Global Fintech INSTITUTE

Understanding FINTECH

A Beginner's Guide to the Fintech Revolution

Global Fintech Institute

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Preface

Understanding Fintech: A Beginner's Guide to Finance in the Digital Age

Why Fintech, and Why Now?

Not so long ago, opening a bank account required a branch visit and a stack of paper forms. Sending money abroad took days and cost a significant fee. Investment advice was the preserve of those wealthy enough to afford a private banker. In the space of roughly a decade, almost all of that has changed. Today you can open a bank account on your phone in minutes, send money across the world in seconds, and access a professionally managed investment portfolio through an app. A small business owner can obtain a loan assessed not by a branch manager but by an algorithm (a set of rules a computer follows to make a decision) analyzing hundreds of data signals in real time. This sweeping transformation goes by a single word: **fintech**, short for financial technology.

The scale of change is striking. Global investment in fintech grew from a few billion dollars in the early 2010s to well over one hundred billion dollars annually by the early 2020s. Billions of people who were previously unbanked (without access to even a basic bank account) now make and receive payments digitally through their phones. Fintech has become one of the defining forces reshaping how money moves, how risk is managed, and how people relate to financial services in their daily lives.

Who This Book Is For, and How We Have Written It

This book is written for anyone who wants to understand fintech without a background in finance or technology - students approaching the subject for the first time, professionals in law, policy, or business for whom fintech keeps arising, or simply curious people who use financial apps every day and want to understand what is going on behind the scenes. We approach it from the perspective of a thoughtful newcomer asking: What is fintech? Who does it affect? What technologies drive it? What risks does it create, and what might come next?

Wherever we introduce an unfamiliar term, we explain it immediately in plain English, right there in the sentence - so you never have to stop and look something up. For example, liquidity (the ease with which an asset can be converted to cash) or encryption (converting data into a coded form so only authorized parties can read it) are explained the moment they appear. Our deeper aim, beyond vocabulary, is to convey **intuition** — the sense of why something exists and what problem it solves. Understanding why someone might want to borrow money outside the banking system makes the mechanics of peer-to-peer lending (a platform that connects borrowers and lenders directly, without a bank in between) far easier to follow. That is the philosophy guiding every chapter.

Fintech and Its Impact on Finance and Society

Fintech is not only a story about technology. When a mobile payments app gives someone in a rural area their first access to financial services, that is a change with real

human consequence. When an algorithm makes a credit decision, questions of fairness, transparency, and accountability arise that go well beyond the technical. We keep these broader dimensions in view throughout the book, because understanding fintech means understanding not just the tools but the context and the effects of their use. Fintech is shaped by regulation (rules set by governments to protect consumers and maintain financial stability), by competition, and by culture. Its growth has also created genuine risks: to consumers, to financial institutions, and to the stability of the financial system as a whole. An honest account of fintech must reckon with both its considerable promise and the real challenges it creates.

How This Book Is Organized

The book opens with an overview chapter mapping the entire fintech landscape - what it is, how it evolved, what technologies underpin it, what benefits it delivers, what risks it creates, and where it is heading. We recommend reading it first and returning to it at the end as a review. Subsequent chapters explore specific areas in depth: payments, lending, wealth management, insurance, regulatory technology, digital assets, and more. Each chapter introduces motivation before mechanics, explains terms as they appear, and draws on real-world examples. Each also ends with a glossary, review questions, and suggestions for further reading. Because fintech moves fast, we have written around principles and frameworks rather than specific companies, so the core ideas remain useful as the landscape continues to evolve.

You do not need to be an expert to engage seriously with fintech. You need curiosity, a willingness to think carefully, and a guide written with your needs in mind. We hope this book can be that guide.

Chartered Fintech Associate (CFTA) Program

This book also serves as the text for the Chartered Fintech Associate program. The CFTA is a certification program for those who wish to receive recognition of their mastery of a body of knowledge contained in this book. The CFTA designation is conferred upon those who successfully pass an exam. More information on this program can be found at https://globalfintechinstitute.org/programmes/cfta/.

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Chapter 1 Overview of Fintech

Introduction

Many people know that “fintech” is short for financial technology. If you look up the term, you will often see a definition such as “the use of technology in finance”. At first glance, this does not sound new. Banks have used technology for decades. An obvious example is the Automated Teller Machine (ATM) (Arner et al., 2016).

What is new is not the fact that technology exists in finance, but the way technology is changing **(i) who** can provide financial services and **(ii) how** these services are designed and delivered (Arner et al., 2016; Feyen et al., 2021).

First, the provision of financial services is no longer restricted to banks and traditional financial firms. Today, you can send money to someone locally or overseas using a mobile app that is not from a bank. If you need short-term credit to pay for goods, you may not have to use a credit card. You can use a buy-now-pay-later provider instead (Pazarbasioglu et al., 2020; International Monetary Fund & World Bank, 2019).

Second, technology has changed the customer’s experience. In the past, many services required a visit to a branch, paper forms, and waiting time. Today, many transactions can be carried out online at any time of day using a mobile phone. As shown in Figure 1.1, this shift can be seen in the movement from branch-based, paper-intensive and time-limited services to app-based, instant and always-available financial services (Pazarbasioglu et al., 2020; Demirgüç-Kunt et al., 2022).

In this chapter, we provide an overview of fintech by explaining what fintech is, how it evolved, how it is reshaping financial services, and what risks and regulations come with this shift. If you do not fully understand some of the technologies described, don’t worry. In later chapters, the various technologies will be explained in greater detail with examples of how they are applied.

