blockchain requires another internet component to make it trustworthy. The chapter concludes by pointing out that a further expansion of Fintech and Blockchain is to be undermined by the security and regulatory measures. His framework will address the dangers previously inaccessible. Specialized work to form regulatory measures will help foresee Fintech's dependence on blockchain technology.

The following Chapter 5 prepared by Roman Matousek and Dong Xiang focuses on the challenges and opportunities of Fintech companies. The authors show how the digitalization is galloping to every business area and in particular in financial sector. It is further argued that the implementation of technological changes is driven by customer's demand that is influenced significantly by millennium generation. The changes of the banking sector and its products are distributed across all bank's activities: retail banking including progressively expanding mobile banking, wholesale banking, and of course insurance

companies and their use of blockchain. The authors give the main attention to the key areas that give a better understanding of the complexity of the penetration of Fintech into the banking sector. The chapter starts with a discussion about "Creative Destruction of Traditional Banking", where the key aspects of the evolution and implementation of Fintech are discussed. The discussion is underpinned by a broader theoretical framework. The discussion then follows by highlighting the link between bank competition and the introduction of new technologies. A substantial part of the analysis is then devoted to the role and future of new technologies and new types of banks. The analytical overview is then wrapped by the exploration of the regulatory challenges with a special focus on regulatory sandboxes.

In Chapter 6, David C. Broadstock, Louis T. W. Cheng, and Jack S. C. Poon of The Hong Kong Polytechnic University analyze Fintech Unicorns. This very original contribution shows how Fintech has emerged as a disruptor for financial services. Technology maturity in key factors including cloud computing, big data, artificial intelligence, blockchain and smartphones have culminated in meteoric successes among fintech start-ups, and the emergence of fintech unicorns—privately held start-ups with a valuation exceeding USD$1 billion. The successes among fintech unicorns have sent shockwaves throughout the financial services sector. The authors discuss the implications of this to the current and future roles of key market players including regulators, incumbent finance, technology, and dedicated fintech firms, as well as new entrants. The discussion is underpinned by an analysis of initial public offerings of unicorns in China, as a performance indicator for tech start-ups, allowing for richer discussion on the components of a successful fintech business model. It is argued that Fintech unicorns epitomize the disruptive potential of fintech as a whole toward the financial services sector and are generating huge uncertainty and risk to traditional financial services providers. customers. The authors point out that an exciting prospect is that fintech unlocks lower cost advanced financial services solutions. The potential value of this is not to be understated, since advanced banking, investment opportunities, life-long wealth planning, and other financial services have often been confined to preferred banking customers with large enough savings to justify the expense to a bank for providing bespoke financial advice. Through automation, AI and fintech can vastly reduce the costs of providing a version of such services, making them accessible to a considerably larger fraction of the population. The subsequent improvements in financial literacy and economic welfare which may ensue are an exciting prospect. The authors further bring up to the reader's attention also concerns that financial specialists have e.g., financial analysts, concerning the potential role of fintech to provide automated/programmatic analyst solutions, and these are legitimate. There will need to be a re-positioning of staff over time, with some roles becoming more machine-based, yet there will always be a human interface component to financial services provision. In summary, fintech will undoubtedly change the face of financial services, and the balance of personnel required in different

service areas, but it cannot replace the functions of incumbent financial services providers.

Tanguy Jacopin in Chapter 7 provides a case study that explores Fintech, Big Tech, and Banks in India and Africa. Jacopin shows that the disruption within the financial ecosystems of India & Africa was made possible by pressure on the competitive landscape that did mobilize many financial resources in IT for Indian incumbents and in M&A for African. It is further argued that as such, these banks were not able to attend properly the challenge of inclusive growth. At the same period, African mobile operators such as M-PESA paved the way toward mobile payments in Kenya whereas the Indian regional entrepreneurial ecosystem in Bangalore was taking off apart from BPO. With the subprime crisis and the advent of big data and digitization, big techs and financial start-ups took the opportunity to disrupt the local financial ecosystems as incumbents were already weakened. Jacopin further explains that despite low average incomes, poor financial inclusiveness, and a negative legacy, both Indian and African financial ecosystems are the most dynamic at the global scale providing some relevant insights for the benchmark for their counterparts. The author finds that even though the organization of the geographic space is different, comparing Fintech in India and Africa, it provides a framework where the disruption takes place in a different context. It is shown that if banks in India have managed until recently to preserve better the microsphere of activity. This was due to large IT investments that enabled the capillarity to reach 80% by 2020. It is also shown that the existence of entrepreneurial ecosystems around Bangalore, Delhi, Mumbai, Chennai, and Hyderabad paved the way for deals in venture capitals that should be relevant in the upcoming years. In the case of Africa, national incumbents were right to consider M&A when French & English banks left Africa for Asia as it has enabled them to become regional players. Nevertheless, as this phenomenon coincided with the digitization and the mobile payment revolution provoked by M-PESA, all telcos managed to enter mobile payments with the support of local fintech. As it was a source of new income for governments, the barriers to entry that used to protect incumbents disappeared. Jacopin then concludes that in both regions, the competitive landscape has evolved in a much favorable aspect for consumers and the customer experience should be a major stake in this open banking scenario where the influence of Big Tech may increase drastically in the upcoming years.

