FinTech: Finance, Technology and Regulation - Introduction

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FinTech: Finance, Technology, and Regulation

In this comprehensive, accessible work, Ross P. Buckley, Douglas W. Arner, and Dirk A. Zetzsche offer an ideal reference for anyone seeking to understand the technological transformation of finance and the role of regulation: the world of FinTech. They consider FinTech technologies including artificial intelligence, blockchain, BigData, cloud computing, cryptocurrencies, central bank digital currencies, and distributed ledger technology and provide a unique perspective on FinTech as an interactive system involving finance, technology, law, and regulation. Starting with an evolutionary perspective, the authors then consider the major technologies transforming finance, arguing for approaches to balance the risks and challenges of innovation. They address the central role of infrastructure in digital financial transformation, highlighting lessons from China, India, and the EU, as well as the impact of pandemics and other sustainability crises, while considering the risks generated by FinTech. They conclude by offering forward-looking regulatory strategies to address the challenges faced by the world today.

About the authors

Ross P. Buckley is one of the world's most cited and read FinTech scholars. Professor Buckley leads a major, six-year Laureate research project at the University of New South Wales (UNSW), Sydney, into the regulation of FinTech. He advises governments and regulators around the world and has twice been a Fulbright scholar, at Yale and Duke.

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Chapter 1: Introduction

Finance and technology have been central to human societies and economies since the advent of settled human civilisations almost 10,000 years ago, and for almost as long, efforts have been made to govern and regulate both.

While innovation has always affected finance, over the past 50 years, finance and technology have evolved incredibly rapidly due to digitalisation. Digitalisation combines processes of digitisation and datafication. Digitisation is the process of moving data from physical (analogue) to electronic (digital) form, while datafication is the process of deriving data from activities and analysing them, typically via a range of information technologies, including artificial intelligence (AI). The resulting opportunities and risks are challenging the evolution of financial policy, governance, law, and regulation domestically and internationally.

This book considers this ongoing evolution. In particular, we enquire into how law and regulation can best balance the opportunities and risks of finance and technology, and how finance and technology respond to advancing and expanding financial regulation.

When in 2008 the financial world changed and the Global Financial Crisis (GFC) plunged the world into the worst recession since the Great Depression, millions of people lost their homes, jobs, and life savings. Some of the unemployed were financial services professionals. Young talented finance people with good tech skills were looking for new opportunities, conventional credit sources were contracting due to the Crisis and post-Crisis regulatory reforms, internet penetration was extensive in many markets, and the first widely successful smartphone, the Apple iPhone, was launched in mid-2007. The scene was set for dramatic change in finance. The result was a truly dramatic growth in the application of technology to finance – known as FinTech.

Accordingly, when most people think of FinTech today they think of it starting around 2008. However, we argue that FinTech is not new, because finance and technology have always danced well together – technology has long assisted in information provision which is (and always has been) crucial for financial decision-making. Today, money is intangible. It moves in response to information that comes to us on computers and is directed via electronic systems. At the same time, technological innovation helps to overcome distances, both physical and temporal. This is important in a world where financial markets are the most globalised segment of the economy , and one of the largest investors in information technology (IT) systems has long been the financial services industry, in its competitive race for new information and speed.

We show that since the 1960s, finance has gone through a profound process of digital transformation, involving digitisation and datafication and the creation of massive amounts of digital infrastructure. Finance today is the most digitised, datafied, and, due to both its destructive and constructive potential, regulated sector in developed societies.

FinTech, as we lay out in this book, is best understood as including four major elements: first, global wholesale markets where digitisation means speed, crucial for capitalising on information advantages; second, an explosion of financial technology (FinTech) start-ups particularly since 2008 in the aftermath of the GFC seeking regulatory

lenience that was available to the small but not the large; third, the unprecedented digital financial transformation in retail finance in an increasing numbers of countries, most dramatically China and India; and fourth, the increasing role of large technology companies (BigTechs) moving into financial services and digital financial platforms.

The changes since 2008 have been unprecedented, particularly in terms of the speed of technological evolution and emergence of new entrants, including start-ups and BigTechs. These changes have brought greater financial inclusion and efficiency and new risks. Regulators seek to maximise the former and ensure that financial intermediaries well accommodate the latter.

