

Guest editorial: Fintech: past, present and future

1. Introduction

1.1 Past

Looking back, the 2008 global financial crisis was arguably a catalyst for the rapid growth and adoption of fintech. Fintech firms were seen by technology firms as a vehicle to spur innovation and increase efficiency in the banking system. Fintech firms were also seen as a channel to improve the quality of life of the global population. A joint study of the IMF and World Bank, which helped develop the 2018 Bali FinTech Agenda, underscored how the livelihood of an estimated 1.7 billion adults around the world without access to financial services could be improved by financial technology. Several global central monetary institutions concluded that Fintech could have a major social and economic impact on the welfare of their population. There was a strong thrust by national governments and central banking institutions to adopt and deploy rapid advances in financial technology to help the unbanked and achieve financial inclusion goals. The 2018 Bali FinTech Agenda was focused on supporting the Sustainable Development Goals of especially low-income countries, where access to financial services was limited. The optimal path forward for countries desiring deeper access to financial markets was to deliver fintech solutions that could enhance financial services, mitigate risks and achieve stable, inclusive economic growth for the welfare of banking customers (IMF, 2018).

Given these varied models of global fintech firms, the [Bank for International Settlements Committee \(2018\)](#) classified fintech financial innovations into two major categories.

1. A set of three product sectors that relate to core banking services.
2. A set of market support services relating to innovations and new technologies.

Since 2018, fintech innovations have continued to grow and transform, especially as a consequence of the C-19 pandemic. The most popular types of current fintech innovations include payments, clearing and settlement services and mobile wallets, peer-to-peer (P2P) payments (such as PayPal, Venmo, Zelle and Square Cash) and loans (such as Prosper and Funding Circle), and digital currencies or cryptocurrencies. Digital currencies combine new payment systems with new currencies which are not issued by a central bank (such as Bitcoin, Litecoin and Ripple). Exploration of central bank digital currencies, business-to-business payments, foreign digital exchange platforms have also evolved. In market support services, distributed ledger technology (DLT) has become particularly prominent (Blockchain, Smart Contracts).

DLT has been intricately linked to digital currencies since its inception because it was initiated as the underlying technology of the cryptocurrency Bitcoin. Smart contracts were facilitated by blockchain, and cryptocurrencies such as Ethereum, launched in 2014, were made possible by revolutionary blockchain technology. These smart contracts and decentralized apps run as part of the blockchain's network. Since no server or computer could control these applications, they would continue to exist if the Ethereum network continued to operate. As acceptance and adoption of cryptocurrencies like Bitcoin and Ethereum by Wall Street firms exploded, "decentralized finance" has become mainstream and fueled further the growth of fintech firms.

Additionally, technological developments in artificial intelligence (AI) and machine learning (ML) have provided an impetus for investment management fintech's to grow. Fintech firms in the investment management services space provide solutions for high frequency trading, electronic and algorithmic trading and provide robo-advice. Enhanced



computational speed enables execution of trades in micro-seconds. High frequency trading (HFT) has become widespread, especially in equity markets, accounting already in 2018 for over 50% of the daily trading volume. Robo-advisors are now part of the institutional suite of services offered by major financial institutions such as Vanguard, Schwab and Fidelity. Since robo-advisors are less expensive than human advisors, they democratize access to financial advice. The primary impetus for the use of robo-advising has been affordable access, and fintech has facilitated a dramatic decrease in costs for clients.

1.2 Present – dominance of AI models, banking-as-a-service and decline in funding

CB Insights reported in 2022 that global venture capital (VC) backed fintech funding increased from \$21.8 billion in 2015 to \$139.8 billion in 2021 and \$75.2 billion in 2022. However, 2024 was a sobering year for fintech. Global fintech investment fell by 20% in 2024, with fintech companies worldwide attracting a total of \$43.5 billion in investments compared to the \$54.2 billion total achieved in 2023. The total number of fintech deals globally dropped to 6,464 in 2024 compared to 7,683 in 2023, a decrease of 16% (Emanuel-Burns, 2025). In 2024, even the most active US banks investing in fintech startups including Goldman Sachs, Citigroup, JPMorgan Chase, Morgan Stanley, Wells Fargo and Bank of America Merrill Lynch were cutting investments in fintech while promoting Banking-as-a-Service (BaaS). BaaS is an end-to-end process that allows fintech and other third parties to connect with banks' systems directly via Application Programming Interfaces (APIs). The objective for BaaS is to build banking services on top of the providers' regulated infrastructure, as well as to unlock the open banking opportunity reshaping the global financial services landscape. The two main monetization strategies for BaaS include charging clients a monthly fee for access to the BaaS platform or charging a la carte for each service used was more viable. Even technology companies such as Google, Apple, Amazon and Facebook, which invested heavily in fintech in the form of both internal projects and external partners in pursuit of new revenue streams, started tapering of their investments.

