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E-banking, Fintech, & Financial Crimes

The Current Economic and Regulatory Landscape

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ISBN 978-3-031-67852-3 ISBN 978-3-031-67853-0 (eBook)
https://doi.org/10.1007/978-3-031-67853-0

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Preface

The financial sector is now experiencing a significant and fundamental change, mostly due to the continuous advancement of technology and innovation. The advent of e-banking and Fintech has fundamentally transformed the delivery of financial services, enhancing its accessibility, efficiency, and consumer focus. Nevertheless, these technological improvements bring forth fresh obstacles and vulnerabilities, especially in the domain of financial illicit activities. As technology advances, criminals also develop new ways, which require a strong and flexible regulatory framework to protect the integrity of the financial system.

E-banking, Fintech, & Financial Crimes: The Current Economic and Regulatory Landscape is a curated collection of chapters that aim to examine the many aspects of this rapidly evolving landscape. This book consolidates the knowledge and proficiency of prominent academics, professionals in the industry, and regulatory bodies to provide a thorough analysis of the economic and regulatory consequences of e-banking and Fintech advancements, as well as the increasing risks associated with financial crimes.

Our writers explore a diverse range of subjects, including the complex workings of e-banking systems and the disruptive possibilities of Fintech businesses, as well as the intricate nature of cybercrimes and frauds. The text examines the impact of digital technology on conventional banking paradigms and the subsequent response of regulators to maintain stability, security, and consumer protection in this rapidly changing environment.

The contents of this book are organised into three primary sections:

E-banking: This section discusses the progression of electronic banking, its influence on conventional banking models, and the prospects and difficulties it poses for both customers and financial institutions.

Fintech: In this discussion, we examine the cutting-edge field of financial technology, focusing on its ability to bring about significant changes in areas like payments, lending, investing, and financial inclusion. We also analyse the regulatory measures taken in reaction to these new technologies.

The last half of the book delves into the negative consequences of technological progress, specifically investigating the increase in financial crimes during the era of digitalisation. These crimes include cyber-attacks, money laundering, and fraud. Additionally, it explores the tactics and regulatory actions being taken to address these challenges.

This book seeks to function as a beneficial resource for scholars, politicians, industry professionals, and others with an interest in comprehending the convergence of technology, finance, and regulation. Our aim is to contribute to the continuing discussion on how to effectively utilise e-banking and Fintech while minimising the dangers, by offering a comprehensive understanding of the present economic and legal environment.

We express our gratitude to our writers for their unwavering commitment and perceptive contributions, and to our readers for their keen interest in this crucial and ever-changing domain. We anticipate that this publication will not only provide information but also stimulate more investigation and creativity in the quest for a stable and all-encompassing financial future.

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Chapter 1
Fintech Revolution: Navigating Consumer Privacy Concerns and Cybersecurity Challenges

Sahil Bhalla, Chander Mohan Gupta, and Palak Dewan

Introduction

In the quick landscape of finance, a noteworthy combination of money and innovation has birthed what is presently ordinarily known as fintech. This combination, set apart by creative models and state-of-the-art innovations, has ignited a transformation ready to reshape economies around the world. The expression "fintech" itself, a portmanteau of "money" and "technology", epitomizes the essential job innovation plays in present monetary frameworks. Fintech remains as a problematic power, spanning the gap between conventional financial practices and the consistently propelling domain of money. Its development proclaims a change in outlook, promising to reform the monetary business as well as the essential designs supporting financial frameworks universally. This part dives into the beginning and direction of fintech, investigating its extraordinary effect on crucial monetary capabilities like instalments, credit, loaning, protection, and venture administrations. Starting from the cauldron of mechanical development, fintech has arisen as a catalyst for change, pushing economies towards phenomenal degrees of productivity and openness.

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C. M. Gupta, G. Kaur (eds.), *E-banking, Fintech, & Financial Crimes*,
https://doi.org/10.1007/978-3-031-67853-0_1

The Evolution of Fintech in India

The seeds of fintech's development in India were planted in the midst of the scenery of the 2016 demonetization, a turning point that catalysed the country's change towards a computerized economy. Before this groundbreaking occasion, India's financial scene was overwhelmingly cash-driven. Notwithstanding, the resulting years saw a brilliant ascent in the reception of computerized instalment arrangements, denoting a vital change in customer conduct. Throughout the last half-decade, fintech has blossomed, testing dug-in standards and reclassifying the shapes of India's monetary environment. Key drivers powering this development incorporate improved admittance to capital, proactive administrative help, vital industry coordinated efforts, unavoidable tech reception, a blossoming pool of gifted experts, and the basics of information sharing. As validated by the Reserve Bank of India, the flood in computerized instalments has been completely brilliant, with a stunning 216% expansion kept in 2022 alone. Such remarkable development highlights the significant effect fintech has applied on India's monetary scene, proclaiming another time of monetary inclusivity and advancement.

Unveiling the Ghost of Cybercrime

Amid the background of fintech's transient ascent hides an imposing enemy—. Characterized as crime executed through PCs and organizations, it includes a heap of odious exercises going from crypto-jacking to fraud, monetary misrepresentation, digital surveillance, and ransomware assaults. The approach of the computerized age has worked with the multiplication, empowering pernicious entertainers to execute wrongdoings without any potential repercussions and take advantage of weaknesses in the advanced foundation. In India, crimes has arisen as an unavoidable danger, with the Public Network Protection Center featuring ransomware as the most common type. Alarmingly, statista.com announced north of 65,000 cases in India in 2022 alone, highlighting the extent of the test. Despite its universality, cybercrime stays a misnomer in regulative speech, without an extensive legal definition. Regardless, its effect is much the same as customary wrongdoing, inciting breaks of lawful standards and risking the structure holding the system together. Ordered into target, device, and PC coincidentally, presents multilayered difficulties that request earnest redressal.

In general, it has three categories:

1. Target—using a computer is the target of the offense.
2. Tool—computer is used as a tool in committing the offense.
3. Computer incidental—the role of the computer is minor in committing the offense.

Against the backdrop of fintech's ascendancy and the specter of crime looms a pressing imperative—the safeguarding of user security. In light of this imperative, this chapter sets forth two overarching objectives:

1. To get knowledge about user privacy concerns with fintech companies.
2. To understand the privacy concerns of people associated with fintech companies.

In pursuit of these objectives, this chapter embarks on a comprehensive exploration of the interplay between technological innovation, regulatory oversight, and ethical considerations, with a view towards charting a course for navigating the complex terrain of fintech's transformative journey.

Investigating Fintech Advancements and Their Suggestions

In the dynamic landscape of monetary (fintech), a heap of developments has arisen, each with its one-of-a-kind arrangement of implications and challenges. This part digs into a complex examination of select fintech developments and their sweeping effects across different areas.

ChatGPT: Balancing Pros and Cons

Dwivedi et al. (2023) directed an extensive examination of the ChatGPT revolution, investigating its impact across different spaces including banking, marketing, software engineering, hospitality, nursing, education, and management. Their review highlights both the positive and negative repercussions of ChatGPT organization, provoking considerations on the need for administrative measures to administer its use.

Across areas like banking, money, insurance, and education, ChatGPT has been hailed for its groundbreaking potential, working with upgraded effectiveness and customized administrations. In any case, concerns about its affinity for spreading counterfeit data, empowering cheating in exams, executing literary theft, and undermining transparency and explainability. This polarity requires a nuanced approach towards administrative systems to bridle its advantages while relieving its traps.

Digitization in Banking: Exploring Functional Dangers

Uddin et al. (2023) dig into the functional dangers intrinsic to the computerized change of banking foundations, driven by the basic to adjust to developing purchaser requests and mechanical headways. As banks progressively embrace

digitization to stay cutthroat in the fintech scene, they wrestle with elevated functional dangers and related costs.

Employing operational risk (OPR) intermediaries inside Basel structures, the review clarifies the relationship between expanded digitization and intensified functional dangers. While digitization offers roads for development and proficiency gains, it likewise opens banks to a heap of functional weaknesses (Gupta & Kumar 2020b). Thus, banks are constrained to proceed circumspectly, gauging the dangers against the likely rewards and selecting vital speculations or re-evaluating attempts given their gamble hunger.

Entrepreneurial Ecosystems: Catalysts for Financial Turn of Events

Gomez et al. (2023) shed light on the crucial job of entrepreneurial ecosystems (EEs) in encouraging financial development and advancement. Through an observational review led in Yaba, Lagos, Nigeria, the creators clarify the complex elements supporting the advancement of EEs, portrayed by assorted partners, common trust, and resilience.

Entrepreneurial ecosystems act as incubators for new companies, working with advantageous connections among firms and catalysing financial turn of events. Key parts including markets, government strategies, foundation, money, culture, and human resources combine to make prolific ground for enterprising endeavours. In any case, understanding the maximum capacity of EEs requires purposeful endeavours to prepare assets, give satisfactory compensation, and encourage inspiration among partners.

Blockchain Innovation: Transforming Business Models

Tandon et al. (2021) investigate the groundbreaking capability of blockchain technology in reforming traditional plans of action. Beginning from the domain of cryptographic money, blockchain has arisen as a problematic power, empowering straightforward and decentralized computerized transactions sans intermediaries.

Through a broad bibliometric investigation, the review highlights the flexibility of blockchain revolution and its combination with the Internet of things to drive development. By encouraging transparency, proficiency, and confidence in business processes, blockchain holds massive potential to reshape the monetary framework and advantage assorted areas including financial markets. Be that as it may, further exploration is justified to explain the bunch of factors affecting its reception and enhance its use in business settings.

Blockchain in Public Service Organizations: Enhancing Operational Efficiency

Shahaab et al. (2023) look at the effect of blockchain revolution on open assistance associations, explaining its capability to improve transparency, security, and permanence. Amid the scenery of prospering adoption, the review features difficulties in information sharing and socio-specialized interfaces between government substances and the public.

Embracing a systematic approach, the creators advocate for utilizing inventive changes to smooth out functional cycles and address administrative compliance requirements. By embracing blockchain, public help associations can open efficiencies while protecting information respectability and upgrading partner trust (Aldboush & Ferdous 2023).

In outline, the investigation of these Fintech developments highlights the requirement for a fair methodology that expands benefits while moderating dangers and difficulties. Administrative systems, strategic investments, and cooperative endeavours are basic to exploring the developing fintech scene and saddle its extraordinary potential responsibly.

Safeguarding Fintech: Addressing Concerns and Security Challenges

In the always-advancing scene of monetary changes (fintech), the fast expansion of cutting-edge developments, for example, data innovation, artificial intelligence (AI), cloud computing, Internet of things, chatbots, and ChatGPT, has changed the functional ideal models of the financial ecosystem (Blumenstock & Kohli 2023). These innovative headways have become characteristic of the activities of fintech organizations, empowering advanced changes that upgrade business volumes and drive benefits across different areas of the financial industry, including banks, investment houses, insurance agencies, moneylenders, and land venture trusts.

In any case, as fintech organizations embrace computerized developments, they are confronted with a bunch of network protection challenges that compromise both their functional respectability and the trust of their customer base. Cybercrime represents a huge gamble, with potential repercussions going from reputational harm to cross-country information breaks. The deficiency of public confidence following digital episodes can be devastating for fintech organizations, featuring the basic significance of powerful online protection measures.

The heightening speed of mechanical developments requires consistent variation by fintech organizations, which can disturb ordinary activities and present new weaknesses. While interests in network safety are basic, an unnecessary spotlight on digital transformation might redirect assets from centre business capabilities, prompting functional shortcomings and expanded gambles.

Security concerns pose a potential threat in the digitized scene of fintech, with the gathering of huge measures of delicate information presenting organizations with likely breaks and administrative examinations. Shielding information respectability and guaranteeing consistency with guidelines like the General Data Protection Regulation (GDPR) in Europe and the California Consumer Privacy Act (CCPA) is paramount for fintech firms. Encryption, confirmation protocols, and watchful observing are fundamental parts of network safety structures intended to safeguard against digital dangers.

Beyond specialized shields, fintech organizations should address concerns connected with information abuse and algorithmic bias. Transparent information rehearses and express client consent components are essential for safeguarding purchaser trust and relieving the gamble of information abuse. Administrative consistency is a significant challenge, requiring fintech associations to explore a complex scene of regulations and guidelines overseeing information security.

The ascent of algorithmic decision-making presents new components of worry, as biases encoded in calculations can sustain imbalances and compound social disparities. Accomplishing harmony among development and moral contemplations is basic for building a future where monetary information is not just secure yet in addition ethically managed for the aggregate advantage of society.

All in all, the security of protection and network safety in fintech associations is principal in an undeniably digitized monetary scene. A comprehensive methodology that coordinates mechanical development, administrative consistency, moral contemplations, and customer strengthening is fundamental for protecting monetary information and cultivating trust in fintech administrations. By tending to these worries proactively, fintech organizations can explore the difficulties of the advanced age and add to the manageable improvement of the monetary business.

Conclusion

In the consistently developing scene of monetary transformation (fintech), the issues of consumer security and online protection stand as huge difficulties. As fintech organizations tackle the force of creative advances to reshape financial administrations, they simultaneously aggregate tremendous measures of delicate buyer information (Gupta & Kumar 2020a). Nonetheless, this collection raises serious worries concerning the security and privacy of such data. Customers dread potential information breaks, unapproved access, and the abuse of their information for designated promotion without express assent. Besides, the quick speed of fintech advancement frequently dominates administrative structures, leaving holes in oversight and responsibility.

The issue of data misuse is a basic one. Fintech firms might be enticed to abuse client information by reusing it without assent, offering it to outsiders, or utilizing it for designated publicizing without sufficient exposure. This absence of straightforwardness dissolves trust and subverts the actual groundwork of the fintech

environment, possibly making purchasers accidentally give up command over their monetary information. Administrative consistency further entangles matters, with a horde of regulations and guidelines overseeing information security, like the General Data Protection Regulation (GDPR) in Europe and the California Consumer Privacy Act (CCPA). Exploring this complex administrative scene requires cautious regard for deflect legitimate repercussions and moderate consistency gambles.

In addition, the development of algorithmic direction presents one more layer of concern: algorithmic bias. Notwithstanding their implied objectivity, calculations may coincidentally propagate biases innate in the information they dissect, prompting one-sided results, especially in credit appraisals and chance assessments. This predisposition disregards standards of reasonableness and value as well as worsens existing inconsistencies, propagating monetary rejection and social disparities. Tending to these security concerns is vital as fintech keeps on reshaping the monetary scene.

Accomplishing harmony between development and security requires a comprehensive methodology incorporating mechanical progression, administrative consistency, moral contemplations, and buyer strengthening. Fintech organizations should put resources into hearty information safety efforts, embrace straightforward information rehearses, and stick to rigid administrative guidelines to keep up with trust and validity. Besides, they should focus on moral contemplations in calculation plan and sending, guaranteeing reasonableness, straightforwardness, and responsibility in dynamic cycles. Coordinated efforts with controllers, policymakers, and common society are fundamental to laying out clear administrative structures that advance development while shielding customer interests.

Engaging shoppers with more prominent command over their monetary information is urgent. Fintech organizations ought to give clear data about information assortment, stockpiling, and utilization, alongside amazing open doors for clients to quit or agree to explicit practices. This requires vigorous protection approaches, easy-to-understand assent components, and devices to oversee security inclinations. Furthermore, training and mindfulness drives can assist customers in coming to informed conclusions about information sharing and security.

In summary, protection worries in fintech are complex and require purposeful endeavours from all partners. By focusing on information security, transparency, administrative consistency, and moral contemplations, fintech organizations can construct trust, cultivate development, and advance monetary incorporation. Enabling buyers with command over their information is crucial for addressing protection concerns and guaranteeing even-handed admittance to fintech benefits. Through cooperative endeavours and capable practices, the fintech business can outfit the huge capability of advanced money to drive feasible financial development and cultural advancement.

The assortment of information by fintech organizations addresses a critical security worry for their clients, as it includes the collection of delicate monetary data that people might be reluctant to share. Fintech organizations frequently assemble information connected with banking exchanges, speculation history, credit scores, and more, to offer custom-fitted monetary types of assistance and customized

recommendations. While this information-driven approach can improve effectiveness and accommodation for customers, it likewise brings up significant issues about information security, assent, and the potential for abuse or unapproved access. Clients properly stress over the privacy and respectability of their monetary information, as well as the ramifications of its abuse for designated promoting or different purposes without their unequivocal assent. Tending to these worries requires a multilayered approach including fintech organizations, controllers, policymakers, and common society. Fintech organizations should focus on vigorous information safety efforts, transparent information rehearses, and moral contemplations in their activities to assemble trust and believability with customers. Administrative bodies need to lay out clear rules and guidelines for information security in the fintech business, guaranteeing consistency and responsibility. Besides, policymakers should attempt to find some kind of harmony between encouraging advancement and shielding purchaser protection through extensive regulation and oversight. Civil society assumes an urgent part in bringing issues to light, pushing for purchaser freedoms, and considering organizations and controllers responsible for their activities. Eventually, it is an aggregate liability to address the security concerns encompassing information assortment by fintech organizations and to guarantee that customers' privileges and interests are safeguarded in the digital age.

Future Directions

While our examination has revealed insight into the heightening cybercrime and consumer privacy concerns in fintech organizations, it is vital to take note that our review used a deliberate writing survey approach and lacked empirical data. Additionally, research in this field stays restricted. Future examinations could focus on analysing the pattern of cybercrime in fintech organizations utilizing real information. Furthermore, it is imperative to consider theories published in different sources like books, exchange magazines, and different mediums, rather than solely relying on theories from academic journals.

Development and innovative headway cannot be ended. With the nonstop movement of innovation, cybercrime is unavoidable. Cybercrime sabotages the interests of all gatherings included. Thus, fintech organizations should foster complete procedures for network protection. Existing network safety regulations have been indistinct and immature. There is a squeezing need to lay out powerful network safety regulations and guidelines at both the organization and administrative power levels.

Besides, administrative specialists should develop regulations to extensively oversee every single mechanical device. The complexity of different tools, for example, AI consciousness, AI, and the Internet of things, presents difficulties in creating rigid regulations. As these instruments keep on developing, creating successful regulations will be a difficult errand. Fintech organizations cannot stop digitization to battle digital dangers; all things considered, they should participate in upsetting further advancements and constantly refresh their network safety measures.

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Chapter 2
Fintech Landscape

Vaibhav R. Ashar

Introduction

The history of mankind has seen many ages which have gone through the tryst of hardship as gold has to be steamed before the shine comes mankind has seen; the history of mankind includes the evolution of humans as well as the formation of societies, cultures and civilisations throughout millions of years. This history can be categorised into several significant eras which are as follows:

The Paleolithic Age, which is also called the Stone Age, is the oldest and longest period of human history, where the early humans started living in caves and used stones as basic hunting tools.

The Mesolithic Age, sometimes known as the Middle Stone Age, occurred between 10,000 and 5000 years ago. It was a time period where humans started domesticating the animals and basic agricultural activities started.

The Neolithic Age referred to a time period where humans made developments in agricultural activities and sophisticated societies were formed.

The Copper Age was a time period where the basic hunting weapons and tools made of stones were replaced with copper metal.

The Bronze Age was a time period where the tools and weapons made of copper metal was replaced with bronze metal.

The Iron Age was a time period where the tools and weapons made of bronze metal was replaced with iron metal.

The Renaissance Age was a time period described between the fourteenth century and the seventeenth century. This age was known for the revival of classical learning and wisdom in different fields such as arts, literature, etc.

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C. M. Gupta, G. Kaur (eds.), *E-banking, Fintech, & Financial Crimes*,
https://doi.org/10.1007/978-3-031-67853-0_2

The Industrial Age was a time period between 1760 and 1840, where the focus was towards the mass production of goods and rise in manufacturing sector.

The Machine Age, which started from the late nineteenth to the mid-twentieth century, was a time of tremendous industrialisation and technological development, typified by the creation and pervasive application of automation and machinery. Significant advancements in manufacturing, communication and transportation during this time period contributed to higher production efficiency and the expansion of metropolitan areas. The assembly line, powered machinery and improvements in the manufacture of steel and electricity transformed industry and daily life.

The Nuclear Age began with the detonation of the first atomic bomb in 1945, bringing in a new era characterised by the creation and spread of nuclear energy and weapons. Global politics were greatly impacted by this time, which resulted in the Cold War and increased emphasis on arms control and nonproliferation initiatives. Nuclear technology advancements also benefited the scientific, medical and energy domains by illuminating the potential benefits and drawbacks of nuclear energy.

The Space Age began in 1957 with the launch of Sputnik 1, the first artificial satellite, marking humanity's venture into outer space. Space exploration made significant strides during this era, with manned moon landings, space stations and unmanned solar system exploration probes among them. The Space Age has accelerated scientific and technological advancements that have an impact on communication, navigation and our comprehension of the cosmos.

The Information Age (Internet Age), as it is envisaged with communication being convenient in this age, has given rise not only to transformation from wired phones to wireless communication but also to transformation from Qwerty keypad led mobile phones to touchscreen mobile phones and laptops.

The term 'fintech' has evolved in Information Age. In simple layman's language, the term 'fintech' is the marriage of finance with technology. Further, the simplified word fintech is a combination of two words 'financial' and 'technology', i.e. the term 'fin' comes from the word 'financial', which includes managing money, banking, investing and other financial service, and the term 'tech' is derived from the word 'technology' which involves using digital tools and software so as to improve efficiency and experience. Fintech, the application of technology and innovation in the financial sector, has revolutionised traditional financial services by leveraging advancements like artificial intelligence and blockchain. It has expanded access and inclusion, empowering previously underserved populations with digital platforms for banking, lending and payments. Fintech has improved efficiency by automating processes, reducing costs and enhancing operational effectiveness. Through innovation and customisation, it offers personalised solutions such as robo-advisors, while data-driven insights enable better risk management and fraud detection. However, challenges around privacy, regulation and inclusion must be addressed. Looking ahead, fintech's integration with emerging technologies like IoT and 5G, as well as the potential for decentralised finance and digital currencies, will shape the future of

finance, creating a more inclusive and efficient financial ecosystem. The revolution of Internet has led to many inventions and innovations, and one such invention is the emergence of fintech spearheading financial transactions. According to Gai et al. (2018), 'Fintech had brought in Novel technology from data security to Financial service deliveries. The study focused on five technical aspects of Fintech, which includes Data oriented techniques, facility and development of equipment, application designs, service model placement – security and privacy protection. The study also states that, development of the above mentioned area, leads to development of overall term called as Fintech'.

The National Payments Corporation of India (NPCI), which was set up in April 2009, started a green initiative called UPI to reduce domestic paperwork. UPI stands for Unified Payments Interface. It was in the year 2016 UPI was officially launched for public. Today, as India leads the world in the Unified Payments Interface (UPI), the so-called Jan Dhan-Aadhaar-Mobile (JAM) integration gave rise to a different world where exchange of money from a fiat currency to a digital currency through bank accounts has made transfer of funds more stress-free and less usage of paper.

The advent of World Wide Web and the dawn of Internet in the year 1991 and later the propagation of smartphones have made it possible for India to catapult not only in technology but also in the economy strata of people. The years of wired telephone to an age of messaging through pagers to today where smartphones which are not just handsets but a laptop which perform the tasks with ease and convenience, we see an abundance of opportunities in the industry of banks, share market, insurance and many payments laid transactions.

Imagine a world where in a 150-meter zone there is just one phone in neighbourhood and the owner of the phone will use his/her whims and fancies to allow only a particular person to talk or not to talk at his/her advantage. Imagine a world where opening a bank account took nearly 10–15 days and endless bank visits. Imagine a world where in order for one to have a D-Mat account for trading in share markets, one will have to go over more than 100 pages and put signature on more than 65 pages. Well, this is not a world of imagination; this is a real world where all the above-mentioned actually existed.

In the late 1980s, the things took time cut to 2024 where we see an undeniably different world which is quick and super-fast is due to emergence of Internet. It is due to this fast Internet that telephone was replaced by smartphone, brick-and-mortar banking was replaced with branchless banking called neobanking, and trading on bourse has become as simple as having your snacks or lunch.

All this has been due to the combination of finance coming together with information technology.

The Emergence

Necessity is the mother of all inventions—fintech was born out of the crisis of 2008 bubble burst and things changed.

The crisis made the bank recognised the need of scale back, but the consolidation to be continued. Banks tried to deliver value to shareholders, even though valuations were in doldrums, but they could not see a way to reduce their costs by losing key individuals without losing the ability to generate value, so the salaries of their investment bankers and their staff stayed high, whereas the lower hung fruit was asked to vacate to bring the costs down and people were rewarded for the same old system of measurement.

The generations of the 1980s to 2010 have seen a world which was to shop for your basic day to day supply which is like fruits, vegetables and other groceries it used to be hardbound currencies stuffed into your wallet which we called it as fiat currency. Today, India spearheads the payment revolution with its integration of bank accounts, Aadhaar and Mobile smartphone. The word payments means different to different people as per their convenience an organisation will use the same to its benefit a central bank is the core to its transfer and a watchdog for its smooth and without any hindrances caused to anyone. It is also the work of a regulator to ensure that these payments are free of any sort of vices and are not hot money being pumped into system to create a scenario which gives rise to terrorism, militant activities and any sort of antisocial elements which can be antistate of any country.

We are still interacting with the deep-rooted organisations, supported by high-tech groups that have been built over the last five decades based on centuries-old process of regulatory trusted organisations. Clients and traders exchange money for goods and services, facilitated by card networks, and banks extend credit and reconcile balances between themselves, ultimately being settled at the centralised bank or using counterparty process via outdated global messaging systems between global commercial banks. There are many independent actors in an ecosystem with many mediators, all of whom are profiting from the movement of the value in payment. The world of payments is not as complicated as it is looked upon, and this chapter will try to unearth as why to understand fintech understanding the payment system is the key as it's the most important ingredient to our story of fintech landscape.

So, to begin with, our story starts with the ancient times where there used to be a barter exchange of goods and services. In simple words, a dairy owner will produce milk and will hand it over to the farmer producing rice and vice versa. This gave rise to an inequality-based society as it was impossible to understand and bring equivalency in the payment system. So, the next era brought in gold, silver, bronze and other metals as mode of payment for goods and services. But as these were metals and trade and transfers of goods flourished a more sophisticated payment system was the need of the hour so came, printed notes came to the fore and were our main actors and have occupied a dominant place for past 200 years. But imagine a farmer of who has a rubber tree removes its raw material in Thailand sends the same to a factory in India to convert it into a finished product, the Indian manufacturer converts it in to a tyre and sends it to an automobile factory in Germany.

Just imagine how they transacted this money in the Old World. So there came the internationalisation and a common ground required for transfer of money not just from one place to another but from one continent to another continent. These transactions need to be quick and fast and should be settled as quick as possible.

Hence, the whole gamut of fintech will revolve around the term payments and the payment systems.

Payment System

Payment systems are a set of common rules and procedures, which support the transfer of funds between people, business and financial institutions. Most payment systems are managed by operators and supported by one or more infrastructure providers of hardware, software and communication networks. Some financial institutions have direct access to each payment system and provide payment services to their customers. As per Kumar (2019), for growth of any economy, the financial system has to act as a pillar for it. The study further states that reliability and transparency act as two keys behind any financial system of the economy. The study concluded that applicability, ease of use, security, reliability, trust, convertibility, scalability, efficiency, anonymity, traceability and authorisation type act as the basic fundamental characteristics of the e-payment system. The researcher also states about ideal e-payment service as reversal, immediate, compliant, freely accessible and transparency.

Many payment systems employ a two-stage deferred net settlement process. Payments are initially made in commercial bank money, often between different banks; this creates net obligations between these banks, which are settled in central bank money at a later point in time. Features such as the netting of payments can have liquidity-saving benefits in systems where participants make multiple offsetting payments between each other in a space of time (e.g. payments between banks).

Payment Instruments

Payment instruments are the things that end users of payment systems use to transfer funds between accounts at banks or other financial institutions. Cards, credit transfers, direct debits and e-money are examples of noncash payment instruments.

Payment Schemes

A payment scheme is a professional body that sets the rules and technical standards for the execution of payment transactions using the underlying payment systems. Payment schemes manage the day-to-day operations of the payment systems and processes and ensure any regulatory requirements associated with the processing of payment are met.

Characteristics of a payment schemes (based on the UK payments definition) are as follows:

- Offers a service to move money between parties.
- Has a governance structure that includes independent directors with a mandate to represent the views of all service users, together with directors appointed from the members of the scheme.
- Custodians of the payment scheme rules and technical standards for operation of the payment scheme.
- Responsible for the operation of the underlying payment systems.
- Complies with regulatory aspects governing payment schemes and systems.
- Has access criteria and an application process for joining.

The Movement of Money?

As described above with payments of money, the accounting of the same is as important as its usage so as in above example of farmer of rubber plantation and its subsequent movement to different countries, their accounting is also of utmost importance so as the faith of the company, and a complete audit is possible so that no leakages are there in the system which leads to any kind of doubts in the minds of the stakeholders of large corporations; regulatory bodies and governments are also equally responsible for due diligence of these corporations.

In today's world, balances in bank accounts are no longer based on units of currency, and fractional reserve lending has abstracted value from 'real money', with significant implications for a move towards ownership-based units such as cryptocurrency. However, there are many risks to individuals and businesses in moving to payments outside of the traditional banking system: from the heavily regulated world in which consumers are protected to the Wild West where there is scant protection.

P. Krishna Priya and K. Anusha (2019) in their papers have covered a plethora of benefits that fintech has to offer with a wide range of making payments for a P2P transaction or raising money from crowdfunding and crowd investing. It also refers to various other challenges to cater to asset management where it addresses the issues of social trading, robo-advice, personal finance management and many other things. The paper highlighted that 72% of the digitally active consumers in India have used the fintech platform for money transfer and payment, whereas the global average is 50% as per the 2017 EY fintech adoption index.

Venkatachalam (2020) in its paper brought to the fore that, globally, there is a disruption in the financial sector due to the emergence of fintech companies. The industry is changing in the way it functions. Hence, it is important to understand the changing landscape in the Indian context. The key players identified in the landscape are regulators, traditional banks and fintech companies. The objective of the study is to understand in Indian context:

1. Role of key players in the changing landscape.
2. Influence of fintech companies on the ecosystem.

This study observes that there will be an emergence of the multidimensional relationship among the participants in the ecosystem and the scope of regulation will widen. This paper also observes that fintech has a positive influence on meeting Sustainable Development Goals and the challenges of regulation considering this larger goal will vary based on the risk involved in business models and products, with technology playing a pivotal role.

Near Future Trends: Exponential Payment Growth (Blakstad & Allen, 2018)

According to the BNP Paribas and Capgemini World Payments Report for 2017, global electronic transactions broke a decade-long record for growth in 2014–2015, with volumes exceeding 11% growth to reach more than 433 billion. In 2017, they estimate the global noncash transaction volumes will record a CAGR of 10.9% during the period 2015–2020 reaching 725 billion in 2020. Developing markets are expected to boost the global growth rate of transaction volumes with a sustained CAGR of 19.6% during this period, while mature markets are expected to grow by a modest 5.6% over the next 5 years.

Also as per Dubey (2018), fintech technologies, including artificial intelligence, augmented reality and blockchain, are revolutionising digital banking worldwide. AR is being used in healthcare, oil and gas construction, retail and manufacturing to improve efficiency and reduce costs. Artificial intelligence is gaining popularity on social media, and blockchain has become mainstream in industries like healthcare, government, insurance, supply chain management and finance. In 2018, $1.3 billion was invested in fintech projects based on blockchain innovation. Progressive financial organisations are also investing in internal bank technologies, particularly those powered by permanent ledgers. The present study explores the role of AI, AR and blockchain in digital banking.

There are several key convergent payment trends to watch which are as follows:

- Wearable payments: These are a type of contactless payment in which consumers make payments with a wearable device such as a smartwatch or fitness tracker. The wearable device functions as a digital wallet, storing the user's payment information and allowing them to make purchases with a tap or wave of their wrist.

Wearable payments make use of near-field communication (NFC) technology, which allows two devices in close proximity to communicate wirelessly. Contactless credit and debit cards also use this technology, but with wearable payments, the device is always on the user's wrist, making payments even more convenient.

- IoT-based payment: As of update in January 2022, the IoT-based payments market worldwide was experiencing steady growth, driven by increasing adoption of connected devices, advancements in IoT technology and evolving consumer preferences for convenient and secure payment methods. While specific market size estimates may vary depending on the source and methodology, a general overview of the market trends and potential valuation based on available data:
- Market Size and Growth.
    - The IoT-based payments market encompasses a wide range of connected devices and payment solutions, including smart wearables, connected cars, smart home devices and IoT-enabled POS terminals.
    - According to various industry reports and market research studies, the global IoT payments market was estimated to be worth billions of dollars annually, and it was projected to continue growing at a robust pace over the coming years.
- Key Drivers and Trends.
    - Increasing adoption of connected devices: The proliferation of IoT devices, such as smartwatches, fitness trackers and connected appliances, has expanded the potential for IoT-based payment solutions.
    - Seamless and secure transactions: IoT technology enables frictionless payment experiences by allowing consumers to make transactions seamlessly using connected devices, reducing the reliance on traditional payment methods.
    - Enhanced customer experience: IoT-based payment solutions offer personalised and convenient payment experiences tailored to individual preferences, driving customer satisfaction and loyalty.
    - Integration with emerging technologies: IoT payments are often integrated with other emerging technologies, such as artificial intelligence, blockchain and biometrics, to enhance security, scalability and functionality.
- Market Segmentation and Regional Trends.
    - The IoT payments market is segmented based on the type of connected devices, payment methods, industry verticals and geographic regions.
    - North America, Europe and Asia-Pacific are among the leading regions driving the adoption of IoT-based payment solutions, with significant investments and innovation in the fintech sector.
- Industry Players and Partnerships.
    - Key stakeholders in the IoT payments ecosystem include technology companies, financial institutions, payment processors, device manufacturers and software developers.
    - Partnerships and collaborations between these stakeholders are essential for driving innovation, expanding market reach and delivering integrated IoT payment solutions to consumers and businesses.

- Regulatory and Security Considerations.
  - Regulatory compliance and data security are critical considerations for IoT-based payment solutions, given the sensitivity of financial transactions and personal information involved.
  - Regulatory frameworks, such as the General Data Protection Regulation (GDPR) in Europe and the Payment Card Industry Data Security Standard (PCI DSS), play a significant role in shaping the regulatory landscape for IoT payments.
- Future Outlook.
  - The IoT-based payments market is expected to continue evolving rapidly, driven by advancements in technology, changing consumer behaviours and emerging use cases across various industries.
  - Opportunities for innovation and growth exist in areas such as contactless payments, biometric authentication, subscription services and cross-border transactions.
  - As per Statista.com, the IoT market is expected to witness a significant surge in revenue, reaching a staggering US$1387.00bn by 2024 worldwide (Insights, 2023).
  - Among various segments, automotive IoT is projected to dominate the market, with a substantial market volume of US$494.20bn in the same year.
  - Looking ahead, the market is anticipated to grow at an annual growth rate of 12.57% (CAGR 2024–2028), resulting in a remarkable market volume of US$2227.00bn by 2028.
  - In terms of global comparison, the USA is expected to lead the pack, generating the highest revenue of US$199.00bn in 2024.
  - This showcases the country's strong foothold and influence in the IoT market segment.
  - In the USA, the Internet of Things market is rapidly expanding, with companies investing heavily in smart home devices and connected cars.
- *Micropayments*: Today, we cannot make or receive micropayments (fractions of pennies or cents) for tiny units of service, such as paying to read a single online news page referred as pay-per-view or receiving a financial reward for clicking on a website advert, mostly because in the earlier days such transactions would cost too much. Money itself is divisible, but there is no point paying 0.05 of cent for something if processing the payment costs many times more than that. Thanks to emerging technology and new payment systems, this constraint has been eliminated, and today not only small or micropayments are used for goods and services even for shares like in US bourse it's possible to buy a fractional share of Meta or Apple or Tesla at the accessibility by just click of button and not only for a citizen of US but also for an Indian citizen who can buy the shares of foreign company at ease by using apps such as INDmoney or Trendlyne and many others who have allowed Indians to purchase fractional shares in many US-based companies.

- Peer-to-Peer and Social Payments: Roommates and colleagues are using social media platforms to split bills, rent and utilities, supported by innovative peer-to-peer payments platforms such as Venmo and Braintree. Social context gives platforms an opportunity to build on emotions and personal bonds and social reinforcement to gain traction. In 2017, WeChat, China's favourite messaging app, had over 980 million monthly active users to 1.427 billion active users in 2024. There's a Chinese tradition of exchanging packets of money among friends and family members during holidays, and, in 2014, for Chinese New Year, WeChat introduced a feature for distributing these virtual 'red envelopes', allowing customers to send money to contacts and groups as gifts. A month after it was launched, WeChat Pay's customer numbers expanded from 30 million to 100 million. Two years later, in 2016, 3.2 billion red envelops were sent over the holiday period; in 2024, this stands at 5 billion sent across the globe.
- *New Digital Payment Channels*: Mobile payments have become ubiquitous; a big driver of commerce lies in enabling consumers and merchants to connect at new points of discovery. Businesses can reimagine business models and how they interact with their customers, thanks to new technology, especially integration with social and lifestyle platforms. As the platforms provided by Meta, WeChat, Amazon, Alphabet, Alibaba and others continue to lower the barriers of participation, opportunities arise for payments providers to differentiate consumers' and merchants' experience and allow select financial services to fit more naturally into their customers' lives. The key to success will be identifying which account features are best handled through which channel, including voice, messaging and even augmented reality. Augmented reality, for example, can provide new payment channel opportunities through customers' devices, such as selecting and paying for item from an in-app camera or reserving a seat in a cinema while scanning the 'Screening Now' board in the street.