This long-term process of digitisation and datafication of finance has been increasingly combined over the past 15 years with a group of technologies commonly termed 'ABCD': Artificial Intelligence (A), Big Data (B), Cloud Computing (C), and Distributed Ledger Technology (D). The latter typically uses blockchains and makes possible the smart contracts that underpin cryptocurrencies and central bank digital currencies. These technologies have together, on the one hand, prompted the need for digital identification and, on the other hand, triggered the extraordinary growth we have seen in use of technology for regulatory and supervisory purposes: Regulatory Technologies (RegTech) and Supervisory Technologies (SupTech).

We include all of these aspects of the revolution through which we are all living in the rubric, FinTech. Its ambit is broad and extends from innovations with disruptive effects on existing intermediaries, such as crowdfunding and crowdlending among many others, through to the entry into financial services of the BigTechs and the existential threats they pose to traditional banks.

While this process of digitisation and datafication and emergence of new technologies extends across both developed and developing markets, the latter often display faster digital financial transformation because of the absence of legacy systems and the demand driven by large-scale financial exclusion.

During the 2020s, factors beyond digitisation and datafication have driven this revolution. The COVID-19 pandemic and its attendant lockdowns around the world drove ever better presenceless payments and security measures. If the pandemic had struck a mere decade earlier, the then technology would have allowed far fewer of us to work, shop, and communicate well from home. FinTech likewise has been central in times of conflict and in our current sustainability crisis. Only a digital financial system has the capacity and versatility to deal with the plethora of objectives that regulators now impose on financial systems.

We consider the history, evolution, and scaffolding of 'FinTech' in Part I of this book.

We commence in Chapter 2 by analysing the evolution of FinTech since 1865 in four periods. The first period involved electrification and lasted for a century until the mid-to-late 1960s. It was dominated by analogue processes and traditional banks. The second period lasted 40 years and was marked by digitisation, including across securities markets (NASDAQ), payments (ATMs and SWIFT), computerisation (financial calculators and PCs), and mass communication (Internet and mobile). From around 2007 onwards, a new period commenced which was driven by the application of a range of new

transformative technologies to finance, the impact of the 2008 crisis on finance, and the massive concomitant increase in regulation. These three driving forces underpinned the emergence of huge numbers of tech-driven financial services start-ups commonly called 'FinTechs'. This period lasted just over 10 years and included a rapid rise in the algorithmic analysis of data that has transformed finance. The fourth and most recent period commenced in 2020 driven by the COVID pandemic and is characterised by the rise of new scale and impact in technology, for instance with the emergence of large digital platforms, central bank digital currencies and AI.

These ever-shortening time periods are no coincidence, for it is the nature of technological change to build upon itself and thus be ever accelerating. The current period may only last five years. It has been a wild ride so far, and only likely to get faster and wilder.

In Chapter 3, we argue for smarter regulatory approaches and measures. Since the 2008 GFC, financial regulation has increased dramatically in scope and scale. Post-crisis regulation, plus rapid technological change, has spurred the development of FinTech and RegTech firms and data-driven financial service providers. Financial regulators increasingly seek to balance the traditional objectives of financial stability and consumer protection with promoting growth, innovation, and sustainability. This chapter analyses possible new regulatory approaches, ranging from doing nothing (which spans being permissive to highly restrictive, depending on context), cautious permissiveness (on a case-by-case basis, or through special charters), structured experimentalism (e.g., sandboxes or piloting), and development of specific new regulatory frameworks. We argue for a new balanced, risk-based, proportionate approach that incorporates these rebalanced objectives, which we term 'smart regulation'.

Chapter 4 considers the evolution of the use of technology for regulatory and supervisory purposes: RegTech for short. RegTech is the use of technology, particularly IT, in monitoring, compliance and regulatory reporting by industry, and in supervision and enforcement by regulators. The latter use by regulators is sometimes termed 'SupTech', which then narrows the ambit of the term RegTech to the use by industry. Either way, for industry, regulators, and policymakers, the pace of transformation in digital financial products and systems requires ever greater use of RegTech. In this substantial sense, FinTech demands RegTech. While the principal regulatory objectives of financial stability, consumer protection, market integrity, and support for growth and development remain, their attainment increasingly requires the deployment of sophisticated technology by both reporting entities and regulators. The increasing use of RegTech in turn enables a paradigm shift involving a reconceptualisation of financial regulation which we analyse.