One important concurrent development and integration in 2024 is the use of Generative AI and Predictive AI, both widely employed by Fintech companies. Caballar (2024) differentiates the two AI models. The most generative AI models start with a foundation model, a type of deep learning model that "learns" to generate statistically probable outputs when prompted, while Predictive AI blends statistical analysis with ML algorithms to find data patterns and forecast future outcomes. Generative AI models are widely used in customer service by fintech firms. Generative AI-powered chatbots and virtual agents offer real-time support, provide personalized responses and initiate actions on behalf of a customer and for software developments. Predictive AI extracts insights from historical data to make accurate predictions about upcoming events, results or trends. Financial institutions use predictive AI models to forecast market trends, stock prices and other economic factors. Banks employ predictive AI to spot suspicious transactions in real time that signify fraudulent activities.

1.3 Future of fintech – Quantum supremacy

One of the significant concurrent developments with a significant effect on Fintech firms is the development of quantum computing. This is a new paradigm that leverages the principles of quantum mechanics to process and leverage information. This development is both an immense opportunity and an existential threat to fintech firms and banking markets. Quantum computing enables abilities that are beyond what can be achieved with the current classical digital computing.

Theoretically, quantum computers can replace the transistor in digital computing with an atom. These digital bits can carry only one bit of information, but qubits used in quantum computers have unlimited power and can operate in multiple states. Additionally, the qubits can interact with each other inherently and are becoming exponentially more powerful and

able to manage multiple states operating at lightning speed. For example, a quantum computer with 100 qubits can have 2^{100} capacity, more than a supercomputer with just one qubit.

Rapidly developing quantum computing has the capability to compromise current encryption methods within a few years, with ominous challenges to protect the security and privacy of individuals and organizations. Quantum computers can create turmoil for current fintech and banking firms. In Wall Street firms, quantum computing can unlock the encrypted security systems and the blockchain codes and has the potential to compromise and break all the cyber-codes. This poses an existential threat to cryptocurrencies. [Kaku \(2023\)](#) details how the quantum computer revolution will change all existing computing and achieve “Quantum Supremacy” in the forthcoming years. According to National Institute of Standards and Technology ([NIST, 2024](#)), quantum computers could potentially break widely used 128-bit AES encryption by 2029. This poses a significant threat to data encryption standards. In consequence, NIST is accelerating “post-quantum cryptography” standards to safeguard data in the future quantum computing era.

Quantum computers have the potential to revolutionize various fields such as cryptography, AI, fraud detection and trading. Quantum computing also enhances machine learning by solving high-dimensional optimization problems. As Quantum qubits can exist in multiple states simultaneously, thanks to the principles of superposition and entanglement, it offers techniques like quantum data compression that can manage massive datasets more efficiently.

Quantum computers also excel at parallel processing, performing many calculations simultaneously enhancing speed and accuracy. This ability can be helpful to fintech firms in neural network training and inference, where multiple pathways can be processed in parallel. Quantum parallelism can lead to faster and more efficient learning and decision-making processes, significantly boosting the capabilities. Hence, it can add immense value in fraud detection, risk assessment and algorithmic trading. [Naik et al. \(2023\)](#) detail the applications in portfolio optimization, fraud detection and Monte Carlo methods for derivative pricing and risk calculation. Furthermore, they provide a comprehensive overview of the applications of quantum computing in the field of blockchain technology which is a main concept in fintech. After delineating the difference between the quantum-resistant blockchain and quantum-safe blockchain, they identify the security countermeasures to take against the possible quantumized attacks aiming these systems.

We finalize our discussion with quantum blockchain, efficient quantum mining and the necessary infrastructures for constructing such systems based on quantum computing. [Bunescu and Vârtei's \(2024\)](#) review work further identifies that within the financial sector, quantum computing is currently used in three main areas (simulation, optimization and ML) and holds much promise.