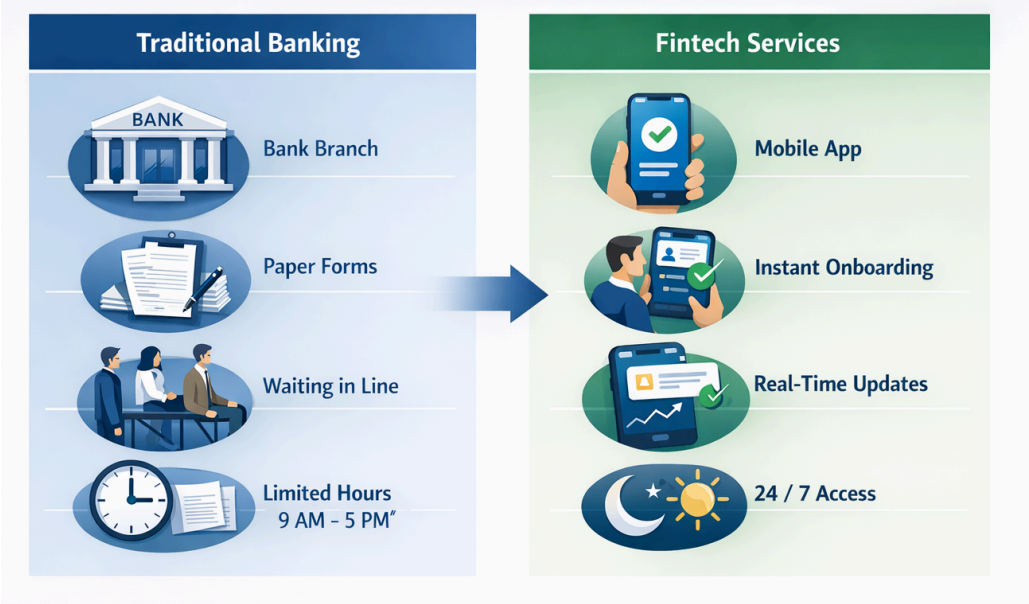

Figure 1.1 From branch to app: How financial service delivery has changed

Learning Outcomes

By the end of this chapter, you should be able to:

- Understand the key risks, governance issues, and regulatory concerns associated with AI in finance, including bias, explainability, hallucination, model drift, and accountability.
- Master the core concept of fintech, including its definition, key characteristics, and role in transforming financial services.
- Be familiar with the evolution of fintech and the main technologies and business models used in the industry.
- Be familiar with the impact and benefits of fintech on financial institutions, customers, and market structure.
- Understand the key risks and challenges in fintech, including cybersecurity, data privacy, and operational risks.
- Understand the regulatory landscape and future trends shaping fintech development.

1.1 What is Fintech

1.1.1 Definition

Fintech refers to technology-enabled innovation in financial services that leads to new or improved business models, processes, products, or delivery channels, and has a material effect on how financial services are provided (Financial Stability Board, 2024; International Monetary Fund & World Bank, 2019). As shown in Figure 1.2, this definition highlights three important points.

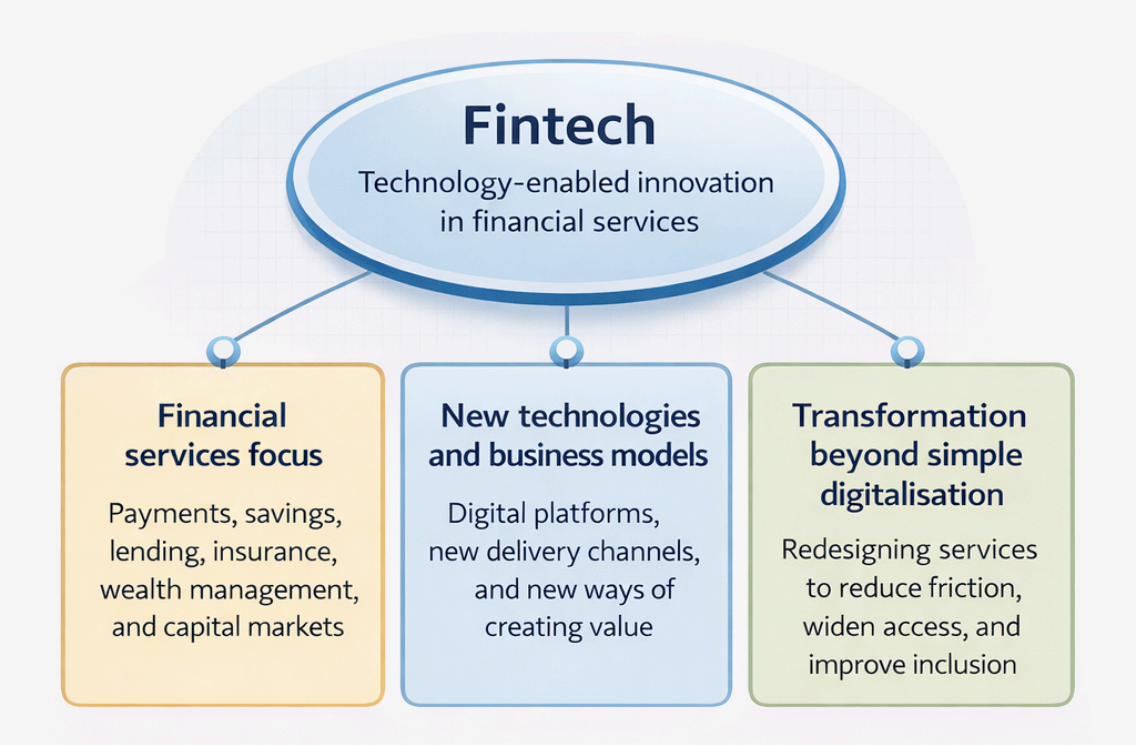

Figure 1.2 What counts as fintech?