- India is seeing an exuberance of this new innovative change in payment system; the inception of QR code and its scanning is an experience which has brought the following into a reality: that there is no need of carrying any wallet and a smartphone device enabled with Internet is sufficient to make payments and receive payments. Whether it is shopping for vegetables and fruits or even having coconut water at a stall or buying an expensive Rado watch at a luxury showroom, the QR code market is posing challenge to the debit and credit card market.

The New Payments Landscape and Its Enablers

QR Code-Based Payments

The widespread use of QR codes in India's transaction landscape is being mirrored in Singapore and the Benelux countries. These regions recognise the ease of use and accessibility of QR code-based transactions, making them appealing for both urban and rural demographics.

Micropayment Solutions

India's adept handling of micropayments caters to a market driven by small-value transactions. This approach is being keenly observed by France and Malaysia, where similar market dynamics exist, and there is a need for efficient handling of low-value transactions.

Aadhaar-Enabled Payment Systems

The Aadhaar-enabled payment systems of India, leveraging biometric verification, are influencing countries like the UAE and the UK. These nations are exploring similar biometric systems to ensure secure and inclusive digital transactions.

Financial Inclusion Initiatives

Initiatives pioneered by India to foster financial inclusion through the adoption of digital payments are finding resonance and being replicated in nations such as Nepal and Malaysia. These nations are adopting India's strategies to extend banking services to the unbanked, leveraging technology to bridge financial divides.

Rural Digital Payment Adaptation

India's strategies to penetrate rural markets with digital payments are a blueprint for countries like Nepal and the Benelux region. These regions share similar rural demographics and are implementing analogous strategies to extend digital payment networks to remote areas.

India's regulatory framework for managing digital payments is emerging as a model for nations like France and Singapore. These countries are developing their digital economies and see value in India's balanced approach to regulation and innovation.

It is this UPI payment transaction which has been a great enabler for any individual to sip coffee from the Eiffel Tower using UPI or to see the majestic view from Burj Khalifa using UPI. UPI has become a huge exporter of currency services for India, and its rise has been tremendous; as more and more countries will adapt, the cost of transfer of funds will be lower, and it will lead to optimisation of revenues.

Innovative Payment Technologies

The innovative payment technologies embraced by India, including contactless payments and e-wallets, are influencing markets like the UK and the UAE. These regions are adopting similar technologies to keep pace with global digital payment trends.

Cross-Border Payment Systems

Finally, India's advancements in facilitating cross-border payments are being closely studied by countries like Singapore and the Benelux nations. These countries see India's model as a way to enhance their international trade and remittance flows, ensuring smoother cross-border financial transactions.

Emerging Fintech Solutions

Solutions to the classification challenge, including definitions for green and climate bonds, have already emerged, thanks to efforts by NGOs and big data analytics. There are a small number of platforms already available that enable investors to select their investment criteria and see a match, for example. If they favour projects supporting gender equality or eradicating poverty, or for emission reductions, so that investments can be tailored to the investor. These solutions enable a wider body of investors to access a wider variety of sustainable investment, increasing the scope of sustainable investments, although provenance and corruption may still be an issue for riskier countries or industries.

Tokenisation of green initiatives using blockchain is also becoming more common, with a variety of initiatives involving tokenisation of renewable energy carbon offset schemes emerging, enabling, community ownership of energy resources, facilitating targeted investments in green projects. While tokenisation itself is

effectively a type of securitisation giving confidence to purchasers that the underlying asset is clean, these tokens are also easier to transact those traditional securities, as they can be traded for other cryptocurrencies or for fiat currencies via cryptocurrency exchanges. As per Malamas et al. (2023), the process of issuing bonds is intricate and fraught with technical problems, including unreliable stakeholders, restricted traceability and regulatory frameworks. Issuing green bonds increases administrative and compliance costs because they fund environmentally beneficial projects that need to be verified by a third party. Through the development of impact reporting green bond procedures that are trusted, blockchain technology can resolve these problems. An architecture based on a proposed blockchain tokenises bonds with an ERC-20 smart contract. The smart contracts take regulatory compliance tools into consideration, manage validatory and regulatory approval requirements and provide forensic-by-design services. Regulatory agencies' access to issuance records is also improved by the system.

Meanwhile, robo-advisors are starting to make it easier for normal people to participate directly in green investments, via exchange-traded funds (ETFs), and we have already seen the mainstream robo-advisor WealthSimple trading a green ETF as part of its standard portfolio of products, among others.

Case Study

This is the case study of a company named BigOHtech (https://bigohtech.com, 2024) which solved the problem of handling a large number of loan applications from manual to automation which increased the human productivity as well as the disbursal of loans quickly.

Project Details

The client was seeking a solution to handle a high volume of loan applications and help with the loan processing time and efficiency of the process. Furthermore, the company's existing processing system was prone to errors and needed some fixing.

Problem

The customer was experiencing a high volume of loan applications and lacked the mechanism to handle such overloads. This resulted in long processing times and delays in loan approvals.

The company's loan officers received an average of 50 loan applications per day, which proved to be an overwhelming number and led to processing delays. The high

volume of loan applications led to processing times of up to 2 weeks, which is much longer than industry standards. This, in turn, resulted in decreased customer satisfaction and loss of business.

The company's customer satisfaction rating had dropped by 15% over 6 months due to delays in the loan processing process. A total of 10% of the company's business was lost to competitors who offered faster loan processing times. The company's existing loan processing system was prone to errors. This could have resulted in incorrect loan decisions for up to 50 loan applications per day. The company realised that a way must be found to improve the loan processing time and enhance the customer experience.

Company's Approach

On average, loan applications processed manually could take up to 10 business days, while automated loan processing systems can process loan applications in under 24 h. With an automated loan processing system, the loan approval rate is expected to increase by up to 10%, as the machine learning algorithms will be able to identify patterns in successful loan applications and make more accurate decisions. The implementation of an automated loan processing system can save the company up to $500,000 per year in employee salaries and benefits, as fewer loan officers will be required to handle loan applications.

The customer-facing portal is expected to reduce the time required for loan application completion by up to 50%, as customers will no longer be needed to visit the company's physical locations or wait on hold for customer service support. An automated loan processing system can reduce the overall loan processing time by up to 90%, as loan officers will only need to review and manually process complex loan applications that cannot be handled by the automated system. The implementation of an automated loan processing system would reduce the overall loan processing cost by up to 30%, as fewer loan officers will be required to process loan applications, and the risk of errors and legal issues will be significantly reduced. An automated loan processing system would improve the company's loan approval speed and accuracy, leading to increased customer satisfaction and retention rates.

Benefits Due to the Adoption of Fintech

Sun Ryu (2018) The study proposes a benefit-risk framework to understand users' willingness to adopt fintech. Based on data from 244 fintech users, it was found that perceived benefit and risk significantly impact adoption intention. Legal risk had the biggest negative effect, while convenience had the strongest positive effect. Early and late adopters' adoption decisions are influenced by different factors. The research stated that there are two perceived factors responsible for adoption of

fintech which are (a) perceived benefit and (b) perceived risk; under perceived benefit, the researcher has identified three factors which are economic benefit, convenience and transaction process, whereas perceived risk consists of four factors which are financial risk, legal risk, security risk and operational risk.

The new automated loan processing system reduced the average loan processing time from several days to under 24 hours, resulting in an 80% improvement in processing time. The improved loan processing time resulted in a 50% increase in loan approvals, reducing the number of loan rejections and resulting in more revenue for the company.

The new system also reduced the risk of errors in loan decisions by implementing advanced machine learning algorithms, resulting in a 40% reduction in the number of inaccurate loan decisions. The customer-facing portal provided customers with real-time access to their loan application status, reducing the need for customer support inquiries and improving customer satisfaction by up to 90%. The portal also allowed customers to upload required documents and e-sign loan agreements, reducing the need for manual paperwork and improving the efficiency of the loan processing process. Also the new automated loan processing system was fully scalable, allowing the company to handle increased loan volumes without any additional infrastructure investment, resulting in a 60% reduction in operational costs.

Fintech has not just energised the payments market but has given a boost to even the savings and investment basket. Today, mutual funds are seeing more than 18,000 crore inflows month on month, and the amount is going to grow exponentially. This has fulfilled the long-drawn dream of ex-SEBI governor to have a marketplace like Amazon and Flipkart which are increasing the consumerism buying and on the other hand companies like Groww, Zerodha and Upstox which have been a huge beneficiary for increasing the investment culture not only among Gen Z but also among the millennials and baby boomers.

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Chapter 3
Fintech in International Relations: Some Reflections on Globalisation and Transnational Governance

R. Radhakrishnan and Shreya Jha

Introduction

Today, we are witnessing the advent of new technologies that go beyond the euphemism of global village, a term popularised by Marshall McLuhan, the late Canadian communication scholar. This observation can be juxtaposed by the recent statements from the Indian government that Indians could use the UPI services to carry out transactions in Sri Lanka, Mauritius, Bhutan, Nepal, Oman, UAE, France and Southeast Asian countries which support UPI. Moreover, there are plans to introduce UPI services in major powers like the UK, Australia and the USA (Goldstein et al., 2019). These developments go beyond transborder and highlight the strides made in the globalised world economy while also raising questions about the authority of the nation-states albeit getting diminished as a result of significant changes in technology and finance due to the integration of national economies into a global world economy (Walker, 2017).

In the Indian context, the future prospects of fintech seem to be very promising with a growing middle class in the world's most populous nation, wherein its overall fintech market potentiality is estimated to be around $1.3 trillion by 2025 (Laboure & Deffrennes 2022). This assumes more importance given India's unique position in the comity of nations. It is a subcontinental country, with enormous diversity with most of its population having a polyglot features and carrying multiple identities. Its reliance on social justice and an inclusive, secular and democratic nation-building is in contrast to the general discourse on modern nation-state system as witnessed in other parts of the world (Haddad & Hornuf 2019).

In this context, the advent of fintech merits all the more attention given its adherence to decentralisation, fiscal discipline and governance which is an integral part of good governance. Fintech when in force in its totality will also regulate the

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C. M. Gupta, G. Kaur (eds.), *E-banking, Fintech, & Financial Crimes*,
https://doi.org/10.1007/978-3-031-67853-0_3

municipal and panchayat targets for fund disbursement through the existing banking system. This aspect endorses the inevitability of fintech in our day-to-day life and highlights the centrality of the state especially in the formulation of discourse on financial governance and security. In recent times, fintech has claimed spotlight due to various factors. Some of them are a booming economy and a tech-savvy, youthful population, i.e. the demography dividend. The meteoric rise of India's fintech landscape can be traced back to multiple factors, chief among them the government's drive for a cashless economy, which has accelerated the adoption of digital payment methods and stoked the demand for fintech offerings.

Financial technology can be comprehended as the 'electronification' or 'digitalisation' of the services provided by the banking sector to utilise them in ingenious or unconventional ways. Financial technology can be explained in terms of the market and its functions, its establishment, its technological mechanisms, its layout, its consequences and its retardation and the aftermath. Fintech, for instance, has been elucidated as 'to technology enabled financial solutions' or 'to the use of technology to deliver financial solutions'. Universally, the expansion of fintech has been remarkable and significant. Earlier investment institutions have used fintech to grow over and develop initial forms of algorithmic trading, high-frequency trading (HFT) and off-market dark and grey pools. The growth of fintech has been very substantial and reflects potential to the core of the future growth of all market sector areas. Keeping the consideration and in the present scenario fintech is being used in security areas to create fintech being used in security areas to creating an indiscernible traverse among traditional stock markets and exchanges and then the development of new electronic markets.

The system of financial technology consists of deposits, withdrawals, lending, credits, payments, investment and its risks and management of losses. One of many definitions defines fintech as concerning the company rather than concerning the market. Referring to the reports of UK fintech financed by HM treasury and prepared by Ernst & Young in March 2015 espoused an entity-based approach; According to them fintech are 'high-growth organizations combining innovative business models and technology to enable, enhance and disrupt financial services'. There are many other components identified by Ernst & Young which is centred around the experiences of consumers and simple and low-cost modelling. The reports and studies embrace a 'classic' (Ernst & Young, 2014). With constant studies on financial technology, many scholars adopt specific technical approach to comprehend the effects, aftermath and working of fintech. The UK government Chief Scientific Advisor, Sir Mark Walport, elucidates fintech as 'financial technologies that integrate finance and technology in ways that disrupt traditional financial models and businesses and provide an array of new services to businesses and consumers' (Ernst & Young, 2016). Separate UK government commissioned official reports define fintech in generic sense as 'technology applied to financial services' or 'the use of financial technology to provide financial services'. Both meanings conferred by the authorities refer to 'Amalgamation of technology with the orthodox method of financing in all dimensions' (Chen et al., 2019).

With an average estimate of 4000 start-ups of financial technology by the end of 2015, among them 12 start-ups were considered as 'unicorns', meaning those start-ups have an average net worth of over 81 billion. The most remarkable innovations have been noticed in the retail payments sector, which have led to the unbundling of different traditional financial services and led to a shift to low-cost foreign exchange (FX) services (Chiu & Koeppl, 2019). Recently, we have seen advances in the payments sector with the introduction of integrated payment systems, contactless payments and peer-to-peer system, among many others. The paramount consideration for these innovations is the overall welfare of society, not just the health of the financial sector. But it is difficult considering the vast majority of parties involved—the solution to this: thorough research of the market. For example, if the banks and fintech lenders are competing on provisioning of credit, they will take into account the implications to both the final consumers and the investors. Questions like the following will all need to be considered because one of the key promises of fintech is its potential for greater financial inclusion: 'How will credit provision be affected?' 'How will the provision of liquidity be affected?' 'How will the effects translate to welfare?' Worldwide estimates show that over 2 billion people around the globe are unbanked; their inclusion into the fintech ecosystem could provide them with welfare improvements. A modelling system which is accompanied with empirical evidence can help us shed light on these issues. Ample of studies on fintech has invited many worldwide associations in various other disciplines. The term 'fintech' itself elucidates an amalgamation of finance and technology. Few significant studies on issues pertaining to fintech are taken up by many scholars in finance, but the research dwells deep into the territory of technology, and the scholars are not necessarily equipped with the knowledge to combat these issues. This is where collaborations with experts of technological sector can be fruitful (Cong & He, 2019). For instance, the blockchain infrastructure is based on technological innovation which has been achieved after in-depth research into computer sciences. Understanding the impact of blockchain on the financial market can allow us to develop beneficial insights which present the need of the collaboration of finance and technology. Numerous studies on blockchain demonstrate the potential for such synergy. Another such impactful synergy can be anticipated with legal scholars, considering that financial technology indulges many issues pertaining to law, such as issues related to the accessibility of available data to the lenders without them being in violation to the privacy or anti-discrimination laws (D'Acunto et al., 2019). These are some of the issues that the experts of the field have been exploring; these issues pose several opportunities to collaborate. The fintech includes neophyte small-scale business, start-ups and scale-ups, full-fledged companies out of them many company had expertise on telecommunication services and e-retail. The classification of fintech has always been a very far-fetched subject. The classification of fintech had many characteristics to be considered before subjecting them to a particular spectrum like classifying them on subject of being customer-centric, legacy-free, scalability, innovations and in accordance of the compliance. The classification of fintech is inspired by principles given by David Chuen and Ernie Teo. While consideration of

classification adopts a very foundational approach, it also highlights many features and effects in terms of impact, expansion and repercussions.

Fintech's growth has been very subsequent and has shown a large scale of progress and development in the sense of proficiency as well as productivity. Surveys conducted by mega companies like Capgemini and LinkedIn facilitated the use of fintech by a large scale of companies with an average of 50.2% companies worldwide are embracing fintech while they do their business. Investment in the sector of fintech may take a leap in the future expansion as predicted by some scholars and market watchers. Numerous financial establishments have been already been investing from a long due time, internally into fintech. With the predictions of the experts and constant market watchers, fintech-related investments have witnessed a steep rise. The UK's fintech global reports, October 2018, emphasised on year-to-year growth on capital raised by the fintech establishments, and they were seen to reach $54.4 billion in 2018. The rate of declined offers and deals has dropped down from peak of 2291 in 2015 to 1187 in 2018.

The regulation of fintech in financial institutions has always faced grave challenges, making it a centre of topic in worldwide financial sector and infrastructure. Fintech has an edgy technological spectrum which makes it difficult to comprehend, utilise and make it work in the day-to-day professional work. Though fintech offers lot of potentialities in making any traditional financial services easy and prompt, its regulation is quite a difficult task. Many regulatory circles in the USA and around the world have made this subject a rampant central matter of talk these days. In many instances, banks are put up in a disadvantageous situation in coordination with the technological companies, in terms of its regulation, wherein the banks are not regulated as tightly. One of the many challenges pertaining to fintech is how to regulate new fintech into the traditional, orthodox financial establishments.

Maintaining financial stability and consumer welfare while boosting innovation is an intricate equilibrium that must be struck while negotiating the complicated regulatory landscape of fintech. The traditional regulatory framework, which is based on classifying businesses according to their kind, has substantial difficulties in the ever-changing fintech environment, where a variety of actors participate in comparable activities. Activity-based regulation proponents call for a paradigm change and stress the significance of regulating based on actions as opposed to entity type. They contend that this strategy promotes fair competition, reduces regulatory arbitrage and strengthens transparency. The adaptation of conventional regulatory frameworks to the innovative financial modalities inherent in fintech raises a fundamental concern. Because market-based lending, for example, differs from traditional bank lending, it is questionable whether the present regulatory frameworks intended for traditional financial institutions still apply. This disparity highlights the need to adjust legislation, but care must be taken to avoid strangling creativity. There are worries about the potential consequences of insufficient screening in some fintech endeavours, especially when it comes to large-scale investment distribution to individual investors, which brings to mind the flaws found in the financial crisis of 2008. It is crucial to take a balanced strategy that embraces activity-based regulation and is adaptable to the changing fintech scene. Regularly updating and

adjusting regulatory frameworks to keep pace with evolving risks and technological advancements in the financial sector is essential. This requires concerted collaboration among policymakers, regulators, industry figures and the public. Through collective efforts, these stakeholders can uphold consumer protection, preserve financial stability and cultivate an enabling atmosphere for fintech advancement.

Regulators can effectively traverse the complexities of fintech regulation by fostering open conversation and adopting creative tactics.

In recent times, a new risk that is on the rise is the risk from the technologies itself. A system glitch, any problems in the market-based lending method or a mere breach of security of the cloud system where all the essential financial data is being kept could cause detrimental damage to the financial industry, so severe that only a few have even begun to imagine it. These are all issues which should be evaluated in any future researches.

The advent of fintech companies has resulted in the creation of new financial consumer-oriented services that offer faster, cheaper and more accessible digital-financial user experiences across the world. So it now invariably has a geopolitical dimension as firstly it has generated an economic competitiveness along with growing innovations. Secondly, it seeks to usher in a sense of economic and social stability along with promotion of inclusion of various sections of people from across the world. In this context, the role of regulators and governments around the globe seeks to now adopt a forward-looking progressive stance to nurture future opportunities which could emerge from a radically different new economic order and decentralised applications and services system. Such a scenario has created a decentralised finance (DeFi) as financial power and wealth have always been closely related to geopolitics and foreign influence. The rise of fintech has revolutionised the prevailing transaction system among the masses by providing cheaper credit and access to financial services leading to the dismantling of the influence of large monopolistic financial institutions. This at the same time raises concerns about the giving space to the nontraditional threats such as money laundering and tax evasion, leading to bringing new risks that seek to disrupt the existing global financial and economic order. In a globalised world, the rises of fintech with technological innovations seek to confront and replace the existing global institutions of financial governance. These companies have an enormous potential to influence the general behaviour as they have the potentiality to disrupt the traditional financial companies by seeking to acquire companies around the world and seeking to acquire them or their ideas by trying to copy their ideas within their centralised ecosystems (Foley et al., 2019).

Modern technology is making huge transformations to the financial services in the present era; along with that, it has also led to the formation of competitors which fall outside the traditional sectors of finance. After a thorough research of four academic papers by scholars Fuster et al., D'Acunto, Prabhala and Rossi, Tang and Vallee and Zeng, different perspectives of the technological disruption of the market can be formed. These articles discuss about technological lending of money as well as technology-based investment advice services.

Fuster et al., in their paper, noted that the fintech lenders, in comparison to banks, had increased their share in the mortgage lending market in the USA to 8% in 2016 from the previous 2% in 2010 (Fuster et al., 2019). They analysed various loan-level databases and concluded that fintech lenders process the applications at a 20% faster rate than traditional lenders. Plus, they are less likely to incur any bottlenecks upon demand shocks. A surprising thing to note by the authors was that fintech did not target people with less access to traditional finance methods, which suggests that they are not increasing access for people but instead competing with the existing finance methods. Vallee and Zeng and Tang in their scholarly articles further expanded on this view by providing a theoretical analysis on this topic further supported by empirical research on the interactions between banks and peer-to-peer (P2P) lending services (Tang, 2019). The authors found that P2P lending is becoming a substitute for bank lending concerning infra-marginal bank borrowings but acts as a complement in instances of small loans of money. The authors also focused on the fundamental issue of joint information production by investors and platforms, which directly challenged the bank's role as the sole information provider on the investor's behalf. Their concern is the trade-off between unfavourable investor selection and more thorough screening by knowledgeable investors. Their empirical testing and theoretical model both demonstrate that as platforms advance (Vallee & Zeng, 2019). They reduce investor information provision while optimally increasing platform pre-screening intensity. The authors D'Acunto, Prabhala and Rossi analysed whether virtual advisors improve investors' performance. With a sample based in the Indian market, in the prior stages, adopters of a virtual assistant performed similarly to non-adopters who preferred human advisors. However, most became better diversified to reduce portfolio volatility after adopting robo-advising. Although robo-advisory is an effective tool in tackling some significant behavioural biases like disposition effect and momentum chasing, it is essential to note that it is not a ready-made solution. The way robo-advising succeeds or faces challenges is primarily determined by the degree of personalisation in the interventions designed to meet the varying needs of the diverse investor classes. Moreover, the authors underline that robo-advisory has unique benefits that should not be perceived as a panacea in investment-related matters. Even in the aftermath of the global financial crisis that swept from 2007 to 2008, international financial hubs are under a heavy burden as the expenses and the effects remain to be seen. More recent large-scale successful technological innovations in financial technologies and the development of various fintech service platforms and models gave impetus to the growth and visible improvement of the efficiency and profitability of economic systems after the crisis. On the other hand, this has seen the development of new and equally dangerous risks, mainly in market and counterpart fragmentation. This has hindered regulatory institutions and supervisory authorities, resulting in disorganisation, disintegration, disconnection, depletion and distraction. Consequently, there is a preference for essential materials and skills in manoeuvring in these contemporary terrains (Zhu, 2019).

Internationally it can be observed that a lot of the fintech advancements are happening outside the USA, with China leading at the forefront of financial technology.

Other nations which have less developed financial markets are also noticing considerable activity in their markets. This does not come as a surprise since the financial industry of the USA has always been among the most developed ones and has been at the forefront for decades, being home to many well-established players. This results into much fewer opportunities for innovation and growth since anything that will cause disturbance to the financial equilibrium will be faced with a lot of resistance. The same cannot be said for other emerging economies like China as they have less developed finance sectors; they provide a lot of scope for innovation, stage skipping and disruption to the equilibrium in general. This has presented numerous opportunities for researchers in the finance sector, since, for many years, finance research has been restricted to the USA only. This growing interest in fintech in other emerging economies opens up paths to expand the target of research at a global stage.

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Chapter 4
Theoretical Perspective of Fintech

Monika Thakur and Chander Mohan Gupta

Introduction

Fintech, short for financial technology, is a relatively new concept that has been getting a lot of attention lately but has not gotten much attention in research area and publication. This chapter delves into the origins of fintech by reading widely and analysing the already published articles and chapters. There are many different ways in which fintech might show itself. No universally accepted meaning of the word "fintech" has been settled upon, and its use could vary depending on the surrounding circumstances. Innovation in the financial technology sector is complex and dynamic. Additionally, the way it spreads, its widespread acceptance and the amount of people it manages to attract are all quite unique. Companies operating outside of fintech's jurisdictional constraints are particularly caught in the middle of the heated debate over the regulatory ramifications of fintech. Financial technology (fintech) poses problems for established banks and financial services while opening up opportunities for nimble and creative entrepreneurs to shake up the industry and take charge.

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C. M. Gupta, G. Kaur (eds.), *E-banking, Fintech, & Financial Crimes*,
https://doi.org/10.1007/978-3-031-67853-0_4

Background and Reasoning

More than 70% of millennials would rather go to the dentist than go to their bank, according to Arslanian (2016). Even if there are differing opinions on this, it does bring up an important point about how the banking and financial industries will be involved in the Industry 4.0 age (Gabor & Brooks, 2017; Jakšič & Marinč, 2019). Technology, consumer habits, ecosystems, businesses and even governments have all been impacted by the emergence of fintech.

The assumption that money and technology were closely related—and sometimes the same—was shattered by a single comment on this major change. When compared to other service industries, the financial services sector is frequently considered to make the most comprehensive use of information technology, and its pioneering role in technical breakthroughs has earned it widespread fame (Iman, 2014). The interplay between service providers, customers, technology and laws is complicated and dynamic, and it may be difficult to keep up with all the moving parts.

Sadly, this line of inquiry has received very little funding (Ozili, 2018). Notwithstanding the wealth of information on the subject, there are few fintech studies; a basic search for "fintech" on Google Scholar should provide the same results. The majority of the findings are often presented in policy studies and consultancy reports. The following questions are foundational for this purpose. What is fintech? What are the most prevalent themes covered in fintech research?

Technique and Strategy

The fintech study drew from a wide range of credible sources, including those in the fields of law, computer science, business, management, information systems and technology management. We searched the Web of Science database for each publication separately to find chapters that have the words "fintech" and "financial technology" anywhere in the title, abstract or keywords. The increasing use of the words "fintech" and "financial technology" has led to some uncertainty and misunderstanding over their precise meaning, which is why this limitation was put in place (Milian et al., 2019). The goal of this study is to get back to the fundamentals of the idea.

Using this methodology, a total of 228 chapters were generated, with a focus on the theoretical or empirical discourse surrounding "fintech" or "financial technology". Later, in order to make them more manageable for human evaluation, the chapters were condensed by removing any unnecessary or tangential references.

Table 4.1 No of articles reviewed to write this paper (by Authors)

Year	Journal papers	Conference papers	Articles	Review papers	Total
2014	6	4	3	2	15
2015	9	6	4	3	22
2016	11	7	5	3	26
2017	14	8	5	3	30
2018	13	7	4	2	26
2019	12	6	5	3	26
2020	10	5	4	3	22
2021	8	4	5	2	19
2022	9	5	5	2	21
2023	10	6	4	1	21
Total	102	58	44	24	228

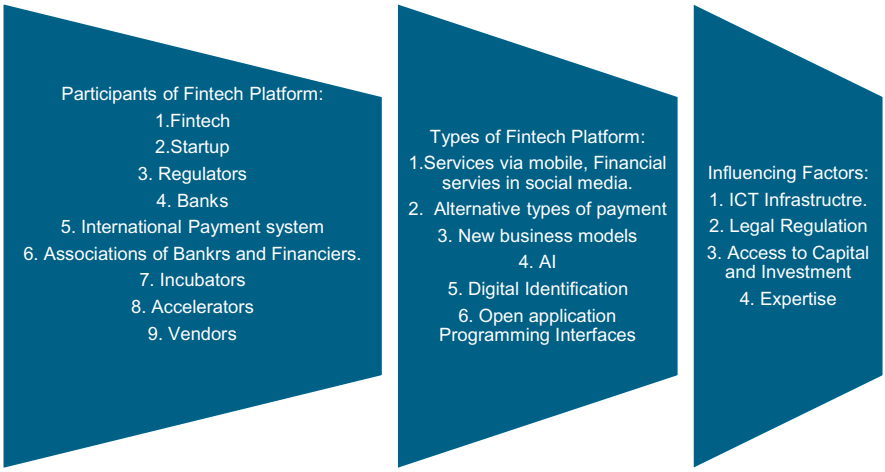
Several chapters that fulfilled the inclusion criteria were found by the researcher during the literature study. Journal and year were used to classify 61 publications that fulfilled the requirements.

The first step in the coding process is for the author to go through a stack of these chapters to compile a detailed list of categories. At the same time, two research assistants used these criteria to evaluate each paper separately. After reviewing the findings, the author fixes any coding issues and makes adjustments to the codes until everyone is satisfied. Instead of doing a thorough literature study, this approach aims to highlight key themes and trends discovered in fintech empirical research.

In order to determine the presence and frequency of ideas in the data, the research used conceptual analysis, particularly content analysis (Creswell, 2003). In this step, the frequency of an idea—implied or explicit—in the selected literature for study is quantified. This inquiry calls for a qualitative approach, and that method is both appropriate and sensitive enough to provide light on what happened.

According to the methods put out by Miles and Huberman (1994), each and every item was recognised, evaluated, categorised and arranged into primary themes. In addition, we reviewed other significant papers that came to light throughout the course of the research but were not originally part of the dataset. After reaching data saturation, certain publications were removed from the research. A practical task was then used to combine the identified ideas (Table 4.1). Analysis, processing and interpretation of the data followed. The study in this work was built around the identification of the key conceptualising patterns.

There are three pivotal pillars that contribute the background of financial revolution, namely, innovation, accessibility and security; the other as pacts related to fintech can be best explained with the help of following diagram:



Why Is Fintech Important?

In contrast to conventional and neoclassical economics, which centre on product prices and the laws of supply and demand, studying technological innovation like fintech is very difficult, if not impossible. The unique qualities of technological artefacts and intellectual knowledge set them apart from other types of resources (Galende, 2006). Traditional banks are no longer the primary intermediaries in financial transactions; instead, "shadow" banks have emerged as a significant player (Buchak et al., 2018).

The growth of fintech has led to the elimination of middlemen in the financial services industry, which has prompted the introduction of new protections for investors and consumers. Startups in the financial technology sector might sidestep the minimum capital requirements and fees of intermediaries that are common in conventional banking (Iman, 2018a, b). Data science and big data analytics have revolutionised data acquisition, processing and evaluation methods, drastically cutting down on search budgets (Giudici, 2018).

According to Gomber et al. (2017), the term "fintech" was coined not long ago from the combination of the words "financial" and "technology". This new term describes how traditional banking practices are being transformed by integrating present Internet technologies. Five factors—participants, added value, legislation, methods and scope—have been identified by Hung and Luo (2016) as having the ability to alter the dynamics of the fintech sector. A number of works have made reference to fintech and its many useful aspects (Alt et al., 2018; Gai et al., 2018; Lee & Shin, 2018).

Fintech, according to Puschmann (2017), is all about new ideas in the financial services industry in terms of business models, goods, services, organisations,

procedures and systems that come from IT advancements, whether they are little tweaks or major overhauls. The term "fintech" was used by Gomber et al. (2017) to describe technological advancements in the banking industry that upend long-standing practices, procedures and products.

The four main types of financial technology businesses identified by Ng and Kwok (2017) include crowdfunding, automated investment advisors, peer-to-peer lending and deposit platforms and simplified payment processing. The five main players in fintech ecosystems, according to Lee and Shin's (2018) research, are government agencies, financial consumers, fintech startups and conventional financial institutions. Fintech is defined and classified in this way to highlight two key features: the use of technology and the adoption of pre-existing government rules and regulations.

Since banks have been pioneers in embracing IT from the start, they have had to constantly raise their game in terms of knowledge and skill. There are two possible roles for fintech firms in these situations: disruptors and collaborators (Hung & Luo, 2016). A co-opetition approach, which incorporates both collaboration and competition simultaneously, might be advantageous for participants in this specialised and lucrative field (Brandenburger & Nalebuff, 1996).

Fintech startups' development and advancement might be significantly impacted by government laws. Their policies will definitely shape the sector's future (Arner et al., 2017a, b). It must be emphasised that we must be very careful how we apply this legislation. The outcomes would probably not live up to expectations if governments mandated that all banks innovate. If, however, they pushed for fintech startups to join the regulated sector, a lot of regulations and standards may not be satisfied.

Fintech startups may find policy favourability in certain industrialised nations. Nonetheless, protectionism is popular in a number of other nations. Instead of directly motivating fintech entrepreneurs to create new goods and services, the Taiwanese government encourages investment between conventional banks and fintech firms (Hung & Luo, 2016). In her analysis of Indonesia's fintech regulations, Iman (2018a, b) focuses on the interplay between the country's central bank and several financial services organisations.

The majority of the existing literature is descriptive and heavily focused on investigation, according to this study. There are studies that focus on the mechanics and systems of interaction, and there are studies that provide new ways of looking at fintech. Studies by Kim et al. (2016), De Kerviler et al. (2016), David-West et al. (2018); and Kim et al. (2015) all reflect the murkiness in the fintech industry. While fintech has the ability to simplify and improve possibilities, it also carries the risk of negative consequences.

The research shows that fintech is multi-faceted, intricate and diverse, with many possible manifestations. There are those who stress the innovative nature of fintech, while others say it is all about creating new goods and markets. While some people place a premium on following rules and regulations, others place a premium on solving complex problems using technology. It must be emphasised that there have been previous studies in the academic field that have conducted similar evaluations.

When Looking at Fintech from an Academic Standpoint, What Is the Big Picture?

We have learned a lot about the dynamics of fintech from the literature review, which are distinct from those of tech startups. Nevertheless, there are chances to improve and maybe reorganise the literature due to the increasing frequency and inexplicable scarcity in some domains. We are still confused and have not fully grasped the complexities of the fintech concept. Therefore, a more comprehensive classification of fintech is required.

Based on their relationships, subcategories, basic technologies, variety of services, key players, settings and industries, we grouped them into many groups. It is evident that there are certain omitted categories, despite our best efforts to be comprehensive in our categorisation. Nevertheless, the final outcome should not be drastically changed by any deviations.

This study adds to the growing body of literature indicating that fintech is receiving substantial attention in business and management journals. Among these subthemes, you may find information on fintech's history, evolution, key features, consumer acceptance, regulatory considerations and market rivalry.

What Is Universal Fintech?

A proper explanation of fintech must take into account and respect its historical foundations. Fintech refers to the increase of financial service offering; yet, most studies that have looked into its roots have been qualitative and have not analysed its history (Schueffel, 2016).

The exact meaning of "fintech" is still up for debate. While some studies focus on the features and distribution of products and services, others examine the frameworks and functions. In addition, contrary to popular belief, most fintech companies have their roots in information technology (IT) rather than conventional banking (Gomber et al., 2017). A large proportion of fintech entrepreneurs have backgrounds in banking, according to King (2014) and Iman (2018a, b). The reason for this is their ability to think outside the box and come up with new solutions and tasks, which was previously only achieved by banks and other financial organisations.

The word "fintech" is facing semantic problems and does not have a strong foundation, according to Schueffel (2016). Despite the lack of a universally accepted definition of fintech, new terms like regtech, insurtech and wealtech are emerging from the concept. The subjective nature of the term "fintech" may lead to different understandings among native English speakers, French speakers, German speakers and those from other regions of the globe (Schueffel, 2016). This is why, in order to establish a benchmark in the corporate sector, a globally accepted and widely used definition of fintech must be crafted.

There are three pivotal pillars that constitute the backbone of financial revolution, namely, innovation, accessibility and security.

The Unique Features of Fintech

The fast growth of financial technology (fintech) has happened in several settings, providing new goods and services using cutting-edge tech. In terms of breadth and depth, fintech companies' products differ greatly. There is a dearth of research on the inner workings of fintech firms, in contrast to the abundance of studies that have examined consumer uptake and spread of fintech goods and services. Understanding the basic mechanisms that lead to discoveries might enhance our admiration and comprehension of technical accomplishments while preserving the feeling of amazement and wonder that comes with them (Dranev et al., 2019).

Wonglimpiyarat (2017) states that innovators face a dilemma when trying to manage the complexity of innovation on their own. To solve this problem, a systematic strategy is suggested. Among the many service industries, banks stand out as pioneers in the use of new forms of information technology. A new environment has emerged in the banking sector as a result of the increasing usage of fintech. Payment and transfer services that span networks are now possible because of technological advancements (Thompson, 2017; Shim & Shin, 2016). As a result, the complex web of ties between fintech companies and other industry players is not unexpected.

Should we encourage the formation of fintech startups to boost economic development, according to Schumpeter's idea of creative destruction? Is it reasonable to restrict the expansion of established businesses on purpose when new innovations never come out of them? Wonglimpiyarat (2017) argues that the complex web of ownerships and externalities around fintech technologies need strong systemic features to ensure their widespread adoption. However, fintech companies vary in terms of their unique traits, levels of innovation and available resources.

Present Pattern of Use

An examination of fintech will reveal interdependencies in the following areas: ownership (banks vs. nonbanks), structure (fintech vs. techfin), regulation (or lack thereof) and scope (from basic payments to more complicated products). Both Rogers' (1983) theory of innovation dissemination and Davis' (1989) model of technology adoption get the lion's share of the scholarly attention. Some journals stand out from the crowd by investigating fintech adoption via nontraditional theoretical lenses, such as regulatory focus theory (Higgins, 1998).

In this area of fintech, new products and services are offered to meet customer demands that were not met by conventional financial institutions (Gomber et al., 2017; Pousttchi & Dehnert, 2018). Companies operating in the market may create

innovations and discover new chances by using state-of-the-art technology and modern ideas. Their goods and services, say Alt et al. (2018), are more suited to and perform better in the modern, fast-paced environment. Companies like these are quick to adapt and think beyond the box, and they are well positioned to take over the conventional banking industry (Hemmadi, 2015).

Analysing the actions of present customers and the reactions of long-standing incumbent businesses is another way to do research. According to Pousttchi and Dehnert (2018), consumers in the financial technology sector will inevitably alter their digital behaviours, as well as their beliefs and loyalties. The decision-making time of consumers is decreasing, which means that established organisations need to innovate faster and employ data-driven tactics to compete with new fintech start-ups (Lee & Shin, 2018). Clients, established organisations and young fintech companies all have a hand in creating promising research opportunities.