2. Manuscript introductions

2.1 *Twitter-based economic uncertainties and time-frequency connectedness among cryptocurrencies*

This study investigates the connectedness spillovers among major cryptocurrency markets. It examines the extent to which cryptocurrency markets serve as a safe haven, hedge and diversifier from news-based uncertainties. It analyzes the sentimentality of total, short-term and long-term return connectedness spillovers among cryptocurrencies, concerning Twitter-based economic uncertainties and US economic policy uncertainty. The findings suggest that Ethereum and Bitcoin are net shock transmitters at the center of the connectedness return network. Further analysis reveals that Twitter economic policy uncertainty and US economic policy uncertainty are effective drivers of short-term and total directional spillovers. Overall, it finds evidence that Twitter's news-based uncertainty and US economic policy uncertainty have a significant effect on short-term market risk spillovers. Furthermore, it notes high cryptocurrency market risk spillovers coincide with periods of events such as the US China

trade tensions in January 2018, the Brexit process in February 2019 and the COVID-19 outbreak in November 2019.

2.2 The effects of FinTech adoption on bank loan spreads

This study predicts that banks adopting FinTech to a greater extent are likely to experience an increase in the average corporate loan spreads. This is because FinTech enables banks to extend loans to smaller and riskier firms, which they would typically avoid without FinTech adoption, allowing them to charge higher interest rates to these new customers to compensate for the increased risk. Traditionally, private information is collected by banks over time through frequent and personal contact with their borrowers. This approach means banks typically operate in a local and personal market with borrowers who have strong creditworthiness and a well-established trust with the bank.

2.3 Cyber fraud (CFs) in banking: a dual-layer, blockchain-enabled approach for prevention and managerial response

This study addresses the growing cyber risks of banks by proposing an innovative, end-to-end dual-layer blockchain-based cyber fraud (CF) response system that integrates Safeguard (SG) and Block guard (BG) mechanisms. The comprehensive solution offers an actionable framework for bank managers to mitigate CFs by prioritizing fraud detection, leveraging early warning signals (EWSs), and implementing tailored, need-based control measures before, during and after a fraud event.

The dual-layer approach enhances the sector's resilience to CFs by providing a robust, adaptive framework for fraud prevention and mitigation. It aids managers in maintaining stability, safeguarding the bank's reputation and improving overall risk management practices, thus ensuring a more secure financial environment. This study is unique in its development of an integrated SG and BG response system, combining ML, blockchain technology, EWSs and a structured before-during-after fraud control model. The research also highlights the critical role of bank managers in implementing and overseeing this innovative response system.

2.4 Bank acquisitions of AI and FinTech: impact on performance

This paper investigates the impact of financial technology innovation on bank performance. Using a large sample of FinTech mergers and acquisitions (M&A) deals by major and regional US banks, as well as AI patent applications and grants by banks from 2010 to 2022, their impact on bank return on assets (ROA) and return on equity (ROE) is explored. Data analysis shows a positive association between the number of FinTech M&A deals and bank performance is documented; however, none of the patent variables (grant, filing or publication) appear to have a significant effect.

2.5 Political perspectives and their impact on fintech mortgage lending adoption

The purpose of this paper is to explore the link between political perspectives and the adoption of fintech mortgage lending, a new type of mortgage lending facilitated by online platforms. The authors find that a higher tendency towards Republican views is positively associated with adoption rates of fintech mortgages. The empirical results are supported by Republican ideology, which advocates for deregulation and market-driven solutions, as well as an increasing skepticism among Republicans towards traditional banking and financial institutions.

2.6 Evolution of financial advisory market with the advent of robo-advisors

This study finds that as the number of robo-advisors increases: (1) the probability that an incumbent firm adopts robo-advisory technology is relatively higher for a firm offering wrap fee programs, (2) the probability that an incumbent firm adopts robo-advisory technology is

relatively higher for a firm catering to individual clients, (3) a firm offering wrap fee program increases their financial advisors relative to the other firms and (4) a firm offering services to individual clientèle increases their financial advisors relative to the other firms.

These results further emphasize that there is a simultaneous increase in the number of financial advisors and robo-advisors due to the advent of robo-advisors. Such an increase could only imply that there is an overall increase in the demand for financial advisory services due to the advent of robo-advisors. This is possible if the advent of robo-advisors is bringing more attention to the overall financial advisory industry. For example, as the robo-advisors came into the market, they probably advertised more, and this could have been instrumental in bringing in new demand. Also, these results indicate that the firms whose services are similar to robo-advisory services are competing in the same market space for the same clientèle. This could lead to competitive pressure on the already existing similar service providers. And similar service providers are responding by adopting technology. As the market evolves with increasing robo-advisory technology adoption, it could be bringing about new demand for such service providers, causing the simultaneous increase in both the number of robo-advisors and financial advisors.