(a) Fintech is about financial services. Fintech is not "any technology". It is technology applied to financial activities such as payments (transferring money or paying a merchant), savings and deposits (placing money in an account), lending and credit (borrowing money), wealth management (investing and managing financial assets), insurance (managing risk through insurance products), and capital markets (trading and issuing securities such as stocks and bonds) (Financial Stability Board, 2017; International Monetary Fund & World Bank, 2019).

(b) Fintech uses new technologies and new business models. A business model describes how a firm creates value for customers and how it earns revenue. Fintech firms often

use technology to offer a service in a different way, for example, a digital-only bank that has no branches, or a platform that connects users directly through peer-to-peer services instead of going through a traditional intermediary (Arner et al., 2016; Feyen et al., 2021).

(c) Fintech is transformation, not simple digitalization. Digitalization means moving an existing process from paper or manual steps onto computers (for example, putting a paper form onto a website). Fintech goes further. It often redesigns the process itself to reduce friction (Feyen et al., 2021; Financial Stability Board, 2024).

Friction refers to the "pain points" that slow down or complicate a transaction, such as long processing times, repeated document checks, or high fees. By reducing frictions, fintech can make financial services broader in scope, more convenient in daily life, and more inclusive (Feyen et al., 2021; Pazarbasioglu et al., 2020).

Fintech makes financial services more inclusive. More people and small businesses that were previously underserved or excluded can now use affordable financial services to make payments, save money, or get credit.

1.1.2 Drivers of fintech growth

Fintech did not emerge in a vacuum. Its growth is linked to long-term changes in technology, consumer behavior, and regulation. Below are main drivers of fintech growth (see Figure 1.3).

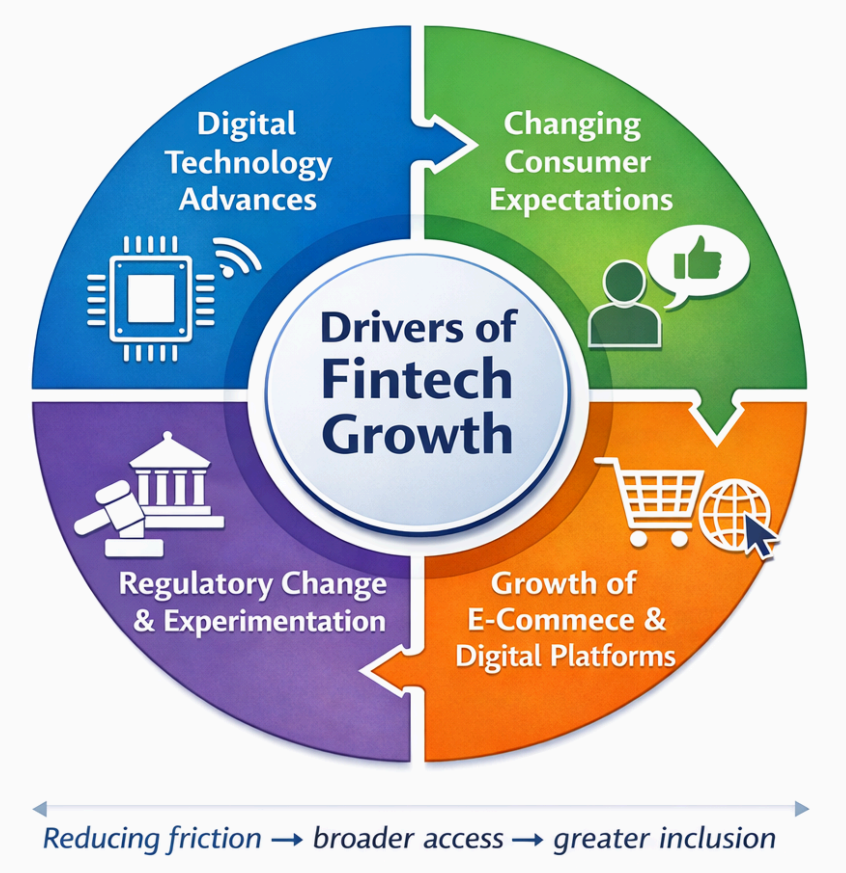

Figure 1.3 Main drivers of fintech growth

(a) Advances in digital technology have reduced the cost of delivering financial services at scale (that is, to many users at a low cost per user). Examples include mobile devices and high-speed internet, cloud computing, data analytics, artificial intelligence (AI) and machine learning (ML), blockchain (distributed ledger technology), and stronger cybersecurity tools (Basel Committee on Banking Supervision, 2024; Pazarbasioglu et al., 2020).

Cloud computing allows firms to rent computing power and storage over the internet instead of building their own data centers. Data analytics refers to techniques that turn raw data into useful information (Basel Committee on Banking Supervision, 2024; OECD & Financial Stability Board, 2024). AI refers to computer systems that can perform tasks that normally require human judgement, such as recognizing patterns or making predictions. ML is a common approach within AI where the system "learns" patterns from data rather than being programmed with fixed rules.

(b) Changing consumer expectations have arisen as people become used to smooth digital experiences in shopping, entertainment, and communication, and this means consumers expect finance to deliver similar standards in speed, transparency (clear fees and real-time

updates), and personalization (services tailored to the customer) (Bank for International Settlements, 2023; Pazarbasioglu et al., 2020).

(c) Regulatory change and experimentation. Regulation refers to rules set by authorities to protect consumers and keep the financial system stable. In some countries, regulators have introduced frameworks that make it easier to test new financial services safely through regulatory sandboxes (Financial Stability Board, 2017; Financial Conduct Authority, 2026).