The term "regulatory framework" describes the system of laws and regulations put in place by political entities to manage and oversee different fields and pursuits. According to Hung and Luo (2016), established banks do not foster the development of new financial technology companies since they have been protected from competition for an extended period of time. In this industry, there are already established banks serving the customers, and there are also high obstacles to entry and fierce rivalry. It is not believed that the government will become involved in this industry to protect the present conventional financial institutions or to lessen the possibility of a rise in systemic risk (Chen, 2016). Management academics and corporate law specialists may benefit from a stronger and more consequential collaboration.

Financial technology has a crucial role in facilitating the growth of the financial sector by increasing the variety and accessibility of services (Gabor & Brooks, 2017; Haddad & Hornuf, 2018; Swartz, 2017). This, along with the democratisation of financial services, needs an in-depth familiarity with the regulatory and fintech industries. All financial technology sector players are significantly impacted by the present laws and institutional standards.

Several challenges have arisen for regulators as a result of fintech businesses' merger of jobs, clients, technological platforms and creative business models. When new business models and procedures emerge, regulatory frameworks are notoriously slow to adapt (Gozman & Currie, 2014). It is crucial to analyse the challenges that new financial technology companies will face as they expand across many jurisdictions at the same time.

Competitive Landscape and Market

According to Gomber et al. (2017), fintech refers to persons or organisations that provide innovative and game-changing technology to improve efficiency, flexibility, security and opportunity. The pioneer can be a young banking firm, a tech behemoth or a long-standing supplier of services. While Wonglimpiyarat (2017) found that

cooperative strategies may be beneficial in certain contexts, Hung and Luo (2016) found that, in other nations, the market is seen as a situation where one side's gain is the same as another side's loss. This dynamic conditionality should be further examined in future study.

Traditional financial intermediaries' functions have been altered by the rise of fintech (Gai et al., 2018; Haddad & Hornuf, 2018). One example is the fintech lending business, where a rise in loan amounts might result in more commission money. However, this could cause some to overestimate the borrower's credit risk (Giudici, 2018). This is the potential domain in which the insurance company may participate. Security, insurance, IT infrastructure and other ancillary domains are often left out of publications that centre on main players.

The likelihood of substantial employment losses due to fintech innovation is low in developing nations that are not financial hubs like Singapore or Hong Kong, according to studies by Tao et al. (2017); Iman (2018b); and Chen (2016). This research suggests that several businesses, including legal companies, accounting firms, technology suppliers and others, may see employment shifts. There has been a marked difference in the skill sets needed by bankers and financiers over the last decade.

However, we acknowledge that fintech is an intriguing subject that has not been well investigated up to this point (Romēnova & Kudinska, 2016). The primary goal of this piece is to propose areas that may be investigated further. In order to effectively manage and control the constant expansion of financial innovation, this study suggests a method. The results provide useful information for governments and regulators, and they also have real-world consequences for how we handle innovation in the finance industry.

The unique aspects of financial technology that have received little attention in previous studies are the focus of this investigation. This shows how much academic literature discusses fintech. It seems from the results of the study that there is an ongoing effort to establish a common and accurate definition of fintech. Further research is required to fully understand the subject's intriguing features and properties, particularly its importance in ecosystems and market competitiveness. In order to promote financial inclusion, blockchain technology is crucial, particularly in developing nations. Furthermore, regulatory systems in many situations provide great promise for enhancing the existing studies.

The fintech literature is still very much up for dispute, but it is essential to look at it from all angles and do a thorough analysis. The study implies that the present research is fragmented and unrelated to management or strategy literature. It is possible to systematically build a multidisciplinary system of fintech services and governance by including the above principles utilising an impartial approach. Research on fintech ecosystems will benefit substantially by taking into account the unique and significant role that national cultural factors play in various contexts.

There are still strong arguments against it. Unfortunately, additional crucial concepts like "blockchain", "cryptocurrency", "crowdfunding", "big data analytics" and "near-field communication" were left out of the study since it was too limited in scope. This approach was comprehensive as it successfully removed any linked

terms. Another point of contention is that the issue may have lost some of its relevance and timeliness by the time this essay is published, due to how quickly the subject is developing. As a foundation for expanding upon existing literature, this study should be considered the first stage of our research domain.

The many uses of financial technology (fintech) are the focal point of this essay's in-depth examination of basic business and management concepts. A growing corpus of research has established the reality of a phenomenon known as "fintech transformation". This phenomenon has been studied for its unique characteristics, characteristics in flux, complexity in dynamics and environmental factors. As a result of integrating fintech into empirical research and theoretical frameworks in the subject of business and management studies, the researcher claims that the discipline will grow and develop with the implementation of the aforementioned principles. It is expected that this review and recommendation still provides engaging information, even when the author acknowledges certain inadequacies.

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Chapter 5
The Role of Fintech on Creative Accounting and Companies' Performance

Yana I. Ustinova

Introduction

The term "fintech" (or "FinTech", short for "financial technology") usually refers to a set of financial services provided using innovative technologies. Financial technology (fintech) combines several existing technologies like blockchain, machine learning, cloud computing and distributed ledger into several financial innovations and solutions. Fintech is a recent trend that many businesses are adopting in order to enhance their business models and operations through computer power, information exchange, reduced transaction costs and competitive benefits. The Financial Stability Board (FSB) of the Bank for International Settlements (BIS) has provided the following definition of fintech: "Fintech is technologically enabled financial innovation that could result in new business models, applications, processes, or products with an associated material effect on financial markets and institutions and the provision of financial services" (FSB, 2021, p. 5; Blazek et al., 2023, p. 9).

Fintech is widely acknowledged to improve the financial industry's transparency, client experience and efficiency. Fintech has expanded due to both technological advancements and the fact that it is subject to different regulatory constraints than conventional financial service providers.

As it is mentioned in research by Marei et al. (2023, p. 3), during the previous 10 years, worldwide investment in fintech has dramatically expanded, reaching over $100 billion in 2018. Fintech has also been embraced by consumers, with a survey by EY finding that over half of consumers in the USA use fintech products and services.

Fintech has seen an enormous adoption rate, i.e. 87%, in developing countries like India, much higher than the global adoption rate of 64% (EY, 2019). Moreover,

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C. M. Gupta, G. Kaur (eds.), *E-banking, Fintech, & Financial Crimes*,
https://doi.org/10.1007/978-3-031-67853-0_5

the adoption and awareness of fintech have significantly increased since 2015 (EY, 2019). Regarding finance.

app downloads, India led the list of the top ten nations in the world in 2020 (EY, 2021).

Technological advances such as mobile payments and cloud-based accounting software have radically changed the way businesses operate and interact with their customers. Financial data is transferred much faster than ever before, the accuracy and efficiency of calculations increase and tools for constructing multivariate calculation models appear to find the optimal financial solution, which helps to increase the efficiency and information security of decisions made by companies. The ability to work from anywhere on the planet potentially entails the levelling of territorial boundaries for the provision of accounting services. According to Johnson (2022), experts estimate that today more than 58% of accounting firms are investing in innovative accounting solutions to meet client need (Jofre & Gerlach, 2018).

At the same time, approximately 90% of accountants believe that technological changes in the accounting industry are due to a cultural shift in the profession (Jofre & Gerlach, 2018). The role of the accountant is changing. While traditionally an accountant was only expected to comply with regulatory requirements, prepare tax calculations and provide accounting advisory services, with the advent of fintech, a new generation of accounting startups is challenging the status quo and offering innovative solutions such as financial and tax advice, financial risk identification and development of proposals for their management, which becomes an obvious competitive advantage (Jofre & Gerlach, 2018).

So, this trend suggests that the fairness and reliability of financial reporting should have gradually improved. However, the phenomenon of creative accounting remains popular.

One of the most successful definitions of creative accounting in its negative aspect was given by K. Nasser (Naser, 1993, p. 2, 59: *Creative accounting is … the process of manipulating accounting figures, using the weak links of the rules and taking advantage of the same in its favor as required by the management*. M. Jofre and R. Gerlach (2018, p. 2) have stated: *accounting fraud may take the form of either direct manipulation of financial items or* via *creative methods of accounting*. So, the negative aspect of creative accounting includes accounting fraud, uses the same instrument and can be detected with the same approaches.

It is worth to mention that detecting creative accounting is not an easy task but time- and energy-consuming, demanding for high professional experience and qualified professional judgements from experts. As a result, big hopes in solving this problem were anchored on fintech. According to conclusion, made by Montesdeoca et al. (2019) after studying of 156 articles published in high-impact journals during the period 2000–2018, the aspect that seems to be gaining more followers in the last years is the use of information technology to help auditors better identify the patterns of fraudulent behaviour in the company (Montesdeoca et al., 2019, p. 23).

The main idea behind writing this chapter was to review various aspects of theoretical and empirical studies on the Nexus created by fintech and creative accounting.

Historic Background

Fintech and Creative Accounting

The fields of creative accounting and fintech, while apparently unrelated, have the same historical foundation and overlap in intriguing ways since both involve the modification and administration of financial data. Gaining knowledge about their pasts offers valuable understanding of the development of financial practices and technology.

Financial Manipulation

Creative accounting, commonly referred to as aggressive accounting, is the deliberate manipulation of financial records and statements in order to portray a desired perception of a company's financial well-being, rather than its actual financial standing. This practice has existed for millennia.

The emergence of joint-stock corporations and the introduction of professional stock markets in the nineteenth century required the creation of standardised accounting methods. Nevertheless, these advancements also brought about the allure and possibility of financial deceit. Companies may use innovative accounting methods to artificially increase profits, conceal obligations or manipulate results in order to satisfy investor expectations or regulatory mandates.

An exemplary instance from history is the South Sea Bubble of the early eighteenth century, whereby firms artificially inflated stock values using questionable accounting methods, resulting in a disastrous market collapse. In a similar vein, the twentieth century saw countless occurrences of manipulative accounting practices, exemplified by the notorious Enron incident in 2001. Enron used intricate financial arrangements and off-balance-sheet corporations to conceal its debt and artificially boost its earnings, resulting in one of the most substantial bankruptcies in American history. This also prompted important regulatory reforms, such as the enactment of the Sarbanes–Oxley Act in 2002.

Fintech

Fintech refers to a wide array of technical advancements that attempt to enhance and automate financial services. The origins of Fintech may be traced back to the emergence of early computer technology in the mid-twentieth century, which started to fundamentally transform the methods of processing and managing financial data.

During the 1960s and 1970s, banks began using mainframe computers to manage accounting and client transactions, therefore establishing the foundation for

advanced financial technology. The advent of ATMs in the 1970s and computerised trading platforms in the 1980s were important milestones in the development of fintech.

In the 1990s, the Internet emerged and ushered in a new era of financial advancements. The advent of online banking has gained popularity, enabling users to remotely oversee their financial affairs. Mobile banking and payment solutions were developed in the early 2000s, leading to a fundamental shift in how individuals engage with financial services.

Over the last 10 years, the fintech sector has had a rapid growth, mostly due to progress in artificial intelligence, blockchain technology and big data analysis. Both startups and established organisations are using these technologies to develop cutting-edge financial goods and services, including peer-to-peer lending platforms, robo-advisors, cryptocurrency exchanges and mobile payment applications.

The Convergence Between Creative Accounting and Fintech

Although fintech seeks to improve transparency and efficiency in financial services, it also introduces novel difficulties and prospects for innovative accounting practices. The rapid development and widespread acceptance of intricate financial technology may provide gaps and prospects for financial manipulation. Regulatory systems often fail to keep pace with technological progress, therefore allowing dishonest individuals to take advantage of these loopholes.

In addition to the above textual background, we can also have an insight into the past studies (research parameter) which prove that the relation between creative accounting and fintech is growing and the following is the confirmation of the same.

Asif et al. (2023) conducted a study aimed to perform a bibliometric analysis of fintech. Analysis of 1135 articles indexed on Scopus from 2002 to 2021 was focused on fintech and found that 2021 was the leading year with 389 articles, which accounted for 34.3% of total publications, in which China was identified as the most productive country having 142 publications, accounting for 12.5% of the total publications (Asif et al., 2023, p. 47]. The vast part of publications was devoted to fintech and its influence on financial sector in general and banking in particular as well as its influence on accounting industry, new opportunities and challenges for accountants. However, the issue of a role of fintech in detecting creative accounting was not that much popular.

M.M. Thottoli (2023) performed a contextual systematic literature review using a bibliometric analysis of 277 publications for the period 2017–2021, indexed in the Scopus and Web of Science databases with the keywords “financial technology accounting and auditing”. The analysis showed that researchers see a significant impact of fintech, primarily in the professional field of accounting and auditing. Fintech is still in its infancy, and its ongoing development and adoption is occurring at an increasing pace, especially in the field of audit. The results also confirm that fintech can enable the convergence of various research areas, including accounting, auditing, business finance, economics, management and the business domain.

ALShanti et al. (2024) observed the Web of Science Core Collection and analysed 465 research articles dealing with creative accounting and external auditors authored between 1981 and 2022. Cluster analysis, all-keyword co-occurrence analysis and bibliographic coupling mapping are all investigated in the study. The survey discovered four main research trends: the first trend shown is "The Future of External Auditing and Financial Reporting Quality" (red cluster). The second trend focuses on the future of auditors in detecting creative accounting (the green cluster). The third trend is Financial Statement Audit Quality Management for Earnings Management and Fraud Detection (blue and purple clusters). The fourth trend is related to Preventing the Next Financial Fraud: A Global Creative Accounting (yellow cluster).

Although the topic of creative accounting (accounting fraud) as well as the topic of fintech development and its influence on accounting practices has attracted a lot of attention from researcher's side, there are still some gaps that cause the relevance of the topic and necessity for its further development.

This theoretical study develops new convergence points between fintech and creative accounting by reviewing the literature and proposing new ideas and research questions.

Connection Between Fintech and Creative Accounting

To understand the concept of fintech and creative accounting, we need to first understand the relation between the two. To have a better understanding, we can go through the three theories which put in more light to the subject and link both fintech and creative accounting:

1. *Agency theory*—this theory implies manager's motivation to depict those financial indicators in financial statements that cause desirable bonuses for them and to do this without spending significant resources on collecting and operating information.
2. *Stakeholder theory*—this theory means that managers must be oriented not only on stakeholders' informational desires but on desires of all stakeholders. That strikes them to incorporating special instruments that enabled them to operate huge volumes of information in no time.
3. *Legitimacy theory*—this theory means that legitimate enterprise must fulfil a bunch of social standards to get benefits from social acceptance. This forces company to "maintain and regulate" a lot of financial and nonfinancial indicators and requires using special tools to monitor them permanently.

These theories can be taken as a foundation to explain the relationship between fintech and creative accounting, opening up opportunities for accounting and increasing the reliability of financial reporting, as well as the emerging risks to the reliability of financial statements.

Fintech Integration into Accounting Practice

The fintech advancements that have significantly altered the accounting business include:

1. Artificial intelligence and automation: The accounting profession has been transformed by the use of artificial intelligence (AI) and robotic process automation (RPA), which have automated mundane tasks. This technology innovation has greatly enhanced productivity, minimised human fallibility and enabled accounting experts to concentrate on more critical responsibilities.
2. Cloud technologies: The introduction of cloud computing has significantly broadened the time and location possibilities for the accounting profession. Cloud-based solutions provide immediate access to financial data, support remote work and improve cooperation between accounting professionals and their customers, regardless of their location.
3. taxes Software Services: Cutting-edge software solutions for taxes have optimised the tax computation process, minimising mistakes and minimising the time needed for modifications. These services guarantee adherence to intricate tax requirements and enhance the precision of financial reporting.
4. Mobile apps, particularly those designed for digital payments, have revolutionised the way companies, customers and accounting processes interact. These advancements have sped up the sharing of information, decreased the need for manual tasks and greatly reduced the amount of repetitive activities.
5. Blockchain technology: The promise of blockchain technology lies in its ability to bring together many stakeholders in a single, secure, transparent and unalterable database. This invention streamlines the process of monitoring financial transactions and, by decreasing the probability of fraudulent activities, enables the validation of financial statements and records. The intrinsic characteristics of blockchain, such as immutability and transparency, improve the integrity of financial data and promote confidence among participants. The influence of these technologies determines a qualitative change in the architecture of accounting and auditing through automation of accounting and reduction in the number of routine operations, assistance in ensuring compliance with accounting and auditing standards, tax legislation (including monitoring their compliance), prompt preparation of various reports, comprehensive analysis of various data in order to provide information support for decision-making, automation of payments, optimisation of management of incoming documentation, increasing staff efficiency, reducing accounting costs and introducing procedures aimed at reducing the risks of financial fraud.

The result of fintech integration can be not only a transition from routine accounting to analysis and risk management but also a transition from historical retrospective accounting to expert assessments of data in the present, as well as forecasting future financial estimates. It is no coincidence that 84% of accountants admit that using fintech allows them to focus on more meaningful work (Fintech, 2022).

At the same time, on the path to widespread integration of fintech into practice, the accounting profession faces the following challenges:

1. *General level of confidence in fintech, the ability to see positive prospects in the use of fintech*.

   In particular, according to Ph. Smith (2022), prepared on the basis of an ACCA study carried out in May 2022 (Fintech, 2022), 50% of accountants admit that turning to fintech demonstrates the profession's desire to gain new opportunities and overcome the crisis in the profession, while there is a risk that the older generation will not be able to adapt to fintech.

   The researcher notes that, in general, trust in fintech depends on the age of the respondents. In particular, among respondents aged 18–35, 41% trust fintech more than traditional accounting products, while among respondents over 55, only 20% share the same opinion.

   Assessments of the availability of career opportunities also depend on the age of respondents and their place of residence: the availability of opportunities in general is seen by 50% of respondents, which is due to the first most important factor, region of residence (44%), and the second most important, age (24%).
2. Flexibility to comply with the requirements of national accounting regulations (to the extent that there are discrepancies with IFRS). In particular, according to Ph. Smith (2022), eight out of ten surveyed accountants in the context of the introduction of fintech see the need for the speedy unification of accounting regulation.
3. The relative complexity of present accounting and auditing standards and their relative detachment from the requirements of fintech (e.g. in terms of the implementation of the professional judgement of an accountant), which causes some restrictions on the implementation of fintech, including:

   - Accounting and auditing regulations require the implementation of certain procedures that cannot be replaced by digital technologies.
   - Legislative pressure is aimed at ensuring the reliability of information, while fintech does not cover all stages of its preparation (e.g. it does not guarantee the quality of source information).
   - Ethical dilemma and professional scepticism require additional guarantees of the safety of the use of digital technologies, while solving this problem requires long-term efforts.

   However, these limitations, as shown by the results of the study by Fulop et al. (2022), can be successfully overcome as digital technologies spread and confidence in them grows, which will be the key to appropriate reform of accounting and audit regulation.
4. The need for expertise (in particular, in terms of coordination with the norms of national legislation).
5. The importance of joining forces with the regulator and the professional community (in terms of discussing innovations and proposals).

The potential dangers posed by the integration of fintech into the accounting industry, according to Mahan (2022), Smyrnova (2021, 2022), should not be discounted:

1. Cybersecurity issues, including virus attacks.
   According to Smith (2022), eight out of ten accountants surveyed consider this threat to be the most important deterrent to the integration of fintech into accounting practice. At the same time, according to Fulop et al. (2022), users are aware of the risks associated with using fintech but trust the information received, recognising the resource as useful from a practical point of view, without changing their attitude towards its use, which can be considered as some adaptation to risk.
2. Changes in the structure of employment in the accounting industry (reduction in the volume of routine work, shift of accounting work towards expert functions).
3. Network and software errors, including system failure.
4. Formation of dependence on technical support of used fintech.

Although technology will continue to change the accounting industry, a number of experts (e.g. Johnson 2022) conclude that one thing remains certain: the business need for qualified and experienced accountants. Only expert-level specialists in the field of accounting have not only the relevant specialised knowledge but also the ability, by integrating fintech into their professional activities, to offer a qualitatively new level of accounting services, including accounting and analytical support for decision-making on risk management, analysis of financial and economic activities, identifying bottlenecks and competitive advantages of business and financial planning and forecasting.

The work of Juita (2019) is devoted to the study of accounting's ability to adapt to new challenges associated with the influence of fintech. A survey of three groups of respondents (representatives of the academic community, the professional community and the accounting regulator) showed that they all see positive changes due to the spread of fintech in the accounting industry. At the same time, in order to increase the ability of accounting to adapt to digital technologies, respondents proposed a number of measures: adjusting accounting regulations in order to prepare them for various aspects of the activities of accounting specialists in the digital world, developing training programmes and updating and improving training materials related to digital technologies, as well as support for supporting activities such as visits to companies using fintech, master classes and training for both students and teachers.

The conclusion of this chapter is supported by the findings of Ojha et al. (2023). The paper notes that fintech like big data analysis, cloud accounting and other various advanced automated processes actually prepared the accountants or, say, elevated them to survive this new tech era in the best possible way. It is a major concern for all the educational institutions across the world to bridge this technological know-how gap between what industry demands from future accounting professional and what presently they know to keep up with advances in technologies. As a corollary, there is a rise in the call for accounting professionals who are well versed

with fintech, which, in turn, increases the requirements for mastering fintech not only for accounting graduates but also for professors.

Siddiqui and Rivera (2023) pointed out that during the last few years, many top universities have taught fintech-specific courses in undergraduate, graduate and executive programmes. This content seeks to prepare specialists from the field who can strengthen the fintech industry better. For now, no specific curriculum or teaching format is taught by fintech as this is a fast-changing industry, and the curriculum needs to be adapted accordingly. The authors proposed the critical elements regarding the content that must be introduced in these programmes, basing on collected information and conducted the content analysis on the profile of fintech-specific offered by the top 20 universities in the world and on the literature focusing on fintech-specific content.

The key skills of an accountant in a fintech environment are explored in Vaidyanathan and Evett (2022). Among the main ones, the researchers included understanding of new business models, "commercialisation" (the ability to convince an investor), technology in new accounting areas, ethical approach and trust (through ensuring transparency in the preparation of financial statements), digital thinking and the ability to work without voluminous paper documentation, flexible approach and adaptation to rapidly changing conditions. From a practical point of view, the key skills of the "accountant of the future", researchers include: analysis and strategic thinking, teamwork and interaction, knowledge of new technologies and the ability to quickly learn new things, "look into future", including combining IT skills with the skills of an expert accountant. New technologies will also increase requirements for auditors in terms of developing tools for testing fintech systems used by clients (Leonowicz 2023, p. 43).

Fintech in Detecting Creative Accounting

Creative accounting can be understood on two levels. Creative accounting is defined, at the first level, as procedures designed to account for new situations that are not subject to existing accounting standards. The second level includes a general understanding of this concept, as activities leading to financial statement manipulation.

The main goal of creative accounting (taking into consideration the overlaps with accounting fraud) is to trick the public by hiding the real financial performance of the enterprise. According to Blazek et al. (2023, p. 413), creative accounting practices, such as renewing income, increasing amortisation, wrongly reporting assets and liabilities, having trouble reporting profits and losses or using the profit-and-loss statement, may show the level to which creativity is possible. The primary reasons for using these practices include the execution of planned legal actions and enhancing the image of the company.

There is a widespread approach to consider corporate governance to be necessary for curbing creative accounting and keeping it to a minimum. However, it is obvious that corporate governance may not be sufficient. Companies need to utilise

a well-established internal control system to detect fraudulent activities and prevent them. Companies should make sure their employees receive ongoing training, update their code of ethics to include problems that have been fixed or create a corporate culture that does not support these kinds of activities.

However, effective instruments for detecting creative account cannot be overestimated. There are many fraud theories in accounting literature. The most common fraud theories include Benford's law (1938), the fraud triangle theory (1953) with all updated versions, the Altman (Z-score) (1968), the Healy model (1985), DeAngelo's model (1986), the Jones (1991), the Dechow et al. (1995), which is a modified Jones model, the Dechow et al. (1996), the Beneish model (M-score) (1999) and the Dechow et al. (F-score) (2011) model. These theories addressed many issues related to why fraud exists and developed models to detect fraud and explain its causes and consequences to answer why fraud exists.

Thus, it seems obvious that fintech, which provides processing of huge volumes of various information with high accuracy and in the shortest possible time, can help in identifying creative accounting.

Indeed, identifying creative accounting causes certain difficulties in practice. In this sense, the study, the results of which are presented in the work by Blazek et al. (2023, p. 415), is very indicative. Quoted research had been focused on the Big Four firms (KPMG, EY, PwC and Deloitte), directly asking the workers of these firms how they deal with the creative accounting machinery. Their research found that the psychological behaviour of respondents was inconsistent. The respondents were unable to distinguish between the various concepts linked to creative accounting, and the most remarkable finding was their inability to apply models indicating creative accounting.

No wonder that Big Four has started to improve this situation. They are adopting server-based platforms that support auditors by implementing real-time financial data collected directly from clients. For example, in April 2022, PwC announced the use of a new cloud-based auditing platform named Aura that provides many services powered by advanced analytics (PwC, 2022).

Generally speaking, accounting and auditing embrace big data analytics in different procedures. The Big Four are investing heavily in data analytics and artificial intelligence and promoting embracing big data technologies. For instance, the recent adaptation of the Halo online platform by PwC implemented the inclusion of whole population analysis, which outperforms the sampling techniques that are usually used in auditing procedures along with many recalculations and risk assessment tools (e.g. journal entry testing and general ledger analysis) that become possible by its enhanced connectivity and high server-based processing capabilities (PwC, 2014). However, special instruments for detecting creative accounting are still developing.

Moreover, according to Bineid et al. (2023), detecting creative accounting using traditional techniques (e.g. accrual-based detection) requires nonpublic, inaccessible and time-consuming data to reach. This can cause serious difficulties on a way of revealing distortions in financial statements.

The availability of financial and nonfinancial types of data and the possibility to include these data types in advanced intelligent models motivated researchers to develop many applications that meet business needs. There are some examples of using fintech in detecting creative accounting, which could be systematised in the table.

Researchers	A type of fintech that was used
Cao et al. (2015)	Big data analysis
Chen et al. (2015)	Big data processing and intelligent risk models
Zhou (2017)	AI algorithms
Leonowicz (2023)	AI and machine learning algorithms (blockchain)
Aboud and Robinson (2020)	Big data analysis
Ibrahim et al. (2021)	Big data and advanced analytics
Chimonaki et al. (2023)	AI (natural language processing (NLP) with machine learning)
Osei-Assibey Bonsu et al. (2023a)	AI and big data analysis
Osei-Assibey Bonsu et al. (2023b)	AI (with a larger impact) and big data analysis
Hussain et al. 2023	AI
Bineid et al. (2023)	Big data analytics with the creative accounting detection model (CADM), using AI
Al-Smadi and Al-Smadi (2024)	Big data analysis (BID) and blockchain (BCH)

Cao et al. (2015) described a case when big data analysis could assist auditors to effectively measure client risks associated with internal control design and implementation, managerial fraud, insolvency and material financial statement falsification.

Chen et al. (2015) found that Alibaba Group has developed a fraud risk management system based on real-time big data processing and intelligent risk models, which can monitor and assess fraud threats in real time, capture fraud signals and send out alerts to prevent fraud. This system can produce thousands and thousands of attributes in addition to employing advanced risk fraud models.

Zhou (2017) elaborated the idea that AI algorithms could provide accountants not only with analytical capabilities to evaluate the impact of risks and manage them for minimising automatically but also can be used to detect and prevent fraud in innovative practices. Firms including EY and Deloitte used AI to detect fraudulent invoices and tax returns and reduce processing time periods.

According to observations by Leonowicz (2023, p. 42), patterns of behaviour and actions are assessed by artificial intelligence and machine learning algorithms in order to identify anomalies and opportunities for improvement. This, in turn, improves the quality of information for the auditor's work, which leads to improved quality of the audit itself, as well as improved quality of reports for management. In particular, blockchain, as a means of reducing fraud risks, is considered in the work of Leonowicz (2023, p. 43) due to the stability of any stored information to any of

its modifications, as well as due to the possibility of using reporting data (including data on completed transactions) to confirm, which can be used by the auditor instead of requests, external confirmations, etc.

Aboud and Robinson (2020) pointed out that big data analytics can be used to detect or prevent fraud.

Ibrahim et al. (2021) have found that big data and advanced analytics have the potential to overcome the data limitations of accounting techniques that require estimations and predictions. Big data could help improve the data quality by improving accuracy and completeness and making it available in real time, providing more opportunities to detect and correct any possible distortions. Moreover, it was suggested that big data will change accounting to recognise early the developments required for accounting standards. Large amounts of nonfinancial data inside companies may need the issuance of special standards to summarise and disclose. Further, accounting standards should develop to treat big data as an asset since it is sold in markets. Researchers also proposed some recommendations for the development of the accounting curriculums by incorporating big data and data analytics in the accounting subjects. Authors warned that, despite the argued benefits that big data could provide to the business community, some risks can result when some people misuse big data. Therefore, a legal framework and a big data act should be developed to protect humanity from the misuse of big data.

According to Chimonaki et al. (2023), the main treat of their research was usage annual reports, which are not as biased as financial ratios probably are, and usage of natural language processing (NLP) with machine learning. In the context of pre-assessment processes, machine learning approaches offer clear advantages in predicting financial statement fraud. These methods may carefully examine big datasets, spot complex patterns and gain knowledge from these data patterns, improving the precision of fraud detection. Machine learning algorithms can efficiently accommodate the dynamic nature of fraudulent operations due to their ability to learn and adapt continuously. This considerably increases the effectiveness of the pre-assessment process in identifying probable fraud.

According to Osei-Assibey Bonsu et al. (2023a) has approved the same results. Moreover, evidence, gotten by researchers, indicates that while big data significantly impact accounting and auditing of accountants, utilising the diversity of data volume, data variety and data velocity significantly enhances it. The finding suggests that accountants could improve the quality and accuracy of financial reports especially when big data and analytics is continuous is used. The study emphasises the need for accountants, prospective accountants and accounting graduates to hone their competencies in studying and producing big data analytics, which will benefit the industry. Moreover, business institutions of higher learning should create business curriculums that use big data in their offerings. Finally, policymakers can help by establishing governance models for big data to organise its usage and prevent its exploitation.

In another work by Osei-Assibey Bonsu et al. (2023b), the empirical results show that the impact of AI and big data on accounting practices is positive and significant, indicating that fintech could potentially mitigate the agency problem in

accounting practices and lead to better accounting practices. Results evidenced that, in general, the impact of AI is larger than that of big data and led to the conclusion that accountants must embrace and build accounting and auditing practices by using BDA–AI to enhance their lengthy and firm performances. In addition, researchers concluded that accountants using BDA and AI help firms obtain deeper insight, anticipate outcomes and streamline nonroutine processes. Furthermore, BDA presents opportunity for the accounting profession to add value and aid businesses transform decision-making in a variety of ways. However, AI provides more opportunities to empower accountants to spend their time and resources wisely and creatively. Therefore, accountants, expectant accountants and accounting graduates should sharpen their skills in learning and developing BDA and AI forecast models that will aid the sector, while universities should develop business courses that incorporate BDA and AI.

Hussain et al. (2023) pointed out that AI can moderate the link between ethical commitment and creative accounting practices, detect and avoid creative accounting, promote ethical financial reporting and improve accounting transparency, accuracy and consistency. This moderating influence works along with organisation's culture of integrity and transparency in its accounting practice, increasing ethical consciousness and creating rigorous governance structures (AI). The application of AI can further improve ethical commitment, contribute to the detection and prevention of creative accounting practices and further strengthen ethical commitment.

Bineid et al. (2023) concluded that big data analytics has provided practical applications in auditing, and recently the employment of deep learning in fraud detection has delivered remarkably accurate results. To obtain promising results of using big data approach, it was approved to implement the two-step method: training on a simulated dataset of financial statements prepared (i.e. deliberately manipulated) based on financial statements available in the literature for supervised learning and then testing on real-world financial reports. The use of big data analytics made it possible to include nonfinancial data and aggregate accounting data with other sectors' data, making accounting results more accurate and credible. They proposed a framework for the creative accounting detection model (CADM). The model suggests the employment of a hybrid deep learning (HDL) that implements artificial neural network (ANN), recurrent neural network (RNN) and long short-term memory (LSTM), using financial and nonfinancial data, depicted in published financial statements. Further, standardising accounting data through new unified formats like XBRL and secure data structures like blockchain added promising opportunities for efficient research and improved accounting outcomes.

Moreover, according to Bineid et al. (2023), regulatory agencies' results have been enhanced by incorporating nonfinancial data as a supplement to the traditional financial data in their systems (e.g. the UK government's tax authority uses different sources of data from the Internet, social media, land registry records, international tax authorities and banks).

The empirical investigations, conducted by Al-Smadi and Al-Smadi (2024), declared that fintech, specifically the combination of big data analysis (BID) and blockchain (BCH), positively influences the financial reporting, management

performance, corporate budgeting and risk and fraud management accountants. Their study confirmed the imperative for accountants to adopt the BID and BCH and consider them as tools to explore high-quality information. This adoption serves the dual purpose of decreasing agency costs and addressing the inherent ambiguity with agency theory.

It seems to be noticeable from the table that if about 10 years ago the most popular fintech instrument for detecting creative accounting was big data analysis, then now AI instruments are the leaders. This trend strongly correlated with paying more attention to nonfinancial data and comprehending the need of a permanent development of algorithms for creative accounting detection.

At the same time, we should not forget that fintech is capable of processing large volumes of information but cannot mitigate the risks of distortion of reporting due to manipulation of incoming data, as well as artificial distortions of built-in algorithms. The risks of the emergence of creative accounting in these conditions have not yet been sufficiently reflected in the scientific literature.

Thus, fintech can help in identifying creative accounting. This requires the organisation of an environment that reduces the risks of using fintech, which can, in turn, lead to distortions in financial reporting. To provide an enabling environment for expanding implementation of fintech into accounting, ensuring the security of financial information, the ACCA report makes the following further recommendations to governments and regulators (Blazek et al., 2023):

1. Come together to develop common principles to underpin a multi-jurisdiction approach to fintech regulation. There are precedents, such as the EU's General Data Protection Regulation (GDPR), covering all EU member states. An international regulatory sandbox should be created to explore minimum global standards for fintech regulation; this was an approach supported by three-quarters of the finance professionals globally who fed into this research.

   However, it is worth to mention that the econometric analysis, conducted by Ciukaj and Folwarski (2023), confirmed the existence of a significant relationship between the level of fintech sector regulation and the level of its development.
2. Prioritise secure data management and cybersecurity at the heart of frameworks for government and regulatory approval of new fintech products and services. Given the data-driven nature of fintech, cybersecurity is a key concern (expressed by 83% of those who responded to an ACCA/CA ANZ survey) of governments, businesses and the public. Ways of driving public confidence in this regard include government-backed certification schemes for fintech services and products—particularly those that are business-to-consumer (B2C)—to protect end users.
3. Governments should incentivise fintech innovation and growth. Fintech is an industry which attracts talented people and helps to develop highly skilled jobs.

The ACCA report called on governments to consider an approach which prioritises areas identified by finance professionals globally, such as building links internationally to learn best practices, working with education partners to improve skills/training, developing labs/sandboxes to support innovation and supporting fintech as a tool for the development agenda to tackle challenges.

Conclusion

Fintech is a way to improve transparency and efficiency of financial industry. Fintech can increase the speed and accuracy of operating financial and nonfinancial data. That is why certain hopes are anchored on fintech as a tool for detecting creative accounting.

However, as far as creative accounting implies intentional distortion of financial indicators from the real numbers, it cannot be easily detected. It requires precise operating with huge volumes of data in no time, high professional level of experts and significant experience.

No wonder that several advanced firms in accounting and auditing industry nowadays are investing a lot in developing fintech instruments to improve quality and variety of their services and to detect different financial risks and accounting frauds. At the same time, the implementation of fintech into accounting practice for the detection of creative accounting is still not a common approach.

Nevertheless, there is a bunch of scientific publications discovering the role of fintech instruments in revealing and preventing accounting fraud. Generalising the trend, it might be concluded that if about 10 years ago big data analysis had the leading position, then these days the leading role is occupied by AI.

It worth to mention that fintech implementation strongly affects accounting industry and accounting profession. That's why getting well along with fintech seems to be must have for professionals as well as for graduating students and their teachers.

Some risks related to fintech should not be forgotten. So, smooth integration of fintech into accounting practice requires some steps toward regulations from governments and professional society.

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Chapter 6
Demystifying the Demand and Supply of Money in India

Shatakshi Johri

Introduction

Demand and supply for money plays a pivotal role in macroeconomic analysis, particularly in order to select suitable monetary policy activities. As a result, a stream of theoretical and empirical research has been carried out across the globe, over the past few decades. However, in the recent years, the interest in this regime has escalated primarily by concern among the Reserve Bank of India ('RBI') and researchers on impact of the movement towards flexible exchange rate regime, globalization of capital markets, ongoing domestic financial liberalization and innovation and country-specific issues. The widespread literature presents two major points relevant to altering the demand for money: variable selection and representation and framework chosen (Sriram, 2000). Failure to provide due consideration to these issues has tended to yield debate on interrelationship between motive for which money is held and making a rational choice.

This chapter surveys a selected number of papers that applied various theories to analyse the demand for money and the supply of money. The objective here is to consolidate relevant information from these theories and present it in a handy and simplistic form. In specific, the chapter presents details concerning the techniques followed, variables chosen, periods and frequency selected and major findings of an array of economists on the issue. In addition, it summarizes the monetary policy instruments utilized by RBI to moderate liquidity in the market. It is hoped that the resources accessible in this chapter provide some reference points concerning the behavioural aspects of money demand, which in turn will help the policymakers in

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C. M. Gupta, G. Kaur (eds.), *E-banking, Fintech, & Financial Crimes*,
https://doi.org/10.1007/978-3-031-67853-0_6

designing appropriate monetary policy actions and the researchers in carrying out further research.