Chapter 5 considers the impact of COVID and how the digital financial infrastructure that emerged in the wake of the 2008 Crisis assisted to address the financial, economic, and health challenges presented by the COVID-19 pandemic. While the 2008 Crisis was a financial crisis that impacted the real economy, COVID-19 was a health and geopolitical crisis that impacted the real economy. Remarkably, during the pandemic, the financial system proved to be highly resilient and, in fact, turned from problem child to crisis response facilitator.

Chapter 6 analyses the drivers of the recent digital financial transformation as the quest for (i) efficiency, (ii) financial inclusion, and (iii) sustainability. These three factors

are necessarily intertwined: financial inclusion underpins long-term-oriented economies, and sustainability is required longer term for efficiency, and vice versa. More efficient and innovative financial systems support responses to crises such as the COVID pandemic and enable financial inclusion and sustainable development across the full range of the United Nations Sustainable Development Goals (SDGs).

Having set the scene historically with a conceptual framework within which to understand the FinTech Revolution, we then proceed to consider the breadth of FinTech. We analyse its various elements, which taken together comprise nothing less than a revolution in finance.

In Part II, we consider the major new technologies that characterise the FinTech age. Chapter 7 addresses the use of AI and machine learning in finance. The chapter develops a framework for understanding and addressing the increasing role of AI in finance. It focuses on human responsibility as central to any solution to the AI 'black box' problem – which is the risk of undesirable results arising from people's difficulties in understanding the internal working of an AI or from an AI's independent operation outside human supervision or involvement.

The next two chapters (Chapters 8 and 9) in Part II address distributed ledger technology (DLT) and blockchain, and the evolution of decentralised finance (DeFi) and embedded regulation.

In Chapter 8, we consider how DLTs and blockchain are contributing to the creation of a new foundational infrastructure for financial services, including crypto-assets and smart contracts. We classify the new business models, analyse the opportunities, and highlight the regulatory challenges.

In Chapter 9, we analyse the meaning, legal implications, and policy consequences of DeFi. Decentralisation has the potential to undermine traditional forms of accountability and erode the effectiveness of traditional financial regulation and enforcement. At the same time, where parts of financial services are decentralised, there will be a reconcentration in a different (but possibly less regulated, less visible, and less transparent) part of the financial services chain. DeFi regulation could and should focus on this reconcentrated portion to ensure effective oversight and risk control. Paradoxically, DeFi may well require regulation in order to achieve its core objective of decentralisation. Furthermore, DeFi facilitates 'embedded regulation', by allowing regulatory measures to be built into the decentralised infrastructure, potentially decentralising both finance and its regulation in the ultimate expression of RegTech.

Chapter 10 considers the role of data and data regulation. Against the background of the big data age, this chapter explores the relationship between data and financial regulation in four major jurisdictions: the EU, the United States, China, and India. We argue that data regulation provides a crucial foundation upon which FinTech infrastructure is designed, built, and operated. Data regulation thus profoundly shapes the emergence of FinTech ecosystems. For FinTech, data regulation is a new form of financial regulation.

Chapter 11 presents a framework for a balanced proportional approach to supporting innovation, focusing on the role of innovation hubs and regulatory sandboxes. This chapter argues that innovation hubs provide most of the benefits that the policy

discussion associates with regulatory sandboxes, while avoiding most of the downsides of formal regulatory sandboxes. Consequently, we argue, regulators should focus their resources on developing effective innovation hubs, including, in appropriate cases, a sandbox as part of the hub.

In Part III, we move from the questions around new technologies to the strategies for building better financial systems, focusing on the role of digital financial infrastructure, so as to allow societies to capitalise on the true potential of FinTech.

Chapter 12 explores the infrastructure for digital financial transformation and suggests it be built on four primary pillars. The first pillar comprises digital identity, simplified account opening, and e-KYC systems. The second is open interoperable electronic payment systems. The third involves the electronic provision of government services and payments. The fourth is the design and development of digital financial markets and systems, which supports broader access to finance and investment.