A regulatory sandbox is a supervised environment where firms can test innovative products with real users under specific safeguards (Appaya et al., 2020; Financial Conduct Authority, 2026). Sandboxes can encourage innovation while allowing regulators to learn about new risks.

(d) The growth of e-commerce and digital platforms has led to large online platforms increasingly offering banking-like services, such as payments, consumer credit, and financing for merchants. This blurs the boundary between "financial" and "non-financial" firms and accelerates the integration of finance into everyday digital activity (Carstens et al., 2021; Financial Stability Board, 2020).

1.1.3 Technologies commonly used in Fintech

Fintech applications use many technologies. It is helpful to group them into layers.

(a) Foundational infrastructure technologies. Traditionally, computers store software programs and data in their memories and use a microprocessor to run the programs. Today, computer programs and data can be stored remotely in data centers instead, giving rise to an innovation called "cloud computing", which provides scalable (easily expanded) computing resources (Basel Committee on Banking Supervision, 2024).

Advances in Application Programming Interfaces (APIs), essentially "connectors" that enable different software systems to communicate, allow fintech services to integrate with banks, merchants, and other platforms.

(b) Blockchain and distributed ledgers. A ledger is a record of transactions. In traditional systems, a central institution keeps the ledger. In a distributed ledger, multiple participants share and update the record using agreed rules. Blockchain is one type of distributed ledger where transactions are grouped into blocks and linked together, making it difficult to alter past records without detection (Basel Committee on Banking Supervision, 2024; Financial Stability Board, 2023).

Blockchain-based ideas support applications such as cryptocurrencies (digital tokens used as a medium of exchange on a blockchain), faster settlement (the final completion of a trade or payment), and digital identity (verifying who a user is online).

(c) Data intelligence and cognitive technologies. E-commerce, online social media, the internet and other platforms, have created a deluge of data (often called Big Data). The resulting datasets are large, fast-changing, or complex. AI through Machine Learning (ML) has enabled the analysis of this data to support credit scoring (estimating the likelihood that a borrower will repay), fraud detection (spotting suspicious transactions), customer support (such as chatbots), and automation of back-office work (such as document processing) (OECD & Financial Stability Board, 2024; Basel Committee on Banking Supervision, 2024).

(d) Cybersecurity and privacy-preserving technologies. Encryption converts data into a coded form so that only authorized parties can read it. Authentication confirms a user's identity. In the case of multi-factor authentication (MFA), more than one method is used, for example, a password plus a one-time code sent to a phone. Identity management and anti-fraud tools are deployed to monitor activity for unusual behavior (National Institute of Standards and Technology, 2024; Financial Stability Board, 2017).

(e) User-facing technologies. Most fintech services are delivered through mobile apps. Biometric authentication uses physical traits, such as fingerprints or facial recognition, to confirm identity. The Internet of Things (IoT) consists of connected devices (such as sensors) that collect and transmit data. In finance, IoT can support usage-based insurance, for example, insurance pricing partly based on driving behavior measured by a device instead of only broad historical averages of accidents (Appaya et al., 2020).

Table 1.1 illustrates the main technologies commonly used in fintech and shows how they contribute to different financial services and fintech solutions.

User Needs	Traditional Model	Gaps	AI/ ML	Data/ Cloud Plat-forms	DLT/ Crypto	Mobile	Fintech Solutions

Pay	Cash/ATM Check, Wire/MTO, Debit/Credit Cards, Card-Centered Settlement	Speed, Cost, Transpa-rency, Access, Security	L	H	H	H	Virtual Currencies, Remittances, Mobile Payments, Mobile POS, P2P Payments, B2B Transactions, DLT-based Settlement
Save	Bank Deposits, Mutual Funds, Bonds, Equities		L	H	H	L	Virtual Currencies, Mobile Market Funds, Blockchain Bonds
Borrow	Bank Loans, Bonds, Mortgages, Trade Credit		H	H	H	L	Credit Modeling, Platform Lending, Crowd-funding, Blockchain Bonds, Auto-underwriting
Manage Risks	Brokerage, Underwriting, Structured Products, Trading, Compliance, Insurance		H	L	H	L	Regtech, Smart Contracts, Suptech, Crypto-asset Exchanges, eKYC, Digital ID
Get Advice	Financial Planner, Investment Advisor		H	M	L	M	Robo-advising, AI-curated Wealth Management

Table 1.1 Key technologies supporting fintech services

Source: Pazarbasioglu et al. (2020) and International Monetary Fund and World Bank (2019)

1.1.4 Key characteristics of fintech services

Fintech is not only about using new technology. It is also characterized by a particular approach to designing and delivering services.

(a) Customer-centric design. Products are now designed around the user's needs and experience. This often leads to simpler interfaces and faster onboarding, which is the process of signing up and verifying a customer's identity (for example, verifying identity online instead of visiting a branch) (Pazarbasioglu et al., 2020).

(b) Accessibility and convenience. Many services that previously required physical visits can now be accessed through mobile devices, often 24/7. This is valuable for customers in remote areas or for those with limited time to visit branches (Demirgüç-Kunt et al., 2022; Pazarbasioglu et al., 2020).

(c) Efficiency and speed through automation. With automation, tasks are performed by software with limited manual input. Straight-through processing is where a transaction is processed from start to finish electronically with minimal manual intervention. Some systems use smart contracts, which are computer programs and incorporate computer code (often on a blockchain) that automatically carry out an action when specified conditions are met (Financial Stability Board, 2017; Bank for International Settlements, 2023).

