

Development trends, fundamental characteristics, and impact analysis of financial technology

Zihan Zhuang

Huron University, London, UK

zihanzhuang68@gmail.com

Abstract. With the rapid advancement of digital technologies, Financial Technology (FinTech) is profoundly reshaping the operational paradigm of traditional financial systems and exerting wide-ranging influence across multiple domains, including payments, banking, investment management, and digital assets. This paper systematically examines the developmental trajectory of FinTech and its key technological drivers, with particular emphasis on its transition from early-stage back-end technical support to a consumer-centric financial service model. Building upon this foundation, a comprehensive evaluation is conducted using the SWOT analytical framework to assess FinTech's strengths in enhancing financial efficiency, optimizing resource allocation, and promoting financial inclusion, while also identifying potential risks and external threats related to data security, technological ethics, financial stability, and market restructuring. Furthermore, by incorporating cutting-edge applications of artificial intelligence in risk management, credit assessment, and customer service, this study analyzes the inherent trade-off between efficiency gains and risk propagation in FinTech development. The findings indicate that FinTech does not constitute a simple substitute for traditional financial institutions; rather, under improved governance frameworks and risk management mechanisms, it can unlock value through synergistic development with commercial banks. The paper concludes by suggesting that strengthening technological governance, enhancing data security capabilities, and deepening collaboration between FinTech and traditional financial institutions are essential for achieving sustainable development that balances innovation with stability in the financial system.

Keywords: financial technology, financial risk management, artificial intelligence

1. Introduction

With the rapid evolution of information technology, the financial sector is undergoing a profound process of digital transformation. Financial Technology (FinTech), through the deep integration of financial services and digital technologies, is reshaping the operational logic of traditional financial systems and generating structural impacts across a wide range of areas, including payments, banking, investment management, and digital assets. In particular, in the aftermath of the COVID-19 pandemic, the surge in demand for remote transactions and contactless services has not only accelerated the global diffusion of FinTech but has also underscored its foundational role within the modern economic system.

FinTech demonstrates significant advantages in improving the efficiency of financial services, reducing transaction costs, and expanding the coverage of financial services, thereby offering new pathways for Small and Medium-sized Enterprise (SME) financing and the advancement of financial inclusion. Existing studies suggest that FinTech can mitigate information asymmetry through digital channels, enhance the efficiency of financial resource allocation, and broaden access to financial services [1]. However, the rapid expansion of FinTech is not without drawbacks. The associated risks and challenges—particularly in terms of data security, technological ethics, market restructuring, and financial stability—are becoming increasingly evident. Scholars have noted that while FinTech improves efficiency, it may also amplify systemic risk, undermine the effectiveness of traditional regulatory frameworks, and pose potential threats to financial stability [2, 3].

Against this backdrop, this paper first reviews the development of FinTech, analyzing changes in its development models and the key technological drivers. It then employs a SWOT analytical framework to systematically examine the strengths, weaknesses, opportunities, and threats associated with FinTech. On this basis, the study further evaluates the trade-off between efficiency enhancement and risk diffusion inherent in FinTech development. Finally, it proposes corresponding policy recommendations and outlines future development directions. Through this comprehensive analysis, the paper seeks to reveal the deeper impact of FinTech on the modern financial system and to identify the key conditions necessary for its sustainable development.

2. Development of financial technology

2.1. Evolution of FinTech development models

In the early 21st century, Financial Technology (FinTech) primarily focused on providing back-end technical support for financial institutions [4]. It has since gradually expanded into consumer-oriented financial services. In particular, during the COVID-19 pandemic, the process of digital transformation accelerated significantly, with an increasing number of firms adopting FinTech solutions to meet the rising demand for remote transactions and contactless payments, thereby further promoting the development of the sector [5]. The widespread adoption of mobile payments and virtual credit cards reflects the deep penetration of FinTech into everyday financial activities.