In Chapter 8: Fintech and the Real Economy—Lessons from the Middle East, North Africa, Afghanistan, and Pakistan (MENAP) Region, Inutu Lukonga of the International Monetary Fund tries to identify the policy mix that can enable MENAP SMEs to leverage digital technologies to boost growth and promote inclusive growth. The analysis addresses three principal questions relating to the digitalization of SMEs in MENAP: Can digital technologies usher in a new era of resilience, growth, and quality employment generation among SMEs? How digitalized are SMEs and what constraints do they face in digitalizing their businesses? What policy mix can enable SMEs

to leverage digital technologies to boost their growth and achieve inclusive growth, and what role should the government play? The author applies benchmarking techniques and gap analysis to evaluate the performance of MENAP SMEs and identify needed policies. The review covers 21 of the 24 countries that make up the MENAP region. The analysis is based on both primary and secondary data sources from central bank reports, presentations by senior government officials, World Bank enterprise surveys, and other studies, as well as information obtained through seminars at the IMF, World Bank, and the MENA region. The chapter's analysis is divided into several key sections. The first part provides an overview of the landscape for SMEs in MENAP, focusing on their structure, performance, and constraints to growth and employment contribution. Lukonga also explores the benefits of SMEs adopting digital technologies, reviews digitalization trends of MENAP SMEs and the broader economy, and identifies the factors that hamper digital transformation among SMEs. The final part then summarizes the findings and discusses policy strategies to enable SMEs to leverage digital technologies to boost their growth and employment creation, thereby facilitate inclusive growth. In the conclusion, the author states that more systematic and regular compilation of SME data is needed to facilitate policy formulation that is evidence based. This requires information on the number of firms—characteristics of the SMEs by size, gender, age, and education, their sectoral distribution, their contribution to output and employment, new entries and exits, gender participation, and bank credit to SMEs and SMEs share of NPLs.

Lin William Cong of Cornell University, Beibei Li of Carnegie Mellon University, and Qingquan Tony Zhang of University of Illinois Urbana Champaign's Gies School of Business in their Chapter 9: Alternative Data in FinTech and Business Intelligence introduce recent research in economics and business-related fields utilizing data from unconventional sources or of unstructured nature. The chapter highlights unifying themes of such big data and the methodologies for analyzing them at scale, this chapter elaborates the applications of (i) textual analysis in corporate finance, investment, and macroeconomic forecasts, (ii) image processing in financial markets and governance, (iii) digital footprints from social media and mobile devices, and (iv) emerging data from the Internet of Things. The authors also discuss promising directions of using alternative or unstructured data for both academics and practitioners. The chapter provides an insight into the major types of alternative data, as well as the methods and examples of analyzing or utilizing them, in academic research or practice. The chapter starts with textual data and analytics, which have been used in finance and accounting since the dawn of the century. The authors then introduce the various approaches, the data sources, and recent developments and examines mine images, another form of unstructured data that is available in abundance before touching on audio and video data. The substantial part of the analysis is then focused on the Internet of Things (IoT), which has become prominent in tech innovations and represents a dominant source of alternative data. The authors summarize

the key takeaways of the discussion in this overview of research in economics and business-related fields utilizing alternative data. They also provide a review of the merits and scope of the different categories of alternative data and the methodologies that have been considered. In particular, they highlight textual analysis in corporate finance, image processing in financial markets and governance, digital footprints from social media and mobile devices, and IoT-based data retrieval and applications. The authors also state that the general trend and utility of using alternative data are here to stay and are likely to significantly impact the world of FinTech and business intelligence.