(d) Transparency. Many fintech apps provide real-time information on balances, fees, and transaction status. This visibility can help customers make more informed decisions when information is clear and accurate (Pazarbasioglu et al., 2020).

(e) Personalization at scale. Using analytics and sometimes machine learning, providers can tailor products and advice. For example, apps can categorize spending to highlight trends or suggest investment portfolios based on a risk profile (your willingness and ability to take risk) (OECD & Financial Stability Board, 2024; Pazarbasioglu et al., 2020).

(f) Ecosystem orientation: open banking, APIs, and embedded finance. In open banking, banks provide secure API access to customer-permitted data to approved third parties. Embedded finance occurs when financial services are offered within a non-financial platform, such as instalment payments at online checkout (Financial Conduct Authority, 2025a, 2025b; Kerse et al., 2024).

Fintech can make services more convenient and accessible, but greater reliance on data and automation raises issues around privacy, security, fairness, and financial stability. These topics are examined later in this chapter.

1.2 Evolution of Fintech

Fintech has evolved over decades as technology changed, new firms entered the market, and customer behavior shifted. One useful approach is to distinguish several broad phases. Table 1.2 summarizes the evolution of fintech.

Phase	Approximate period	Main theme	Examples
Fintech 1.0	mid-20th century – early 2000s	Digital foundations built mainly by banks	Visa, SWIFT, ATMs
Fintech 2.0	early 2000s – mid-2010s	Start-ups disrupt specific services; mobile-first finance	PayPal; Alipay / WeChat Pay; LendingClub (P2P lending); Bitcoin (early crypto)
Fintech 3.0	mid-2010s – present	Integration and collaboration; platform ecosystems	Stripe (API payments); Ant Group (ecosystem); Revolut / Monzo (neobanks)
Beyond 3.0	emerging	DeFi, CBDCs, tokenization, and new technologies	Ethereum / DeFi protocols (e.g. Uniswap); CBDCs (e.g. Digital Yuan, e-CNY); Tokenization platforms (e.g. BlackRock tokenized funds)

Table 1.2 The Evolution of Fintech

Source: Bank for International Settlements (2023), He et al. (2017) (International Monetary Fund), and Feyen et al. (2023) (World Bank).

1.2.1 Fintech 1.0 - Building the digital foundation

Fintech 1.0 refers to a long period when traditional institutions, such as banks, led technology adoption. The main goal was to make existing services more efficient, rather than changing the industry's structure.

Key developments included (Arner et al., 2016; Feyen et al., 2021):

(a) Electronic payment instruments. Credit and debit cards supported large-scale cashless payments. Over time, technologies such as chip-and-PIN improved security.

(b) Automated Teller Machines (ATMs). ATMs gave customers 24/7 access to cash and basic services, without being limited by bank branch opening hours.

(c) Electronic trading and settlement systems. Financial markets moved from floor-based trading on exchanges to electronic platforms. Settlement refers to the process that finalizes a trade, such as transferring securities to the buyer and money to the seller.

(d) Core banking systems and back-office digitization. Core banking systems are central systems that record deposits, loans, and transactions. Banks invested heavily in these systems to automate accounting and reporting.

In this phase, innovation was largely institution driven. The outcome was a more efficient and interconnected financial system, but banks remained the central intermediaries.

1.2.2 Fintech 2.0 – Disruption and new business models

Fintech 2.0 marks a shift towards disruptive innovation. Two forces were especially important: the global financial crisis of 2008 (which weakened trust in some traditional institutions) and the smartphone revolution (which changed how people access digital services) (Arner et al., 2016; International Monetary Fund & World Bank, 2019).

Several new patterns emerged.

(a) Mobile banking and payments. Banking apps, mobile wallets, and contactless payments made "mobile access" an expectation.

(b) Cryptocurrencies and smart-contract platforms. Bitcoin demonstrated the use of decentralized digital money where there is no single central operator controlling the system. Later, blockchain platforms introduced smart-contract capabilities (International Monetary Fund & World Bank, 2019; Financial Stability Board, 2023).

(c) Peer-to-peer (P2P) lending and crowdfunding. P2P lending platforms connect borrowers and lenders directly. Crowdfunding (e.g. Kickstarter, Indiegogo) collects small amounts from many contributors to fund a project or business. These activities provide an alternative to going through a financial institution, for example a bank, to link those who need funds with those who have excess funds to invest (Financial Stability Board, 2017; International Monetary Fund & World Bank, 2019).

(d) Robo-advisers. A robo-adviser uses algorithms to recommend and manage investments. Portfolios may be rebalanced automatically, meaning the system adjusts the mix of assets to keep risk and return in line with the strategy. Robo-advisers made the provision of financial advice for investing more accessible to small investors. This service was previously only available to high-net worth individuals due to the need for expensive human advisers (International Monetary Fund & World Bank, 2019).

(e) Digital-only banks (neobanks). A neobank is a digital-first bank-like service, often with no branches, focusing on fast account opening, clear fees, and user-friendly design (through a regulated license or partner, depending on jurisdiction). Costs are significantly reduced by operating digital-only banks as there is no need to operate from expensive physical buildings and using customer-facing staff (Arner et al., 2016; Feyen et al., 2021).

Fintech 2.0 placed strong emphasis on user experience, with some apps using visualization and gamification (game-like features) to make finance more engaging. Traditional institutions responded by improving their own digital services.

1.2.3 Fintech 3.0 – Integration and collaboration.

Fintech 3.0 describes the current phase, where earlier innovations have matured and are increasingly integrated into mainstream finance. The story is not simply "fintech versus banks". Instead, collaboration and ecosystems are central.