Taking PayPal as an example, the company was initially founded to address back-end technical issues in online payments within the e-commerce environment. It subsequently evolved into a direct digital payment platform serving both consumers and merchants. As of 2024, PayPal has more than 400 million active accounts worldwide and provides payment services in over 200 countries and regions, reflecting the global diffusion of consumer-centric FinTech models [6]. PayPal's development trajectory is not merely the result of product upgrading; rather, it illustrates a broader industry shift from "technology enabler" to "financial intermediary substitute".

Today, FinTech applications have expanded into retail banking, education, investment management, non-profit organizations, and the rapidly growing cryptocurrency market [4]. In retail banking, digital banking platforms such as Revolut offer integrated financial services for both personal and business users, including payments, savings, credit, investment, and trading functions. At the same time, Revolut integrates cryptocurrency services into its platform, supporting digital assets such as Bitcoin, Ethereum, and Litecoin [7], thereby demonstrating the convergence of traditional banking services and digital assets within FinTech.

In the cryptocurrency market, trading platforms such as Coinbase further promote the adoption and marketization of digital assets by providing users with convenient trading and custody services [8]. These

cases collectively demonstrate that FinTech is continuously expanding its influence within the modern financial system through diversified applications.

2.2. Technology-driven factors of FinTech

With the continuous innovation and development of Financial Technology (FinTech), advancements in key technologies have become the core driving force behind the rapid evolution of the industry. By integrating information technology with financial services, FinTech is fundamentally reshaping the operational mechanisms of traditional financial systems. Among these developments, several critical technologies are profoundly influencing financial institutions' operating models, risk management approaches, and customer service experiences.

First, the application of Artificial Intelligence (AI) is particularly prominent. AI has increasingly become a foundational component of FinTech, significantly improving the efficiency of financial services by enabling data analytics, predictive modeling, and customer service functions [9]. For instance, AI algorithms can assess risk profiles at high speed, enabling financial institutions to make more accurate and informed lending and investment decisions [10]. In addition, AI-powered chatbots can respond promptly to routine customer inquiries, providing continuous support and thereby enhancing overall customer experience [11].

Second, blockchain technology is playing an increasingly important role in the FinTech sector. This technology offers greater transparency, security, and decentralization in financial transactions [4]. For example, smart contracts enable automated, secure, and traceable transaction processes, thereby reducing fraud risk and improving regulatory compliance [4].

Third, the rise of digital banks and nonbanking models is transforming traditional banking services. With the development of fully digital banks, customers can now access more convenient and seamless banking experiences through mobile devices [12]. These digital banks typically provide services comparable to those of traditional banks, such as checking and savings accounts, but without high fees or cumbersome account-opening procedures [13]. For example, Chime offers fee-free accounts, budgeting tools, and enhanced mobile accessibility, all of which are designed to improve user experience and expand financial accessibility [12].

3. SWOT analysis of financial technology

To systematically evaluate the development status of financial technology and its potential impacts, this paper adopts the Strengths, Weaknesses, Opportunities, Threats (SWOT) analytical framework to conduct a comprehensive assessment of the FinTech industry (Figure 1). SWOT analysis is a widely used strategic research and business environment evaluation tool. By examining internal strengths and weaknesses as well as external opportunities and threats, it enables a more holistic understanding of an industry's developmental potential and the challenges it faces. Through this approach, the advantages of FinTech in technological innovation, market expansion, and risk management can be more clearly identified, while its potential issues in data security, regulatory environments, and market competition can also be systematically revealed. Accordingly, this section analyzes the development of FinTech from the four dimensions of strengths, weaknesses, opportunities, and threats.

3.1. Strengths of financial technology

The integration of FinTech with big data technologies enables financial services to process massive volumes of information within extremely short timeframes, handling billions of data points, with real-time financial behavior analysis latency reduced to the millisecond level. By analyzing large-scale customer data, FinTech

platforms can identify user needs and behavioral characteristics, thereby providing more precise and personalized financial services to different customer segments and significantly improving service quality and user experience. According to available data, approximately 70% of consumers show a stronger preference for personalized financial services, highlighting the important role of data analytics in improving customer experience [14].