The chapter is structured as follows: Section I briefly specifies the general framework that usually underlies the determination of the demand and supply of money in the economy. Section II carries out relevant discussion regarding various theories explaining such behaviour. Section III presents a brief overview of the monetary policy of the RBI used to control the concepts the captioned concepts in India. Consequently, Section IV deals with risks associated in holding securities, and Sect. V concludes the entire discussion.

General Overview of Money Demand and Supply

There is a diverse spectrum of money demand theories emphasizing the transactions, speculative, precautionary or utility considerations. As a result, one agreement that emerges from the literature is that the empirical work is enthused by a blend of theories. The general determination begins with the following functional relationship for the long-term demand for money (Laidler, 1985; Sriram, 2000):

$M/P = f(S, OC)$ where the demand for real balances M/P is a function of the chosen scale variable (S) to represent the economic activity and the opportunity cost of holding money (OC). M stands for the selected monetary aggregate in nominal term and P for the price. Like in theoretical models, the empirical models generally specify the money demand as a function of real balances (Laidler, 1985).

The definition of money is not precise. It is a special species of wealth. It is something that is used as a medium of exchange or as an accepted means of payment. Nonetheless, for empirical purposes, we will use rather technical definition—monetary aggregates.

The underlying equation depicting these aggregates is as follows:

M = M1 + M2 + M3. In this equation, M1 comprises of currency in circulation plus sight deposits. Consequently, M2 comprises of assets that are identical to sight deposits. Banks often offer more attractive accounts that bear interest, but they cannot be drawn on with cheques. The ease of transfer renders these assets very similar to sight deposits. They are included in the second definition of money M2. Consequentially, the broader measure of money instruments is rather restricted in access and liquidity. This includes foreign currency deposits and long-term certificate of deposits or time deposits with non-banking financial institutions. This is called M3. However, these definitions are general and differ from country to country. Usually, money demand is calibrated in terms of the narrower meaning, M1 (Agarwal et al., 2018).

The demand for money results from the form in which a person's wealth should be held. These are termed as macroeconomic motivations.

A typical money demand function (liquidity preference function) may be written as follows:

$M^d = P * L(R, Y)$ where M^d is the nominal amount of money demanded, P is the price level, R is the nominal interest rate, Y is real output and L is real money demand (Krugman et al., 2020).

The main reason for holding money is to facilitate transactions. The real volume of economic activity must therefore be an important factor in determining the demand for money. We should expect a positive relationship between real GDP and money demand (Nelson, 2002).

Money is valued for its purchasing power, and this purchasing power is measured by the price level. With increased prices, people increase their demand for money, and higher interest rates discourage the holding of wealth in the form of money; therefore, there is negative relationship between money demand and nominal interest rate (Nelson, 2002).

At this juncture, it is apt to highlight key features of various approaches to determine the flow of money in the economy.

Approaches to Determine Money Demand and Supply

The most fundamental 'classical' transactions motive is illustrated with the aid of the quantity theory of money (Friedman, 1987). The clearest exposition of the classical quantity theory approach is found in the work of the American economist Irving Fisher. It gives a behavioural interpretation to the demand of money in a functional relationship with prices and income. The basic equation is $MV = PY$, where M is the stock of money, V is its velocity (how many times a unit of money turns over during a period of time), P is the price level and Y is real income. Consequently, PY is nominal income or in other words the number of transactions carried out in an economy during a period of time. The velocity of money is presumed to be constant in this case (Eatwell et al., 1987). Each transfer of goods, services or securities is termed as the product of a price and quantity: wage per week times number of weeks, price of a good times number of units of the good, dividend per share times number of shares, price per share times number of shares and so on (Fisher, 1911).

The above-mentioned motives for holding money are in perfect conformity with the classical quantity theory, to which John Maynard Keynes also confined (1923). In his famous 1936 book *The General Theory of Employment, Interest, and Money*, Keynes developed a theory of money demand which he called liquidity preference theory. Fig. 6.1 depicts the same graphically (Schumpeter, 1936).

Keynes abandoned the classical view that velocity was a constant and emphasized the importance of interest rates. He postulated that there are three motives behind the demand for money: the transactions motive, the precautionary motive and the speculative motive (Schumpeter, 1936) (Fig. 6.2).

According to the precautionary motive, people hold money not only to carry out present transactions but also as cushion against an unexpected need. Because people

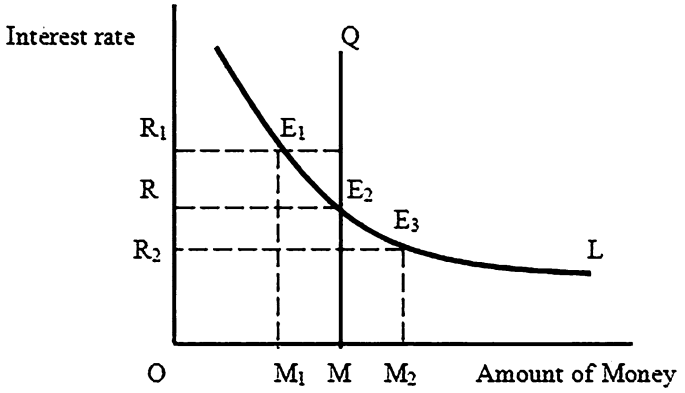

Fig. 6.1 J.M. Keynes: liquidity preference curve. (Schumpeter, 1936)

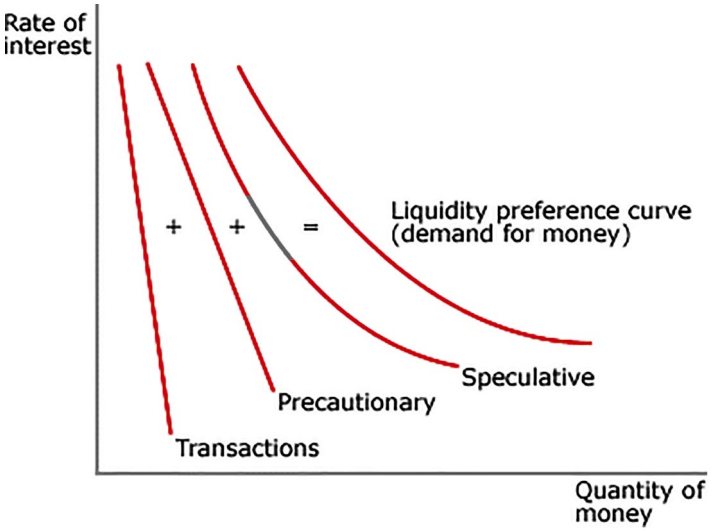

Fig. 6.2 Keynesian motives of holding money. (Schumpeter, 1936)

are uncertain about the payments the might want, or have, to make. If people don't have money with which to pay, they will incur a loss. When you are holding precautionary money balances, you can take advantages of the sale. Keynes believed that the amount of precautionary money balances people want to hold is determined primarily by the level of transactions that they expected to make in the future and that these transactions are proportional to income. So he considered the demand for precautionary money balances to be proportional to income (Schumpeter, 1936).

By specifying a speculative motive, he stressed the choice between money and bonds. If agents expect the future nominal interest rate (the return on bonds) to be lower than the present rate, they will then reduce their holdings of money and

increase their holdings of bonds. If the future interest rate does fall, then the price of bonds will increase, and the agents will have realized a capital gain on the bonds they purchased. This means that the demand for money in any period will depend on both the present nominal interest rate and the expected future interest rate (in addition to the standard transactions motives which depend on income) (Schumpeter, 1936; Eatwell et al., 1987).

The fact that the present demand for money can depend on expectations of the future interest rates has implications for volatility of money demand. If these expectations are formed, as in Keynes' view, they are likely to change erratically and cause money demand to be quite unstable.

Keynes also recognized people hold money not only to carry out present transactions but also as cushion against an unexpected need. People are uncertain about the payments they might want, or have, to make. If people don't have money with which to pay, they will incur a loss. When you are holding precautionary money balances, you can take advantages of the sale. Keynes believed that the amount of precautionary money balances people want to hold is determined primarily by the level of transactions that they expected to make in the future and that these three transactions are proportional to income. So he considered the demand for precautionary money balances to be proportional to income. By deriving the liquidity preference function for velocity PY/M, we can see that Keynes' theory of the demand for money implies that velocity is not constant but instead fluctuates with movements in interest rates. $F(i,Y)$ YM $V = PY$ = Keynes' liquidity preference theory of the demand for money indicates that velocity has substantial fluctuations as well (Tobin, 1956).

With the advent of time, economists developed more precise theories to explain the three Keynesian motives for holding money. A key focus of this research was to understanding better the role of interest rates in the demand for money.

William Baumol and James Tobin independently developed similar demand for money models, which demonstrated that even money balances held for transactions purposes are sensitive to the level of interest rates. They considered a hypothetical individual who receives a payment once a period and spends it over the course of this period in developing their models. In their models, money which earns zero interest is held only because it can be used to carry out transactions.

The amount of money demanded for transactions however is also likely to depend on the nominal interest rate. This arises due to the lack of synchronization in time between when purchases are desired and when factor payments (such as wages) are made. In other words, while workers may get paid only once a month, they generally will wish to make purchases, and hence need money, over the course of the entire month. The most well-known example of an economic model that is based on such considerations is the Baumol-Tobin model. Under some simplifying assumptions, the demand for money resulting from the Baumol-Tobin model is given by $\frac{M^d}{P} = \sqrt{\frac{tY}{2R}}$ where t is the cost of a trip to the bank, R is the nominal interest rate and P and Y are as before (Tobin, 1956).

The conclusion of the Baumol-Tobin analysis is as follows: as interest rates increase, the amount of cash held for transactions purposes will decline, which in turn means that velocity will increase as interest rates. The transactions component of the demand for money is negatively related to the level of interest rates.

Another motivation required for carrying out transactions has been provided by him, called as the portfolio motive, considered a situation where agents can hold their wealth in a form of a low-risk/low-return asset (here, money) or high-risk/high-return asset (bonds or equity). This creates a negative relationship between the nominal interest rate and the demand for money (Tobin, 1956).

The key difference between this formulation and the one based on a simple version of quantity theory is that now the demand for real balances depends on both income (positively) or the desired level of transactions and on the nominal interest rate (negatively). Simply put, in the transactions version, the elementary event is an isolated exchange of a physical item for money—an actual, clearly observable event. In the income version, the elementary event is a hypothetical event that can be inferred but is not directly observable. It is a complete series of transactions involving the exchange of productive services for final goods, via a sequence of money payments, with all the intermediate transactions in this income circuit netted out. The total value of all transactions is therefore a multiple of the value of income transactions only (Eatwell et al., 1987).

The Baumol-Tobin model is a microeconomic model and does not offer a simple method to capture the transactions motive (Baumol, 1952). Tobin assumed that most people are risk-averse, and the return of money is zero. Bonds can have substantial fluctuations in price, and their returns can be quite risky and sometimes negative. When the expected returns on bonds exceed returns on money, people might want to hold money as a store wealth because it has less risk. Tobin's analysis also shows that people can reduce the total amount of risk in a portfolio by diversifying (by holding both bonds and money). His model suggests that people will hold bonds and money simultaneously as stores of wealth. Tobin attempted to improve on Keynes' rationale for the speculative demand for money, but he was only partly successful.

In his famous work, modern quantity theory of money, Milton Friedman developed a theory of the demand for money in his famous article, 'The Quantity Theory of Money: A Restatement', in 1956. He considered that the demand for money must be influenced by the same factors that influence the demand for any asset. Friedman then applied the theory of asset demand to money. The demand for an asset is positively related to wealth, and money demand is positively related to Friedman's wealth concept (permanent income) (Friedman, 2005).

The demand for money is a function of the resources available to individuals and expected returns on other assets relative to the expected return on money. Friedman regarded his model of the demand for money as follows: where M^d/P = demand for real money balances; Yp = permanent income, Friedman's measure of wealth; rm. = expected return on money; rb = expected return on bonds; re = expected return on equity (common stock); Πe = expected inflation rate; w = proportion of human

wealth and non-human wealth; and u = other factors influencing demand for money (Friedman, 2005).

Permanent income has much smaller short-run fluctuations because many movements of income are transitory. Friedman regarded permanent income as a determinant of the demand for money in that the demand for money will not fluctuate much with business cycle movements. Friedman categorized them into three types of assets: bonds, equity and goods. The incentives for holding these assets rather than money are represented by the expected return on each of these assets relative to the expected return on money. The expected return on money rm. is influenced by (1) the services provided by banks on deposits and (2) the interest payments on money balances (Friedman, 2005).

The modern macroeconomic models, called as dynamic stochastic general equilibrium, have succeeded in this attempt. The most commonly used models are the cash-in-advance model and the money in utility function model (Sargent, 1993).

In the cash-in-advance model, agents are restricted to carrying out a volume of transactions equal to or less than their money holdings. In the latter model, money directly enters agents' utility functions, capturing the 'liquidity services' provided by money (Benchimol & Fourçans, 2012).

Moving further, the asset motive focuses on potential return on various assets as an additional motivation to spend money.

Nonetheless, the transactions motive is still assumed as the most popular motive to hold money, and the asset motive treats money, in the broader sense of including interest-bearing bank deposits, as a particular type of a financial asset among many others.

Role of the Reserve Bank in Money Circulation

Bank behaviour is one important determinant of money and credit developments, both of a cyclical and of a more persistent nature. In recent years, against the background of the financial crisis, it has become increasingly evident that such a passive view of banks is unwarranted (Papademos & Stark, 2010).

The volume of broad money in the economy is the result of the interaction of the banking sector (including the Reserve Bank) with the money-holding sector, consisting of households, nonfinancial corporations, the general government other than central government and non-monetary financial intermediaries. Broad money comprises currency in circulation and close substitutes, such as bank deposits, and is informative for aggregate spending and inflation. It thus goes beyond those assets that are generally accepted means of payment to include instruments that function mainly as a store of value (European Central Bank, 2011).

Empirical models for money holdings are applied for two purposes. First, they are used to guide the analysis of monetary developments, as a means of quantifying the contribution of various economic determinants to money growth in order to provide a deeper understanding of the causes of money growth. This is necessary in

order to develop a view of underlying monetary expansion. Second, the models provide a normative framework to assess whether the stock of money in the economy is consistent with price stability and to interpret the nature of deviations from this norm. An understanding of why the money stock deviates from an equilibrium level, defined on the basis of empirical regularities, is therefore essential from a monetary policy perspective (Papademos & Stark, 2010).

Identifying whether monetary developments are driven by money demand or money supply is of prime relevance when assessing the relationship between money, asset price developments and wealth. Indeed, the holdings of broad money, as one element in the portfolio of economic agents, are determined by the size of agents' wealth. At the same time, asset prices, and thus the overall wealth position of agents, may be influenced by money supply. The assessment of monetary developments is therefore closely linked to an assessment of the sustainability of wealth and asset price developments (ECB, 2010).

If the observed level of money is assessed as being consistent with the level of prices, income and interest rates, then money growth reflects the economic situation. Risks to price stability resulting, for example, from strong economic growth would be visible in money. If, however, observed monetary developments do not evolve in line with expectations based on the historical relationship with prices, income and interest rates, then the appropriate monetary policy response will depend on the underlying forces leading to this deviation. If the inconsistency is the result of demand considerations, resulting, for instance, from heightened financial uncertainty, monetary policy should not necessarily react to monetary developments. Monetary policy influences the supply of money through the effects it has on banks' intermediation activity. However, the majority of the changes in money supply occurring in the economy result from developments in the way that banks conduct their business (Coenen et al., 2005).

More specifically, a bank is an institution, the core operations of which consist of granting loans and supplying deposits to the public. Through the duality of lending and deposit issuance, banks fulfil a number of functions: they offer liquidity and payment services, undertake the screening and monitoring of borrowers' creditworthiness, redistribute risks and transform asset characteristics. These functions will often interact within a bank's intermediation process (Brunner & Meltzer, 1990).

Banks may intermediate between savers and borrowers by issuing securities and lending the receipts onward. Such lending activity will require the processing of detailed and often proprietary information on borrowers and the monitoring of the projects that have been financed. Such credit is, however, also provided by a number of non-monetary financial intermediaries, such as insurance corporations, as well as pension and investment funds, and is not specific to banks. Banks may also lend to borrowers but therefore create deposits (initially held by the borrowers) (Brunner & Meltzer, 1990).

The deposits constitute claims on the bank that are capital-certain and demandable, that is, redeemable at a known nominal value (Freixas & Rochet, 2008). These deposits have as a key feature the provision of liquidity services to their owner and, in some cases, such as overnight deposits, can also be used for payment services. As

described by Diamond and Dybvig, this transformation of illiquid claims (e.g. bank loans) into liquid claims (e.g. bank deposits) is a key defining element of a bank (Von Thadden, 2002). Non-monetary financial intermediaries do not provide their customers with liquid deposits (Diamond & Dybvig, 1983).

Banks' liquid deposit liabilities constitute the core of broad monetary aggregates, and banks thus play a leading role in the supply of broad money. Changes in banks' behaviour will alter the money supply.

A wide range of determinants affecting banks' intermediation activity has been identified in the literature, such as banks' risk aversion, borrowers' creditworthiness, the regulatory framework, the availability of capital buffers and the spread between lending rates and funding costs, known as the 'intermediation spread'. This spread represents the remuneration that banks can obtain for the service of intermediating between depositors and borrowers through their balance sheet. In a competitive equilibrium, it will equal the marginal cost of banks, which results from the costs of originating and servicing the loans, the provision of transaction services and the risk of default (Goodfriend & McCallum, 2007).

If deposit money can be created so easily, what is to prevent banks from making too much—more than sufficient to keep the nation's productive resources fully employed without price inflation? The Reserve Bank derives its role in currency management from the Reserve Bank of India Act, 1934. The Reserve Bank manages currency in India. The government, on the advice of the Reserve Bank, decides on various denominations of banknotes to be issued. The Reserve Bank also coordinates with the government in the designing of banknotes, including the security features. The Reserve Bank estimates the quantity of banknotes that are likely to be needed denomination-wise and accordingly places indent with the various printing presses. Banknotes received from banks and currency chests are examined, and those fit for circulation are reissued and the others (soiled and mutilated) are destroyed so as to maintain the quality of banknotes in circulation (RBI, 2013).

In terms of Section 25 of RBI Act, 1934, the design of banknotes is required to be approved by the central government on the recommendations of the Central Board of the Reserve Bank of India. The responsibility for coinage vests with the Government of India, on the basis of the Coinage Act, 1906, as amended from time to time. The Government of India also attends to the designing and minting of coins in various denominations.

The Reserve Bank decides the volume and value of banknotes to be printed each year. The quantum of banknotes that needs to be printed broadly depends on the requirement for meeting the demand for banknotes due to inflation, GDP growth, replacement of soiled banknotes and reserve stock requirements. The Government of India decides the quantity of coins to be minted on the basis of indents received from the Reserve Bank. The Reserve Bank estimates the demand for banknotes on the basis of the growth rate of the economy, the replacement demand and reserve stock requirements by using statistical models/techniques (RBI, 2013).

Monetary operations of the RBI involve monetary techniques which operate on techniques such as money supply, interest rates and availability of credit aimed to maintain price stability, stable exchange rate, healthy balance of payment, financial

stability and economic growth. RBI, the apex institute of India which monitors and regulates the monetary policy of the country, stabilizes the price by controlling inflation. RBI takes into account the following monetary policies (RBI, 2013).

An open market operation is an instrument of monetary policy which involves buying or selling of government securities from or to the public and banks. This mechanism influences the reserve position of the banks, yield on government securities and cost of bank credit. The RBI sells government securities to contract the flow of credit and buys government securities to increase credit flow. Open market operation makes bank rate policy effective and maintains stability in government securities market (RBI, 2013).

The most important tool of contracting or expanding the flow of money in the economy is the reserve ratio or cash reserve ratio, which is a certain percentage of bank deposits which banks are required to keep with RBI in the form of reserves or balances. Secondly, every financial institution has to maintain a certain quantity of liquid assets with themselves at any point of time of their total time and demand liabilities. These assets can be cash, precious metals, approved securities like bonds, etc. The ratio of the liquid assets to time and demand liabilities is termed as the statutory liquidity ratio (RBI, 2013).

In addition, the Reserve Bank also uses prudential tools to modulate the flow of credit to certain sectors so as to ensure financial stability. The availability of multiple instruments and their flexible use in the implementation of monetary policy have enabled the Reserve Bank to successfully influence the liquidity and interest rate conditions in the economy. While the Reserve Bank prefers 24 indirect instruments of monetary policy, it has not hesitated in taking recourse to direct instruments if circumstances warrant such actions. Often, complex situations require varied combination of direct and indirect instruments to make the policy transmission effective (RBI, 2013).

The bank rate, also known as the discount rate, is the rate of interest charged by the RBI for providing funds or loans to the banking system. This banking system involves commercial and co-operative banks, Industrial Development Bank of India, IFC, EXIM Bank and other approved financial institutes. Funds are provided either through lending directly or rediscounting or buying money market instruments like commercial bills and treasury bills. Increase in bank rate increases the cost of borrowing by commercial banks which results in the reduction in credit volume to the banks and hence declines the supply of money. Increase in the bank rate is the symbol of tightening of RBI monetary policy (RBI, 2013).

In the credit ceiling operation, RBI issues prior information or direction that loans to the commercial banks will be given up to a certain limit. In this case, commercial banks will be tight in advancing loans to the public. They will allocate loans to limited sectors. A few examples of ceiling are agriculture sector advances and priority sector lending (RBI, 2013).

Furthermore, moral suasion as in instrument of monetary policy is just as a request by the RBI to the commercial banks to take so and so action and measures in so and so trend of the economy. RBI may request commercial banks not to give

loans for unproductive purpose which does not add to economic growth but increases inflation (RBI, 2013).

Another crucial instrument with the RBI is repo rate which is the rate at which RBI lends to commercial banks generally against government securities. Reduction in repo rate helps the commercial banks to get money at a cheaper rate, and increase in repo rate discourages the commercial banks to get money as the rate increases and becomes expensive. Reverse repo rate is the rate at which RBI borrows money from the commercial banks. The increase in the repo rate will increase the cost of borrowing and lending of the banks which will discourage the public to borrow money and will encourage them to deposit. As the rates are high, the availability of credit and demand decreases resulting to decrease in inflation. This increase in repo rate and reverse repo rate is a symbol of tightening of the policy (RBI, 2013).

Risks Involved in Holding Securities

First and foremost, market risk arises out of adverse movement of prices of the securities that are held by an investor due to changes in interest rates. This will result in booking losses on marking to market or realizing a loss if the securities are sold at the adverse prices. Small investors, to some extent, can mitigate market risk by holding the bonds till maturity so that they can realize the yield at which the securities were actually bought (Kirabaeva, 2009).

Second, cash flows arising out of maturity of these securities like treasury bills need to be reinvested whenever they are paid. Hence, there is a risk that the investor may not be able to reinvest these proceeds at profitable rates due to changes in interest rate scenario.

Thirdly, the risk of amenability to liquidity is important. It refers to the inability of an investor to liquidate (sell) his holdings due to nonavailability of buyers for the security, i.e. no trading activity in that particular security. Usually, when a liquid bond of fixed maturity is bought, its tenor gets reduced due to time decay. For example, a 10-year security will become 8-year security after 2 years due to which it may become illiquid. Due to illiquidity, the investor may need to sell at adverse prices in case of urgent fund requirement. However, in such cases, eligible investors can participate in market repo and borrow the money against the collateral of the securities.

Conclusion

The above-mentioned theories on the demand and supply of money vary from country to country in their selective application. However, it can be concluded safely that money demand is a function of not just income and interest rate but also stock market prices and exchange rate.

Holding securities till maturity could be a strategy through which one could avoid market risk. Rebalancing the portfolio wherein the securities are sold once they become short term and new securities of longer tenor are bought could be followed to manage the portfolio risk. However, rebalancing involves transaction and other costs and hence needs to be used judiciously. Market risk and reinvestment risk could also be managed through asset liability management (ALM) by matching the cash flows with liabilities. ALM could also be undertaken by matching the duration of the cash flows (RBI, 2013).

Advanced risk management techniques involve the use of derivatives like interest rate swaps (IRS) through which the nature of cash flows could be altered. However, these are complex instruments requiring advanced level of expertise for proper understanding. Adequate caution, therefore, needs to be observed for undertaking the derivatives transactions, and such transactions should be undertaken only after having complete understanding of the associated risks and complexities.

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Chapter 7
Financial Crimes Through Fintech by Political Leaders: The Experience of Select South Asian States

Debasish Nandy and Abdullah Al Mamun

Introduction

Fintech has emerged as a catalyst for new business prospects within the realm of traditional banks. Its potential lies in the complete transformation of financial services, aiming to disentangle, distribute, and demystify them in the future. The impact of fintech has already been felt in the disruption it has caused to conventional finance, as highlighted by Lee and Shin (2018). This disruption presents unique challenges to established players in the industry, who once held an unquestionable dominance, while simultaneously offering exciting advancements for them. For instance, a startup armed with an innovative concept for a customized financial solution tailored to the tech-savvy generation can pose a formidable threat to the billion-dollar financial service providers presently operating in the market. Notable examples of such disruptive fintech companies include M-Pesa, which specializes in mobile payment services, Revolut, which offers integrated services, and Robinhood, which facilitates trade and investment (Mahmud, et al., 2023). However, the realization of these desired changes hinges upon the successful and widespread adoption of fintech services. Al-Okaily et al. (2021) emphasize that fintech-enabled sustainable development holds significant advantages, particularly for marginalized groups.

Fintech can be described as financial technologies and financial innovation focus of small companies to large corporations and financial institutions. The main focus is to develop technologies that can transform the financial landscape by simplifying typical financial applications (Rahman et al., 2021). The growth and development of

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C. M. Gupta, G. Kaur (eds.), *E-banking, Fintech, & Financial Crimes*,
https://doi.org/10.1007/978-3-031-67853-0_7

the digital economy are part of national policies. ICTs play a crucial role in advancing the Sustainable Development Goals (SDGs) outlined by the United Nations, encompassing economic growth, decent work, well-being, and poverty eradication. By harnessing information and communication technologies, particularly through the digital economy, nations can effectively utilize ICTs to provide digital goods and services, thereby fostering social and economic development (UNCTAD, 2019).

In recent years, the term "fintech" has gained significant attention in Bangladesh due to its active disruption of long-established financial systems. Fintech encompasses the utilization of technological advancements to enhance and expedite traditional financial services and transactions. It is often used interchangeably with the term "financial technology." Under the fintech umbrella, various services and products such as digital cash management systems, peer-to-peer lending, mobile banking, e-wallets, and mobile financial services (MFS) can be found.

Conceptualizing Financial Crime

Most of the states of South Asia have witnessed financial crimes. In many countries in South Asia, political leaders are accused of financial crimes. The political culture of South Asia is stigmatized for enormous corruption. Leaders are blamed for having unauthorized wealth, property, and money. Many of them used to send money through illegal channels abroad. The political leaders often face judicial challenges and used to go to prison for financial offenses. Financial crimes encompass a range of nonviolent offenses that result in financial losses for some individuals while benefiting others at their expense. Despite the numerous advantages brought about by the globalization of financial systems, increased trade volume, and rapid advancements in information technology, financial crime has unfortunately expanded and evolved (Ünvan, 2020). Consequently, it is increasingly crucial to combat these sophisticated and well-structured crimes that inflict significant financial harm upon individuals and organizations. To effectively address this growing menace, a comprehensive approach involving all sectors of society is imperative. Financial crimes encompass various illicit activities such as fraud, misconduct in financial markets, manipulation of financial information, handling of criminal proceeds, and financing of terrorist activities.

Money laundering poses a significant threat due to its potential to fund terrorist organizations, drug and weapons traffickers, and criminal enterprises. This can have devastating effects on both the financial system and national security. Criminals can use their illegal profits to support their legal businesses, creating an uneven playing field between legitimate and illicit enterprises. The constantly evolving nature of money laundering activities requires a comprehensive approach from both the international community and individual nations. Legislation alone is not enough to combat this issue. Seizing illicit gains and reducing the profitability of crime are crucial objectives. Foreign aid is also necessary, and cooperation between countries is essential in fighting multinational money laundering operations. Negotiations based

on mutual understanding and respect can help resolve conflicts and prevent delays in legal and investigative processes. Almost all crimes targeting financial institutions can be categorized as financial crimes in some manner due to their wide range of impact. This statement is occasionally employed to encompass any type of fraudulent activity linked to monetary schemes, which encompasses an even broader array of behaviors. Money laundering, tax evasion, embezzlement, forgery and counterfeiting, identity theft, bribery and corruption, financing of terrorism, wash trading and pump-and-dumps, insider trading, and market manipulation are among the significant categories.

Reasons Behind the Financial Corruption by Political Leaders

Political culture generates corruption. In the political spectrum of South Asia, corruption has been an integral part. The leaders of different political parties in South Asia spend a huge amount of money during electoral campaigning. Many times, they try to spread money and offer money to the voters and petty leaders, party supporters, and local administration to manage the vote bank. This is a very common practice that before contesting the elections, political leaders take financial support from the business houses. Sometimes, they used to take loans from individuals, financial companies, and relatives. After winning the election, those leaders try to earn money illegally very fast to repay loans they have taken. The political systems of South Asian countries are mostly volatile; that is why the political leaders consider their political career as an uncertain venture. So, they try to earn as much as they can. Considering the uncertain political career, the leaders often get involved in illegal money laundering activities. The unauthorized fintech channel is used by many South Asian leaders. Due to inadequate execution, a prevailing culture of financial politics rooted in close ties between corporate leaders and political figures, which mutually benefits both parties, interference in legal proceedings to hinder the punishment of corrupt wrongdoers, especially prominent individuals, and inconsistent outcomes in anti-corruption endeavors, corruption continues to be widespread.

Democratic politics is about making government work for the people by giving citizens a voice in government and the ability to remove leaders from office. Corruption is the misuse of public office for private gain. When politicians use their office to enrich themselves or their political allies, they violate the public's trust and undermine the legitimacy of their governments. Politicians in liberal democracies should be more resilient to corruption than their counterparts in authoritarian regimes are, but experiences in Asia show that the region's democratic governments are by no means immune from corruption. Corruption remains a central policy issue for democratic governments in Asia, and the politics of controlling corruption is central to understanding electoral politics and elite political maneuvering.

Transparency International (2014) has mentioned that in the South Asian region, bribery, nepotism, and fraud have the potential to impede economic growth and

worsen poverty levels. This is particularly detrimental to the most vulnerable individuals who heavily rely on social safety nets. These unethical practices divert funds that were originally intended for public services, further exacerbating the situation. Moreover, they contribute to the concentration of wealth in the hands of a privileged few while discouraging potential investors who play a crucial role in fostering economic development. The prevalence of corruption in South Asia is on the rise, and failing to address this issue could undermine the region's progress and hinder efforts to achieve a fair distribution of resources. The corruption epidemic in South Asia can be attributed to various factors, including excessive government interference in the operations of anti-corruption bodies, lack of transparency in public institutions, and inadequate protection for those fighting against corruption. Transparency International conducted a comprehensive assessment of 70 prominent institutions across six South Asian countries, such as Bangladesh, India, the Maldives, Nepal, Pakistan, and Sri Lanka to gauge their vulnerability to corruption. The findings of the report are as follows. Sometimes, the flow of foreign direct investment (FDI) is negatively linked with corruption. Moreover, corruption stemming from democratic governance, stringent regulations, and religious diversity has a substantial influence on the region's capacity to combat corruption (Khati & Jinwon, 2023).

The key reasons behind the corruption of the political leaders in South Asia are as follows: Firstly, the presence of an unjustified or poorly justified government, coupled with the negative influence of negligent leaders at both the federal and local levels, contributes to the prevailing issues. Secondly, political favoritism and nepotism within the educational and administrative sectors further exacerbate the problem. This culture of corruption in both Pakistan and Afghanistan has been nurtured by a disregard for meritocracy, inadequate remuneration, and a culture of favoritism. Thirdly, both nations frequently witness violations of rules, regulations, and codes of conduct within the public sector. Fourthly, a commonality between the two countries is the lack of public accountability. Fifthly, both countries have unfortunately normalized a culture of corruption and unfairness in the workplace, with citizens becoming accustomed to these reprehensible behaviors. Sixthly, influential leaders, military personnel, and ministers distort laws, norms, and even constitutional provisions to facilitate corrupt activities. Lastly, civil society and the media have failed to effectively address these issues in both nations. While Pakistan lacks a functioning civil society, Afghanistan is still in the process of establishing one (Nandy, 2023).

The Selected Countries of the Study

In this study, three countries in South Asia have been chosen, such as Pakistan, Afghanistan, and Bangladesh. The political and financial systems of the three countries are different. The nature of the financial corruption through fintech is also different.

Pakistan

Pakistan's political landscape was marred by a long-standing culture of corruption (Nandy, 2017). Prominent figures in the country were accused of financial impropriety, including the former prime minister who hailed from a wealthy Punjabi family. He had led the Pakistan Muslim League-N as its president and had held various positions in the government, including the Ministry of Finance and the Chief Minister of Punjab. However, serious allegations of using Inter-Services Intelligence (ISI) to manipulate elections through financial means were leveled against him. In 1993, he was fired by the president of Pakistan at the time due to his involvement in corruption. Despite this, he was elected to a second term as prime minister in 1997. These incidents highlight the pervasive nature of corruption in Pakistan's political history. During his second term in office, Nawaz Sharif experienced a significant clash with both the military and judiciary. In 1999, his tenure was abruptly ended by Musharraf's intervention. Subsequently, in 2017, Sharif faced another setback when he was implicated in the Panama Papers trial, leading to a ban on holding any public office. This trial exposed a grave financial fraud, resulting in prison sentences for Sharif and his daughters. The year 2016 witnessed the Panama Papers leak, which further intensified the scrutiny of Sharif's financial affairs. Ultimately, in July 2017, the Pakistani Supreme Court removed him from his position.

Following the unfortunate aircraft accident that claimed the life of General Zia-ul-Haq, Benazir Bhutto assumed the role of Pakistan's first female prime minister. However, her tenure was cut short due to allegations of corruption, leading to her removal from office before completing 2 years. In 1993, Bhutto returned to power as Pakistan's second prime minister, concurrently taking on the responsibilities of the finance minister. It was during her time as prime minister that she introduced the practice of nepotism by appointing her husband, Asif Ali Zardari, as the minister of investments in 1996. This decision inadvertently set the stage for a culture of family dominance within the country's political economy. Zardari himself faced numerous accusations of engaging in illicit financial activities and misappropriation of public funds. Leveraging his connections, he managed to expose defense contacts. The state-owned businesses and power plant projects were divested by him. In return for granting radio licenses, he succumbed to bribery. Moreover, he received payment to bestow an export monopoly upon a select few companies. When Pakistan International Airlines was procuring planes, he embezzled public funds. In exchange for approving textile export quotas and permitting the establishment of sugar factories, among other matters, he accepted bribes. The Bhutto family unlawfully obtained property in London for a sum of USD 2.5 million (Nandy, 2023).

The former prime leader has been handed his second prison term in 2018. In a distinct corruption case, he and his daughter Maryam were incarcerated in July 2018. However, their sentences were temporarily halted by the Islamabad High Court in September, and they were obliged to pay a bail amount of $5000 each. After details regarding his family's financial status were disclosed in the Panama

Papers, the Supreme Court of Pakistan directed Sharif to step down from his position as prime minister in 2017 (Saifi, 2018).

Unfortunately, no Pakistani prime minister has been able to complete a full 5-year term. In 2008, Pervez Musharraf was brought to power by Western powers and domestic democratic forces, but he faced allegations of corruption thereafter. While elected governments are usually held responsible for corrupt practices, Pakistan's corrupt culture stands out due to the interplay between unscrupulous landlords, ineffective political parties, and corrupt political leaders. The military-civil alliance has also played a crucial role in establishing military dominance. Shaikh (2009) asserts that the Pakistani military has gained supremacy in the country over the years, making it the most significant institution. The military has utilized munitions and the guise of security to establish its dominance in major financial transactions. Unfortunately, corruption in the armaments sector has become more prevalent over time, as highlighted by Henriksson (2007). The major arms sales involve significant amounts of money, and politicians and senior army personnel in Pakistan collude to engage in corrupt arms sales.

Pakistan's former Prime Minister Imran Khan was arrested in 2023 by an anti-graft agency on corruption charges. Government officials alleged that Khan and his wife received land worth millions of dollars as a bribe from a real estate tycoon through a charitable trust. Khan and his aides have denied any wrongdoing. The developer has denied the charges in the past, but he could not be contacted on Wednesday, and his company's marketing manager did not respond to a request for fresh comment. The trust has nearly 60 acres of land worth 7 billion Pakistani rupees ($24.7 million) and another large piece of land in Islamabad close to Khan's hilltop home, the minister said. The government said the scheme originated with 190 million pounds repatriated to Pakistan in 2019 by Britain after Hussain forfeited cash and assets to settle a British probe into whether they were proceeds of crime (Shahzad, 2023). On November 28, 2023, a Pakistani court ordered a public trial in prison of former Prime Minister Imran Khan on charges of financial irregularities (Ahmed, 2023). The Islamabad High Court (IHC) on November 30, 2023, sought a response from the Election Commission of Pakistan (ECP) on former Prime Minister Imran Khan's petition seeking to set aside his conviction in the *Toshakhana* reference and the suspension of his disqualification (Khan & Asad, 2023).

Afghanistan

Corruption in Afghanistan is primarily a reflection of the country's native customs and regional traditions. Numerous cabinet ministers, members of parliament, and political leaders have faced allegations of involvement in financial scandals. At all levels, the administration is plagued by rampant corruption. Afghanistan's democratic principles are fragile, and its economy is unstable. The nation faces threats from terrorism and ethnic violence, relying heavily on international assistance due to its lack of industrialization and economic challenges. Despite the leadership of

Ashraf Ghani and Hamid Karzai, corruption has remained pervasive in both political and administrative spheres since the Taliban era. The allocation of development funds has been drained due to careless corruption practices. Over time, Afghanistan has developed a financial culture where politicians and officials frequently misuse international funds. According to Transparency International's 2019 report, Afghanistan scored a mere 16 out of 100 and ranked 173 out of 180 nations in terms of corruption. Transparency International has advised the Afghan government to collaborate with the National Unity Government (NUG) and civil society to combat corruption effectively. The rapid escalation of corruption has worsened instability and hindered developmental efforts. The prevalence of corruption in Afghanistan paints a grim picture of its socioeconomic profile, indicating that corruption has become deeply ingrained within its institutions.