(a) AI and machine learning in core operations. Banks and fintech firms use AI for credit assessment, fraud detection, customer service, and process automation (OECD & Financial Stability Board, 2024; OECD, 2026).

(b) Blockchain beyond cryptocurrencies. Distributed ledgers are being tested for trade finance, settlement, and digital identity. Some central banks are experimenting with central bank digital currencies (CBDCs), which are digital forms of a country's official currency issued by the central bank (Financial Stability Board, 2023; Bank for International Settlements, 2023).

(c) Open banking and APIs. Where open banking exists, secure APIs allow approved third parties (with customer consent) to build services on top of banking infrastructure (Financial Conduct Authority, 2025a, 2025b).

(d) RegTech and InsurTech. RegTech (regulatory technology) refers to tools that help firms comply with regulations, for example, monitoring transactions for anti-money laundering (AML) risks. AML refers to measures that detect and prevent the movement of money linked to crime. InsurTech refers to technology-enabled innovation in insurance, such as digital claims processing or usage-based pricing (Financial Stability Board, 2017; International Monetary Fund & World Bank, 2019).

(e) Advanced authentication and security. Biometrics and AI-based fraud detection have become common, supporting trust in digital transactions.

(f) Collaboration: Banking-as-a-Service (BaaS). Banking-as-a-Service means a licensed bank provides certain banking functions (such as accounts or payments) through APIs, so that approved third parties can offer services without building a full bank (Kerse et al., 2024; Crisanto et al., 2021).

(g) Big Tech as financial actors. Large technology firms use their platforms and data to offer payments, credit, and merchant services, often through partnerships or licensed subsidiaries. This increases convenience but raises issues around market power and data governance (Financial Stability Board, 2020; Carstens et al., 2021; Doerr et al., 2023).

Overall, Fintech 3.0 reflects a shift towards a network of interconnected providers rather than a single institution doing everything.

1.2.4 Beyond Fintech 3.0 – Emerging directions

Several trends may shape the next phase.

(a) Decentralized Finance (DeFi). DeFi refers to financial services delivered through smart contracts on public blockchains, with fewer traditional intermediaries. DeFi can enable open access, but it also raises concerns about regulation, security weaknesses, and consumer protection (Financial Stability Board, 2023).

(b) CBDCs and digital payment infrastructure. CBDCs could improve payment efficiency and financial inclusion, but designs differ. A key question is how CBDCs interact with commercial banks and the wider financial system (Bank for International Settlements, 2023).

(c) Embedded finance and platform ecosystems. Financial services are increasingly offered within non-financial apps. This reduces friction for users but may increase concentration risk if a few large platforms dominate (Kerse et al., 2024; Carstens et al., 2021).

(d) Tokenization of real-world assets. Tokenization means representing real assets, such as bonds, deposits, or trade finance claims, as digital tokens recorded on a ledger. Tokenization could make trading and settlement faster, but it also requires legal clarity and reliable infrastructure (Bank for International Settlements, 2023; OECD, 2026).

(e) New technologies and sustainable finance. Green fintech supports sustainability-related finance, for example, tools for ESG (environmental, social, and governance factors) analysis or platforms for carbon markets. Generative AI is beginning to be used for customer support, reporting, and analysis, and will require careful governance

1.3 Impact and benefits: reshaping financial industries

Fintech has altered the financial sector in two related ways. It changes how traditional institutions operate and compete, and it creates benefits for customers and the economy. These effects show that fintech is not merely “another channel” for existing services; it is contributing to a gradual reshaping of industry structure and customer expectations.

1.3.1 Impact on traditional finance

(a) Disruption of established business models. Traditionally, banks were the main intermediaries for deposits and loans, insurers pooled risk, and investment firms managed fund portfolios. Fintech challenges this structure by focusing on specific services and offering alternatives, such as P2P lending, digital wallets, and robo-advice. Technology also affects

wholesale (institution-to-institution) finance, for example, through experiments in cross-border payments and settlement (Financial Stability Board, 2017; Feyen et al., 2021).

(b) Pressure on incumbents to innovate. Many incumbents pursue digital transformation strategies by launching digital-only brands, partnering with fintech firms, or acquiring start-ups. Agile development (building products in short cycles with frequent feedback) is often adopted to shorten time-to-market (Basel Committee on Banking Supervision, 2024; Feyen et al., 2021).

(c) Changing customer expectations. Fintech has raised expectations for fast onboarding, real-time updates, and personalized interfaces. Customers also demand clearer pricing and better communication. Traditional institutions are therefore pressured to move from product-centric selling to customer-centric service (Bank for International Settlements, 2023; Pazarbasioglu et al., 2020).

(d) Reduced barriers to entry and new competitors. Cloud computing reduces infrastructure costs, APIs make integration easier, and sandboxes support safe testing. These developments enable specialized providers and new entrants such as telecom firms, e-commerce platforms, and large technology companies to offer various financial services. The result is an ecosystem that is more competitive, but also more complex to supervise (Basel Committee on Banking Supervision, 2024; Appaya et al., 2020; Carstens et al., 2021).

1.3.2 Benefits of fintech

(a) Improved financial inclusion. Digital wallets and mobile money can serve people without conventional bank accounts. Digital lending and microfinance can support small borrowers. Alternative credit scoring can assess borrowers without long credit histories, although it must be used responsibly to avoid unfair outcomes (Demirgüç-Kunt et al., 2022; Pazarbasioglu et al., 2020).

(b) More efficient financial processes. Automation and straight-through processing reduce time and error. Distributed ledgers may streamline cross-border payments and post-trade processes, while smart contracts can automate parts of agreements (Financial Stability Board, 2023; Bank for International Settlements, 2023).