In addition, FinTech demonstrates significant advantages in risk management. Data-driven and algorithm-based risk assessment mechanisms help identify potential risks and prevent fraudulent activities, thereby providing users with a higher level of security during transactions and safeguarding their financial interests.

In terms of usability, FinTech platforms are typically based on mobile devices and the internet, allowing users to complete various financial transactions simply via smartphones or computers. This model overcomes the temporal and spatial constraints of traditional financial institutions, enabling users to access financial services anytime and anywhere, with particularly strong performance in retail banking and digital payment sectors.

3.2. Weaknesses of financial technology

FinTech is highly dependent on artificial intelligence and data-driven technologies, and the rapid development of these technologies has also raised a series of ethical and security concerns. Among these, data privacy and information security risks are particularly prominent. A typical example is the 2019 Capital One data breach, in which hackers exploited a cloud service misconfiguration and illegally accessed the personal data of over 100 million customers in the United States and Canada, including highly sensitive information such as bank account details. This incident exposed significant deficiencies in data management and security monitoring within FinTech systems [15]. Such incidents are not isolated. According to *the 2024 Cost of a Data Breach Report* published by IBM and the Ponemon Institute, the average loss caused by data breaches in the financial industry reaches approximately 4.88 million USD, higher than the global industry average. In addition, Verizon's *2024 Data Breach Investigations Report* indicates that more than 60% of all data breaches involve highly sensitive personally identifiable information and financial account data. These findings demonstrate that, despite the widespread adoption of digitalization and cloud services, significant vulnerabilities remain in FinTech data governance and security monitoring.

Moreover, FinTech may also suffer from insufficient transparency in pricing structures and product design. When platforms introduce complex pricing mechanisms, feature structures, or embedded risk elements, inadequate disclosure or unclear explanations may lead consumers to bear additional risks without fully understanding them [16]. Although FinTech platforms provide more diverse, innovative, and complex financial products, some consumers, due to limited financial literacy and investment experience, may ultimately purchase products or services that do not align with their financial needs, thereby increasing their individual financial risk exposure [16].

3.3. Opportunities in financial technology development

FinTech presents significant opportunities in advancing financial inclusion. According to relevant studies, more than 1.5 billion people worldwide still lack access to basic banking services, while several hundred million others remain underserved by formal financial systems [17]. Through digital payments, mobile banking, and online financial platforms, FinTech has the potential to provide low-cost and accessible financial services to these populations, thereby substantially expanding financial coverage.

In addition, shifts in user demographics have created new growth opportunities for the FinTech industry. The emerging generation of consumers, particularly millennials and younger digital natives, shows a stronger

preference for managing financial activities through FinTech platforms [17]. Their inclination toward digital, convenient, and personalized financial services suggests a continuously expanding user base for FinTech in the future.

At the technological level, FinTech firms can further expand market opportunities through continuous innovation. For instance, the global number of digital wallet users exceeded 2 billion in 2024, indicating the rapid proliferation of digital financial services [18]. Artificial intelligence is also being widely applied in the development of chatbots that provide 24/7 customer support and basic financial advice, thereby improving service efficiency while reducing operational costs [11].

Meanwhile, in emerging markets such as Latin America, Africa, and Asia, FinTech development is often driven by structural macro-level challenges, including limited access to financial services and underdeveloped digital infrastructure [17]. For example, mobile payment users in Africa have consistently recorded annual growth rates exceeding 20%, while mobile financial services in Asia have expanded even more rapidly [13]. These trends create substantial opportunities for FinTech to enhance both financial inclusion and digital inclusion on a global scale.