Corrupt Practices Among the Politicians

Nepotism has emerged as a prominent feature within Afghan politics. The country's politicians have established strong connections with unlawful activities and financial mismanagement. Numerous prime ministers and ministers in Afghanistan have previously operated private businesses using the names of their family members. Despite being one of the world's poorest nations, the ruling elite in Afghanistan utilizes illicit wealth to sustain extravagant lifestyles. The Anti-Corruption Commission's investigations have revealed that approximately 8000 officials possess unlawful funds and assets that exceed their legitimate earnings. Nevertheless, it is imperative to implement punitive measures against a small fraction of dishonest officers. Political leaders in Afghanistan frequently exploit their positions of power for personal gain. For more than a decade, Afghanistan's government has consistently ranked among the top ten most corrupt nations.

Conversely, there has been a notable transformation in the perception of the nation this year, and the Taliban takes immense pride in this development. Transparency International, an unbiased organization that monitors corruption, recently released the Corruption Perceptions Index for January 2023. Among the 180 states evaluated, Denmark emerged as the least corrupt nation, while Somalia ranked at the bottom, securing the 180th position. With the Taliban presently in power, Afghanistan has made significant strides, climbing from the 174th to the 150th spot in 2021. It is worth mentioning that the nation's standing was even worse in 2011, when the United States had a substantial military and developmental presence in Afghanistan, placing below countries like North Korea and Somalia (Dawi, 2023). Hence, it is crucial to highlight this fact. Despite the challenges faced, Afghanistan has successfully shed its tarnished reputation this year, making remarkable progress, and the Taliban takes immense pride in this achievement.

Ashraf Ghani, the former president of Afghanistan, has been accused of engaging in and profiting from rampant corruption. Rumors abounded among Afghans and analysts that the 75-year-old took millions of dollars in cash with him when he left, and Russian state media reported the same. Please use the sharing tools found

via the share button at the top or side of articles. The ousted president has been criticized by members of his erstwhile government, who have accused him of betrayal and allowing the Taliban to take over Afghanistan in the wake of the US troop withdrawal. Ghani was also accused of looting Afghan coffers as he left, including allegations that he fled with a helicopter full of cash (Chan et al., 2021). Ghani in his letter denied the accusations. The US and former Afghan officials, including those who worked closely with Ghani, allege numerous instances of corruption and bribery within Ghani's office and family, and independent investigations have concluded that Ghani gave lucrative contracts to immediate family members. Ghani has denied the accusations (Turak, 2021).

Taliban Leaders

The collapse of Afghanistan's entire banking sector has led to a decreased reliance on the official financial system by Afghans. Before the Taliban regime in 2021, approximately 15% or more of Afghans held bank accounts. However, with the Taliban government in power, the country's unrestrained economy has become increasingly vulnerable. This vulnerability is evident in the cessation of operations by international money transfer companies like Western Union and MoneyGram in Afghanistan. Furthermore, before the Taliban era, only a mere 7% of women were involved in the formal financial system of the nation, with their participation being significantly limited. As a result, the hawala system has gained significant control over the financial sector, accounting for nearly 90% of it under the Taliban administration. As a result of the prevailing financial challenges faced by the system, both the Taliban and their leaders have taken measures to reduce their operations to conserve funds (Stevenson, 2021). Many individuals previously relied on hawala to stay connected with their relatives residing in Istanbul, Doha, and London. The absence of financial support from hawala would lead to the collapse of entire economic sectors in Afghanistan.

Bangladesh

Bangladesh has witnessed the illegal money transactions of the political leaders of Bangladesh. The political culture of Bangladesh is accused of corruption. The legacy of corruption has made the country stigmatized. Right from military ruler Hussain Muhammad Ershad to the leaders of Bangladesh Nationalist Party (BNP) and Awami League (AL) are accused of corruption and illegal monetary transactions through fintech. Looting the public funds, bribery, hiding the actual income, and using political influence, the leaders of Bangladesh used to send money abroad.

Presently, 198 financial companies are operating in Bangladesh. As the fintech industry continues to rapidly expand, notable innovations like online payments, electronic investment, crowdsourcing, and digital currencies are emerging.

According to global market research firm Statista, the fintech digital investment market in Bangladesh is projected to reach a value of USD 55.5 million by 2023, with a growth rate of 35.8% by 2024. Furthermore, it is anticipated to achieve a market value of USD 909 million by 2027 (Hasan, 2023).

Financial Corruption by Jatiya Party (Hussain Muhammad Ershad)

During the majority of the 1980s and the early 1990s, Hussain Mohammad Ershad held the reins of power in the nation. His ascendancy to leadership was solely based on his position as the chief of staff of the Bangladesh Army, a role he had assumed since 1978. This period was marked by the assassination of Sheikh Mujibur Rahman, the esteemed founding father of the country, in 1975. Subsequently, Ziaur Rahman, a charismatic military figure, assumed the mantle of leadership in Bangladesh (The Irish Times, 2019). In 1991, Ershad was detained and imprisoned on charges of corruption. However, rather than crumbling, the Jatiya Party (JP) emerged as a formidable force in electoral politics. Remarkably, Ershad contested and triumphed in five different constituencies across two consecutive elections all while being incarcerated. Nevertheless, his glory days were now a thing of the past. Ershad faced allegations of failing to disclose the gifts he had received from various nations during his presidency from 1983 to 1990 (The Times of India, 2017).

Professor B. Chowdhury submitted a list of individuals to the Anti-Corruption Bureau, which included notable figures such as members of parliament (MP), ministers, district and Upazila chairs, and high-ranking government officials (JPRS, 1991). In the aftermath of 1991, it became customary in a democratic context to refute allegations of corruption made by leaders of national and local political parties. As the elections of 1996, 2001, and eventually 2007 drew near, these accusations escalated from both sides. The United States and the European Union consistently urged Bangladesh to take stronger measures against corruption. During the period from 2001 to 2005, Transparency International designated Bangladesh as the most corrupt nation in the world or tied for the highest rank (Robinson & Sattar, 2012).

Financial Crime by Bangladesh Nationalist Party (BNP) Leaders

The “fugitive” eldest son of Bangladesh’s opposition leader and former premier Khaleda Zia was today sentenced to 7 years in prison by a court here for laundering nearly USD 2.5 million, overturning a lower court’s decision to acquit him in the high-profile graft case. Two high court judges overturned a 2013 acquittal by a lower court of 51-year-old Tarique Rahman, who lives in exile in London and now faces a ban from politics (Gulf Times, 2016). Tarique Rahman was senior vice president of the Bangladesh Nationalist Party (BNP). He was sentenced for siphoning off the money to Singapore between 2003 and 2007 when the party-led four-party righting alliance government was in power. Rahman, who has been living in London

since 2007, was charged under the Money Laundering Act. The court also slapped a Taka 200 million fine on him. In a surprise verdict, a Dhaka court on November 17, 2013, acquitted Rahman of the graft charge but handed down 7 years of imprisonment and fined Taka (Bangladesh currency) 400 million to his friend and business partner Giasuddin Al Mamun in the same case. The High Court, however, upheld Mamun's jail term but lowered the amount of the fine to Taka 200 million, an equal amount of penalty slapped on Rahman. The Anti-Corruption Commission brought the money laundering charge against Rahman during the past military-backed interim government which spearheaded a massive anti-graft campaign under the State of Emergency from 2006 to 2008 when Rahman was put behind bars (The Indian Express, 2016).

Bangladesh has long grappled with corruption within its political system. The governing styles of many political leaders in Bangladesh have been influenced by the political culture of Pakistan. The deregulated economy of Bangladesh has raised concerns about good governance. Fintech has had a significant impact on Bangladesh's economy. In the past, it was common for businessmen, high-ranking officials, and political figures to employ money laundering techniques to transfer illegal funds abroad. The public's trust has been completely betrayed by the reckless spending of public funds by political leaders. In Bangladesh, there exists a close relationship between the political class and the administration, which has further perpetuated institutionalized corruption and tarnished the nation's reputation for transparency. Begum Khaleda Zia, the former leader of the BNP, faced corruption allegations and was also linked to fintech.

The Zia Orphanage Trust graft case was thoroughly examined by the High Court, which emphasized the detrimental impact of corruption on the fundamental principles of democracy, social equity, and the rule of law. On February 8, 2018, the Special Court-5 in Dhaka sentenced former Prime Minister Khaleda to a 5-year imprisonment, taking into account her age and social status as justifications for the verdict. In their extensive 175-page ruling, the bench highlighted that Begum Zia was entrusted with the management of the PM's Orphanage Fund, a public fund, and that she deceitfully misappropriated, utilized, and disposed of a significant amount of money from the fund, with the active involvement of other inmates. The court emphasized that Khaleda had a responsibility to ensure that the funds allocated for the welfare of orphans were utilized fairly and appropriately (The Daily Star, 2019).

Socioeconomic background plays a significant role in determining the fintech readiness score. Over the past two decades, Bangladesh has made remarkable progress in enhancing the accessibility of the financial system for consumers. Data from Bangladesh Bank indicates a notable expansion in the presence of physical bank branches, ATMs, point-of-sale systems, and CRM machines across various criteria (Mahmud et al., 2023). In response to the adoption of new technologies by banks, there is a growing trend of hiring younger and more technologically adept staff members to ensure adaptability to these changes. Alternatively, some banks are implementing training programs to effectively handle fintech advancements (Ahmed & Rahman, 2020).

Financial Crime Through Fintech by Awami League Leaders

In comparison to the other two major political parties of Bangladesh, such as BNP and Jatiya Party, the number of corrupt leaders in Awami League is less. Due to the transparent image and strict principles of Sheikh Hasina, the supremo of the Awami League party, the party leaders are afraid to be involved in illicit financial transactions and to be involved in money laundering through fintech. Hasina became the Prime Minister of Bangladesh, but no such allegation related to financial crime or money laundering through fintech has been raised against her or her family members. However, power makes people corrupt. There was an allegation against some youth leaders of the Awami League for being involved in financial crime. Sheikh Hasina took a "zero tolerance" policy against corrupt party supporters and party leaders. Sheikh Hasina has made it clear that her administration is committed to stopping illegal money laundering through fintech by political leaders. According to the prime minister, Tarique Rahman and Arafat Rahman Koko, the two sons of Khaleda Zia, were implicated in illicit activities even before foreign entities and an FBI agent provided testimony against Tarique in a money laundering case. The prime minister further stated that Tarique Rahman and Arafat Rahman Koko managed to return Tk40 crore (in Bangladeshi currency) to the government, which they had unlawfully transferred abroad. However, retrieving the funds from the countries where they were stashed has proven to be a formidable challenge, as these nations are unwilling to release the funds (Dhaka Tribune, 2023).

The ruling Awami League (AL) of Bangladesh initiated an anti-corruption drive in September 2019. The initial crackdown targeted a few illicit casinos and clubs, resulting in the apprehension of a limited number of leaders from the ruling AL's youth wing. These individuals were charged with running these establishments, engaging in extortion, participating in money laundering schemes, amassing illicit funds, and securing government contracts through their political connections. The campaign has been described in various ways, including as an effort to support the "cleanse the party" movement. Both opposition leaders and members of the cabinet assert that no one, regardless of their affiliation with the AL or any other party, will be exempt from punishment. This anti-corruption campaign, launched by the ruling Awami League (AL) in September 2019, has resulted in the arrest and imprisonment of numerous leaders associated with different affiliate groups of the ruling party (Riaz, 2019).

Jamaat-e-Islami

The Jamaat-e-Islami party, which is aligned with right-wing ideologies, has been linked to radicalism and the financing of terrorism. The Bangladesh High Court has taken the step of banning this political party due to its connections with various extremist groups and its involvement in illicit financial activities. It has been reported that individuals from Kuwait, the United Arab Emirates, Bahrain, Pakistan, Saudi Arabia, and Libya have contributed funds to the Jamaat-e-Islami party.

Furthermore, the organization has received significant financial support from several international nongovernmental organizations (NGOs), such as the Al Haramain Islamic Institute based in Saudi Arabia, the Revival of Islamic Heritage and Daulatul Kuwait based in Kuwait, and the Al Fuzaira, Khairul Ansar Al Khairia, and Daulatul Bahrain based in the United Arab Emirates and Bahrain, respectively. Moreover, Bangladesh has witnessed the emergence and growth of Islamic fundamentalism, with organizations like Jamaat-e-Islami and others expanding their institutional networks and capitalizing on the financial resources provided by Islamic petrodollars. These organizations include Islami Chhatra Shibir, Jagrata Muslim Janata, Bangladesh, and Islami Oikya Jote (Warikoo, 2006).

In August 2013, the High Court of Bangladesh declared the Jamaat-e-Islami organization illegal due to its violation of the secular provision in the 1972 constitution. Consequently, during the tenth general elections held in January 2014, the electoral commission denied the party's participation (Shikha, 2014). Ameer Shafiqur Rahman, the leader of Jamaat-e-Islami, faced allegations of involvement in militancy and was placed under a 7-day remand by a Dhaka court on Tuesday. Despite the police's request for a 10-day remand under the Anti-Terrorism Act (ATA) case, the court ordered his detention for 7 days. The head of Jamaat-e-Islami was apprehended on Monday in the Basundhara neighborhood, the capital, by the Counterterrorism and Transnational Crime (CTTC) unit. It is worth noting that he had previously been imprisoned twice (All India Radio, 2022).

Taken Initiatives for Stopping Financial Crimes Through Fintech

This study deals with three South Asian countries, such as Pakistan, Afghanistan, and Bangladesh which are alleged with gross financial corruption through fintech. However, these three states have taken some measures to stop financial corruption.

Pakistan is accused of giving access to illegal money laundering practices. The Pakistani government, despite challenges, has taken significant measures to combat illicit money laundering. The Anti-Terrorism Act of 2002 delineates the criminal acts of money laundering and financing terrorism, along with the corresponding penalties and jurisdictions. Additionally, the 1999 National Accountability Ordinance has facilitated the establishment of accountability courts and necessitated financial institutions to disclose any suspicious transactions to the National Accountability Bureau (NAB). Furthermore, the Control of Narcotic Substances Act of 1997 encompasses provisions for the freezing and confiscation of assets linked to drug trafficking while also establishing specialized courts to handle offenses, including financing, related to illegal drugs. Moreover, this act mandates the reporting of any suspicious transactions to the Anti-Narcotics Force (ANF). Since the identification of Pakistan as a country that could potentially be blacklisted in 2018 for failing to comply with international guidelines, the Financial Action

Task Force (FATF) has maintained a vigilant watch over the nation's endeavors to combat the illicit activities of money laundering and the financing of terrorism (Hashim, 2020).

Afghanistan has experienced of hawala system. Due to the drainage of a huge amount of government funds by the former Afghan leaders through fintech abroad, the Taliban administration has demonstrated its ability to combat corruption through the implementation of roadblocks and customs inspections. Despite facing severe international banking and economic sanctions, the beleaguered Taliban leadership has managed to secure financial support for their fight against corruption. The World Bank released a positive report in January 2023, highlighting the successful tax collection during the first three quarters of 2022 under the Taliban administration, which showcased a promising aspect of the Afghan economy. Additionally, the nation achieved strong export levels and maintained a stable currency exchange rate. However, the Taliban has not provided any specific details regarding the distribution of national resources, despite claiming to have collected $1.7 billion in taxes over the past 10 months.

In September 2016, the Special Inspector General for Afghanistan Reconstruction (SIGAR) released a report highlighting the ineffectiveness and lack of independence of the Anti-Corruption Commission in Afghanistan, which was established in 2008. The report also revealed that the commission had never validated the asset declaration forms of former President Hamid Karzai. Furthermore, the asset disclosure forms of Karzai and other high-ranking officials were found to contain mistakes and omissions. Transparency International's annual corruption assessment ranked Afghanistan 166th out of 168 countries, reflecting the country's widespread corruption. The SIGAR investigation discovered that Karzai had reported funds held in a German bank account in his September 2015 asset disclosure form but failed to provide the account number or identify the source of the money (Ali, 2016).

Bangladesh has implemented several measures to combat corruption. To establish an efficient legal system, the court and law enforcement organizations have been provided with the necessary resources and training. To further investigate activities such as money laundering, financing of terrorism, and other related crimes, law enforcement agencies are employing a range of techniques. This includes the identification, containment, and confiscation of unlawfully acquired assets. Moreover, the government is actively working toward reducing trade-based money laundering by facilitating the provision of tools and techniques, as well as promoting collaboration among stakeholders. Bangladesh is making strides in improving the process of recovering stolen assets, curbing illicit transfers, and discouraging the generation of proceeds from criminal activities, all aimed at preventing the unlawful flow of money. Additionally, the government is prioritizing regulatory technology, cybersecurity, and financial inclusion to address emerging challenges and promote wider access to financial services.

Fintech refers to the utilization of innovative and technologically advanced approaches in providing financial services, and it is an industry that is experiencing rapid expansion on a global scale. Additionally, Bangladesh's legal system empowers the government to enact regulations, seize assets, and confiscate illicit goods.

The Anti-Terrorism Act (ATA) and the Money Laundering Prevention Act (MLPA) enable the authorities to confiscate properties and assets associated with money laundering and terrorist financing, whether through convictions or, in certain instances, even without a conviction.

Recommendations

Some policy recommendations can be offered to the governments of Pakistan, Afghanistan, and Bangladesh to eliminate financial crimes through fintech. **Firstly**, the national character of a country is determined by the transparency of the state system of a country. The governments of these South Asian countries should emphasize developing moral education at the school level to educate students about the necessity of moral education and how the economy of the country can be developed by stopping corruption. **Secondly**, through judicial activism, the practice of financial corruption can be stopped. The judiciary needs to be autonomous and powerful as it can actively play a significant role against the political leaders. **Thirdly**, through strong legislation, corruption can be minimized. The fee-and-fare parliamentary democratic system is required for this. **Fourthly**, the role of civil society in the anti-corruption movement is a must. So, to combat financial corruption, a vibrant civil society is required. Except Bangladesh, the role of civil society in the anti-corruption movement is invisible. Fifthly, the strict financial regulation acts are to be implemented by the governments of these countries. Due to enormous corruption, Pakistan was kept on the "gray list." The financial credibility and reliability can be challenged by the IMF and World Bank.

Conclusion

Based on the study, it can be said that financial crime through fintech has been a deep-rooted problem in Pakistan, Afghanistan, and Bangladesh. Despite some initiatives by the concerned governments, fintech-based crimes have not been eliminated yet. This is a quite difficult task for Pakistan and Afghanistan. Bangladesh has little possibility to overcome this issue due to the strong commitment of the ruling government to combat financial crimes. Corruption has been a persistent issue in South Asia for a considerable period. The majority of nations in this region have consistently been recognized as some of the most corrupt countries in the world, with only a few exceptions. According to Transparency International's Corruption Perceptions Index (CPI) for the year 2022, Bhutan, Afghanistan, Bangladesh, India, Nepal, Maldives, Pakistan, and Sri Lanka were all identified as countries with significant corruption levels (Transparency International (TI, 2023). In the case of Pakistan, fintech is associated with terror financing. For Bangladesh, it is also partly true for the Jamaat-e-Islami party.

To enhance financial inclusion by combating corruption, the South Asian governments must prioritize the enforcement of accountability measures and legal repercussions for corrupt officials, particularly those responsible for overseeing the financial sector. Additionally, it is imperative to recognize that lenient penalties may not effectively deter rent-seeking behavior within the financial industry, thus necessitating the establishment of stringent sanctions to address this issue (Mahmud et al., 2023). The culture of corruption in the South Asian region by political leaders has been a common phenomenon. The national political cultures of Pakistan, Afghanistan, and Bangladesh are constitutionally different. However, the practice of corruption by political leaders through fintech is common in Bangladesh, Pakistan, and Afghanistan. In the case of Pakistan, most of the political leaders are corrupt. The systematic corruption in Pakistan stigmatized the national image of Pakistan. For Afghanistan, due to an unregulated economy and lack of an adequate and formal banking system, the leaders of Afghanistan used to transfer money abroad. In Bangladesh, except Sheikh Hasina, the Prime Minister of Bangladesh, most of the key political leaders are accused of financial crime through fintech. The factors contributing to corruption at the individual level have not yet been completely determined, despite efforts to combat it (Han, 2023).

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Chapter 8
Financial Crimes and Fintech in India

Shah Ali Adnan and Pramod Kumar

Introduction

The Indian financial system is constantly changing, and the combination of technology and money has brought about a new age characterised by remarkable innovation and ease. The emergence of financial technology, also known as fintech, has revolutionised the accessibility and delivery of financial services by creating a seamless connection between conventional banking and contemporary digital solutions (Arner, 2016). Nevertheless, as this rapid advancement in technology gathers traction, it also carries with a simultaneous danger—the rising peril of financial misconduct. This paper explores the complex correlation between financial crimes and fintech in India, analysing the difficulties, regulatory structures and the essential need for a well-balanced strategy to promote innovation while guaranteeing strong security measures. The fintech industry in India has had a significant upswing in recent years, propelled by reasons like the government's emphasis on a digital economy, more smartphone use and the growing middle-class demographic. Technological advancements such as mobile wallets, digital payment systems, peer-to-peer lending and robo-advisors have not only made financial transactions easier but have also increased financial access for people from different socioeconomic backgrounds. The combined endeavours of conventional financial institutions and agile fintech startups have fundamentally transformed the financial services ecosystem, rendering it more readily available and adaptable to the requirements of the digitally connected populace. Nevertheless, significant technical progress brings about significant susceptibilities. The rapid integration of digital financial services

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C. M. Gupta, G. Kaur (eds.), *E-banking, Fintech, & Financial Crimes*,
https://doi.org/10.1007/978-3-031-67853-0_8

has opened up new opportunities for financial illicit activities, including cyber deception, identity misappropriation and the concealment of illicit funds and the funding of terrorism. With the rapid growth of the fintech industry, it is crucial to maintain a careful equilibrium between innovation and security. An essential obstacle in the convergence of fintech and financial crimes is the constantly changing character of cyber threats. The interconnectivity of digital networks offers an advantageous environment for adept hackers to exploit weaknesses. The increasing sophistication of phishing assaults, spyware and ransomware presents a significant threat to both consumers and financial institutions. Due to the large volumes of sensitive personal and financial data they manage, fintech businesses become appealing targets for hostile actors that want to gain unauthorised access. Furthermore, the swift rate at which technology progresses often surpasses the establishment of complete legal frameworks. The absence of a comprehensive regulatory framework specifically designed for fintech creates opportunities for regulatory arbitrage and presents difficulties in ensuring adherence to regulations and responsibility. To achieve a harmonious combination of promoting innovation and preventing financial crimes, it is necessary to adopt a regulatory strategy that is both proactive and adaptable. In light of the crucial significance of tackling these difficulties, Indian regulatory authorities have been aggressively striving to provide a favourable atmosphere for the expansion of fintech while also minimising the accompanying dangers. The Reserve Bank of India (RBI) and the Securities and Exchange Board of India (SEBI) have implemented norms and procedures to oversee and control digital payment systems, peer-to-peer lending platforms and crowdfunding activities. The purpose of these regulatory measures is to guarantee consumer protection, data security and systemic stability within the financial industry. In addition, the government's promotion of the Unified Payments Interface (UPI) and the use of Aadhaar-based e-KYC (know your customer) have simplified the process of client onboarding, improving the effectiveness of financial transactions and strengthening security protocols. The introduction of regulatory sandboxes, which provide a regulated environment for fintech businesses to experiment with novel solutions, demonstrates a progressive approach to promoting innovation while adhering to certain legal limits (Hedman & Henningsson, 2012). To reduce the dangers related to financial crimes in the fintech industry, it is essential to adopt a cooperative strategy that involves participation from government entities, regulatory authorities, financial institutions and technology professionals. Sharing information and collaborating may help in creating effective countermeasures to combat emerging dangers. Moreover, the use of cutting-edge technology such as artificial intelligence (AI), machine learning and blockchain might enhance the robustness of fintech platforms in combating fraudulent operations. Integrating AI-powered anomaly detection technologies may improve the capacity to promptly detect and prevent illicit transactions. Blockchain, characterised by its distributed and unchangeable record, provides transparency and traceability, making it a powerful tool in combating fraud and guaranteeing the integrity of financial transactions. Furthermore, the implementation of ongoing educational initiatives and awareness campaigns might enable users to identify and report possible security risks,

therefore establishing a collaborative defence against financial illicit activities. India's rapid transition towards a digitally led financial future necessitates careful consideration of the interdependent connection between fintech and financial crimes. Although fintech advancements provide the potential for economic empowerment and financial inclusion, it is crucial not to ignore the hazards associated with cyberattacks and financial misconduct. To ensure the security of the financial system, it is crucial to adopt a comprehensive strategy that incorporates strong regulatory frameworks, advanced technical solutions and collaborative initiatives. In the next parts of this paper, we will explore particular facets of financial crimes in the fintech industry, analysing case studies, worldwide exemplary methods and probable future advancements. To establish a safe and creative financial ecosystem in India, it is crucial to fully grasp the difficulties and possibilities arising from the intersection of financial crimes and fintech. This knowledge will benefit all parties involved (Kedia, 2022, KPMG, 2016, Briefing, 2022).

Market Updates and Major Deals in India

In its 'Statement on Developmental and Regulatory Policies' issued on June 8, 2023, the Reserve Bank of India put out certain enhancements for the sector. These improvements have expanded the range of objectives and activities for which e-RUPI vouchers may be used. The Reserve Bank of India (RBI) may provide authorisation to individuals for receiving e-RUPI vouchers, while non-bank PPI issuers may also be allowed to issue e-RUPI coupons. In addition, the RBI's statement aims to simplify the membership process for Bharat Bill Payment Operating Units with the goal of enhancing participation and optimising the effectiveness of the Bharat Bill Payment System (Chavan, 2022). In addition, the Reserve Bank of India (RBI) has authorised banks to issue RuPay prepaid forex cards, which may be used at ATMs, point of sale (PoS) machines and online merchants globally, in order to provide Indian travellers more payment options when they go abroad. In addition, the Reserve Bank of India (RBI) plans to facilitate the issuance of RuPay debit, credit and prepaid cards by other authorities, allowing these cards to be used globally, including in India. Despite the changing needs of companies, the RBI has always prioritised the supervision of regulations while also making necessary adjustments to accommodate these changes. In June of 2023, news headlines revealed that the Reserve Bank of India had contacted registered P2P lending enterprises in March and April of the same year. During this time, they conducted thorough investigations of these businesses, specifically focusing on their collaborations with consumer-facing applications and their risk allocation strategies. This phenomenon is attributed to the issuance of the 'Digital Lending Guidelines' by the RBI on September 02, 2022. The RBI's objective is to ensure that digital lending enterprises adhere to these regulations. Lok Sabha MP Jayant Sinha now leads the Parliamentary Standing Committee on Finance, which has recently expressed concern on the growing prevalence of cybercrimes in India. The committee conducted

interrogations of fintech executives as part of its inquiry into cybersecurity and white-collar crimes, specifically focusing on the growing frequency of cybercrime and potential strategies for combating it. The Parliamentary Committee recently addressed the issue of illegal lending applications that have been subject to criticism for imposing exorbitant interest rates and engaging in consumer harassment. The 'Policy Recommendations for Crypto and Digital Asset Markets' consultation paper, released by the International Organization of Securities Commissions ('IOSCO'), is a significant information resource to have in mind. This might be seen as a reaction to the consumer protection issues that arose due to the failure of the US-based Bitcoin exchange FTX. The industry has advocated for worldwide regulation as a remedy for the issue of disparate rules in several nations. The industry often just has to ensure compliance with anti-money laundering checks. The ideas consist of a comprehensive set of 18 principles aimed at enhancing market integrity and protecting investors in the Bitcoin industry (Gozman et al., 2018). The recommendations include a broad spectrum of subjects, such as safeguarding consumer rights, preventing market manipulation and ensuring the secure storage of assets. The IOSCO ideas have significant importance since they represent the first worldwide effort to regulate the Bitcoin industry. The ideas are expected to have a significant influence on the operations of crypto firms, perhaps leading to an increased number of institutional investors allocating their funds to the cryptocurrency market. The IOSCO has introduced a significant advancement in the regulation of cryptocurrencies. Nevertheless, it is premature to determine the efficacy of the proposals in practical application. The success of the ideas will depend on many factors, including the cooperation among cryptocurrency companies and the commitment of authorities to enforce the legislation. During the last week of June, financial influencers, sometimes known as 'finfluencers', emerged as prominent figs. A commercial featuring a finfluencer was released, showcasing the insignia of the India G20 and the Ministry of Electronics and Information Technology (MeitY). Consequently, several individuals believed that the advertisements had the official endorsement of the government. The MeitY later affirmed that the government is not showing favouritism towards any individual or social media platform. The development ignited a discourse over the content propagated by financial influencers and garnered significant censure from professionals inside the sector. This is because, unlike finfluencers, who operate without regulation or adherence to any standards, SEBI-registered investment advisors are legally compelled to comply with regulatory requirements when providing advice that may be considered as investment advice. India is home to 21 out of the 187 unicorns in the financial industry worldwide. Pine Labs, Oxyzo, Paytm, BillDesk, Chargebee, PhonePe, CoinDCX, CoinSwitch Kuber, CRED, Slice, Razorpay, CredAvenue, DIGIT, Groww, Policy Bazaar, Zerodha, Zeta and Open are included in this list of firms. In 2022, the group welcomed two new members: the fintech neobank and the fintech marketplace, and SME loan platform Oxyzo (Gozman et al., 2018) (Table 8.1).

Table 8.1 Monetisation model: how fintech companies generate revenue

	Monetisation method	Key metrics	Fintech segments
Spread based	Earn revenues based on annual percentage rate or a flat fee	AuM, value of transaction	Payments, wealth
Software as a service based	Earn fees from subscription	Market dynamics and size, number of competitor	RegTech
Net interest based	Earn from NIMs	Cost of funds and average lending rates, quality of loan and investment book, control on nonperforming assets	Lending
Direct selling of services through platform	Earn premium or service charges	No. of policyholders, number of services provided	InsurTech

Opportunities for Fintech in India

Similar to a coin, fintech has both benefits and drawbacks. The advancement of technology and the increasing expertise of individuals in utilising it are driving the growth of fintech in India. It must overcome many challenges. The subject of our debate has shifted from the barter system to Bitcoin and cryptocurrency. Significant transformations are taking place in the realm of digital technology. Nevertheless, in comparison to our global rivals, we are lagging behind. The fast rise of the fintech business in India is being driven by both the increasing personal proficiency and the growing availability of new technology. It must overcome many challenges. Our present subject of debate is on the replacement of the barter system with Bitcoin and other cryptocurrencies. In the realm of digital technology, several transformations are taking place. Nevertheless, in comparison to our global rivals, we are lagging behind (Sharma, 2022) (Chart 8.1).

Digital Payments

One may use a credit card for hotel accommodations or a mobile wallet for purchasing vegetables. The emergence and widespread use of digital payment systems have significantly simplified and accelerated daily life. In terms of physicality, cash payments are more condensed compared to digital ones. India had an unparalleled volume of 71 billion digital transactions conducted during the fiscal year of 2022. This exhibited a substantial increase when contrasted with the preceding 3 years. Queuing at the bank has become obsolete. Through digital transactions, individuals may access and get a wide range of goods and services from any location worldwide. Over the last several years, many fintech companies have implemented groundbreaking solutions in the industry, benefiting all stakeholders involved (Statista,

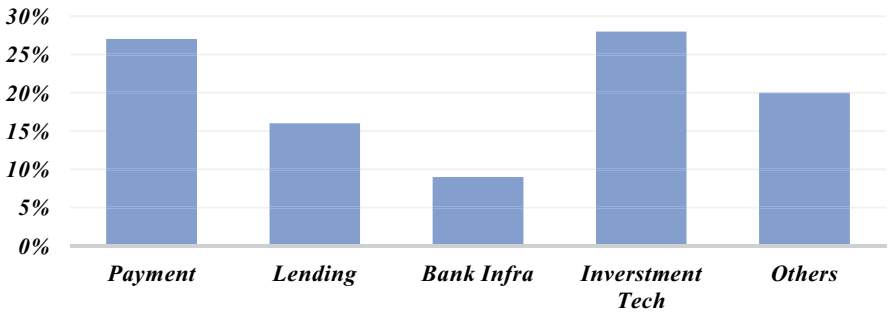


Chart 8.1 Segment-wise fintechs. (Source: ET, 2022)

total number of digital payments across India from financial year 2018 to 2023, 2024).

Big Data Analytics

The present moment is opportune for adopting digitalisation. Financial institutions are embracing digitalisation as we shift towards a more environmentally friendly and efficient business model. The ubiquity and enhancement of data and analytics have led to an increased dependence of businesses on them during the last decade. Utilising analytics and big data enables the creation of customised user experiences. Companies use data and analytics to gain a competitive edge by enhancing operational efficiency, boosting revenue, predicting customer preferences, tailoring product offerings and enhancing demand forecasting. Companies should be mindful of the crucial importance of analytics when dealing with vast amounts of data. They possess an indissoluble bond. Businesses must strategically adapt to the rapid use of data-driven optimisation in the banking industry. The use of acquired client data may provide perceptive commercial outcomes (Muthukannan et al., 2020).

Blockchain Technology

A blockchain, which is a decentralised database, may be used to effectively document transactions and oversee assets inside a company network. Blockchain technology has been widely used by the commercial sector. This is a network of interlinked, encrypted databases that contain transaction data and have the ability to establish connections with each other. The primary purpose of storing data on a blockchain is to create an unchangeable and reliable record of all transactions. Mere acquaintance with technology does not ensure your ability to navigate the intricacies of the topic. However, it is evident that the technology is gaining widespread

acceptance and becoming more prevalent. The use of blockchain technology has the potential to revolutionise record-keeping and intercompany transactions by incorporating it into both public and private ledgers. Blockchain technology has the potential to significantly transform the way organisations exchange and store information, whether it is for public or private ledgers. Organisations can surmount the challenges posed by the COVID-19 pandemic via improved efficiency and heightened visibility. According to a CryptoTrends study (published by Statista Research Department, July 2021, 2022a, b), the majority of Indian respondents highlighted the convenience of blockchain payments. The proportion of those who expressed disagreement was quite small. Despite the absence of official recognition by the government, cryptocurrencies saw a significant surge in adoption in India (Statista, Perception of blockchain payments being convenient across India in July 2020, 2022).

Personalisation

According to Vijai (2019), a benefit of modernising Indian banks is the enhanced efficiency in carrying out transactions. The ultimate outcome of this digital transformation is satisfied consumers and more income. Banks not only engage in competition with one other in the present market, but they also contend with the technological advancements used by their rivals. Everyone desires to outperform their buddies. Recent events have brought about a significant transformation in the banking business, with a complete adoption of the concept of customisation. Banking and customisation are closely linked. Consistently, companies enjoy the advantages of personalised banking. Personalisation in the banking business involves providing customers with tailored attention that is based on their preferences and past interactions. As a result of the escalating epidemic, financial institutions must now prioritise essential needs above discretionary luxuries. Cultivating a personal rapport also fosters the development of trust.

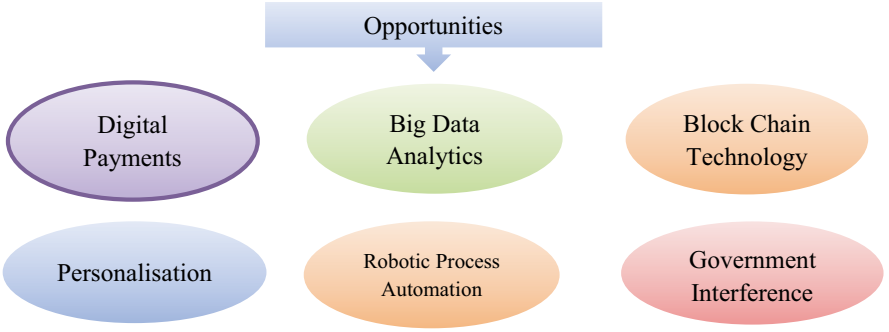
Robotic Process Automation

Robotic process automation has become a crucial tool in the financial technology industry due to its ability to simplify data collecting and processing. Many individuals are seeking to optimise their existing situation and are contemplating doing comprehensive market research in order to optimise their assets. In order to capitalise on this unique opportunity, organisations must be prepared to provide innovative features in their robo-advising services. Providing client support, establishing accounts and managing various financial activities are among the many services offered in the banking sector. Undoubtedly, the reason for the rapid increase in popularity of

RPA is its ability to provide cost-effective cognitive wealth-management guidance and an exceptional user experience.

Government Interference

In addition, the government took a proactive role and implemented many programmes to foster the expansion of fintech. Entrepreneurial initiatives in several nations have facilitated the establishment of digital financial companies. The Reserve Bank of India has presented a straightforward approach for launching a financial technology firm. In addition, emerging firms have the potential to receive government incentives of up to one crore rupees. Both consumers and companies have started to embrace virtual currency for a wide range of transactions (Lee & Shin, 2018).



Source: Author's compilation

Challenges for Fintech in India

The primary challenges that pose concerns for the fintech sector are identified and really obstacles if not solved properly.