2.7 A preliminary test of ChatGPT's ESG literacy

This manuscript demonstrates ChatGPT's unique utility in ESG assessment and presents findings on its real-world applications and limitations. In addition to standardized ESG assessments, ChatGPT-4o mini's practical capabilities by evaluating Bloomberg terminal screen images, analyzing actual ESG reports from companies, and designing CEO compensation plans that incorporate ESG metrics. These findings demonstrate ChatGPT's ability to support practical, real-world applications, particularly in assessing and operationalizing ESG initiatives. The study also reveals certain limitations of ChatGPT-4o mini, such as hallucination tendencies, where the model fabricated non-existent Bloomberg functions. This observation is critical for practitioners relying on AI for ESG analysis, as it highlights areas where human oversight remains essential. Previous work has highlighted the connection between AI and ESG investing, such as [Antoncic \(2020\)](#), [Antoncic et al. \(2020\)](#), [Rane et al. \(2024\)](#) and [Selim \(2020\)](#). Findings suggest the potential use of ChatGPT by the public to educate themselves on ESG issues, by investors to integrate ESG in portfolio construction, by corporate boards to incorporate ESG metrics in CEO compensation contracts, by companies to file ESG reports to regulators, and by ESG-conscious shareholders to engage the management, etc. It conducts a preliminary test of ChatGPT's knowledge of ESG by feeding ChatGPT with questions from three sources: Bloomberg, Corporate Finance Institute and [Alison.com](#). It compares ChatGPT-4 to random guessing, Google's Gemini, and ChatGPT 4, and tests ChatGPT-4 familiarity with Bloomberg terminal functions related to ESG. The study finds that ChatGPT's accuracy is 100% on Bloomberg questions, and that ChatGPT-4o mini's performance is slightly better than Gemini. It shows that ChatGPT-4o mini can analyze Bloomberg terminal screen images, assess companies' actual ESG reports and draft CEO compensation contracts with integrated ESG metrics.

3. Conclusions

In 2016, The World Economic Forum ([Schwab, 2015](#)) announced the advent of the Fourth Industrial Revolution. The Fourth Industrial Revolution builds on the Third Digital Revolution that was set in motion following the mid-last century. The Fourth Industrial Revolution is characterized by a fusion of technologies that blurs the lines between the physical and digital space. The speed of current technological breakthroughs has no historical precedent due to its velocity and scope. Overall, the impact on business, consumers and governments is expected to be potentially unprecedented. The Fourth Industrial Revolution is seen as a growth driver with a potential to raise global income levels and improve the quality of life for populations

around the world by lowering the barriers for businesses and individuals to create wealth. Customers are increasingly the epicenter of the economy, with physical products and services enhanced by digital capabilities. Innovative technologies can make assets more durable and resilient, and data and analytics transform how they are maintained. Customer experience, data-based services and asset performance through analytics require new forms of collaboration, given the speed at which innovation and disruption are taking place.

One remarkable example of the evolving applications of the Fourth Industrial Revolution economy based on combinations of technologies is the global finance sector. The emergence of global platforms, evolving technology and other novel business models have given impetus to both banking and fintech firms to collaborate and enhance the value offerings using their varied talent, culture and organizational forms. What is remarkable about this collaboration is the inherent conflict and dichotomy in the business models of deposit backed conservative banks and aggressive, disruptive VC backed Fintech firms. The two are vastly different in terms of work agility, ethos, focus, structure and risk appetite. Banks tend to make marginal changes to products and services due to legacy systems and hierarchical regulatory restraints and forbearance with low-risk appetite. This leads to focus on creating standardized products and services. On the other hand, Fintech firms are aggressive and dynamic, with speedy execution. This leads to a client focus to customize products and services with overwhelming cannibalization potential.

The successful collaboration of banks and fintech's is a testament that these institutions have been able to recognize and grasp the opportunity and power to shape and direct offerings toward common objectives. However, this collaboration has not been without challenges. The three major challenges posed by new information technologies and the collaboration of banks and fintech firms are ensuring the privacy of individual data, enabling financial inclusion to reduce global inequalities (Brynjolfsson *et al.* (2014)), and assuring the integrity of systems and security of data due to emergent technologies such as quantum computing (Nessi, 2024). While the future of fintech and banks is currently secure and preserved, the future success of fintech will be based on how these concerns are addressed.

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