3.4. Threats facing financial technology

Information security risk has become one of the most prominent external threats facing the FinTech industry. Surveys and industry reports indicate that financial crime and cybersecurity risks are expected to continue rising, largely driven by rapid technological advancement and increased digitalization of financial services [19, 20]. At the same time, cyberattacks are becoming increasingly frequent. In recent years, a significant proportion of financial institutions have been targeted by ransomware and other forms of cyberattacks, resulting in substantial economic losses and posing ongoing challenges to financial system stability [20].

Data breaches also constitute a major threat to the FinTech sector. Unauthorized access to sensitive information, including biometric identifiers, health records, and financial account data, can lead to severe financial and reputational consequences [21]. According to *the Cost of a Data Breach Report 2024*, the average cost of data breaches in the financial sector reached approximately USD 6.08 million, significantly exceeding the global average of USD 4.88 million, highlighting the elevated data security risks faced by FinTech firms in a highly digitalized environment [15].

In addition, FinTech firms often rely heavily on external technology service providers, which may amplify systemic vulnerabilities. For example, when adopting cloud computing services, companies frequently outsource critical infrastructure to third-party providers such as Amazon Web Services, Microsoft Azure, and Google Cloud. Although these providers implement advanced security mechanisms, the shared responsibility model implies that governance failures on either side may propagate through technological interdependencies, thereby amplifying potential risks and creating external shocks for FinTech firms [19].

Beyond technological and security-related threats, the development of FinTech also poses structural challenges to traditional commercial banks by accelerating financial disintermediation. As customers increasingly shift from traditional banking services to digital platforms, banks face intensified competition in both asset-based and intermediary businesses [3]. In asset-based operations, FinTech-driven innovation contributes to greater market competition and may alter funding structures, potentially increasing banks' cost of capital and incentivizing riskier investment behavior [3, 21].

In intermediary services, the widespread adoption of third-party payment platforms continues to erode traditional banks' market share in areas such as payments and agency services, weakening their competitive advantage. According to McKinsey & Company, in countries with highly developed digital payment systems,

traditional banking fee income related to payments may decline by 20%–40% [22]. Such FinTech-driven structural shifts have significantly intensified operational pressures on the banking sector.

It is worth noting that while FinTech enhances financial efficiency and service accessibility, its highly digitalized and efficiency-driven nature may also amplify associated risks. Technological failures, cybersecurity vulnerabilities, and systemic shocks can propagate more rapidly through interconnected financial systems, thereby increasing the overall fragility of the modern financial ecosystem.

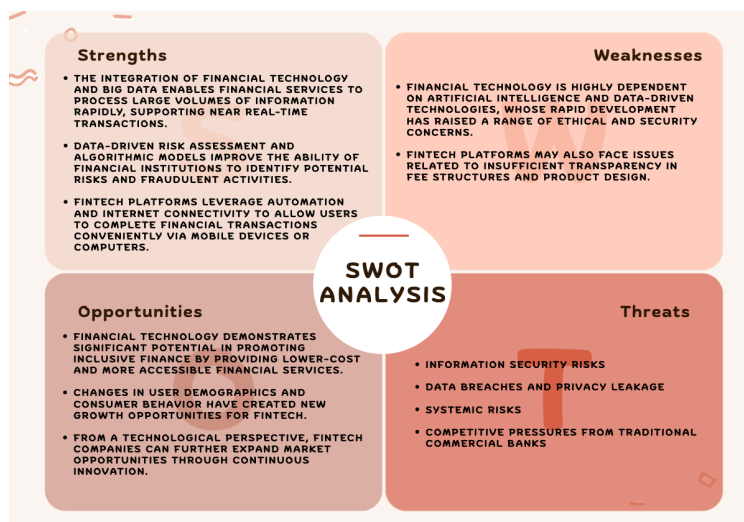


Figure 1. SWOT analysis

4. Frontier developments in financial technology

Artificial Intelligence (AI) demonstrates substantial development potential within the FinTech sector, with risk management representing one of its most critical application areas [9]. Compared with traditional rule-based or linearly specified models, AI algorithms are capable of identifying complex risk patterns and latent trends from large-scale, multidimensional datasets, thereby improving both the timeliness and accuracy of risk detection [10]. For example, AI can analyze structured data such as customers' historical transaction behavior, income levels, and credit records to identify individuals with a higher probability of loan default. This enables financial institutions to exercise greater prudence in credit granting decisions and effectively reduce credit risk exposure [10].