Chapter 10: Bitcoin and other blockchain technologies—mechanisms, governance, and applications prepared by Shoutong Thomas Zhang. Zhang explains that Bitcoin was created to achieve primarily an organizational rather than technical goal. That goal was decentralization. That is, Bitcoin intended to have no single person or organization be in control of the system. One of the original motivations for this was to avoid possible legal consequences to any identifiable entity for running an unauthorized currency system. He further argues that Bitcoin achieved decentralization by using a shared and regularly updated file called a blockchain to coordinate the activities of its decentralized users. The maintenance of this blockchain file requires a careful set of governance procedures, which are the core innovative aspects of Bitcoin. There are three interrelated components to Bitcoin's governance. The first is a set of procedures on how to update the blockchain without a central administrator. This is known as the consensus protocol. The second is a system of incentives for users to contribute computing resources to maintain the blockchain, a process called mining. This mining activity is incentivized by a system of fees and rewards. The third is a process to amend the official Bitcoin software if and when needed. This is done in a way similar to majority voting. Bitcoin's governance mechanisms have proved at least functional, if not effective, in operating the decentralized Bitcoin system. Indeed, Bitcoin has already now arguably withstood the test of time. The discussion is further directed to blockchain applications. The author argues that blockchain applications have emerged since Bitcoin. However, not all of these applications are aligned to the characteristics of blockchains. I conclude with a discussion and critique of five major categories of current applications and their suitability to blockchains. Two appropriate applications of blockchains appear to be decentralized payment systems and the sharing of digital resources, such as storage space or internet bandwidth. The more ambitious blockchain application of smart contracts is also in theory feasible, but practically still undeveloped. In contrast, blockchain applications for data security seem to be less well aligned to the nature of blockchains. Finally, applications of blockchains that are not decentralized but for use only by closed groups (so-called private blockchains) are generally not beneficial except in very specific circumstances, because there are more direct ways to coordinate the activities of a closed group than through blockchains.

Chapter 11 prepared by Andria van der Merwe provides an excellent overview about blockchain and structured products. The discussion starts with a description of the current status of the development. It is shown that many innovative structured products have been introduced that offer digital variations of more traditional structured products such as asset-backed loans and asset-backed securities. Van der Merwe in her analysis points out that the digital structured products differ in their jurisdiction and the number of regulatory requirements, the type of trading venue (over-the-counter or exchange), and the risks. The author stresses the importance of the blockchain as a fundamental building block of these innovations, these products are necessarily exposed to the inherent risks in the blockchain technology such as possible attack from hackers or a potential lack of market liquidity for the underlying cryptocurreoncludes that digital structured products are still in their infancy. Despite that fact, there is a growing interest in these products in particular from investors searching for higher-yielding assets in a low-interest-rate environment. It is shown that structured digital products such as Arca U.S. Treasury Closed-End Fund or the Genesis Capital cryptocurrency-backed lending are grounded in traditional financial principles enhanced with the efficiency of the blockchain. Van der Merwe further shows that other digital structured products are rather novel applications of innovative blockchain technology that include the Ethereum smart contract in the cryptocurrency-backed Dai stablecoin.

The research focus of Chapter 12 that is titled: Categories and Functions of Crypto-Tokens prepared by Lin William Cong and Yizhou Xiao, is given on the discussion about emerging research on digital tokens and cryptocurrencies. They (i) provide a comprehensive categorization of crypto-tokens as observed in practice or being designed, (ii) discuss major issues concerning the economics of using tokens including platform finance, user adoption, stable coins, crowdsourcing, and agency issues, with legal and regulatory implications, and finally, (iii) suggest future directions of digital currency applications and tokenomics research.