Privacy of Data

Data privacy concerns are significant. Fintech manages a substantial volume of data, including social security numbers, credit card information, investment particulars, income statements and several other data points, since this is inherent to the nature of the sector. Ensuring the security of transportation is a continuous worry for

organisations operating in the mobile and Internet-based sectors that handle such data. To prevent an inundation of fraudulent schemes and attempts to deceive via phishing, it is essential to maintain the security of one's data. Advancements in technology have enabled the acquisition of remote access to IT systems that are essential for the success of a mission. As a result, the task of comparing complex data with financial sources has been much simplified. Additional concerns arise due to the lack of physical inspections conducted on essential infrastructure and end-point devices responsible for transferring company data (Basuroy, 2023).

Regulatory and Compliance Laws

Launching a fintech startup requires substantial effort. Several factors, such as fraudulent activities and security breaches, have increased the complexity of obtaining government clearance. For fintech enterprises seeking to enter the Indian market, these rules provide a significant obstacle that is both difficult to understand and execute. An effective regulatory framework should be established to deter fraudulent activities and ensure adherence to regulations. New financial enterprises also face significant challenges. Fintech startups are required to meet rigorous criteria prior to being able to begin their services (Gozman et al., 2018).

Putting the Client Experience First

Comprehending the concept of money may be challenging for those who lack specialised knowledge in the field. Making prudent financial choices and investments requires significant effort and diligence. The proliferation of fintech has facilitated its integration into people's lives, hence enhancing their quality of life. Nevertheless, to provide a seamless user experience, more improvements are necessary. Fintech firms have taken the lead in promoting accessibility and user-friendly interfaces. Moreover, establishing an account with any of the banks has become a straightforward procedure. Due to the upfront disclosure of all prices and expenditures, there is enhanced transparency. Trading platforms such as Robinhood are making the language of finance more accessible (Gomber et al., 2017).

Business Model

Fintech organisations must reassess their revenue and spending plans and resource allocation in order to adapt and thrive among evolving business models and income streams. Due to the economic crisis, several organisations are reducing their workforce and decreasing pay in order to minimise expenses. As a business experiences

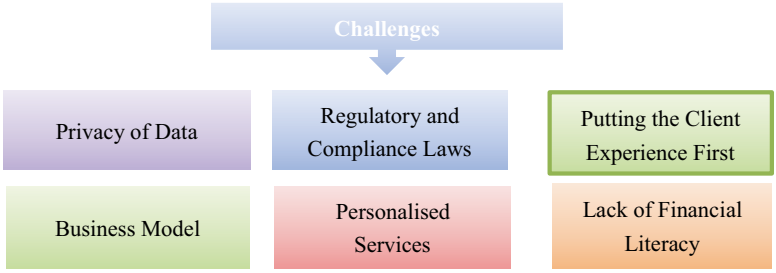
significant growth, it will need to make certain adaptations to handle the increased demand. The data provided includes information on changes in the company's dependence on certain sources of income. Consequently, your company's models will undergo modifications. Fintech firms specialising in contactless payments are effectively using their existing resources to manage the surge in transaction volumes (Dhanuka, 2022).

Personalised Services

The difficulties that firms have while attempting to adjust and provide personalised services are well acknowledged. Despite its long-standing importance and foundational role in banking, firms struggle to deliver. Contemporary personalisation involves engaging with customers in real time using their preferred mode of communication. An individualised solution that considers their distinct requirements is crucial. When customers discuss individualised services, they are referring to this topic. They would only agree to a settlement under these specific circumstances (ET Spotlight, 2016).

Lack of Financial Literacy

Based on the 2015 FinLit Survey, the financial literacy rate among adults in India is at 24%. The prevalence of financial illiteracy among a significant number of individuals, resulting in their inability to effectively use financial information, is a significant reason for concern. A significant number of individuals refrain from investing due to their fear of incurring financial losses resulting from their own imprudent financial choices. Individuals are experiencing the impacts of financial technology, but their ability to fully realise its benefits is hindered by literacy challenges. An additional advantageous component of fintech as a financial wellness consultant is the receptiveness of customers towards its offerings. Certain individuals may have a sense of being overwhelmed due to the multitude of options available. Efficient customisation, conversely, ensures that customers are presented with just relevant choices (Statista Research, 2022).



Source: Author's compilation

Conclusion

India has seen a significant increase in the use of financial technology (fintech) in recent years, which has brought about a revolution in the conventional banking sector. Nevertheless, the process of digitisation has encountered obstacles due to the increasing prevalence of fintech, which has created new opportunities for financial illicit activities. This article examines the complex connection between financial crimes and fintech in India, investigating the dangers, regulatory actions and cooperative endeavours required to protect the financial ecosystem. Fintech, which refers to the convergence of finance and technology, has revolutionised the accessibility and delivery of financial services. India's fintech industry has seen rapid expansion, driven by the use of mobile banking, digital wallets and blockchain applications. This growth has played a significant role in enhancing financial inclusion and improving efficiency. Nevertheless, with the growth of the fintech industry, the possibilities for financial criminals also increase. Within the realm of fintech, financial crimes involve a range of unlawful behaviours, such as fraud, money laundering, identity theft and cybercrime. The speed and convenience provided by finance platforms unwittingly give rise to vulnerabilities that unscrupulous actors exploit. The emergence of digital payments has resulted in a surge in fraudulent transactions and phishing assaults, posing a threat to the financial security of both people and enterprises. In response to the changing danger environment, Indian authorities have implemented proactive measures to tackle the issues presented by financial crimes in the fintech industry. The Reserve Bank of India (RBI) and other regulatory agencies have enforced strict requirements, highlighting the significance of strong cybersecurity safeguards, thorough customer due diligence and vigilant transaction monitoring. Furthermore, the implementation of know your customer (KYC) rules and anti-money laundering (AML) guidelines seeks to improve the general credibility of the financial sector. To effectively address financial crimes in the fintech sector, it is crucial to foster coordination among regulators, financial institutions and fintech startups. To strengthen the financial ecosystem, it is essential to exchange information about new risks, adopt industry-wide best practices and promote a

culture of cybersecurity awareness. Public-private collaborations are crucial in creating and implementing new solutions to proactively address emerging challenges. Given the heavy reliance of fintech on technology, it is crucial to implement sophisticated cybersecurity safeguards. Employing artificial intelligence (AI) and machine learning algorithms may improve the ability to identify fraudulent activities, while strong encryption and secure authentication procedures can protect critical financial data. Regular cybersecurity assessments and upgrades are crucial to maintain resilience against constantly emerging cyber threats. To summarise, the convergence of financial crimes and fintech in India highlights the need for a well-balanced strategy that prioritises both innovation and security. Although fintech has undeniably empowered millions by giving them access to financial services, it has also simultaneously exposed the financial sector to novel and complex dangers. Regulators, financial institutions and fintech startups must work together and use technology protections to effectively reduce these risks and guarantee the ongoing expansion and durability of India's fintech industry. In order to successfully navigate the complex relationship between financial crimes and fintech, it is crucial for the country to remain vigilant and adaptable as it embraces the digital future.

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Chapter 9
Financial Crimes in Fintech: An Evidence from Cryptocurrency Market

Megha Rewal and Parminder Singh

Introduction

The rise of fintech (financial technology) has changed the way we handle money, making things more convenient and innovative. But with these changes comes a new problem: financial crimes. One tricky area is the cryptocurrency market, where digital currencies like Bitcoin and Ethereum are becoming popular (Amsyar et al. (2020)). Unfortunately, these digital assets are also becoming targets for illegal activities like fraud and hacking (Grobys (2021), Kapsis (2023)). This chapter explores how fintech and financial crimes intersect, specifically focusing on the cryptocurrency market represented by the CCi30 index by taking the effect of the news on the cryptocurrency coins and then the effect of the hacking events on them. Cryptocurrencies attract both regular investors and bad actors due to their decentralized and private nature (Carlisle (2017)). From scams to cyberattacks, a lot is going on, and regulators are trying to catch up. Switching effects to recent trends in cryptocurrencies, the use of technology in finance has brought some problems (Huang (2021)). Generally people taken Cryptocurrencies like Bitcoin as investments rather than regular money. For yet another consecutive year, cybercriminals have managed to steal billions of dollars in cryptocurrency. However, there is a noteworthy shift in this trend, marking the first decline since 2020, as reported by cybersecurity firms specializing in digital assets. In the present year, hackers successfully escaped with approximately $2 billion across numerous cyberattacks and thefts. According to the latest data from Chain Sec, there have been a total of 55 hacking events, resulting in a collective loss of around $2.4 billion at the time of these incidents. Especially, the largest recorded loss stems from the Mt. Gox hack in 2014, amounting to a staggering $661,348,000 in stolen funds. To assess the impact of hacks or news on cryptocurrencies, we utilize the CCi30 index. This index comprises the top 30

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C. M. Gupta, G. Kaur (eds.), *E-banking, Fintech, & Financial Crimes*,
https://doi.org/10.1007/978-3-031-67853-0_9

cryptocurrencies based on adjusted market capitalization, encompassing approximately 90% of the total cryptocurrency market capitalization as of today. By selecting the top 30 cryptocurrencies, the CCi30 statistically mirrors the entirety of the cryptocurrency market with a 99% confidence level and a narrow confidence interval of 1.11. In simpler terms, the margin of error for the index value, serving as an indicator of the market, is minimal at just 1.11%. Earlier studies mainly focus on the particular cryptocurrency coins and the major hacks, but in this chapter, we try to check out the DeFi hacks on the top 30 cryptocurrency coins based on market capitalization. Trozze et al. (2022) Studying both academic and real-world sources reveals 47 types of cryptocurrency fraud. Ponzi schemes and high-yield programs are common, with pump-and-dump schemes and exchange fraud being the most profitable. Surprisingly, pump-and-dumps are seen as the least harmful among these frauds. Kutera (2022) Money laundering is the top cryptocurrency fraud, followed by Ponzi scheme-based financial pyramids. The study highlights the urgency for stricter laws to tackle the growing cryptocurrency crimes. It offers practical advice for people in the market and suggests focusing on advanced computer applications to better detect abuse. De Koker and Goldbarsht (2022) explore that financial technologies are changing fast and attracting criminals. Regulators, industry, and law enforcement must respond well. Because we're still new to these technologies, changes will happen even faster. It emphasizes understanding and dealing with the changing challenges in financial crime. Thowseaf (2023) discovers that the danger comes from services like Bitcoin mixing and exchanges that scammers and money launderers use. These services hide where the money comes from, making transactions secret. Bitcoin's unpredictable payments and unclear system make it attractive for illegal stuff like supporting rebels or buying drugs. Horn (2020) observes how people pay and invest, making financial services easier to use. But it has risks too. Using data for unfair pricing and stealing identities is a worry. Cryptocurrencies in fintech use a lot of energy, causing environmental concerns. When companies use consumer data unfairly, it can lead to social issues. The review suggests we need a balanced approach to developing fintech, thinking about both risks and benefits. Motsi-Omoijiade (2018) studies how financial services operate in cryptocurrency markets. It examines their actions, the risks they encounter, and how they are controlled. It highlights challenges in creating rules for cryptocurrency markets. Carsello (2021) explores how rules are made for cryptocurrencies, highlighting challenges due to the variety of digital assets. In the USA, four important agencies have different views on classifying or treating cryptocurrency. The lack of clarity puts some parts of the cryptocurrency industry at risk of financial crimes. It stresses the importance of clear and comprehensive rules in this rapidly changing tech field. Brown (2016) explains why cybercriminals prefer using Bitcoin. It mentions that Bitcoin is decentralized and provides a level of anonymity. While some may believe Bitcoin is not a significant risk for money laundering, the article argues that it is quite risky for criminal activities. Corbet et al. (2020) explores that when cybercriminals hack a cryptocurrency, its price becomes more unpredictable, and other cryptocurrencies start moving together in price. Cybercrime events also disrupt how prices are usually determined for the hacked currency compared to others. Higbee

(2018) discusses how the cryptocurrency market, starting with Bitcoin in 2009, has become highly unpredictable. It had significant highs in 2017 but experienced a decline in 2018. It emphasizes that these market shifts attract a lot of media attention. Additionally, hackers use tricky schemes like crypto-jacking, where they use other people's computers to mine cryptocurrency. Chen (2023) et al., expresses how hacking affects cryptocurrencies, especially Bitcoin. It examines the impact of hacking incidents and stolen funds on returns, volatility, and price discovery for both directly purchased Bitcoin and Bitcoin futures. The results reveal that when more funds are stolen due to hacking, profits decrease, and the price becomes more volatile for both direct Bitcoin and Bitcoin futures. Charoenwong and Bernardi (2021) The study examines major cryptocurrency thefts in the last decade, estimating stolen amounts ranging from $7 to $88 billion, depending on when the stolen cryptocurrencies were converted to regular money. Larger estimates occur when stolen cryptocurrencies are held longer and market values increase. Out of 30 thefts, 20 were due to security breaches, five to human mistakes, and five to insider thefts caused by agency problems (Fig. 9.1).

The graph indicates that the data is stationary, meaning that the returns of CCi30 are at a consistent level.

Figure 9.2 shows CCi30 has a mean of 0.001111 and a median of 0.003382, suggesting a slight left skew as the mean is lower than the median. The maximum value is 0.200092, while the minimum is −0.484550, illustrating a wide range of values. The standard deviation of 0.041353 implies moderate variability around the mean. The skewness value of −1.863846 indicates a significant negative skew, suggesting a distribution with a longer tail to the left. Additionally, the high kurtosis value of 21.54938 signifies a peaked distribution with heavy tails. The Jarque-Bera test statistic of 21791.75, along with a probability of 0.000000, indicates a departure from normality. A histogram plot of the data would likely reveal a highly negatively

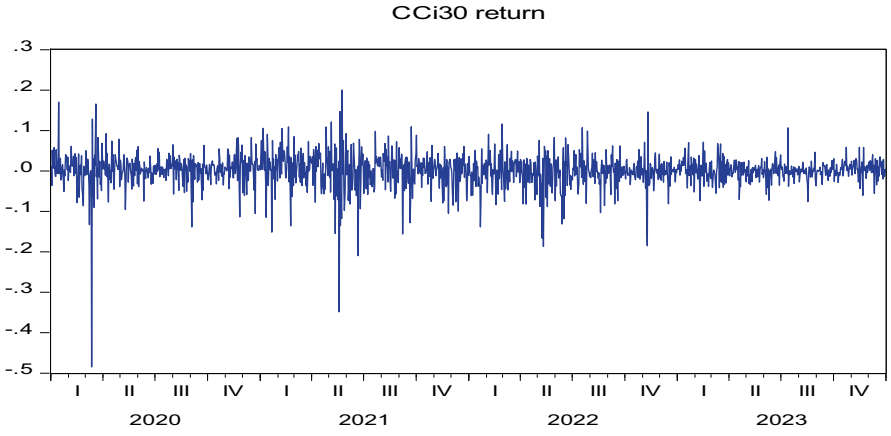

Fig. 9.1 Unit root test on CCi30 return. (Source: Prepared by authors in e-views)

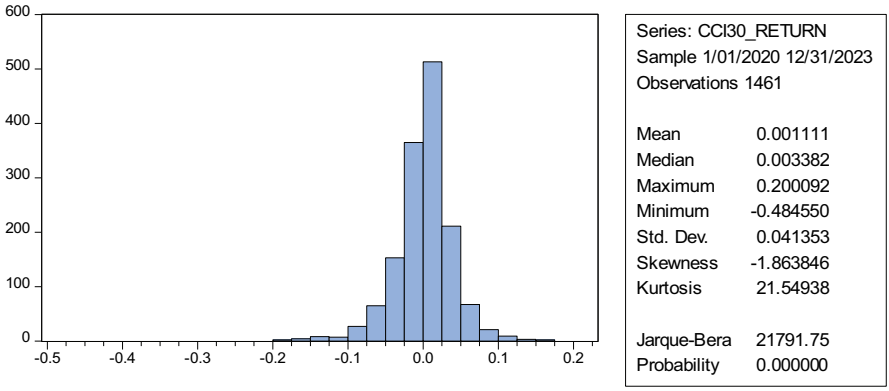

Fig. 9.2 Descriptive statistics of CCi30 returns. (Source: Prepared by authors in e-views)

Table 9.1 ARCH effect on CCi30 returns

Variable	Coefficient	Std. error	z-Statistic	Prob.
CCi30 return	0.0011	0.0013	0.8246	0.4096
AR(2)	0.8746	0.0722	12.1116	0.0000
MA(2)	−0.8514	0.0766	−11.1209	0.0000
Variance equation				
CCi30 return	0.0015	0.0000	67.7914	0.0000
RESID(−1)^2	0.1324	0.0248	5.3309	0.0000

Source: Prepared by authors in e-views

skewed distribution with a sharp peak and heavy tails, consistent with the provided statistical measures.

In the correlogram, the spikes are coming on AR(2) and MA(2). Therefore, we go for the Arima 2,2 estimation. Table 9.1 shows the ARCH effect based on the AR(2) and MA(2). The output suggests the results of a time series analysis, possibly a model with autoregressive (AR) and moving average (MA) components, along with a variance equation. The intercept in the mean equation (CCi30 return) has a small positive coefficient (0.0011), which is not statistically significant ($p = 0.4096$). The AR(2) and MA(2) terms have significant coefficients (0.8746 and −0.8514, respectively) indicating the importance of the lag-2 values in the autoregressive and moving average processes. In the variance equation, both the intercept (0.0015) and the impact of the lag-1 squared residual (0.1324) are statistically significant (p = 0.0000), suggesting a well-fitted model. The model seems to capture the dynamics of the time series, emphasizing the relevance of lag-2 values and lag-1 squared residuals in both the mean and variance equations:

$$\begin{aligned} \mathrm{CCi30\,Returnt} &= \beta 1 * \mathrm{CCi30\,Returnt} - 1 + \beta 2 * \mathrm{ARt} - 2 - \beta 3 * \mathrm{MAt} \\ &\quad - 2 + \sqrt{\alpha 1 + \alpha 2 * \mathrm{RESIDt} - 1 + \alpha 3} * \mathrm{GARCHt} - 1 * \mathrm{Zt} \end{aligned} \tag{9.1}$$

- CCi30 Return_t is the return variable at time t.
- CCi30 Return_{t-1}, AR_{t-2}, and MA_{t-2} are lagged values.
- RESID_{t-1} is the residual term from the previous period.
- GARCH_{t-1} is the generalized autoregressive conditional heteroskedasticity (GARCH) term from the previous period.
- It is a random variable with a standard normal distribution.
- β1, β2, β3, α1, α2, and α3 are the parameters to be estimated.

Table 9.2 shows the GARCH effect on the returns of the CCi30. GARCH (generalized autoregressive conditional heteroskedasticity) model is commonly used to analyze volatility in financial data (Francq & Zakorian (2019)). In the mean equation, the intercept (C) has a positive coefficient of 0.0018, but it is not statistically significant at the conventional significance level of 0.05 (p = 0.0549). The AR(2) and MA(2) coefficients are 0.3006 and −0.2483, respectively, both of which are not statistically significant (p = 0.4014 and p = 0.4954). In the variance equation, the intercept (C) is significant (p = 0.0000), indicating a constant term in the volatility equation. The squared lag-1 residual term (RESID(−1)^2) has a significant impact (p = 0.0000), emphasizing the persistence of volatility. Additionally, the GARCH(−1) coefficient is highly significant (p = 0.0000), suggesting a strong autoregressive relationship in the conditional variance, reflecting the assembling of volatility. Overall, the model indicates the presence of conditional heteroskedasticity in the

Table 9.2 GARCH effect on CCi30 returns

Variable	Coefficient	Std. error	z-Statistic	Prob.
CCi30 return	0.0018	0.0009	1.9200	0.0549
AR(2)	0.3006	0.3582	0.8391	0.4014
MA(2)	−0.2483	0.3642	−0.6818	0.4954
Variance equation				
CCi30 return	0.0000	0.0000	5.2842	0.0000
RESID(−1)^2	0.1260	0.0086	14.6043	0.0000
GARCH(−1)	0.8717	0.0095	91.3761	0.0000

Source: Prepared by authors in e-views

Table 9.3 GARCH in mean effect on CCi30 returns

Variable	Coefficient	Std. error	z-Statistic	Prob.
SQRT(GARCH)	0.0057	0.0933	0.0614	0.9510
CCi30 return	0.0016	0.0031	0.5128	0.6081
AR(2)	0.3003	0.3634	0.8265	0.4085
MA(2)	−0.2479	0.3695	−0.6710	0.5022
Variance equation				
CCi30 return	0.0000	0.0000	5.2803	0.0000
RESID(−1)^2	0.1261	0.0087	14.5226	0.0000
GARCH(−1)	0.8715	0.0096	90.9126	0.0000

Source: Prepared by authors in e-views

time series, with past squared residuals and GARCH effects influencing the volatility dynamics (Table 9.3).

This study adopts the capital asset pricing model (CAPM) within portfolio theory, emphasizing the interplay of risk and return. The GARCH-in-mean model, employing standard deviation as the optimal risk measure, assesses the relationship between risk and return in the context of cryptocurrency investments, particularly CCi30. The non-significance of the SQRT(GARCH) value suggests that cryptocurrency investments may not be preferable compared to alternative avenues, providing insights into potential risk hedging strategies. While individual coefficients in the model lack significance, the incorporation of the GARCH term unveils the significance of ARCH and GARCH coefficients, highlighting the efficacy of CCi30 in providing risk coverage. In the subsequent analysis, the variance equation reveals the significance of the constant term, indicating foundational volatility, and underscores the persistence of volatility through the squared lag-1 residual term. The highly significant GARCH(−1) coefficient emphasizes a robust autoregressive relationship in conditional variance. Overall, the model suggests the influence of past squared residuals and GARCH effects in explaining volatility, while mean equation coefficients lack statistically significant impact at the chosen level.

In Table 9.4, none of the coefficients are statistically significant at the conventional significance level of 0.05, with p-values of 0.1940, 0.3995, and 0.4998, respectively. In the variance equation, the constant term (C) is significant (p = 0.0000), representing the baseline volatility. The squared lag-1 residual term (RESID(−1)^2) is highly significant (p = 0.0000), indicating persistence in volatility. Additionally, the interaction term RESID(−1)^2*(RESID(−1) < 0) is significant (p = 0.0002), suggesting that negative squared lag-1 residuals have a distinct impact on volatility. The GARCH(−1) coefficient is substantial (0.8617) and highly significant (p = 0.0000), indicating a strong autoregressive relationship in the conditional variance. The table shows the effect of good and bad news at one period lag. Term RESID(−1)^2*(RESID(−1) < 0) is significant which shows that there is a significant difference between the effect of good news and the bad news. But to know whether good news dominates or the bad news, we go for the E-GARCH model.

Table 9.4 T-GARCH effect on CCi30 returns

Variable	Coefficient	Std. error	z-Statistic	Prob.
CCi30 return	0.0013	0.0010	1.2988	0.1940
AR(2)	0.3000	0.3560	0.8426	0.3995
MA(2)	−0.2432	0.3604	−0.6748	0.4998
Variance equation				
CCi30 return	0.0000	0.0000	5.8009	0.0000
RESID(−1)^2	0.0996	0.0166	6.0000	0.0000
RESID(−1)^2*(RESID(−1) < 0)	0.0547	0.0148	3.7052	0.0002
GARCH(−1)	0.8617	0.0112	77.1375	0.0000

Source: Prepared by authors in e-views

Table 9.5 E-GARCH effect on CCi30 returns

Variable	Coefficient	Std. error	z-Statistic	Prob.
CCi30 return	0.0014	0.0010	1.3330	0.1825
AR(2)	0.2381	0.3175	0.7498	0.4534
MA(2)	−0.1737	0.3235	−0.5369	0.5913
Variance equation				
C(4)	−0.3565	0.0408	−8.7438	0.0000
C(5)	0.2207	0.0190	11.6091	0.0000
C(6)	−0.0486	0.0086	−5.6225	0.0000
C(7)	0.9695	0.0053	184.6572	0.0000

Source: Prepared by authors in e-views

E-GARCH model clearly shows whether there is good news or bad news which affects more on the returns of the CCi30. In Table 9.5, the mean equation, the coefficients for the CCi30 returns, AR(2), and MA(2) are 0.0014, 0.2381, and −0.1737, respectively. None of these coefficients are statistically significant at the conventional significance level of 0.05, with p-values of 0.1825, 0.4534, and 0.5913, respectively. In the variance equation, the coefficients C(4), C(5), C(6), and C(7) correspond to lagged terms, suggesting a time series structure in the conditional variance. These coefficients have highly significant and interpretable effects. C(4) has a negative coefficient, indicating a dampening effect on volatility four periods ago. C(5) has a positive coefficient, suggesting a long-lasting impact on volatility from five periods ago. C(6) has a negative coefficient, indicating a diminishing effect on volatility six periods ago. Finally, C(7) has a large positive coefficient, implying a substantial and persistent influence on volatility seven periods ago. The probability of C(6) shows the residual value with the multiple of the GARCH effect, which is significant that clear the effect of good news and bad news are significantly different from each other. The coefficient is negative by −0.0486 which shows that bad news dominates more on the returns of CCi30 (Table 9.6).

The provided correlation matrix shows the pairwise correlations between three variables, i.e., CCI30_RETURN, HACK_DAY, and HACK_RETURN. The correlation coefficient between CCI30_RETURN and HACK_DAY is −0.0488, suggesting a weak negative correlation between the daily returns of the CCi30 index and HACK (an exchange-traded fund focused on cybersecurity-related companies). The correlation coefficient between CCI30_RETURN and HACK_RETURN is 0.4032, indicating a moderate positive correlation between the returns of the CCi30 index and HACK. Meanwhile, the correlation coefficient between HACK_DAY and HACK_RETURN is −0.0922, suggesting a weak negative correlation between the daily returns and overall returns of the HACK ETF. These correlation values provide insights into the relationships between the variables, helping to assess potential dependencies or diversification opportunities in a portfolio that includes these assets. It is important to note that correlation does not imply causation and further analysis would be needed to draw more definitive conclusions about the relationships between these financial variables:

Table 9.6 Correlation between CCi30 return and hacking

	CCI30_RETURN	HACK_DAY	HACK_RETURN
CCI30_RETURN	1.0000	−0.0488	0.4032
HACK_DAY	−0.0488	1.0000	−0.0922
HACK_RETURN	0.4032	−0.0922	1.0000

Source: Prepared by authors in e-views

Table 9.7 Regression on CCi30 return with hacking

Variable	Coefficient	Std. error	t-Statistic	Prob.
CCi30 return	0.0017	0.0010	1.6706	0.0950
HACK_DAY	−0.0017	0.0035	−0.4885	0.6252
HACK_RETURN	1.0000	0.0599	16.7078	0.0000

Source: Prepared by authors in e-views

$$\text{CCi30 Returnt} = \beta 1^{*}\text{CCi30 Returnt} - 1 + \beta 2^{*}\text{HACK}_{\text{DAYt}} - \beta 3^{*}\text{HACKRETURN}_{\text{t}} \quad (9.2)$$

- CCi30 Return_{t} is the return variable at time t.
- $\text{Return}_{\text{t}-1}$ is the lagged return.
- DAY-$\text{HACK}_{\text{DAY}t}$ is the variable representing the day of a hack event.
- HACK RETURN_{t} is the return variable corresponding to a hack event.
- β2 and β3 are the coefficients to be estimated (Table 9.7).

The output appears to be from a regression analysis with three variables: CCi30 return (C), HACK_DAY, and HACK_RETURN. The coefficient for the CCi30 return is 0.0017, which is not statistically significant at the 0.05 significance level ($p = 0.0950$). The coefficient for HACK_DAY is −0.0017, indicating a negative but insignificant relationship with the dependent variable. The most notable result is the coefficient for HACK_RETURN, which is 1.0000 with a highly significant t-statistic of 16.7078 ($p = 0.0000$). This implies that a one-unit increase in HACK_RETURN is associated with a one-unit increase in the dependent variable. However, caution should be exercised when interpreting these types of results as the coefficient value of 1.0000 may suggest potential issues, such as perfection of scaling factor. Further examination and diagnostic checks may be necessary to ensure the reliability and validity of the regression model.

Conclusion

This study investigates the interplay between financial technology (fintech), particularly cryptocurrencies represented by the CCi30 index, and financial crimes, with a focus on hacking incidents. Utilizing ARCH, GARCH, and GARCH-in-mean models, the analysis reveals the presence of conditional heteroskedasticity, emphasizing the persistence of volatility. Correlation and regression analyses explore

relationships between CCi30 returns and hacking-related variables, highlighting significant connections. The findings contribute insights for policymakers and industry stakeholders to address risks in the evolving fintech landscape.

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Chapter 10
Compliance Related to Fintech: An Overview of the Indian Legal System

Monika Thakur

Introduction

India has several successful fintech firms in loans, payments, investments, trading, personal finance, wealth management, credit ratings, insurance and regulatory services. Over 2000 financial businesses make the nation one of the fastest-growing fintech ecosystems. The sector might be worth $150 billion by 2025. The Indian fintech sector collected USD 8.53 billion in 278 agreements last financial year. India had over 23 billion digital payments worth INR 38.3 lakh crore (~USD 475 billion) in the fourth quarter of the previous year. Digital (noncash) payments are likely to dominate all payments by 2026 due to their present and forecast growth. Forecasts and trends are often overblown, so be wary. Local companies, some with foreign funding, dominate India's fintech industry. However, international players have increased in recent years, a trend expected to continue. According to the data, the fintech business in India, notably the payments sector, is predicted to develop significantly due to increased Internet use and governmental improvements.

Early in the COVID-19 pandemic, the Indian fintech industry struggled but grew (Singh & Singh, 2023; Tut, 2023). The RBI governor cited a report and suggested the pandemic may have contributed to global financial inclusion and fast digitalisation in India in a recent interview. It would be interesting to observe how the fintech business in India grows once the world returns to normal. Some industrial subsectors may suffer from COVID-19's 2-year technological reliance, which has since decreased (Vasenska et al., 2021; Toumi et al., 2023). Global economic and geopolitical developments might hurt the industry. Fintech may help India's economy survive a global catastrophe, according to some estimates. Affordable Internet services help fintech expand in India by attracting more customers (Fu & Mishra, 2022).

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C. M. Gupta, G. Kaur (eds.), *E-banking, Fintech, & Financial Crimes*,
https://doi.org/10.1007/978-3-031-67853-0_10

ESG objectives are growing in finance. Sustainable financing is growing, and banks are offering ESG-linked loans, which benefits operations. Dicuonzo et al. (2024) stated that the 2023 FIS Global Innovation Report found that 84% of Indian enterprises expect ESG trends to impact their operations. Indian authorities require the top 1000 listed companies to file 'Business Responsibility and Sustainability Reports'. They are also exploring regulating ESG ratings providers. IFSCA's Sustainable Finance committee released a report in October with recommendations to become a global sustainable hub. Starting in October 2022, SEBI may require ESG fund managers to invest 80% of their assets in sustainability-themed securities. Buy now, pay later (BNPL) and other micro-credit options are growing fintech trends. In addition to blockchain, open banking, increased alliances between fintech businesses and conventional banks, neo-banks, embedded finance, AI and the metaverse were major topics last year (Singh, 2022). Technology-based embedded finance is growing quickly and might change the financial business. Some of these firms are 'techfin' under India's future legislation. Digital payments also tend to rise. The Indian fintech industry is expected to achieve USD 1 trillion in AUM and USD 200 billion in revenue. These projections are sometimes inflated by industry participants and promoters for various reasons. 1.2 Are cryptocurrency-based fintech firms unlawful or restricted in your jurisdiction? Indian fintech rules are complicated and ever-changing. The rules that govern a fintech company's operation dictate its constraints. A fintech business that takes deposits and lends must have a banking or non-banking licence from India's central bank and regulator, the RBI. Although BNPL fintech platforms were popular in India, the RBI strengthened its regulations last year by issuing/amending Guidelines on Digital Lending, RBI Master Directions on Credit Card and Debit Card—Issuance and Conduct, 2022, and a clarification to its earlier Master Directions on Prepaid Payment Instruments.

To explain, the newly constituted International Financial Services Centres Authority (IFSCA) in Gandhinagar, Gujarat, under the 2019 Act, prepared a list of 'illustrative' fintech and techfin areas/activities in India. Fintech operations are divided into banking, capital markets, funds management and insurance (Delimatsis, 2021; Shah & Chugan, 2023). BNPL, Digital Banks, Robo Advisory, Sustainable Finance, Embedded Insurance, Cyber Insurance, etc. Techfin includes agri tech, climate/green/sustainable tech, space tech, banking, financial services and insurance solutions using AI, chatbots, Web 3.0, etc.

India's cryptocurrency law is unclear. There is no official regulation for bitcoin businesses. The RBI barred all banks and non-banking financial institutions from virtual currency activities and services in April 2018. The Supreme Court of India overturned the RBI's restriction on cryptocurrency purchases and trading, stating that the RBI cannot regulate without a law (Singh & Rajni, 2022).

The Indian government has proposed the Cryptocurrency and Regulation of Official Digital Currency Bill, 2021. This law establishes a framework for an RBI-issued digital currency and bans all private cryptocurrencies in India, save in specified instances, to promote cryptocurrency technology and applications. Indian parties' involvement will likely change the Cryptocurrency Bill before it becomes law. Indian authorities now tax 'crypto' gains at the same rate as lottery prizes. An

amendment would criminalise not paying taxes on these gains. India, the G-20 presidency, says cryptocurrency is lawful. The IMF and G-20 are creating a crypto asset regulation consultation document. RBI produced a central bank digital currency (CBDC) concept note and began a wholesale and retail test in October 2022. This supports the government's intention to centralise digital currencies, while decentralised currencies' fate remains unclear. The RBI changed the RBI Act, 1934, to cover digital money.

Finance for Financial Technology

What equity and loan funding are available for new and developing enterprises in your area? India's growing enterprises may use stock and loan finance. Private investors like venture capitalists and private equity firms fund most enterprises, including fintech. Bank and other financial institution business loans are unpopular owing to high interest rates and hefty collateral requirements. India allows foreign investments under the law. Indian companies may borrow money from overseas banks, financial institutions and equity investors via external commercial borrowings (ECB) (Cumming & Schwienbqcher, 2021; Li et al., 2023; Moro-Visconti & Moro-Visconti, 2021).

IPOs, particularly in IT, have increased in recent years. After a strong 2021, fintech IPOs in India fell in 2022, contrary to expectations. The global geopolitical scenario and the underperformance of numerous fintech businesses listed on the public market last year may have caused this 'funding winter'. Retail and finance were worst hit by 2022 funding cuts in the Indian startup ecosystem (Salerno, 2022). Startups and developing businesses get financial assistance from the Indian and state governments.

Some of such examples are as follows:

1. Micro and small enterprises may borrow up to INR 10 million from the Credit Guarantee Trust for Micro and Small Enterprise without collateral.
2. Startup India Initiative finances and incentivises eligible fintechs.
3. PRISM's Technopreneur Promotion Programme supports innovators.
4. The Tamil Nadu Fintech Policy 2021 encourages fintech collaboration and gives incentives.

Tax Benefits

Both national and state governments provide long-term policy statements or yearly plans to stimulate investment. Some incentives are exclusive for local investors, while others are open to foreigners.

Competitive capital gains tax rates stimulate investment. Several efforts under the National Manufacturing Policy (2011) and Make in India Programme (2014) improve infrastructure for important industry investments. The new industrial policy from the government will promote investment with national and global market synergies. The 2023–2024 budget allocated INR 1500 crores on fintech and banking. Fintech companies and banks received INR 2600 crore from the government to promote UPI transactions earlier this year. The Indian government is promoting technology, financial technology and startup investments and those that help these businesses. Local fintechs seeking international markets and foreign fintechs seeking IFSC access in India have an incentive scheme from IFSCA. The government offered tax-related relaxations, including extending the deadline for moving money to IFSC GIFT City from March 31, 2023, to March 31, 2025 (Baporikar, 2021).

Jurisdiction's IPO Criteria for a Firm

The Securities and Exchange Board of India (SEBI) sets 'eligibility norms' for IPOs. There are multiple 'routes'. The profitability route requires a business to fulfil minimum net physical assets and net worth to qualify for an IPO. Second, qualified institutional buyers must buy most public shares by the alternative route. Una et al. (2023) talks about Anchor investors, directors and promoters of an IPO must meet SEBI requirements. Promoters must make a minimum commitment, lock up their shares and have a clean SEBI and law enforcement background. Changes and updates last year tightened compliance standards to reduce post-listing price volatility. SEBI makes suitable pricing recommendations. The National Stock Exchange (NSE) also has rules (Ray et al., 2022).

Any major exits (business sale or IPO) by local financial startup founders? RenewBuy paid $10 million for finance business Artivatic.AI. The deal included all shareholders leaving.

Financial Technology Regulation

Fintech business models are complicated and interwoven; hence, India has no comprehensive fintech regulatory framework. Fintech firms' rules and regulations depend on their business operations.

Principals supervise fintech firms are regulated by RBI, SEBI, IRDAI, PFRDA and IFSCA. The stated authorities govern online payments, payment aggregators, data privacy, loans, securities trading, insurance goods, etc. Financial activities need RBI, SEBI or IRDAI permits and licences.

Indian fintech businesses may be subject to several laws:

Relevant Regulations

Sr. no.	Regulation	Year
1	Payment and settlement systems act	2007
2	Master directions on prepaid payment instruments	2021
3	Scale-based regulation for non-banking financial companies	2021
4	Account setup, management and payment processing for electronic intermediary transactions	2009
5	Payment bank licencing regulations were established in 2014 and operating standards	2016
6	Payment system operator self-regulatory organisation recognition framework	2020
7	Regulatory guidelines for payment aggregators and gateways	2020
8	Directive on processing electronic mandates on cards for recurring transactions	2019
9	Card transaction tokenisation circular	2019
10	Digital lending guidelines	2022
11	RBI master directions on credit and debit card issuance and conduct	2022
12	National Payments Corporation of India	2008
13	SEBI	1992
14	Mutual Fund Memo 2021	2021
15	IRDAI	1999
16	Insurance repository and electronic policy issue guidelines	2015
17	Insurance e-commerce norms	2017
18	Insurance regulatory and development Authority of India regulated e-insurance policies	2016
19	The international financial services Centres authority act	2019
20	IFSC Fintech entity framework	2022

Indian financial regulators and politicians are increasingly receptive to fintech innovation and technology-driven fintechs. Disruptive innovation that conflicts with regulatory frameworks or technology that encourages consumer deception or fraud may be difficult to manage. The RBI governor has stressed that fintech enterprises need better client safety, cybersecurity, financial integrity management and data protection to survive. The key market regulators are offering regulatory 'sandbox' options to Indian financial technology companies to foster innovation.