(c) Enhanced user experience and financial empowerment. Fintech tools help users manage money more easily. Budgeting apps can visualize spending. Investment platforms provide learning tools. Alerts can warn about unusual transactions or low balances (Pazarbasioglu et al., 2020).

(d) Potential for lower costs. Digital distribution and automation can lower operating costs, which may reduce fees or improve pricing. However, customers should still consider security, reliability and support, not just price (Pazarbasioglu et al., 2020; Feyen et al., 2021).

(e) Increased transparency and traceability. Some technologies, such as distributed ledgers, can improve traceability (the ability to track transactions). Open banking can help customers compare products and manage data sharing more actively (Financial Conduct Authority, 2025a; Bank for International Settlements, 2023).

1.4 Challenges, risks, and the regulatory landscape

As financial services become more digital and interconnected, risks increase in areas such as cybersecurity, privacy, and system stability, as shown in Figure 1.4. Regulators aim to support innovation while protecting consumers and maintaining financial stability.

Figure 1.4 Main risks in fintech

1.4.1 Challenges and risks

(a) Cybersecurity risks. Digital finance attracts cybercriminals. Common threats include phishing (deceptive messages that trick users into revealing information), ransomware (software that locks data until a ransom is paid), distributed denial-of-service (DDoS) attacks (overloading systems to disrupt access), and exploitation of software vulnerabilities. Because services are interconnected, a weakness at a smaller provider can become a gateway to larger systems (National Institute of Standards and Technology, 2024; Financial Stability Board, 2017). Risk

management typically includes strong encryption, multi-factor authentication, secure software development (secure coding), regular patching, continuous monitoring, and clear incident-response plans. Staff training is also important because many attacks exploit human error, through social engineering that uses psychological manipulation to trick people to reveal sensitive information like passwords (National Institute of Standards and Technology, 2024).

(b) Data privacy concerns. Fintech models often rely on personal data. This can improve services but raises questions about consent, transparency, and fair use. Privacy-by-design means thinking about privacy from the start, collecting only necessary data, storing it securely, and giving users meaningful control (Montes & Appaya, 2021; OECD, 2026).

(c) Regulatory compliance challenges. Financial regulation exists because finance affects the wider economy. New fintech activities may not fit neatly into old categories, and rules may differ across countries. Compliance can be demanding for start-ups. Sandboxes and ongoing dialogue help regulators learn about new services and help firms understand requirements (Financial Stability Board, 2017; Appaya et al., 2020).

(d) Building and maintaining trust. Trust is central in finance. New firms may lack long track records. Automated decisions can feel like a "black box" if users do not understand how decisions are made. Providers must offer clear communication, fair processes, reliable support, and strong safeguards (Financial Stability Board, 2017; OECD, 2026).

(e) Operational and systemic risks. Operational risk is the risk of loss due to failures in processes, systems, or external events (for example, system outages). Systemic risk refers to the risk that problems spread and threaten the wider financial system. Heavy reliance on third-party technology providers, such as large cloud platforms, can create concentration risk, where one outage affects many firms. New areas such as DeFi and some digital-asset platforms may also operate outside traditional safeguards, raising concerns about liquidity risk (not being able to meet payment obligations) and contagion (problems spreading from one part of the system to another) (Basel Committee on Banking Supervision, 2024; U.S. Department of the Treasury, 2023; European Securities and Markets Authority, 2021; Financial Stability Board, 2023).

(f) Algorithmic and model risks. These are risks arising from the use of algorithms (step-by-step instructions used by a computer to do a task) and computer models used in AI. If a model is biased or wrong, it can affect many customers. Bias refers to systematic unfair outcomes, for example, denying credit to a certain class of customers. Model governance includes testing, monitoring, and explaining models. Explainable AI aims to make model decisions more understandable to humans (OECD, 2026; OECD & Financial Stability Board, 2024).

1.4.2 The regulatory landscape

(a) Balancing innovation and consumer protection. Regulators aim to allow useful innovation while preventing fraud, mis-selling, and excessive risk. This is a challenge in areas like crypto-assets, robo-advice, and digital lending (Financial Stability Board, 2017; Financial Action Task Force, 2021).

(b) Evolving regulatory tools. Common responses include regulatory sandboxes, activity-based regulation (similar risks should be regulated similarly regardless of who provides the service), and the use of technology in compliance and supervision (Appaya et al., 2020; Crisanto et al., 2021; Carstens et al., 2021). RegTech helps firms meet requirements through tools such as automated reporting and transaction monitoring. SupTech (supervisory technology) refers to regulators using similar tools to analyze data, detect anomalies, and identify emerging risks. DeFi poses challenges because it may lack a clearly identifiable operator, unlike centralized systems, making accountability and enforcement difficult. The growing role of Big Tech in finance also pushes regulators to coordinate financial oversight with competition policy and data governance (Appaya et al., 2020; Crisanto et al., 2021; Carstens et al., 2021).

(c) Cross-border issues. Fintech services can operate across borders, but regulation is often national. Regulatory arbitrage occurs when firms locate activities in places where rules are more favorable. International cooperation aims to reduce gaps, but countries differ in priorities and risk tolerance, making harmonization of regulations across countries difficult (Financial Stability Board, 2017; Financial Action Task Force, 2021).

1.5 Current state and future trends

1.5.1 Current state of fintech

Over the past decade, fintech has moved into the mainstream. It is characterized by broad adoption, consolidation, and deeper links with traditional institutions.

(a) Market development and consolidation. Investment and activity have grown (although they fluctuate with the economy). Larger platforms acquire smaller specialists, allowing users to access multiple services in one ecosystem (Feyen et al., 2021; Doerr et al., 2023).