Chapter 13: Emerging prudential approaches to enhance banks' cyber resilience is written by Juan Carlos Crisanto and Jermy Prenio of Bank of International Settlement argue that cyber incidents can pose a significant threat to the stability not only of the financial system but also of the global economy. Crisanto and Prenio show that within the financial sector, banks typically have the most public-facing products and services and could be used as entry points for attacks targeting other parts of the financial system. It is further argued that strengthening cyber resilience is, therefore, a key area of attention for banking regulators and supervisors. Regulatory expectations on cybersecurity, which can either be embedded into risk management regulations or established as separate cyber resilience regulations, focus on identification, protection, detection, response, and recovery capabilities of banks. In terms of supervision, most supervisors are assessing cybersecurity as part of their ongoing risk-based supervisory activities, while others are complementing these with

thematic or specialized supervisory reviews. Regulatory expectations generally inform supervisory reviews but in certain cases, such as in testing cyber resilience, supervisors use specific frameworks or tools. The authors point out that it is necessary to explore further collaboration with the industry in strengthening banks' cybersecurity and to pursue greater cross-border cooperation. The detailed analysis also shows that in some jurisdictions, regulators are working closely with the industry in creating or promoting platforms for intelligence-sharing, developing a pool of cybersecurity professionals, and establishing guidelines on penetration testing. Crisanto and Prenio indicate that this could be a model that other jurisdictions could use, especially those with limited regulatory and supervisory resources, smaller banks, or a scarcity of cyber- and information security professionals. Moreover, given the scarcity of cybersecurity resources and the cross-border nature of cyber risk, the need for supervisory cooperation cannot be overemphasized. In this regard, the BIS's Cyber Resilience Coordination Centre (CRCC) is expected to play a key role in facilitating cross-border cooperation. The CRCC seeks to provide a structured and careful approach to knowledge-sharing and collaboration between central banks in the area of cyber resilience. A core CRCC service is to provide a secure collaboration platform for information-sharing on multilateral cyber threats.

Chapter 14 is prepared by Zenu Sharma and Yun Zhu. The authors overview research on blockchain development, funding of blockchains through ICOs (initial coin offering) and discusses also the implications for risks and regulation of blockchains. This Chapter provides an insight into various risks posed by new technologies. Sharma and Zhu explore ICO with the particular emphasis on the platform developments phase, the recent developments in the blockchain technology/industry. The chapter starts with a brief discussion on the background of the platform development of blockchain system, with a unique focus on the difference between permissionless and permissioned blockchains, and evaluate the consensus mechanism of the permissioned system, which has more pronounced prospect in high-level applications. As for the permissionless blockchains, the authors cover the most trending topic in various types of digital tokens, including Bitcoin and other popular cryptocurrencies, as well as the debate in choosing between ICO vs. Airdrop in developing a new token. This discussion is then followed by the examination of the dark side of the technology. Sharma and Zhu explore various risks and challenges that arise from the blockchain ecosystem, including the traditional systemic risk of the financial system. Consequently, with the challenges and opportunities associated with Blockchain technologies, they further review a few policy responses adopted by various governments in regulating DLT/Blockchain, in issues related to consumer protection, competition and the enforceability of contracts, and cross-border coordination.

Chapter 15: Blockchain and Cyber Risk: Identifying Areas of Cyber Risk and a Risk-based Approach for Executives by Charla Griffy-Brown, Mark W.

S. Chun, Howard A. Miller, and Demetrios Lazarikos. The authors start their analysis by showing that the blockchain architecture could help to improve cyber defense, as the platform can prevent fraudulent activities through consensus mechanisms. It is further argued that the technology can help to detect data tampering based on its underlying characteristics of immutability, transparency, auditability, data encryption & operational resilience (including no single point of failure). The authors point out that there is little evidence in the existing body of research literature on the topic of blockchain, the associated risks, and the extent to which these risks can be evaluated and incorporated into corporate decision-making. Thus, they impose the following research questions: What are the risks associated with blockchain? How can these risks be evaluated and integrated into corporate decision-making? The conducted To answer these questions, the arguments are based on previous research and by developing a risk-based approach for securing our current complex enterprise architecture and agile data center environments. The research methodology involved a survey and interviews with 60 executives from 80 companies from Sept 2018–2019. The authors developed cyber-physical framework for executives to use. This specific chapter offers insight by methodically identifying and characterizing the main risks in blockchain and providing a practical framework and tools for making better security decisions involving this technology. Finally, the authors propose a model for addressing security with the growth of blockchain and other emerging technologies. They suggest that it is essential to focus on the project life-cycle, the deployment process, and constantly asking questions to identify risk as part of the project management organization.