Reserve Bank of India and Regulations

The RBI Enabling Framework for Regulatory Sandbox was launched in 2019. Later that year, the first cohort, 'retail payments', was presented. By 2021, six organisations have completed the first group's testing.

The regulatory sandbox's second, third and fourth cohorts cover 'cross-border payments', 'MSME lending' and 'prevention and mitigation of financial frauds',

respectively, announced in December 2020, September 2021 and October 2021. In September 2022, RBI announced the fifth cohort, which will accept proposals for innovative products, services and technology across numerous regulatory functions. Six firms and their solutions were selected for the 'test phase' of the fourth cohort to identify and mitigate financial frauds earlier this year (Varma & Nijjer, 2022; Varma et al., 2022a, b).

The RBI launched the Reserve Bank Innovation Hub (RBIH) in late 2020 to promote financial sector innovation via technology and assistance. The RBI has created a 'fintech department' to focus on the sector.

SEBI

SEBI created the Regulatory Sandbox Framework in 2020 to foster securities sector innovation and allow regulated enterprises to test fintech concepts. SEBI's 'Innovation Sandbox' online project promotes financial innovation (Kherala, 2019; Iyer, 2021).

IRDAI

Virdi and Mer (2023): stated that promote insurance innovation along with, IRDAI created the IRDAI (Regulatory Sandbox) Regulations in 2019. This sandbox aims to balance structured insurance sector development, policyholder protection and innovation.

IFSCA

IFSCA has multiple committees, one on sustainable finance. IFSCA's framework includes the Fintech Regulatory Sandbox (FRS). India has taken steps beyond regulatory sandboxes to boost financial innovation. The government formed joint working groups with the UK and Singapore. To improve coordination, the MAS and IFSCA signed the Fintech Cooperation Agreement in September 2022 (Kaur et al., 2024).

Sustainable Finance and AI Research and Information Sharing

Few years back, the Financial Stability and Development Council (FSDC-SC) subcommittee created an inter-operable regulatory sandbox to help financial sector regulators coordinate fintech problems. What regulatory hurdles must foreign fintechs overcome to gain new customers in your jurisdiction? Foreign fintech companies used to face the regulatory need that some have a physical presence in India. The foundation of the IFSCA and execution of the IFSC's fintech framework, which applies to eligible multinational enterprises, may change the situation. Foreign corporations establishing a company in India must follow foreign currency control laws, which may restrict foreign ownership in an Indian corporation or subsidiary. Cross-border payments and transactions may cause problems. Fintech companies that lend or credit may face regulatory restrictions when borrowing or lending in foreign currencies, particularly if local rules tighten. PayPal, a foreign fintech business, will stop domestic payments in India, a competitive sector, and focus on helping Indian companies sell abroad. Another problem may be data storage management. The RBI mandates that payment system data be stored in India for payments companies. International enterprises that store and handle global payment information at centralised facilities or outside India are substantially affected by this. Due to data storage violations, several major Indian financial services businesses have shut down.

Nonmonetary Regulation Alternatives

Does your jurisdiction regulate personal data collection, use and transfer? What is the legal foundation for these laws and how do they affect fintech companies in your jurisdiction? Data protection rules are lacking in India. However, the government is proposing the Digital Personal Data Protection Bill, 2022, for further debates. The DPDP Bill is unenacted. Data movement outside India is limited to federally designated countries or territories, which is critical for fintech companies (Bashambu & Chetwani, 2022).

The SPDI Rules under the Information Technology Act, 2000, govern sensitive personal data processing. This covers data collection, usage, transfer, storage and processing. The SPDI Rules regulate SPDI collection, storage, transport, processing and disclosure. This includes passwords; financial information like bank account numbers, credit card numbers or other payment instruments; physical, physiological and mental health data; sexual orientation data; medical records; histories; and biometric data. Any corporation collecting SPDI from an individual must seek written authorisation from the data subject, per SPDI Rules. Before collecting sensitive personal data, consent must be obtained, explaining the purpose, recipients, etc. Except under a formal agreement, approval is needed before transmitting or revealing sensitive personal data. Corporate bodies collecting, storing, using or

transferring SPDI must follow the International Standard IS/ISO/IEC 27001 for Information Security Management System Requirements or other government-approved standards. Each SPDI collector must appoint a grievance officer to resolve data subject concerns, per SPDI Rules. SPDI managers must post their privacy policies online. SPDI Rules should be followed in the policy, which should list the categories of SPDI gathered and their usage. Fintech financial data is SPDI and controlled by SPDI Rules. In addition to the SPDI Rules, Indian regulators protect financial data with privacy protections. IRDAI laws require insurers to protect policyholder anonymity, retain insurance records in Indian data centres and swiftly recover data shared with outsourced service providers after service delivery. Insurance brokers, web aggregators, common service centres and surveyors must follow regulations to protect insurance-related data they receive for policy servicing.

The RBI mandates that payment system operators store all payment system data on Indian systems and data centres. Payment data may be processed internationally without limits. However, data processed outside India must be returned to India within one business day or 24 hours after payment processing. Complete transaction data should comprise information collected, transmitted and managed throughout the payment process. If required, the foreign country may keep a copy of the data during the transaction (Chakravarty, 2023).

The RBI's Guidelines on Regulation of Payment Aggregators and Payment Gateways prohibit licenced non-bank payment aggregators and merchants from storing full card data. They can only save card numbers' last four digits for reconciliation.

The RBI's Guidelines on Digital Lending require regulated organisations to ensure that digital lending apps/platforms gather relevant, borrower-approved and auditable data. Regulated entities must ensure that digital lending apps/platforms only access the borrower's mobile phone resources once for necessary features like camera, microphone, location or other required features during onboarding/know your customer (KYC) with the borrower's explicit consent. Regulated organisations must ensure that digital lending apps/platforms do not store more personal data than necessary. Without regulatory approval, biometric data should not be gathered or stored (Chakravarty, 2023).

Data Privacy Laws

Despite the IT Act's provisions for execution beyond India, the SDPI Rules' applicability to international firms is unclear. If passed, the DPDP Bill will include foreign data controllers handling Indian data principals' data. While serving Indian fintech, foreign organisations may need to indirectly comply with Indian privacy laws. According to the SDPI Rules, an Indian organisation cannot send sensitive personal data or information (SPDI) to a foreign organisation that does not fulfil its data protection and security standards.

Not all SDPI Rules ban data transmission beyond India. Cross-border transfers are allowed if the foreign recipient entity guarantees an equivalent level of data protection as the Indian transferor entity and the data subject give explicit consent, unless the data transfer is part of a legal contract. As said, the DPDP Bill might change this.

There are still sector-specific limitations that impede data transfer across borders or require data storage. As said, IRDAI requires insurance data to be housed in Indian data centres. The RBI requires all payment system operators in the payment ecosystem to store payment system data in Indian systems and data centres. The RBI's Guidelines on Digital Lending need borrower consent before sharing personal information with other parties. The guidelines require all data to be stored on Indian servers.

Describe Data Privacy Violation Penalties

Civil and criminal penalties may result from violating data privacy rules and the IT Act. Organisations that retain, handle or deal with sensitive personal data and information (SPDI) must compensate victims if they fail to develop and maintain acceptable security measures. Leaking contract-violating information is punishable by prison time under the IT Act. The IT Act requires service providers, intermediaries and data centres to report cyber events to CERT-In, the institution in charge. Noncompliance can result in a daily fine of up to INR 5000. For its duties, CERT-In may seek information and provide directions. Failure to provide needed information or follow CERT-In's instructions might result in a year in jail, an INR 10 million fine or both.

Sectoral regulators like RBI, SEBI and IRDAI issue fines, penalties and imprisonment. If they were accountable for the company's business behaviour, knew about the offence and did nothing to prevent it, the RBI and IRDAI may penalise people. Data localisation violations, data security breaches and security standards violations may result in RBI and IRDAI suspension of firm operation.

The DPDP Bill seeks roughly USD 60 million in fines for noncompliance. Data principals who violate restrictions face penalties under the DPDP Bill (Malhotra & Bhilwar, 2023). The IT Act and its associated rules, such as the Information Technology (Information Security Practices and Procedures for Protected System) Rules 2018, the Information Technology (Guidelines for Intermediaries and Digital Media Ethics Code) Rules 2021, the Information Technology (Electronic Service Delivery) Rules 2011 and the CERT-In Rules, which establish CERT-In as an administrative body for cybersecurity incident information, could affect (Chaturvedi & Srivastava, 2023).

In addition to the IT Act, the RBI has a rigorous cybersecurity framework for banks and non-banking financial companies. MD-PPIs, another RBI circular, require PPIs to have a system to monitor, manage and handle cybersecurity events and breaches. After their financial year ends, non-bank PPIs must submit a System

Audit Report (SAR) (Jeyasingh, 2023), with a CERT-In-approved cybersecurity audit within 2 months (Chaturvedi & Srivastava, 2023).

SEBI issued circulars on 'Cyber Security Resilience Framework for Stockbrokers/ Depository Participants' and 'Cyber Security Resilience Framework for Mutual Funds/Asset Management Companies (AMCs)' that may influence fintech companies. The IRDAI's Information and Cybersecurity Guidelines offer a comprehensive cybersecurity framework for the insurance business to reduce cyber risks. The Credit Information Companies (Regulation) Act 2005 (Hardik, 2023), Credit Information Companies Rules 2006 and Aadhaar Act 2016 address cybersecurity (Hardik, 2023).

IFSCA's International Financial Services Centres Authority (Maintenance of Insurance Records and Submission of Requisite Information for Investigation and Inspection) Regulations, 2022, require cybersecurity policy and data protection records (Shavshukov & Zhuravleva, 2023).

India's principal money laundering statute is the PMLA and its rules (Mittal & Agrawal, 2023). India is a FATF member and has signed various anti-money laundering and antiterrorism financing agreements (Pandey, 2023). The PMLA requires India to follow FATF and anti-money laundering rules. Banks, financial institutions and intermediaries must preserve financial transaction records, verify information and maintain customer identification records. Financial authorities including the RBI, SEBI and IRDA regulate financial transaction records and consumer verification. SEBI has Guidelines on Anti-Money Laundering (AML) Standards and Combating the Financing of Terrorism (CFT) for Securities Market Intermediaries (Gaviyau & Sibindi, 2023), RBI has the Master Direction—KYC Direction, 2016, and IRDA has AML/CFT guidelines for the insurance sector. Further regulatory frameworks for fintech companies in India are not available. SEBI published a circular requiring registered mutual funds that utilise AI and machine learning technologies to produce quarterly updates on their technology and AI safety procedures. To assist Make AI in India and Make AI Work for India, the 2023–2024 budget proposed three AI centres of excellence at top universities.

Conclusion

The journey of the financial system has changed it appearance and working; through this chapter, the author has tried to understand the concept of fintech and found that it is the need of the hour and has also solved several problems, but along with the solutions have come several problems which are to be checked and solved through the legal fraternity. The financial system in India subcontinent is governed by several acts and provisions, and several bodies such as RBI and SEBI are the main players which govern all the financial transactions in India and play a major role to control the activities of fintech companies. Thus, the journey of fintech and its financial structure will always go hand in hand but times will be there which will make them overtake each other sometimes and those will be the times when they have to settle or find the mid way to get the possible outcomes for the betterment of the society.

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Chapter 11
Optimizing the Role of Indonesian Fintech and Legal Protection Efforts for Fintech Users by the Indonesian Financial Services Authority (OJK) in Financial Services

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Introduction

The growth of fintech companies in Indonesia is very rapid (Rahayu & Astuti, 2022). The Financial Services Authority in Indonesia, Otoritas Jasa Keuangan (OJK), continues to encourage the development of technology-based financial service providers (fintech). The rapid expansion of fintech in Indonesia has sparked a debate over its regulatory framework. While fintech offers unprecedented access to financial services for the unbanked and underbanked population, concerns about data privacy, cybersecurity, and financial stability are mounting (Wilson, 2017). Critics argue that the existing legal infrastructure is inadequate to tackle the unique challenges digital financial services pose. This contention underscores the need for a nuanced understanding of fintech's impact and the development of robust legal mechanisms.

The Indonesian financial sector has undergone a significant transformation with the advent of fintech. Traditional banking models are being challenged by agile, technology-driven companies offering various services, from digital payments to peer-to-peer lending (Hartono, 2020). This shift necessitates a reevaluation of regulatory approaches. The OJK has been instrumental in this transformation, implementing regulations that foster innovation while ensuring financial stability and consumer protection (Wijaya & Tumpal, 2022).

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C. M. Gupta, G. Kaur (eds.), *E-banking, Fintech, & Financial Crimes*,
https://doi.org/10.1007/978-3-031-67853-0_11

A notable trend in the Indonesian fintech sector is the increasing collaboration between fintech firms and traditional financial institutions (Rodliyah et al., 2020). This synergy combines technological innovation with the reliability and trust of established financial entities. Moreover, there is a growing focus on financial inclusion, with fintech services reaching remote areas previously underserved by traditional banks (Pratama & Dewi, 2021). However, this expansion brings forth issues related to equitable access and fair treatment of consumers, emphasizing the role of regulatory bodies in monitoring and guiding this trend.

The urgency lies in establishing a legal framework that promotes fintech innovation and ensures the protection of consumer rights and the integrity of the financial system. The OJK has taken commendable steps in this direction, such as introducing regulations on digital financial services and engaging in stakeholder dialogues to understand the evolving fintech landscape (Aditya & Nugroho, 2022). Moving forward, a balanced approach is required, one that encourages innovation while implementing stringent oversight mechanisms to prevent malpractices and ensure the safety of users' financial and personal data. The role of fintech in Indonesia is a dynamic and evolving narrative marked by rapid growth and significant regulatory challenges. The OJK's efforts in legal protection and optimizing fintech's role are crucial in shaping a resilient and inclusive financial ecosystem. This paper aims to explore these aspects in depth, contributing to the discourse on fintech regulation and consumer protection in Indonesia.

The problem is that fintech company usually withdraws funds from the public. Therefore, its operational activities must also be regulated and supervised by the OJK. Therefore, the OJK has issued OJK Regulation Number 10/POJK.05/2022 about information technology-based lending and borrowing services. This OJK regulation states that fintech companies' lending and borrowing services operating in Indonesia must be registered and follow the rules set by OJK. They must comply with OJK regulations regarding operational permits, forms of institutions, business scope, financial reports, and capital. The objective of this OJK legislation is to facilitate individuals in meeting their cash requirements promptly, conveniently, and efficiently. Additionally, it aims to enhance competitiveness and enable actors in micro, small, and medium firms to obtain access to capital. Based on data from the Indonesia Fintech Association (AFI), there are a huge number of fintech startups in Indonesia. However, not all are registered and get operational permission from OJK (Salvasani & Kholil, 2020). So, there is great potential for harm to fintech users. The problem in this study is how to implement OJK Number 10/POJK.05/2022 concerning information technology-based money-borrowing services to optimize the role of fintech and as a legal protection effort for fintech Indonesia users.

The study highlights a pivotal aspect of the fintech landscape in Indonesia, focusing on the implementation of OJK Regulation Number 10/POJK.05/2022. This regulation marks a significant stride in addressing the dual objectives of promoting financial innovation and ensuring legal protection for users of fintech services. Despite the progressive nature of this regulation, challenges remain, particularly in ensuring comprehensive compliance among Indonesia's burgeoning number of fintech entities. The discrepancy between the total number of fintech startups and those

registered under OJK's purview underscores an urgent need for stringent monitoring and enforcement mechanisms (Suryono et al., 2021). This regulation is not merely a statutory requirement but a crucial step toward establishing a balanced ecosystem where fintech can thrive without compromising the safety and rights of its users. It is imperative that future studies and policy measures continue to evolve with the dynamic fintech sector, focusing on the effective implementation of existing regulations and the introduction of innovative solutions to emerging challenges. Also it is important to study the best practice of fintech in another relevant developed country.

Discussion

Fintech in Indonesia

Based on Law Number 21 of 2011 (OJK Law), OJK has the authority to regulate and supervise financial services, including banking and nonbanking financial services. Since December 31, 2012, OJK has had the juridical and effective authority to regulate and supervise nonbanking financial services institutions (LJKNP). If the operator does not register in accordance with the provisions of the OJK regulation, then the operator is considered to conduct illegal business activities.

According to the OJK Regulation Number 10/POJK.05/2022, information technology-based money-borrowing services are very helpful in increasing public access to financial services and products online, both with various parties without the need to know each other. The main advantages of information technology-based lending and borrowing services include the availability of online electronic agreement documents for the needs of the parties, the availability of legal counsel to facilitate online transactions, risk assessment of the parties online, sending billing information online, provision of loan status information to parties online, and provision of escrow accounts and virtual accounts in banks to parties so that the entire implementation of the payment of funds takes place in the banking system. For this reason, information technology-based lending and borrowing services are expected to meet cash needs quickly, easily, and efficiently and increase competitiveness (Asongu et al., 2019).

Understanding the role is an action that limits a person or an organization to carry out an activity based on goals and conditions agreed upon so that it can be carried out as well as possible (Soekanto, 2009). In order to get the desired outcome, fintech organisers play a crucial role. Therefore, the role of the OJK is also required as regulated in the OJK Regulation Number 10/POJK.05/2022, in which the activities of the fintech company/organizers to help provide funds in cash quickly and efficiently to small- and medium-sized micro-entrepreneurs are carried out.

Law enforcement is not merely the implementation of legislation or the implementation of court decisions. However, law enforcement's main problem is the

factors that might influence it (Cruz, 2019). These factors are as follows: legal factors themselves; factors of law enforcement, namely, parties that form or apply the law; factors of facilities or facilities that support law enforcement; and community factors, namely, the environment in which the law applies or is applied. Cultural factors result from creative work and a sense based on human intentions in the relationship of life (Soekanto, 2011).

Thus, law enforcement or implementation of OJK Regulation Number 10/POJK.05/2022 is influenced by several factors, namely, the legal factor itself; factors of law enforcement, namely, parties that form or apply the law; factors of facilities or facilities that support law enforcement; community factors, namely, the environment where the law applies or is applied; and cultural factors, namely, as a result of creative work and a sense based on human intentions in the relationship of life.

The legal factor in this case is the OJK Regulation Number 10/POJK.05/2022 concerning information technology-based lending and borrowing services. This OJK regulation aims to provide legal protection to users and organizers of information technology-based lending and borrowing services. There are several concepts regarding legal protection. Legal protection relates to how the law provides justice, namely, giving or regulating rights and obligations to legal subjects. Besides that, it also relates to how the law provides justice to legal subjects whose rights are violated to defend their rights. Philipus M. Hadjon distinguishes legal protection into preventive and repressive legal protection. All means, including legislation, are preventive protection to prevent disputes. Handling protection by the judiciary is repressive legal protection, which aims to resolve disputes. Fintech Indonesia users in lending and borrowing services are lenders and loan recipients who use information technology-based lending and borrowing services domiciled in the territory of Indonesia (Saputri et al., 2022). Obstacles related to the legal factor are that the OJK regulation still requires implementing regulations, so that the OJK Circular is stipulated immediately, among others, which regulates specifically the settlement of disputes in the information technology-based lending and borrowing services, thus providing legal certainty regarding legal protection to fintech users.

One factor of law enforcement, in this case, is the OJK because the OJK has to supervise compliance with the obligations of the company/fintech organizers and give sanctions if there is a violation of the obligations of the OJK regulation. Registration and permit applications for information technology-based lending and borrowing services can only be submitted to the Central OJK. Hence, the law enforcer in OJK Regulation Number 10/POJK.05/2022 is the Central OJK. Law enforcement carried out by the OJK Center is administrative law enforcement of 63 fintech companies that have registered and obtained OJK permits.

Factors of facilities or facilities that support law enforcement to enforce the law: OJK requires human resources, and then the rules are used as a benchmark for enforcing the law. Initially, it was discussed that human resources are limited and only implemented by OJK at the center; the POJK is insufficient. OJK still needs guidance in conducting supervision and evaluating the results of supervision,

meaning that more technical regulations, such as the OJK Circular about the implementation of supervision and so on, are needed.

Community factors, namely, the environment in which the law applies or is applied: The population examined in this research include fintech companies/organizers as well as fintech users, comprising lenders and receivers. Fintech companies must search for information online on the profile and information of fintech users. In addition, fintech companies must have the feasibility of managing information technology systems in implementing information technology-based lending and borrowing services. Based on data from OJK, there are several reasons why there are still many fintech companies that have already carried out their business activities but have not registered and obtained OJK permits, because of financial limitations (1 billion for registration and 2.5 billion for obtaining OJK licenses) which have not fulfilled the requirements and do not yet have the feasibility of governance of information technology systems the implementation of information technology-based lending and borrowing services. For the fintech company to fulfill these requirements, it is also necessary to have the role of the Indonesia Fintech Association (AFI) to encourage its members to fulfill these requirements.

Cultural factors result from creative work and a sense that is based on human intentions in the relationship of life. The meaning of cultural factors in this study is the assumptions or judgments of fintech users and the public toward information technology-based money-borrowing services that ultimately affect their attitudes and behavior toward these services. One is the public's perception that borrowing from fintech company is highly interesting. So, they still choose to borrow from conventional institutions, and the fact that some people still do not keep up with technological developments means they cannot access fintech services. For this reason, more intense socialization from fintech and OJK companies is needed.

Many fintech companies/organizers have already registered and obtained permission from OJK, and 3 trillion rupiah has been absorbed for loans. This proves that fintech companies/organizers have helped (MSMEs) to find funds quickly and efficiently. However, in order to optimize the role of the fintech company, the role of OJK as law enforcement/supervisor must be supported to ensure compliance with the OJK regulation. Despite the presence of obstacles such high interest rates, individuals in society still opt to borrow from traditional institutions instead of fintech firms because to their lack of familiarity with technological advancements. Therefore, it is crucial to promote widespread awareness and acceptance of fintech companies by OJK.

An important drawback of the Indonesian fintech industry is the constantly changing regulatory environment, which continues to pose a problem. Regulations in Indonesia often lack specificity and are subject to frequent changes, creating uncertainty for businesses. The evolving regulatory framework is a significant hurdle for fintech development in Indonesia. This underscores the need for a more stable and predictable regulatory framework to support the fintech industry's growth.

Compared to Indonesia, Singapore boasts a more advanced technological infrastructure for fintech (Luk & Preston, 1998). This is supported by significant government investment in information technology, and the Singaporean government

proactively develops specific and consistent regulations to support innovation. The Monetary Authority of Singapore (MAS) has implemented various policies, including regulatory sandboxes, to foster fintech growth (Bromberg et al., 2017). This approach has created a conducive environment for fintech innovation.

The US fintech ecosystem is characterized by significant capital support and advanced innovation: A strong capital market and a deep-rooted culture of innovation influence this. The Financial Technology Association reports that fintech investments in the United States reach billions of dollars annually (Indonesian Fintech Association (AFI), 2022). This investment capacity accelerates innovation and growth in the US fintech sector. The United States adopts a decentralized regulatory approach to fintech. This is due to a greater role played by state governments in financial regulation (Anagnostopoulos, 2018).

China's fintech industry is distinguished by its massive scale and integration with the broader digital economy. The Chinese government has actively promoted fintech as part of its broader digital transformation strategy. As reported by the People's Bank of China, China's fintech sector is one of the largest in the world, with a significant presence of big tech firms in financial services. China's approach reflects a unique model where fintech is deeply intertwined with the country's digital and economic policies (Zhou et al., 2018).

As a researcher in the field of law, it is critical to explore the best practices in regulating and implementing financial technology (fintech) as observed in leading global economies like the United States, China, and Singapore. These countries have developed unique approaches and strategies that have significantly shaped their respective fintech landscapes, offering valuable insights into effective fintech governance. Their experiences offer critical insights for other nations looking to cultivate a thriving, well-regulated fintech ecosystem. The detailed comparison will be explained below:

Singapore Fintech Regulation

The financial regulator in Singapore, the Monetary Authority of Singapore (MAS), is one of the world regulators that responded early to the development of fintech. MAS is actively working to frame an appropriate regulatory approach to support and oversee the development of fintech (Khan, 2003). MAS adopts the following policy approach: First, MAS will take a differentiated approach to different technologies and their applications. It is worth noting that, unlike full-fledged financial companies such as banks, which provide comprehensive services and products, the present wave of fintech startups themselves individually develop technology to improve certain financial services or products, so the risks inherent in their activities or due to the nature of the technology are different. A "one-size-fits-all" regulatory approach is inappropriate. For instance, digital payments and digital currencies raise authentication and identity issues; P2P lending platforms and crowdfunding have implications for consumers. Second, MAS will adopt a risk-based approach to

fintech innovation in unregulated sectors. MAS is aware that prematurely introducing regulation can stifle innovation and potentially thwart the adoption of beneficial technologies. Therefore, it always ensures that regulation should not be a precursor to innovation. Instead, MAS applies materiality and proportionality. This means that when the risks posed by new technology become material, then regulation comes in. In addition, regulations must be proportional to the risks posed. For example, the MAS regulates banks primarily because they accept deposits from ordinary people. Securities crowdfunding platforms (debt or equity) are not permitted to take deposits, and where investors are limited to accredited or sophisticated investors, MAS generally regulates such platforms lightly. However, when some crowdfunding platforms wanted to help companies obtain business loans from retail investors, MAS stepped in to require the platforms to be licensed by MAS and enforce licensing conditions such as minimum capital and disclosure requirements. The aim is to strike the right balance between increasing access to securities crowdfunding for new businesses and small and medium enterprises and protecting the interests of investors. MAS also stated that if the financing platform becomes huge and raises concerns about financial market stability, then MAS may consider macroprudential regulations such as capital adequacy, credit ratings, fund solvency, etc., to strengthen individual players and others—measures to strengthen the resilience of the entire market. Third, in connection with the fintech experiments mentioned above, MAS published the "Regulatory Sandbox" for fintech startup companies and large financial companies to experiment with financial technology (fintech) solutions. MAS is well aware of the speed at which the emerging fintech landscape is evolving and that friction caused by existing regulations can slow down the innovation process (Horn et al., 2020).

The Monetary Authority of Singapore (MAS) and the National Research Foundation established the Fintech Office to review, align, and improve fintech funding schemes across government agencies, identify gaps, and propose strategies, policies, and schemes.

China Fintech Regulation

The fintech industry in the People's Republic of China (PRC) differs greatly from that of the developed world in many respects. While cryptocurrency and cross-border payments receive a lot of attention in North America and Western Europe, mobile payments and online lending dominate headline news in the People's Republic of China. Ant, Tencent, Baidu, and JD Digits are just a few of the unicorn companies that control the PRC's fintech market (Huang, 2020).

In exploring the resolution of peer-to-peer lending (P2PL) disputes in China, one discerns a multifaceted approach aimed at enhancing both regulatory oversight and procedural efficiency. To begin, regional mechanisms have been bolstered through the implementation of the "Sunshine Management" complaint reporting system, exemplified by its adoption in the Liyang region. This system not only categorizes

and makes public the nature of complaints but also tailors complaint mechanisms to assist financially disadvantaged individuals, with provinces like Hunan offering specialized channels for grievances.

Moreover, a significant regulatory shift is underway as the China Banking and Insurance Regulatory Commission (CBIRC) mandates that all P2PL platforms transition into microcredit institutions within a 2-year timeframe. This transformation is set against a backdrop of stricter regulatory standards designed to curtail fund misuse and improve repayment rates among borrowers. An illustrative directive requires all P2PL firms to settle outstanding loans within a year prior to their conversion into microloan entities, a move calculated to mitigate creditor losses, enhance social stability, and foster the orderly growth of inclusive finance. The capital thresholds set for this transformation are formidable, with a minimum of 50 million yuan for regional operations and 1 billion yuan for national activities, effectively barring platforms with significant credit risks or fraudulent operations from continuing (Technologies, 2016). Additionally, the determination of online loan interest rates has been centralized under the aegis of the Supreme People's Court of the People's Republic of China. This judicial body has set the permissible ceiling for private lending rates at four times the bank's interest rate, a policy aimed at balancing competitiveness with consumer protection.

Lastly, the judicial landscape itself is undergoing a technological revolution with the introduction of the "smart court" system. This digital judiciary leverages software applications that enhance the decision-making processes by providing judges with tools to reference similar cases, verify evidence, and identify contradictions, thus integrating big data and algorithmic support into the judicial workflow. Despite the high-tech assistance, the final adjudicative power rests firmly with the human judges, ensuring that justice retains its inherently human discernment. This suite of reforms and innovations collectively represents a robust framework aimed at modernizing and streamlining the resolution of P2PL disputes in China.

US Fintech Regulation

In the United States, the regulatory framework for peer-to-peer lending (P2PL) is both intricate and comprehensive, involving multiple federal agencies to ensure both operational compliance and consumer protection. Supervision of P2PL falls under the purview of the Securities and Exchange Commission (SEC), the Consumer Financial Protection Bureau (CFPB), and the Federal Trade Commission (FTC), each playing a distinct role in overseeing various facets of P2PL operations.

The operational model for P2PL in the United States adopts what is known as the "Notary Model," which incorporates an intermediary, specifically WebBank, to facilitate the funding process between borrowers and lenders. In this model, although WebBank initially provides the funds, the financial transactions are recorded in the name of the platform rather than the individual lenders. Subsequently, the platform issues a promissory note to the lenders, thereby making them creditors of the platform itself (Turguttopbas, 2022).

Regarding consumer protection, two major institutions stand at the forefront: the CFPB and the FTC. The CFPB exercises broad regulatory powers across the financial sector, particularly focusing on consumer rights within nonbank lending markets. It is tasked with enforcing laws that guard against unfair, deceptive, or abusive acts and practices in consumer lending. On the other hand, the FTC enforces the broader Consumer Protection Act across various sectors, including P2PL. Together, these agencies form a robust regulatory shield, designed to protect consumers while fostering a fair and transparent lending environment. This multilayered approach not only reinforces the security of financial transactions but also ensures that the principles of fairness and transparency are upheld in the fast-evolving landscape of financial technology in the United States.

Conclusion

The research into the regulation and implementation of fintech in Indonesia, compared with global leaders such as the United States, China, and Singapore, reveals significant findings. A key observation is the challenge faced by Indonesia in creating a stable and forward-looking regulatory framework. The Indonesian fintech landscape, while burgeoning, is marked by regulatory uncertainties and evolving policies, which impact the confidence and growth of fintech entities. Another critical finding is the disparity in technological infrastructure and regulatory maturity compared to countries like Singapore and the United States. These nations have developed more advanced frameworks and infrastructures that support fintech innovation while ensuring consumer protection and financial stability. This contrast underscores the need for Indonesia to enhance its regulatory and technological environment to foster a more robust fintech ecosystem. From an academic perspective, this study contributes to the understanding of fintech regulation in a global context. It provides a comprehensive analysis of the varying approaches to fintech governance, highlighting the successes and challenges in different regulatory environments. This comparative analysis offers valuable insights for policymakers, regulators, and scholars, particularly in countries striving to develop their fintech sectors. The findings from this study can guide the formulation of more effective fintech policies and regulations in Indonesia and other emerging economies exploring fintech as a tool for financial inclusion and economic development.

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Chapter 12
Legal Implications of Fintech

Srinivas Subbarao Pasumarti

Introduction to Fintech

Financial technology, or fintech, rapidly reshapes the financial services landscape worldwide. Leveraging cutting-edge technologies like artificial intelligence (AI), blockchain, and cloud computing, fintech companies offer innovative solutions across areas like payments, lending, wealth management, and insurance. This global phenomenon has found fertile ground in India, a country with a young, tech-savvy population and a significant unbanked segment.

The United States has emerged as a leading force in global fintech, boasting established giants like Visa, PayPal, and Mastercard (Iyer & Darabi, 2020). Other established hubs include the United Kingdom, Israel, Singapore, and Hong Kong, which are known for their supportive regulatory environments and vital investor ecosystems (Nguyen & Nielsen, 2020). A recent study by EY depicted the global fintech market reaching a staggering USD 22.3 trillion by 2025, signifying the immense potential of this sector (EY, 2020).

India presents a compelling case study within the global fintech narrative. The Indian market is one of the fastest-growing globally, with a projected value of USD 150 billion by 2025, surpassing its 2021 valuation of USD 50 billion (Invest India, n.d.). This exponential growth can be attributed to several key factors. Indian consumers are increasingly tech-savvy and demand convenient, user-friendly financial services. Fintech companies cater to this need by offering mobile-first solutions that are readily accessible through smartphones (Mehta & Mithas, 2020). Global regulations like the General Data Protection Regulation (GDPR) and the California Consumer Privacy Act (CCPA) mandate robust data security measures and user

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C. M. Gupta, G. Kaur (eds.), *E-banking, Fintech, & Financial Crimes*,
https://doi.org/10.1007/978-3-031-67853-0_12

control over their information. Noncompliance can result in hefty fines and erode consumer trust (Founder Shield, 2023).

The explosion of e-commerce and smartphone penetration in India has laid the groundwork for adopting digital financial services. Fintech solutions seamlessly integrate with these trends, providing a natural transition for consumers to embrace digital finance (Chitale et al. 2018). The Indian government has taken proactive measures to promote fintech innovation. Initiatives like the Jan Dhan Yojana scheme for financial inclusion and the creation of regulatory sandboxes have fostered a conducive environment for fintech startups to experiment and grow (Banerjee & Dutta, 2020). In India, the Reserve Bank of India (RBI) plays a central role in AML/KYC compliance for fintech companies (Global Legal Insights, 2023).

The Indian fintech sector has witnessed a significant influx of investment, ranking second globally in terms of deal volume (NASSCOM, n.d.). This funding fuels innovation and helps startups scale their operations, enabling them to compete with established financial institutions. The rise of fintech in India has significantly impacted financial inclusion. Fintech companies empower millions of previously unbanked individuals, particularly in rural areas by providing access to digital financial services like mobile payments and microloans. Additionally, fintech fosters healthy competition in the financial sector, leading to better interest rates, a more comprehensive range of products, and improved consumer customer service.

Looking ahead, the future of Indian fintech is brimming with potential. The market is expected to continue its remarkable growth, with some projections estimating a value of USD 2.1 trillion by 2030, as per Invest India's report. As technology evolves and government initiatives support innovation, we expect to see even more disruptive fintech solutions emerge, further transforming how Indians manage their finances and interact with the financial system.

Here Are Some Fundamental Legal Considerations in the Fintech Industry

Regulatory Compliance

Regulatory compliance forms the backbone of fintech's legal implications. Different jurisdictions have responded to the rise of fintech with a range of regulatory frameworks aimed at ensuring the integrity of financial markets, protecting consumers, and fostering innovation.

1. *Licensing Requirements*: Many fintech startups engage in activities that require licensing under existing financial regulations. For example, digital payment platforms may need to be approved as electronic money institutions.
2. *Anti-money Laundering (AML) and Counterterrorist Financing (CTF)*: Fintech companies follow AML and CTF regulations, implementing systems to monitor, report, and prevent suspicious activities.

3. *Regulatory Sandboxes*: Some authorities have established "regulatory sandboxes," allowing fintech startups to examine their creations in a measured environment under regulatory supervision.

Data Protection and Privacy

The fintech industry relies heavily on data, raising significant concerns regarding data protection and privacy. Acquiescence with data protection laws, such as the General Data Protection Regulation (GDPR), is crucial.

1. *Consent and Transparency*: Fintech companies must ensure they have lawful bases for processing personal data, typically requiring explicit consent from individuals.
2. *Data Security Measures*: Applying robust data security procedures to protect against data breaches is a legal requirement and critical for maintaining consumer faith.
3. *Cross-Border Data Transfers*: Fintech companies operating internationally must navigate the complexities of transferring data across jurisdictions, each with its data protection laws.

Cybersecurity

Fintech companies are highly apprehensive about cybersecurity due to the financial and delicate personal information they handle.

1. *Compliance with Cybersecurity Standards*: There are increasing regulatory expectations for fintech firms to adhere to stringent cybersecurity standards and practices.
2. *Incident Reporting*: Many jurisdictions require financial institutions, including fintech companies, to report cybersecurity incidents to regulators and, in some cases, to affected individuals.

Intellectual Property (IP)

Innovation is at the heart of fintech, making IP protection vital for securing proprietary technologies and maintaining competitive advantages.

1. *Patents*: Fintech innovations, such as blockchain technologies and algorithms for financial analysis, may be patentable.

2. *Trademarks*: Brand identity is crucial for fintech companies, necessitating trademark protection.
3. *Trade Secrets*: Protecting proprietary algorithms and methodologies as trade secrets is common and requires adequate internal safeguards.

Consumer Protection

Ensuring fair treatment and protection of consumers using fintech services is a priority for regulators globally.

1. *Transparency and Fairness*: Fintech firms must offer pure data about their services, with costs, terms, and conditions.
2. *Dispute Resolution*: Implementing effective customer complaints and dispute resolution mechanisms is essential.
3. *Accessibility*: Ensuring that fintech services are accessible to all population segments, including those with disabilities, is increasingly seen as a consumer protection component.

Contractual Agreements and Cross-Border Considerations

Fintech companies enter contractual agreements with partners, vendors, and customers. Ensuring that contracts are well drafted and legally sound is essential to avoid disputes and legal challenges.

Fintech companies that operate internationally must navigate the legal complexities of multiple jurisdictions. Understanding and complying with each jurisdiction's regulatory requirements is crucial to avoiding legal issues.

Financial Fraud and Compliance

Fintech companies are susceptible to financial fraud and must implement measures to detect and prevent fraud. Compliance with regulations aimed at preventing financial crimes is also critical.