(b) Regulation and risk focus. Regulators update more frequently frameworks for payments, digital assets, data protection, and operational resilience. A key question remains how to balance innovation and protection (Financial Stability Board, 2017; Basel Committee on Banking Supervision, 2024).

(c) Mainstream adoption and inclusion. Digital payments and mobile banking are widely used. The shift to online channels accelerated during the COVID-19 period. Many fintech services focus on inclusion through mobile money and alternative credit scoring (Demirgüç-Kunt et al., 2022; Pazarbasioglu et al., 2020).

(d) Cybersecurity and resilience. Security investment has increased, and regulators emphasize incident reporting and resilience testing (National Institute of Standards and Technology, 2024).

(e) Partnerships between incumbents and fintech firms. Banks provide licenses, balance sheets, and risk management, while fintech firms provide digital platforms and user experience. Hybrid models are common (Feyen et al., 2021; Kerse et al., 2024).

(f) Key technology themes. AI and analytics support personalization and fraud detection. Blockchain supports parts of the digital asset markets and selected infrastructure experiments (OECD & Financial Stability Board, 2024; Bank for International Settlements, 2023). Green fintech supports ESG and sustainability tools.

1.5.2 Future trends

(a) Advanced AI and personalized services. AI may enable more adaptive financial planning and more automation of compliance and reporting. This increases efficiency but raises questions about privacy, transparency, and bias (OECD, 2026; OECD & Financial Stability Board, 2024).

(b) Growth and selective integration of DeFi concepts. DeFi may influence traditional finance through tokenization and programmable settlement, but adoption depends

on better security, clearer regulation, and better user protection (Financial Stability Board, 2023; Bank for International Settlements, 2023).

(c) Embedded finance and platform integration. Financial services will continue to appear inside non-financial apps. Convenience increases, but concerns about concentration and data sharing may grow (Kerse et al., 2024; Carstens et al., 2021).

(d) Digital identity, CBDCs, and inclusion. Digital identity solutions can help people access services when they lack traditional documentation such as identity cards or passports. CBDCs may provide a widely accessible digital form of central bank money, depending on design choices (Montes & Appaya, 2021; Bank for International Settlements, 2023).

(e) Governance will matter as much as technology. The trajectory of fintech will depend not only on new tools, but also on how they are governed. Strong cybersecurity, privacy, fairness, and resilience standards will be central. Regulation will need to remain forward-looking, supporting innovations that serve real economic needs (Basel Committee on Banking Supervision, 2024; National Institute of Standards and Technology, 2024; OECD, 2026).

1.6 Conclusion

This chapter presents a bird's-eye view and summary of the nature of fintech, its evolution, issues facing the industry, and trends. You may not be able to fully understand everything here, as explanations are brief. However, later chapters will provide more detailed explanations, applications, and case studies, so you will have a better understanding of the technologies and the industry. We recommend that you return to this chapter after reaching the end of the book to get a quick review of fintech.

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Sample Questions

Q1. A bank digitizes its paper application form by putting it online without changing the process. Is this fintech?

A. Yes, because it uses technology

B. Yes, because it improves efficiency

C. No, because fintech involves transforming the process, not just digitizing it

D. No, because only startups can be fintech

Q2. Why has cloud computing contributed to fintech growth?

A. It increases regulation

B. It reduces cost and allows scalable service delivery

C. It replaces all human workers

D. It eliminates cybersecurity risks

Q3. A mobile app allows users to lend money directly to each other without a bank. Which phase of fintech does this best represent?

A. Fintech 1.0

B. Fintech 2.0

C. Fintech 3.0

D. Beyond Fintech

Q4. A budgeting app categorizes spending and helps users manage money better. What benefit of fintech does this illustrate?

A. Financial inclusion

B. Operational risk

C. User empowerment

D. Regulatory compliance

Q5. A fintech company relies heavily on one cloud provider, and a system outage affects many services. What risk does this illustrate?

A. Liquidity risk

B. Concentration risk

C. Credit risk

D. Market risk

Q6. A fintech startup tests a new product under supervision with real users and safeguards. What is this an example of?

A. Open banking

B. Regulatory sandbox

C. Blockchain validation

D. Cybersecurity testing

Q7. Which of the following is used to allow different software systems to communicate?

A. Blockchain

B. API

C. Encryption

D. IoT

Q8. What does “embedded finance” refer to?

A. Financial services provided only by banks

B. Financial services integrated into non-financial platforms

C. Finance using only blockchain

D. Finance without regulation

Solutions

Q1.

Answer: C

Explanation: Fintech involves the transformation of processes and business models, not just a simple digitization of existing manual forms.

Q2.

Answer: B

Explanation: Cloud computing lowers the barrier to entry by reducing infrastructure costs and providing the scalability needed for rapid growth.

Q3.

Answer: B

Explanation: Fintech 2.0 (roughly 1967–2008) saw the rise of digital financial services; the shift toward P2P and mobile-first disruption is a hallmark of this modern transition.

Q4.

Answer: C

Explanation: Tools that provide better transparency, data insights, and control over personal finances are core examples of user empowerment.

Q5.

Answer: B

Explanation: Concentration risk occurs when the financial system or a firm depends too heavily on a single node or provider (like a major cloud service).

Q6.

Answer: B

Explanation: A regulatory sandbox is a "safe space" provided by regulators for firms to test innovative products with live customers under a supervised framework.

Q7.

Answer: B

Explanation: APIs (Application Programming Interfaces) act as the technical "glue" that allows different software systems and applications to communicate and share data.

Q8.

Answer: B

Explanation: Embedded finance refers to the integration of financial services (such as payments or lending) directly into the user journey of non-financial platforms.