Chapter 16: Fintech and Financial Intermediation written by Panagiota Papadimitri, Menelaos Tasiou, Minas-Polyvios Tsagkarakis, and Fotios Pasiouras, provides a discussion of how the three main product sectors of FinTech are so far seen interacting or potentially disrupting in the near future—key segments of financial intermediaries, as well as an overview of FinTech regulation and financial stability aspects. The authors show that FinTech innovation has truly captured the interest of various agents in the economy over the past decade. The accelerating hype can be observed in several forms, starting from simple interest in the general population, to product adoption rates, and investment indicators. The three product sectors seem to relate directly to banking services, which, combined with the exponentially accelerated hype over the past five years, yield the question of whether this wave of innovation brings any sort of disruption in financial intermediaries' business models. It is argued that the early views and estimations are somewhat mixed on this front, and they may be dependent on the specific product sector and/or for a specific market segment. The analysis indicates that FinTechs have so far enjoyed a booming period, which can be attributed to a declining post-crisis consumer trust in intermediaries, and the lack of strict regulating frameworks like those surrounding traditional banks. Yet, with the spotlight on this industry and the gradual entry of Big Techs in the arena, this

may well change in the near future. The authors try to assess the impact of the evolution of fintech products and services on the banking industry. They identify five scenarios to describe the potential impact of fintech on banks. They also impose an important question whether the FinTech is a true "revolution," or if it simply remains a mere "evolution." They show that fintech overall is actually just natural market evolution and the assumptions about disruption—or indeed, creative destruction—are, with apologies to Schumpeter, probably out of proportion. Indeed, some early signs and executives' thoughts seem to lean toward intermediaries adapting, evolving and even co-operating with innovating FinTech players, rather than directly competing against. After all, let us not forget that, when a pie increases in a market, it may as well be the case that everyone's share is enlarged, even if unequally. Thus they conclude that banks generally open to innovation and challenge may as well simply "have their cake and eat it too."

Chapter 17: Financial Disintermediation: The Case of Peer to Peer Lending written by Petr Teplý, Yael Roshwalb, and Michal Polena, focuses on innovations in technology used by finance and banking companies specifically designed to replace established industry middlemen, otherwise known as "financial disintermediation." The chapter is organized as follows: Sect. 17.2 provides a review of the use of blockchain in financial services. In Sect. 17.3, we discuss P2P lending in a broader context regarding credit risk management. We analyze essential risk management methods recently applied by P2P platforms and also present a case study on the use of blockchain in the P2P lending market. Within this context, we review the key advantages, such as cost reduction, time management, competitive interest rates, flexibility, and better credit risk management on P2P lending blockchain-based platforms against their disadvantages, including the infancy of blockchain, regulatory uncertainty, the inherent risks of P2P platforms and the riskiness for an investor. In addition, we provide a brief review of classifier methods that rely on collecting datasets for decision trees which allow for analysis dependent on the quality of the data itself. However, aggregating collections of decision tree results, such as with random forest analysis, could provide the ability to analyze numerous portfolios of P2P lenders over time, a perspective that could lead to less biased and more robust predictive insights. Finally, Sect. 17.4 concludes the chapter and states the final remarks. In this chapter, the authors present a review of innovations such as blockchain, smart contracts, artificial intelligence, and machine learning approaches. The authors discuss both the recent and the potential uses of blockchain from accounting, legal, and financial perspectives and briefly reviewed smart contracts, a high-level summary of classifiers and risk scoring methodologies. The authors identified five business areas dependent on P2P blockchain technology that have been identified as promising in financial services: payments and remittances, credit and lending, trading and settlement, compliance, and record management. A further contribution to extensive research in this particular area, the authors overview the performance measurement techniques based on classifiers to forecast loan defaults and refine

credit scoring. It is shown that three main areas, in which "blockchain as a service" can be superior are the following: blockchain-based creditworthiness assessments, blockchain and real-time accounting, and historical data-keeping. It is important to note that while the integrity of blockchain code may withstand hacking attempts, the transaction data itself must be accurate and devoid of fraud for the value of blockchain to be recognized. At the end of this chapter, the authors then estimate that the funding of P2P platforms will increase from a recent USD 100 billion to USD 150 billion by 2025 (of which we forecast a 10% market share of P2P blockchain-based platforms or USD 15 billion in absolute terms). These numbers suggest that investment in P2P blockchain-based platforms will rise in the coming years and disrupt more traditional lending establishments relying on "analog" credit scoring methodologies. In terms of potential disintermediation, the authors estimate that a catalyst to the exponential growth of the P2P platforms in the future would be if the private credit market, comprised of high-net-worth individuals offering direct loans (e.g., loans in excess of USD 50 million+) in exchange for high yields, were to adopt P2P platforms as their foremost vehicle for extending credit, managing their portfolios and collecting on defaults. Finally, it is concluded that future research will undoubtedly analyze the upcoming trends in loan defaults or investments to provide real insight on P2P platforms during unprecedented market conditions.