In the area of credit assessment, AI is increasingly complementing, and in some cases reshaping, traditional credit scoring models. Machine learning-based credit evaluation systems not only incorporate conventional financial data but also integrate higher-frequency alternative data sources, such as online transaction behavior and selected digital footprint indicators, thereby enabling a more dynamic and comprehensive assessment of creditworthiness [9]. This data-driven approach helps mitigate information asymmetry and enhances financial inclusion by expanding access for non-traditional customer segments [21].

In addition, AI applications in customer service and user interaction represent another important frontier in FinTech development. Artificial intelligence assistants based on Natural Language Processing (NLP) technologies can engage in real-time communication with customers through chatbot interfaces [11]. These systems not only provide 24/7 basic customer support but also deliver more targeted service guidance and product recommendations based on users' transaction behavior and financial conditions [11]. While improving

customer experience, AI-driven customer service systems also contribute to reduced labor costs and improved overall operational efficiency for financial institutions.

5. Conclusion and policy implication

At present, FinTech has exerted a profound impact on financial markets. This study finds that FinTech plays an important role in improving financial efficiency, expanding access to financial services, and promoting financial inclusion. However, its rapid expansion has also introduced structural risks and sector-wide challenges. How to effectively prevent and mitigate risks while encouraging technological innovation has become a central issue for the sustainable development of the financial system. In order to achieve a balance between financial innovation and systemic stability, it is necessary to propose systematic policy responses across multiple dimensions, including technological governance, risk management, and institutional coordination.

First, regarding the synergistic development of FinTech and traditional commercial banks, deeper collaboration between the two represents a key pathway for enhancing efficiency while maintaining effective risk control [3, 21]. Through integration with FinTech solutions, commercial banks can strengthen product and service innovation, thereby improving operational efficiency and reducing costs. Taking JPMorgan Chase & Co. as an example, the bank has significantly increased its investment in financial technology and data infrastructure in recent years, with annual technology expenditure exceeding USD 12 billion, primarily allocated to big data and AI-driven credit assessment and risk management systems [4]. Through the coordinated application of FinTech solutions, the loan approval process for small and medium-sized enterprises has been significantly shortened, improving efficiency while reducing reliance on manual review [22]. This case illustrates that FinTech is not merely a substitute for traditional banking, but rather a transformative force that reshapes core banking functions through technological empowerment.

Second, in terms of data security and risk prevention, financial institutions need to establish a multi-layered and systematic technological governance framework to mitigate the risks of data breaches and cyberattacks. Specifically, institutions should strengthen endpoint security by implementing measures such as firewalls, intrusion detection systems, and malware protection technologies, thereby enhancing baseline defenses against external threats [19, 20]. At the same time, adopting a "zero-trust architecture"—based access control mechanism—combined with multi-factor authentication and the principle of least privilege—can ensure that sensitive data is accessible only to authorized users, reducing both internal misuse and external intrusion risks [23].

Furthermore, enhancing risk monitoring and emergency response capabilities is equally critical. Financial institutions should implement continuous monitoring and dynamic risk assessment mechanisms to detect abnormal transactions, system intrusions, and unauthorized data access in real time [10, 20]. In the event of a security incident, rapid response and timely mitigation can effectively contain the spread of risks and minimize both financial losses and reputational damage [15].