Crowdfunding and Securities Regulations

Fintech platforms that engage in crowdfunding or facilitate the issuance of securities must comply with relevant securities regulations. This includes registration requirements and adherence to disclosure obligations.

Given the evolving nature of the fintech industry, staying informed about changes in regulations and seeking legal advice is essential for fintech companies to navigate the complex legal landscape successfully.

Key Authorities and Compliance Requirements for Fintech Activities

The regulatory landscape for fintech in India involves several vital authorities, and compliance requirements may vary based on the nature of fintech activities. Here are some of the key regulatory compliance aspects for fintech in India:

Reserve Bank of India (RBI)

The Reserve Bank of India (RBI) plays a momentous role in regulating and supervising fintech activities in India. The RBI is the apex-level banking institution in the country and is accountable for framing and executing monetary policy, issuing currency, and regulating the financial system. In the context of fintech, the RBI's role involves several key aspects:

The RBI establishes the regulatory framework for various financial services, including those offered by fintech companies. It issues guidelines and regulations to ensure the financial system's stability, integrity, and efficiency. Fintech companies often need authorization or licenses to operate in the financial sector. The RBI is responsible for issuing these licenses and setting the eligibility criteria. The licensing process helps ensure that only legitimate and compliant entities participate in financial activities.

The RBI oversees payment and settlement systems in the country, including those facilitated by fintech companies. It formulates policies to improve the security and efficiency of payment structures and promote the adoption of secure and innovative payment technologies.

The RBI regulates digital payments, e-wallets, and other electronic payment systems. It issues guidelines to protect consumers, enhance cybersecurity, and ensure the proper functioning of these systems. The RBI also sets standards for interoperability and security in digital payments.

Fintech companies often pact with subtle financial and personal data. The RBI formulates guidelines to ensure the safety and privacy of customer data, protecting

it from data breaches and cyber threats. Compliance with these guidelines is essential for fintech companies.

The RBI focuses on consumer protection in the financial sector, including fintech services. It sets standards for transparent disclosure of terms and conditions, fair treatment of customers, and mechanisms for addressing customer complaints and grievances. Recognizing the importance of innovation in the fintech sector, the RBI has introduced regulatory sandboxes. These sandboxes permit fintech companies to examine their products and services in a precise atmosphere with certain relaxations in regulatory requirements. The RBI closely monitors these experiments to assess their viability and potential risks.

The RBI supervises and monitors the activities of financial institutions, including fintech companies, to ensure acquiescence with rules and maintain the economic system's stability. Regular inspections and audits are conducted to assess the financial health and adherence to regulatory standards. The RBI sets guidelines for foreign exchange transactions in cross-border fintech activities, ensuring compliance with foreign exchange regulations. This includes regulations related to outward and inward remittances, foreign investment, and collaborations with international entities. The RBI collaborates with other regulators, such as the SEBI and IRDAI, to address regulatory overlaps and ensure a comprehensive regulatory framework for fintech.

The Reserve Bank of India plays a multifaceted role in amendable fintech activities, covering licensing, payment systems, data protection, consumer protection, innovation, and overall supervision to maintain the stability and integrity of the country's financial system.

National Payments Corporation of India (NPCI)

The NPCI develops and oversees retail payment systems of fintech companies in India. It plays an essential role in promoting digital payments and safeguarding the efficiency and security of payment mechanisms, including the Unified Payments Interface (UPI), Immediate Payment Service (IMPS), and National Electronic Funds Transfer (NEFT).

NPCI designs, develops, and operates retail payment products and services to facilitate electronic transactions. NPCI has introduced innovations like UPI, Bharat Bill Payment System (BBPS), and RuPay to drive the spread of digital payments nationwide. NPCI also works toward creating interoperable payment systems, allowing users of different banks and financial institutions to transact seamlessly. Standardizing protocols and formats is critical to ensuring compatibility among diverse payment systems.

NPCI contributes to financial inclusion initiatives by providing accessible and affordable digital payment solutions. Its various payment products aim to bring the unbanked and underbanked population into the formal financial system. Unified Payments Interface (UPI), developed by NPCI, has played a transformative role in

fintech. It allows users to associate several bank accounts with a single mobile request, allowing easy fund transfers, merchant payments, and other financial transactions. While NPCI is not a regulatory body, it operates under the regulatory framework established by the RBI. It collaborates with the RBI and other stakeholders to ensure compliance with regulations and guidelines governing the payment industry.

Securities and Exchange Board of India (SEBI)

SEBI regulates various securities-related entities and activities, including stock exchanges, brokers, mutual funds, and securities issuance. SEBI oversees fintech applications and innovations in the capital markets. This includes using technology in trading platforms, robo-advisors, blockchain applications, and crowdfunding platforms. SEBI aims to balance innovation with investor protection and market integrity. SEBI regulates crowdfunding platforms and activities, ensuring they comply with established norms. This involves setting guidelines for crowdfunding campaigns, investor protection, and the prevention of fraudulent activities in fundraising.

SEBI strongly emphasizes investor protection and education. It formulates regulations and guidelines to ensure that investors receive fair and transparent information and takes measures to prevent market manipulation and insider trading. SEBI has introduced governing sandboxes to encourage fintech innovation in the securities market. The sandboxes deliver an exact atmosphere for examining new technologies, products, and services, letting companies experiment with certain relaxations in regulatory requirements.

SEBI conducts surveillance of the securities market to identify and address any irregularities or market abuses. It has enforcement powers to take action against entities that violate securities laws, ensuring the integrity and fairness of the market. SEBI concentrates on regulating securities markets and ensures that fintech innovations in the capital markets adhere to regulatory standards, promoting investor safety and market veracity.

Insurance Regulatory and Development Authority of India (IRDAI)

IRDAI is the regulatory authority overseeing India's insurance segment. It regulates insurtech, which uses technology to enhance and streamline insurance services. IRDAI ensures that technological advancements in insurance are aligned with regulatory standards and back to the development of the insurance market. Fintech companies operating in the insurance sector, including digital insurance providers and

insurance aggregators, need to obtain licenses from IRDAI. The authority sets guidelines for compliance with regulatory requirements, including product offerings, customer protection, and solvency margins.

IRDAI is responsible for protecting the interests of insurance policyholders. It sets norms for transparent communication, disclosure of policy terms, and fair treatment of customers. This includes guidelines for insurtech platforms to ensure consumers receive adequate information about insurance products and services.

Department of Telecommunications (DoT)

The DoT oversees the telecommunications sector, and its role becomes crucial in fintech services that rely on mobile technology. Mobile payments, banking, and other fintech applications often depend on robust and secure telecommunications infrastructure. The DoT ensures the availability of reliable connectivity and communication channels for fintech services.

The DoT plays a role in facilitating the use of mobile wallets and USSD (Unstructured Supplementary Service Data) for financial transactions. It works to ensure that mobile-based fintech services comply with regulatory standards and do not compromise the security and privacy of users.

Ministry of Finance (MoF)

The Ministry of Finance plays a broader role in macroeconomic and financial stability through macro-prudential regulations. While specific regulatory bodies oversee sectors like banking, insurance, and securities, the MoF formulates policies and strategies to ensure the overall health and stability of the financial system. The MoF allocates funds through the annual budget for various financial sector initiatives and regulatory bodies. It may introduce measures to encourage the growth of fintech, promote financial inclusion, and address any fiscal challenges arising from adopting new technologies in the financial sector.

Goods and Services Tax (GST)

GST is a wide-ranging indirect tax that has substituted many indirect taxes at the central and state levels. Fintech transactions, including digital payments and financial services, are subject to GST. The GST regime ensures uniformity in taxation nationwide and governs the tax implications of fintech transactions.

Fintech companies must comply with GST regulations, including registration, filing returns, and paying taxes. The GST framework applies to goods and services,

and fintech services fall under the services category. Compliance with GST regulations is essential to avoid legal consequences.

Each entity plays a specific role in the regulatory landscape of fintech in India. IRDAI oversees insurtech, the DoT ensures the connectivity and security of mobile-based fintech services, the MoF contributes to macroeconomic stability, and GST governs the taxation of fintech transactions. These bodies collectively contribute to developing and regulating the country's fintech environment.

Legal Aspects of Fintech Globally

The General Data Protection Regulation (GDPR) in the European Union and similar data protection laws globally require fintech firms to handle personal data responsibly. Compliance with these regulations is crucial for cross-border operations.

Fintech companies must comply with global anti-money laundering (AML) and counterterrorist financing (CTF) regulations. Many jurisdictions have strict requirements for customer due diligence and reporting suspicious transactions.

Fintech companies operating internationally need to navigate a complex web of regulations. Compliance with local laws and obtaining necessary licenses for each jurisdiction is critical.

The legal status of cryptocurrencies and blockchain technology varies globally. Some countries have embraced them, while others have imposed strict regulations or bans. Fintech companies in this space need to be aware of the regulatory environment. Fintech companies need to comply with consumer protection laws globally. Clear and transparent data for users and certifying reasonable business practices are essential.

Global fintech companies must protect their intellectual property rights internationally, considering differences in patent, trademark, and copyright laws. Fintech companies must be attentive to and obey international sanctions and restrictions, especially when dealing with cross-border transactions.

Fintech companies must stay informed about regulatory developments, engage legal counsel, and adapt their operations to comply with the evolving legal landscape in India and the global fintech ecosystem.

Data Privacy Laws and Regulations for Fintech in the United States

- Fintech companies in the United States operate under complex data privacy laws and regulations. Noteworthy legal aspects include:

- Gramm-Leach-Bliley Act (GLBA): The GLBA contains the Privacy Rule, which imposes strict requirements on financial institutions to protect customer data.
- Health Insurance Portability and Accountability Act (HIPAA): HIPAA sets standards for protecting patient data, although it primarily affects healthcare organizations rather than fintech companies directly.
- California Consumer Privacy Act (CCPA): The CCPA provides California residents with certain rights concerning their personal information held by businesses.
- California Privacy Rights Act (CPRA): An amendment to the CCPA, the CPRA strengthens consumer privacy protections in California.
- Virginia Consumer Data Protection Act (VCDPA): Similar to the CCPA, the VCDPA grants Virginia residents certain rights regarding their personal information.
- Colorado Privacy Act (CPA): Like the CCPA and VCDPA, the CPA affords Colorado residents specific rights relating to their personal information.
- Federal Trade Commission (FTC): The FTC enforces federal consumer protection laws, including the Fair Credit Reporting Act (FCRA).
- Consumer Financial Protection Bureau (CFPB): The CFPB administers the FCRA and proposes new rules to enhance consumer data privacy rights.

These laws and regulations establish a comprehensive framework for protecting consumer data privacy in the United States, and fintech companies must abide by these rules to ensure compliance and avoid legal consequences.

Differences in Legal Aspects of Fintech in India and the United States

The legal aspects of fintech in India and the United States differ in several ways. In India, the regulatory landscape for fintech is mainly fragmented, with no single set of regulations or guidelines that uniformly apply to fintech payment products.

- The RBI governs the regulatory framework for fintech in India, setting rules and regulations for every aspect of the industry.
- On the other hand, in the United States, fintech companies must navigate a variety of statutes and regulations based on their location and the services provided.
- Both countries have data privacy laws and regulations to protect consumer financial information. In India, the Gramm-Leach-Bliley Act (GLBA) contains the Privacy Rule, which imposes strict requirements on financial institutions to protect customer data.
- In the United States, the GLBA also applies, along with the Health Insurance Portability and Accountability Act (HIPAA) and the California Consumer Privacy Act (CCPA).

- Another critical difference is the approach to cryptocurrencies. In India, cryptocurrency is not a valid legal tender, and there is no specific legal framework to regulate crypto transactions.
- In contrast, the United States has taken a more nuanced approach, with various federal and state agencies regulating cryptocurrencies and related activities.
- While both countries have established regulatory frameworks for fintech, the specific laws and regulations differ, reflecting each country's unique legal and regulatory environments.

Conclusion

The legal landscape for fintech is complex and rapidly evolving, reflecting the pace of technological innovation and the global nature of financial services. Fintech companies must navigate a patchwork of regulatory requirements, safeguard sensitive data, protect their innovations, and ensure they operate transparently and fairly. As it grows, collaboration between regulators, fintech firms, and traditional financial institutions will be vital in fostering an environment that balances innovation with consumer protection and market integrity.

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Chapter 13
Decentralized Finance (DeFi) and Legal Challenges: Navigating the Intersection of Innovation and Regulation in the Fintech Revolution

K. Bharanitharan and Gagandeep Kaur

Introduction

Decentralized finance (DeFi) represents a paradigm shift in the traditional financial landscape, offering a decentralized alternative to conventional financial services through blockchain technology (Makarov & Schoar, 2022). In contrast to centralized financial systems, which rely on intermediaries such as banks and brokers, DeFi protocols facilitate peer-to-peer transactions and allow users to access financial services without the need for intermediaries. This decentralized approach provides several advantages, including increased transparency, accessibility and censorship resistance. The expanding field of decentralized finance (DeFi) represents a change in the world supported by blockchain technology and smart contracts (Qin et al., 2021)). This fresh system provides a platform for transactions without relying on banks, removing middlemen and promoting greater transparency and accessibility. However, the rise of DeFi also brings about obstacles and uncertainties that require thorough examination. The transformative power of DeFi lies in its capacity to make financial services accessible to everyone with an Internet connection, thus advancing inclusion. This is made possible through the use of public permissionless blockchains and smart contracts that automate transactions. Despite DeFi's benefits of efficiency, transparency and inclusivity, there are risks such as fraud, money laundering and the absence of consumer protections seen in conventional finance (Decentralized Finance: 4 Challenges to Consider | MIT Sloan, 2022; Wall, 2022).

Regulatory bodies like the Securities and Exchange Commission (SEC) stress the importance for DeFi projects to actively engage with regulatory frameworks to

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C. M. Gupta, G. Kaur (eds.), *E-banking, Fintech, & Financial Crimes*,
https://doi.org/10.1007/978-3-031-67853-0_13

safeguard investors and maintain market integrity. The SEC approach highlights the significance of communication and adherence to regulations for encouraging the innovation within a regulated setting. Furthermore, the decentralized and global nature of DeFi presents obstacles, for regulators underscoring the importance of understanding the technology and fostering collaboration between regulators and DeFi entities to establish a regulatory framework that balances innovation with consumer protection (Zetzsche et al., 2020).

The legal environment surrounding DeFi is further complex due to the applications it encompasses spanning from stablecoins and trading platforms to lending services and insurance. Each category brings its set of issues from concerns about issuer risks related to tokenized assets to the challenges of enforcing tax laws in a decentralized setting (Schär, 2021; Schoar et al., 2022). The ability of systems to adapt these innovations is crucial for the progress of DeFi, necessitating a joint effort to navigate existing legal uncertainties and regulatory gaps.

As DeFi progresses, it becomes essential for stakeholders to confront these regulatory hurdles. The future trajectory of DeFi relies on lawmakers, regulators and industry players collaborating effectively to devise tactics that protect consumer interests while nurturing innovation and expansion in this emerging sector (Decentralized Finance: Opportunities, Risks and Legal Challenges, n.d.). The transformation of DeFi from a service into a financial offering will depend on how adeptly it can manage the complex array of legal and regulatory obstacles it encounters.

DeFi: An Overview

The growth of decentralized finance (DeFi) has been a journey intertwined with the evolution of cryptocurrencies and blockchain technology. While Bitcoin introduced in 2009 set the foundation for currencies, it was Ethereum's arrival in 2015 that truly paved the way for DeFi's progress. The implementation of contracts by Ethereum allowed for the development of decentralized applications, particularly those relevant to DeFi (Reiff, 2023).

A significant moment in DeFi's evolution occurred with the establishment of MakerDAO in 2017. MakerDAO, which existed before Ethereum, is a lending protocol that enables users to borrow or lend cryptocurrencies and offers a stablecoin. This period also marked the rise of exchanges like EtherDelta and the surge in popularity of initial coin offerings (ICOs) both playing roles in shaping DeFi. The ICO frenzy in 2017 highlighted both the potential and risks associated with DeFi. ICOs facilitated participation in funding financial projects aligning closely with DeFi's principles of decentralization and inclusivity. Ethereum played a part during this time as many new token projects traded their offerings for ETH. While some projects failed to meet expectations, this era also saw the inception of enduring DeFi platforms such as Aave and 0x. The evolution of DeFi has shifted towards utilizing pooled funds than peer-to-peer interactions. Platforms like Uniswap which emerged

in 2018 demonstrate this change by employing liquidity pools for trading of user-to-user transactions. Moreover, the idea of asset tokenization has played a role in shaping DeFi. Public blockchains enable the establishment of a shared record of ownership leading to the tokenization of assets. Ethereum's blockchain has notably become a favoured platform for creating tokens including the used ERC 20 standard in DeFi applications. Tokenization boosts asset accessibility and effectiveness forming an element in the DeFi ecosystem. Stablecoins categorized as tokenized assets have gained importance within the DeFi sector by fulfilling the demand for stable value assets in agreements. These stablecoins can be supported by on-chain collateral as seen with Dai stablecoin or off-chain collateral like USDT and USDC. While offering advantages, such as stability, these stablecoins also introduce concerns related to reliability and reliance on backing assurances (Schär, 2021).

In the world of DeFi, there are types of tokens aside from the ones such as governance tokens, tokens for specific functions in smart contracts and non-fungible tokens (NFTs). Non-fungible tokens (NFTs) are unique digital assets that represent ownership or proof of authenticity of a specific item or piece of content, typically stored and traded on a blockchain. Unlike cryptocurrencies such as Bitcoin or Ethereum, which are fungible and can be exchanged on a one-to-one basis, NFTs are indivisible and cannot be replicated. Each NFT contains metadata that distinguishes it from other tokens, including information about its creator, ownership history and characteristics that make it unique. NFTs stand out as they represent one-of-a-kind assets and have captured a lot of interest for their role, in establishing ownership and distinguishing individual digital or physical assets (Raman & Raj, 2021).

Key Components and Technologies

Decentralized finance (DeFi) encompasses various components that collectively form a decentralized financial ecosystem. Decentralized finance (DeFi) relies on a mix of distributed ledger technologies (DLT), smart contracts and different types of tokens to operate effectively. Each of these components plays a role in shaping the functional DeFi ecosystem (Fig. 13.1).

The first key component of DeFi is distributed ledger technologies. It serves as the foundation of DeFi providing a structure for transactions that prioritizes transparency, immutability and security. These features are essential for establishing trust without the need for intermediaries. The second key component of DeFi is smart contracts. Smart contracts are automated agreements encoded with terms that execute themselves when conditions are met. They are fundamental to DeFi applications allowing for the automation of transactions and agreements. Interacting with contracts is made user-friendly through web-based interfaces enhancing accessibility to DeFi protocols. The third key component of DeFi is tokenization. Tokenization involves converting ownership rights to an asset into tokens on a blockchain. This process has expanded the range of assets integrated into DeFi immensely. The

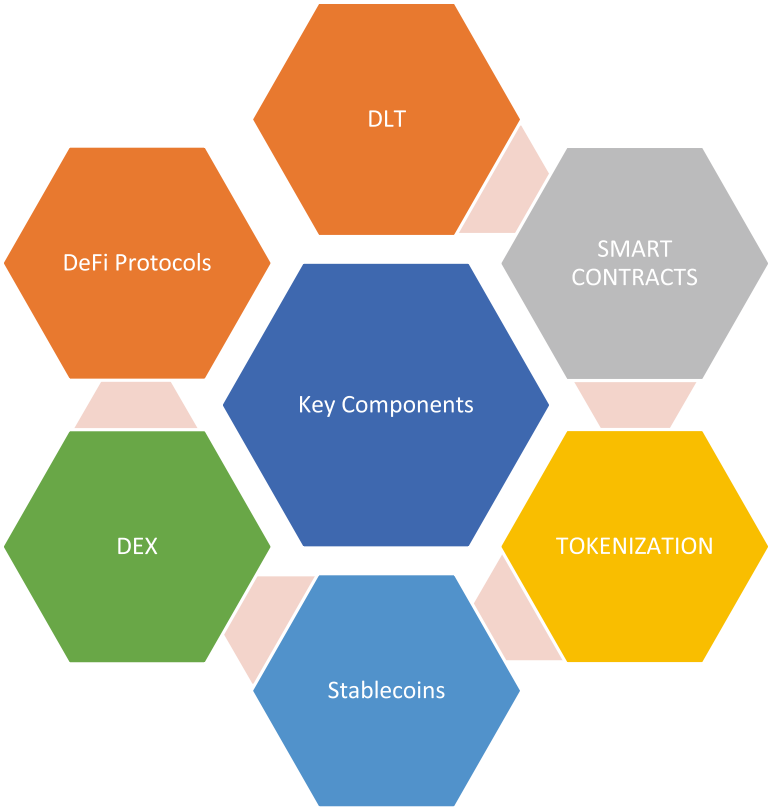

Fig. 13.1 Key components of decentralized finance (DeFi)

majority of tokens within DeFi are built on the Ethereum blockchain using the ERC 20 token standard ensuring interoperability across DeFi platforms. Tokenization not only boosts the efficiency and accessibility of transferring assets but also opens up a whole new range of possibilities when it comes to the types of assets available from stablecoins and governance tokens to non-fungible tokens (NFTs). The fourth key component of DeFi is stablecoins. They play a role in finance (DeFi) by providing low-volatility assets that are crucial for various financial agreements. Stablecoins can be backed by methods, off-chain collateral (such as USDT and USDC), on-chain collateral (like the Dai stablecoin) or even no collateral all. The choice of model affects the stability of the token and counterparty risk. The fifth key component of DeFi is decentralized exchanges (DEX). DEX enables users to trade cryptocurrency assets without having to rely on an entity. This setup helps mitigate risks associated with exchanges including asset seizure or loss vulnerability to points of failure and potential malicious activities. The last key component of DeFi is DeFi protocols and aggregators. These protocols provide a range of services like lending, borrowing and trading derivatives. DeFi aggregators expand these capabilities by

linking applications and protocols offering tools for comparing services and facilitating intricate financial operations across various protocols. Together these elements form a vibrant ecosystem that is constantly evolving and adaptable. Every element has its contribution to maintaining the functionality of the DeFi sector while also expanding the range of financial services available beyond what traditional centralized financial institutions offered.

These key components form the foundation of the DeFi ecosystem, enabling users to access a wide range of financial services in a decentralized and permissionless manner. However, it is essential to note that the DeFi space is rapidly evolving, with new innovations and components continuously emerging to address the evolving needs of users and enhance the efficiency and accessibility of decentralized finance. The ongoing progress and incorporation of these technologies play a role in shaping the future of DeFi paving the way for transformation in the financial sector through enhanced inclusivity, efficiency and transparency, in financial services (Auer et al., 2023).

DeFi Market Landscape

The decentralized finance (DeFi) market is undergoing significant growth and evolution driven by several key factors and trends.

Regulators, in the United States, are increasingly focusing on the DeFi sector. There is a growing emphasis on finding a balance between privacy and transparency to address concerns and promote alignment. True DeFi platforms that operate without control are likely to remain outside existing frameworks. However, platforms with some centralized elements (HyFi) may face scrutiny. Efforts are underway to enhance compliance measures and develop on-chain solutions to address concerns and enhance the security and transparency of DeFi.

On the other hand, the trend of tokenization continues to drive growth in the DeFi sector. Tokenization involves representing real-world assets as tokens on the blockchain. This trend covers a range of assets such as stocks, bonds, real estate and even treasury bills. Tokenization is expected to enhance liquidity transaction costs. The emergence of yield-bearing stablecoins backed by tokenized treasury bills is becoming a trend that appeals to risk-averse investors while contributing to increased liquidity and innovation, in the sector. DeFi platforms are becoming more popular due to their ability to support money transfers, securely store funds in cryptocurrency wallets and facilitate trading of assets. The shift towards networks like Ethereum 2.0 is anticipated to improve the functionality, security and scalability of DeFi.

However, the industry encounters challenges such as the necessity for infrastructure and regulations as well as the risks linked to the volatility of crypto assets utilized as collateral. Emerging as an element, DeFi insurance aims to enhance user trust and drive the adoption of decentralized exchanges (DEXs). It mitigates risks including wallet breaches, liquidity challenges and vulnerabilities in contracts,

thereby appealing to more institutional investors in the DeFi sector. The impact of Covid pandemic hastened the acceptance of technology in streamlining supply chain applications and business processes. It also prompted investors to explore opportunities in DeFi amid a period of interest rates.

Blockchain technology and smart contracts play roles in driving DeFi's expansion. Blockchain empowers decentralized services, while smart contracts enable more secure financial transactions. The DeFi sector is undergoing a change propelled by advancements in technology and creative business strategies. Key players in the industry are using these changes to seize prospects and broaden their reach worldwide. Data analytics take precedence in DeFi applications delivering advantages in decision-making processes and risk mitigation strategies. The realm of payments is also expanding rapidly improving the efficiency of peer-to-peer cryptocurrency transactions.

Presently, North America leads the DeFi market, thanks to industry players and a substantial crypto market presence. On the other hand, Asia Pacific is projected to see growth due to swift technological adoption and economic advancements in the area. The decentralized finance industry is experiencing a surge in companies, established organizations and technology companies vying for advancements and a piece of the market. Collaborative efforts are prevalent as companies strive for innovation and a slice of the market pie. The DeFi market landscape is characterized by its growth, regulatory challenges, the rise of tokenization and evolving technology and applications. These developments are shaping DeFi into a more mature and robust sector of the financial industry (Research, 2024).

International Legal Frameworks Governing DeFi

The legal rules governing decentralized finance (DeFi) are constantly intricate as authorities worldwide work to adjust financial regulations to fit the unique aspects of DeFi.

In the United States, multiple federal agencies like the Department of Justice Financial Crimes Enforcement Network, Internal Revenue Service, Commodity Futures Trading Commission and Securities and Exchange Commission (SEC) potentially oversee parts of DeFi. State authorities might also have a say. Nonetheless, DeFi investors typically do not receive the compliance standards and comprehensive disclosure commonly seen in regulated markets. The SEC plays a role in overseeing activities within its domain concerning securities and related actions in the DeFi realm. It encourages developers of DeFi projects to communicate with its staff for understanding and navigating through matters (SEC.gov | Statement on DeFi Risks, Regulations, and Opportunities, 2021). Regulators around the world are acknowledging the importance of promoting innovation while safeguarding investors and maintaining stability. They are exploring ways to adapt regulations or establish frameworks to offer clarity and oversight in the realm of DeFi. This includes applying existing laws to components of DeFi and crafting tailored

regulations for this sector. Self-regulation is becoming increasingly important within the DeFi community as industry groups are setting up guidelines and standards (Contributors, 2023).

The International Organization of Securities Commissions (IOSCO) has put forth recommendations based on the notion that DeFi's not fundamentally different from finance. IOSCO proposes applying existing securities regulations to the DeFi sector. The recommendations for evaluating DeFi involve a thorough assessment of its products, services, structures and operations. This includes identifying responsible individuals and establishing regulatory standards that address conflicts of interest and manage risks. Enforcing applicable laws is crucial as is fostering international collaboration to ensure comprehensive regulation. Recognizing the connections between DeFi, the broader crypto asset market and traditional financial markets is essential for creating a well-rounded regulatory approach (IOSCO Unveils Consultation Report on Global DeFi Regulation, n.d.).

Also, the financial stability board (FSB) has been looking into the risks to stability posed by DeFi. Although acknowledging the features of DeFi, the FSB points out that its functions are not significantly different from those of finance. The board is worried about weaknesses, liquidity discrepancies and how these could affect stability. To tackle these concerns, the FSB recommends evaluating DeFi activities under structures and considering additional regulations to address DeFi-related risks (FSB Assesses Financial Stability Risks of Decentralized Finance, n.d.). The World Economic Forum has highlighted the importance of implementing strategies for DeFi. They propose that modifying regulations and creating laws tailored to DeFi can help regulate the industry and encourage innovation. This strategy would require cooperation among regulators, industry players and legal professionals to tackle the challenges of DeFi especially considering its global characteristics (Decentralized Finance Heats up: New Approaches Needed for Industry Transformation, n.d.).

Global initiatives suggest a push to incorporate DeFi into a defined regulatory system blending adjustments to existing financial rules with the development of new regulations tailored to DeFi. This holistic strategy seeks to promote stability, safeguard investor interests and foster the expansion of the DeFi industry.

Legal Challenges in DeFi

Decentralized finance (DeFi) faces a range of issues due to its innovative nature and fast-paced development.

One major challenge is the smart contracts and legal enforceability. The status and enforceability of contracts which are self-executing contracts on the blockchain. Understanding how these contracts align with frameworks especially regarding their validity and resolving disputes is crucial. The ongoing debate centres around adapting existing systems to accommodate the aspects of smart contracts. Secondly, anti-money laundering (AML) and know your customer (KYC)

compliance present significant legal challenges. These platforms often facilitate transactions that lack identification making it difficult to comply with regulations that mandate verifying client identities and monitoring transactions to prevent illicit activities. While initiatives like the US Infrastructure Investment and Jobs Act (2021) aim to implement KYC measures in the cryptocurrency sector, their effectiveness in DeFi remains uncertain due to its structure. Another major legal challenge in DeFi is the classification of various products and tokens as securities. The classification depends on factors like the nature of the token, the rights it confers and its marketing. Compliance with securities laws involves obligations like registration, disclosure and adherence to investor protection standards.

To tackle these obstacles, cooperation among regulators, industry players and legal professionals is essential. Crafting frameworks involves striking a balance between encouraging innovation and ensuring adherence to rules for investor protection. The cross-border nature of DeFi complicates matters, necessitating coordination to align regulations and standards across regions. Stakeholders need to navigate these challenges to support the sector's growth responsibly while safeguarding the interests of participants and upholding financial stability. Worldwide efforts are underway to comprehend and regulate DeFi effectively by adjusting existing regulations or formulating ones through discussions aimed at grasping its complexities and potential risks (Salami, 2021).

Overview of Fintech Regulation in India

The regulatory landscape for fintech in India is multifaceted and evolving, reflecting the country's rapid growth in this sector.

(i) Cryptocurrency Regulation: The Indian government has taken steps to regulate cryptocurrencies actively. The draft Cryptocurrency and Regulation of Official Digital Currency Bill, 2021, aims to establish a framework for a currency issued by the Reserve Bank of India (RBI) while placing restrictions on private cryptocurrencies. However, it is important to note that this bill is still in the drafting phase and could undergo changes. In 2023–2024, the Indian government allocated funds for fintech and banks indicating a growing acknowledgment of the sector's significance (Khurana et al., 2023).

(ii) Funding for Fintech in India: In India, fintech companies have access to funding options, including equity and debt. Funding sources range from investors like venture capitalists to bank loans, foreign investments, external commercial borrowings and initial public offerings (IPOs). Nevertheless, there has been a trend in fintech IPOs in 2022 due to global conditions and the performance of certain public fintech companies.

(iii) Government Initiatives and Incentives: Both at the state levels, the Indian government has introduced initiatives to support startups and expanding businesses, particularly those in the fintech industry. This support encompasses

funding programmes such as the Credit Guarantee Trust for Micro and Small Enterprises as policy measures like the Tamil Nadu Fintech Policy 2021.

(iv) Regulatory Framework: The fintech industry in India operates under guidelines as opposed to a single comprehensive framework. Different regulations apply based on the type of fintech service being offered. Major regulatory bodies such as RBI, SEBI, IRDAI, PFRDA and IFSCA oversee aspects of activities like online payments, lending, insurance and securities trading. To conduct business, fintech companies typically need approvals and licenses from these authorities.

(v) Data Protection and Privacy: Regarding data protection and privacy, the proposed DPDP Act 2023 in India introduces changes related to data processing and safeguarding information. This Act could potentially complicate the landscape for technology firms those in the fintech sector handling sensitive financial data (Navigating the Maze of Fintech Regulation in India: Understanding the Challenges of Multiple Regulators. Conventus Law, 2023).

In response to concerns, the Indian government has implemented measures to bring compliance and transparency within the fintech lending domain. Recent actions include imposing bans on loan applications due to compliance issues and other related concerns. These initiatives have prompted fintech firms to adopt transparency practices and foster a lending environment for borrowers.

The Regulatory Landscape for Cryptocurrencies and Decentralized Finance (DeFi) Services in India

The regulatory landscape for cryptocurrencies and decentralized finance (DeFi) services in India is characterized by its evolving nature and the active role of various regulatory bodies. The legal status of cryptocurrencies and DeFi services in India has seen shifts over the years. Initially, the Reserve Bank of India (RBI) imposed restrictions on regulated entities dealing with cryptocurrencies in 2018 causing disruptions in the market. However, a pivotal ruling by the Indian Supreme Court in 2020 overturned this reviving hope for the industry. Subsequently, efforts have been underway to establish a framework for cryptocurrencies in India. A proposed bill titled "The Cryptocurrency and Regulation of Official Digital Currency Bill 2021" aims to introduce a currency issued by the RBI while restricting private cryptocurrencies; however, this bill is still undergoing review and potential modifications. The government's approach towards cryptocurrencies has been cautious emphasizing a balance between embracing technology and safeguarding investor interests (Desire, 2023; R, 2024). Various regulatory bodies play roles in overseeing the fintech sector in India, including, but not limited to, the RBI, Securities and Exchange Board of India (SEBI), Insurance Regulatory and Development Authority of India (IRDAI), Pension Fund Regulatory and Development Authority (PFRDA) and International Financial Services Centres Authority (IFSCA). Various regulatory

bodies oversee aspects of fintech operations such as payments, transactions, data privacy, lending, insurance and securities trading. To kick-start their services, fintech companies often need to obtain approvals and licenses from these authorities.

In times there have been developments and legal judgements influencing the fintech landscape in India. The 2020 Supreme Court ruling brought clarity to the status of cryptocurrencies in the country. Additionally, the Indian government has been actively revising regulations and frameworks to effectively manage the fintech industry. This includes efforts to revamp laws related to the Internet, data, cybersecurity, telecommunications and data protection through policies and statutes. Proposed legislations like the draft National Data Governance Framework Policy 2022 and Digital Personal Data Protection (DPDP) Act 2023 are expected to impact data security and privacy within the fintech sector (Anand et al., 2023).

The environment surrounding fintech and cryptocurrencies in India is vibrant as regulatory bodies strive to keep pace with advancements while safeguarding investor interests and financial stability. Maintaining a balance between fostering innovation and implementing regulations remains an aspect that will shape the future of these industries in India.

Conclusion and Recommendations

It is concluded that the world of finance (DeFi) in India is going through changes and regulatory developments. The legal status of cryptocurrencies and DeFi services is still uncertain as the government is approaching their integration into the system cautiously. Organizations like RBI, SEBI and IRDAI are instrumental in shaping the fintech landscape by addressing issues such as safeguarding investors and ensuring stability. A comparison with countries shows that India is making slow but deliberate progress towards establishing a regulatory framework for cryptocurrencies and DeFi by 2025. Collaboration among regulators, industry players and legal experts will be crucial as the sector advances to handle the complexities of DeFi while promoting innovation and safeguarding stakeholders' interests.

Before researchers dive into the recommendations for decentralized finance (DeFi), it is crucial to acknowledge the impact and swift evolution of this sector. DeFi arising from advancements in technology has revolutionized the financial transactions which are carried out posing a challenge to financial systems and regulations. This new field offers accessibility, efficiency and transparency in services but also brings about complexities like regulatory ambiguity, security issues and ethical dilemmas. The merging of technology and finance embodied by DeFi requires an approach that balances innovation with compliance to laws and regulations. In light of these considerations, the upcoming recommendations seek to offer guidance for the encompassing growth of the DeFi industry ensuring that its potential is fully realized while managing associated risks effectively. Few recommendations are as follows:

1. *Harmonizing Regulations and Setting Standards*: It is essential to promote a DeFi landscape by harmonizing regulations and setting standard practices across different countries. This approach should involve defining the status of cryptocurrencies and DeFi services as well as establishing consistent standards for protecting investors, preventing money laundering and countering terrorist financing.
2. *Implementing Technological Governance*: Encourage the development and implementation of governance mechanisms within the DeFi ecosystem. This could include conducting audits of contracts, implementing risk management protocols and devising emergency response strategies to maintain system integrity and safeguard users against vulnerabilities and exploitation.
3. *Improving Interoperability and Transparency*: Support the creation of DeFi platforms and protocols that facilitate platform transactions and enhance liquidity. Transparency can be enhanced through reporting practices that ensure users have knowledge about the risks associated with DeFi services.
4. *Establishing Legal Frameworks for Smart Contracts and Educating Consumers*: It is recommended to develop a framework tailored specifically to address the enforceability and implications of contracts. This framework should provide guidance on jurisdiction contract validity and dispute resolution mechanisms in a decentralized environment. Also, it is important to inform consumers about the risks and benefits of DeFi including its technology, potential uses and risks. This will help users make decisions.
5. *Balancing Innovation and AML and KYC Compliance*: It is important to find a balance between promoting innovation in DeFi and adhering to legal policy. Collaboration between regulators and DeFi stakeholders can create a secure ecosystem. Also, developing AML and KYC frameworks that can function effectively in the nature of DeFi transactions without compromising privacy or decentralization principles is crucial.
6. *Global Standards Collaboration and Ethical Behaviour*: It is recommended to encourage cooperation among authorities, tech experts and legal professionals to establish standards for DeFi is essential. Addressing issues, like border transactions, security concerns and legal uncertainties should be a priority. Ethical behaviour offers reward to DeFi platforms that follow standards such as transparency, consumer safeguarding and compliance with regulations. This could include tax benefits, funding opportunities or acknowledgment initiatives.

These suggestions aim to pave the way for an ethical and advantageous advancement of DeFi that aligns with the technology's capabilities and the need for strong regulatory supervision.

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C. M. Gupta, G. Kaur (eds.), *E-banking, Fintech, & Financial Crimes*,
https://doi.org/10.1007/978-3-031-67853-0