Chapter 18: Fintech and Blockchain based Innovation: Technology driven Business Models and Disruption by Maurizio Pompella and Lorenzo Costantino, is about the continuously evolving business models adopted in the Fintech sector, and more specifically is focused on the question of whether Fintech and in general disruptive technologies related to digital banking will lead to the end of traditional banking, and will make banks and financial intermediaries obsolete. By successive approximations, the authors identify the limitations of the arguments for disruption. Starting from the journalistic way of describing disruption of banks as a "uberisation of banking sector," two paradigmatic examples of sharing economy from mobility and lodging sectors, respectively, are taken into account, such as Uber and Airbnb, to extrapolate analogies and differences. The main conclusion of this exercise is that, in the same way, Uber and Airbnb could not replace taxi and hotels, triggering and accelerating efficiencies, competitive pressure, and opportunities for new entrants instead, fintech and new business models will not disrupt or cancel financial intermediaries, and specifically banks. Rather than "disruption" leading to the disappearance of banks, they will bring a new way of banking and financial intermediation provided by the new entrants actually: a new way of "doing banking" with traditional banks innovating and tailoring servicing and products. The authors suggest that the advent of new technologies will not necessarily disrupt the banking and financial intermediation, therefore. Rather they will trigger innovation and evolutions that may lead to a "new breed of banks and financial intermediaries" that will adjust to those evolutions and embed such innovations. Banking and finance have been evolving over the past

decades with the advent of new technologies and products. As such, banks appear to be well positioned to absorb—and adjust to—any disruptive impact of DLTs and blockchain by developing new business models and capitalizing on their dominant position by embedding those technologies and services.

Then, Pompella and Costantino raise concerns on potential threats deriving from specific financial innovations, such as Tokenomics, for instance, somehow referred to—with an explicitly provocative intention—like a trick to produce "Nothing-Backed Securities." And this is the opportunity, for them, to emphasize the lack of regulatory framework.

Chapter 18 is complemented by Chapter 22, where the consequences of the pandemic are specifically dealt with, and a few directions for regulators are proposed, in order to let them properly react.

The following Chapter 19: Digital Currencies and Payment Systems. Chinese way into internationalisation of the renminbi prepared by Ewa Dziwok, explore how new payment options and new forms of money allow China a gradual but systematic internationalization of the renminbi and strengthening its role as an international medium of exchange outside a traditional banking system. Dziwok states that in the digital world rules are not the same—no borders and benefits connected with digital technology make transactions faster, cheaper, and easier to do. It simplifies global recognition of different currencies that could either replace or coexist with a local currency. The emergence of a world digital currency is possible and real. The author shows that China's ambitions to enforce the role of yuan are not new—the path into full internationalization was taken for decades and started in 1979 from its first step "open door policy." It is further argued that the Global Financial Crisis paradoxically speeded up that process thanks to the fact that China was not affected as much as the rest of the world. The author also imposes a timely question of whether it is enough to make Chinese renminbi (RMB) a desirable reserve instrument, store of value, and medium of exchange. Dziwok argues that there is a need to fulfill several conditions that are crucial to be assessed as an international currency. Dziwok highlights channels of how to spread yuan abroad through several initiatives that have been existing with success for several years.

Finally, it is discussed how the recent regulatory changes in China speeded up preparations to launch its digital currency and Alipay and to switch to clearing company UnionPay (state-owned). Dziwok then concludes that all these activities, together with a new digital currency, could cause that China will not dominate the existing financial system but bypass it.