Chapter 13 focuses on the role of digital identity as a core enabling infrastructure and explores the various requirements for identification in the financial sector and the evolving nature of identity. We argue that technology enables the solution of the identity challenge through the development of digital identity infrastructure and related identity utilities. The establishment of such utilities for digital or electronic identification requires addressing design questions, such as registration methods, data availability, and cross-jurisdictional recognition, and offers massive efficiencies to financial services.

Chapter 14 explores the digital transformation of payments and the emergence of cryptocurrencies, stablecoins, and central bank digital currencies ('CBDCs'). In the future, we expect domestic money and payment systems to involve public central banks cooperating with (old and possibly new) private entities, including commercial banks, to launch digital currencies which will underpin profoundly better monetary and payment systems at both domestic and international levels.

Chapter 15 highlights the experience of the European Union in bringing these elements together to support digital financial transformation. Europe's path to digitisation and datafication in finance has rested upon four apparently unrelated pillars: (1) extensive reporting requirements imposed after the GFC to control systemic risk and change financial sector behaviour; (2) strict data protection rules; (3) the facilitation of open banking to enhance competition in banking and particularly payments; and (4) a legislative framework for digital identification imposed to further the European Single Market. We suggest that together these seemingly unrelated pillars have driven a transition to data-driven finance. The EU experiences provide insights for other countries in developing regulatory approaches to the intersection of data, finance, and technology.

Part IV then focuses on the risks of FinTech, which we term 'TechRisk'. It explores the risks to competition that arise because both finance and technology industries tend towards winner-takes-all outcomes and the other risks that increasing dependence upon technology brings.

Chapter 16 highlights the emergence of a range of new platforms that are transforming finance far more than have the FinTech start-ups which characterised the 2010s. These massive data companies moving into financial services we refer to as

'TechFins'. China has led this change, with Alibaba establishing the online financial conglomerate Ant Group. The chapter also considers the emergence of digital finance platforms and the entry of BigTech firms (the tech behemoths Microsoft, Apple, Google, Meta, and Amazon) into finance. These changes are a natural outcome of the economies of scope and scale that characterise finance combined with the network effects of data and technology. These major trends are at the heart of the current era of FinTech and bring the major risks we explore in Chapters 17, 18, and 19.

Chapter 17 provides a framework to understand the emerging risks in digital finance, and in particular, we focus upon systemic, cybersecurity risks and privacy risks.

Chapter 18 considers the emergence of new systemically important financial institutions (SIFIs) and financial market infrastructures, and the risks that this brings and how best to regulate these SIFIs, many of which will not trigger the traditional thresholds of financial regulation.

Chapter 19 analyses platformisation, one of the trends transforming finance, with examples including the rise of Ant Financial in China's financial landscape and of Blackrock's Aladdin in the US mutual funds industry. This chapter considers how to regulate these emerging massive digital finance platforms in the light of their impact on financial regulation objectives, competition, and innovation.

Our analysis then concludes in Chapter 20, in which we argue that contemporary digital finance, which emerged from the crisis of 2008, has become a crisis impact mitigation tool able to assist in dealing with the plethora of challenges and crises mankind is facing, be they wars, a pandemic, or the climate-related sustainability crisis. Better financial systems may not only promote efficiency and stability but also support resilience in future crises whatever their source.

We argue that the digitisation of finance has been central to the positive contributions of today's financial systems. To ensure our financial systems continue as a force for good, financial regulation must simultaneously pursue the objectives of efficiency, resilience, inclusion, innovation, and sustainable development. This is particularly challenging because the rise of the TechFins and of digital financial platforms means two of the major players in contemporary finance will often be systemically significant without activating the traditional triggers for financial regulation – and thus will lie outside the purview of financial regulation. This is the core challenge facing financial regulation globally today. Digital finance, well regulated, will be essential to respond well to the increasing range of crises likely in coming decades. To realise this potential, FinTech and digital finance require a fundamental readjustment of approaches to the regulation of finance and technology. How this may be brought about is the subject of this book.

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