Overall, the long-term value of FinTech does not depend solely on the technological sophistication itself, but rather on whether it operates within a robust governance framework and prudent risk management regime. By promoting the synergistic development of FinTech and traditional financial institutions, strengthening technological governance, and improving data security systems, the financial sector can achieve a dynamic balance between efficiency enhancement and risk control, thereby fostering sustainable development of the financial industry.

References

- [1] World Economic Forum. (2024). *Fintech growth driven by customer demand*. <https://www.weforum.org/stories/2024/02/fintech-growth-customer-demand/>
- [2] Financial Stability Board. (2017, June). *Financial stability implications from fintech*. <https://www.fsb.org/2017/06/financial-stability-implications-from-fintech/>
- [3] Vives, X. (2019). Digital disruption in banking. *Annual Review of Financial Economics*, 11, 243–272. <https://www.annualreviews.org/content/journals/10.1146/annurev-financial-100719-120854>
- [4] Investopedia. (2025). *FinTech definition*. <https://www.investopedia.com/terms/f/fintech.asp>
- [5] World Bank. (2022). *The Global Findex Database 2021: Financial inclusion, digital payments, and resilience in the age of COVID-19*. <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099818107072234182>
- [6] PayPal. (2024). *Annual Report 2024*. <https://investor.pypl.com/>
- [7] Revolut. (n.d.). *Cryptocurrency services*. <https://www.revolut.com/crypto>
- [8] Coinbase. (n.d.). *About Coinbase*. <https://www.coinbase.com/en-ca>
- [9] IBM. (n.d.). *AI in fintech*. IBM Think. <https://www.ibm.com/think/topics/ai-in-fintech>
- [10] IBM. (n.d.). *AI in fraud detection for banking and financial services*. IBM. <https://www.ibm.com/think/topics/ai-fraud-detection-in-banking>
- [11] Zendesk. (2020, January 7). *How fintech chatbots improve customer experience*. Zendesk. <https://www.zendesk.com/blog/fintech-chatbot/>
- [12] Pérez, S. (2024, November 12). *FinTech evolution: How technology is revolutionizing financial services*. Distillery. <https://distillery.com/blog/fintech-evolution-how-technology-is-revolutionizing-financial-services/>
- [13] GSMA Intelligence. (2023). *The mobile economy 2023*. <https://www.gsmainelligence.com/research/the-mobile-economy-2023>
- [14] The Financial Brand. (2024). *The future of banking is personal*. <https://thefinancialbrand.com/news/personalization/the-future-of-banking-is-personal-181998>
- [15] IBM Security. (2024). *Cost of a data breach report 2024*. <https://www.ibm.com/reports/data-breach>
- [16] Malta Financial Services Authority. (n.d.). *Fintech: Risks and benefits for consumers*. <https://www.mfsa.mt/consumers/consumer-awareness/consumer-awareness-and-campaigns/fintech-risks-and-benefits/>
- [17] Bankingly. (2022). *What are the risks and opportunities for the fintech industry?* <https://www.bankingly.com/news/what-are-the-risks-and-opportunities-for-the-fintech-industry/>
- [18] Statista. (2024). *Mobile payments worldwide*. <https://www.statista.com/topics/4872/mobile-payments-worldwide/>
- [19] Neontri. (2024). *Fintech security: Risks and challenges*. <https://neontri.com/blog/fintech-security/>
- [20] Verizon. (2024). *Data breach investigations report*. <https://www.verizon.com/business/resources/reports/dbir/>
- [21] National Center for Biotechnology Information. (2022). *Financial technology and its impact on the banking sector*. <https://pmc.ncbi.nlm.nih.gov/articles/PMC9345119/>
- [22] McKinsey & Company. (2023). *Global payments report*. <https://www.mckinsey.com/industries/financial-services/our-insights/global-payments-report>
- [23] UpGuard. (2025, July 4). *8 ways finance companies can prevent data leaks*. <https://www.upguard.com/blog/how-finance-companies-can-prevent-data-leaks>