Chapter 20: Cryptocurrencies and other Digital Asset Investments written by Andria van der Merwe deals with a very interesting topic. The chapter starts with the description of four, interrelated components of the crypto-economy typically consists of: (i) the distributed ledger or blockchain; (ii) the digital assets such as bitcoin; (iii) the active participants or "miners;" and (iv) the passive participants or users. A particular blockchain is comprised of blocks or groups of cryptocurrency transactions. A particular transaction represents the

purchase or sale of cryptocurrency between two participants. The number of transactions per block varies—e.g., the original Bitcoin protocol allowed up to 2,000 transactions per block. Only settled transactions are included in a block appended to the blockchain so that the speed with which new blocks are created effectively determine the time it would take to settle a particular transaction.

The author argues that the real innovation behind cryptocurrency is the blockchain, which enables user-to-user trading among decentralized participants and settlement and recordkeeping of such transactions without a trusted, centralized authority. Transactions are settled by a collection of anonymous, active participants referred to as miners. The price of cryptocurrency is closely linked to the number of participants assigning value to it by engaging in trading. It is further argued that the cryptocurrency is not fiat money, but it could be used as a medium of exchange in the crypto-economy. It is shown that in the broader economy, cryptocurrency functions as a digital, intangible asset with little resemblance to most traditional asset classes. From an economic perspective, cryptocurrency shares the limited supply characteristic of non-renewable commodities—in the case of cryptocurrency the limited supply is an artificial scarcity embedded in the protocol design. Der Merwe shows that cryptocurrency may add diversity to an investment portfolio because of its low correlation with more traditional assets. It concludes that a potential investor should however recognize the qualitative and quantitative risks typically associated with an investment in cryptocurrency such as the high price volatility and unique market structure.

Chapter 21: How does digital transformation improve customer experience?, prepared by Spencer Li, explains how disruptive innovation drive digital transformation rapidly. Li shows that recent researches indicate that good end-to-end customer journeys generate business results better than touchpoints. Customer journey mapping is the center of all consumer-focused organizations and can transform business by multi-layer studying on the existing process and soliciting constructive insights and suggestions from stakeholders. Li points out that the executives always learn lessons from customer journey map exercise. The authoradvocates the view that Gartner CX Customer Experience Pyramid proves customer experience driving loyalty, and therefore it is recommended to focus on fine-tuning digital services to improve customer care, customer experience, and customer-centricity to achieve better customer satisfaction. It is also suggested that top executives could apply know-how to improve customer satisfaction through digital transformation. It is further shown that recent trends confirm that most promising disruptive technologies have been developed rapidly and come to maturity. These disruptive technologies contribute to the following development: 5G, Blockchain and Crypto-currencies, emerging BaaS, AI, and Machine Learning, Cloud, Big Data and Faster WiFi (according to Accenture, Gartner, McKinsey, etc.); These disruptive technologies will be applied for FinTech, smart cities, IoT, analytics and cloud computing; These disruptive technologies kick-off the

digital transformation era; corporates want to compete with competitors for the survival. ING transformation project "Think Forward" is a good example of changing traditional finance business into an "ING as platform" business. Li concludes that the transformation is not an easy task. Without top management commitment, intensive investment, the right direction, and a good pilot project, transformation does deliver the expected outcome.

Chapter 22: From Disruption to post-Pandemic Scenario, again by Pompella and Costantino, is the ideal complement of Chapter 18. Now the authors bring into the discussion the COVID-19 pandemic stroke, revolutionizing social and economic paradigms, and heavily affecting Fintech, Blockchain, and banking sector as well. "Pandemization of economy" like they call contingent and permanent changes imposed to the economy as a whole, and to financial institutions/intermediaries, is described as a pervasive and irreversible process comparable to Dot-Com Bubble and Great Financial Crisis. Their point is that COVID-19 is deflating the bubble of blockchain and fintech before it bursts: in other words, the pandemic is accelerating the process and anticipating some of the adverse effects of a bubble, enacting a process of natural selection that is due not to an internal process but to an external factor, disruptive again. The COVID-19 can hence be considered a "reset" in the industry as it is revealing the extremely positive potential of fintech and blockchain solutions while exposing the vulnerabilities of the hype-related compliancy of some blockchain and fintech ventures.

Having said this, and assuming just for a while that the devasting health and social consequences of COVID-19 may be ignored, the virus is also presented like an unprecedented opportunity for governments, regulators, and policy makers. In a sense that governments have a chance to advance the implementation of public blockchain and fintech initiatives, whereas policy makers and regulatory agencies could reassert their leading role in the space of blockchain and fintech by proactively acting rather than merely reacting.