

Financial technology



Figure 1: New York City, the world's principal fintech and financial center

Financial technology (abbreviated as fintech) refers to the application of innovative technologies to products and services in the financial industry. This broad term encompasses a wide array of technological advancements in financial services, including mobile banking, online lending platforms, digital payment systems, robo-advisors, and blockchain-based applications such as cryptocurrencies. Financial technology companies include both startups and established technology and financial firms that aim to improve, complement, or replace traditional financial services.

Evolution

The evolution of financial technology spans more than a century, marked by significant technological innovations that have reshaped the financial industry. While the application of technology to finance has deep historical roots, the term “financial technology” emerged in the late 20th century and gained prominence in the 1990s.

The earliest documented use of the term dates back to 1967, appearing in an article in The Boston Globe titled “Fin-Tech New Source of Seed Money.” This piece reported on a startup investment company established by former executives of Computer Control Company, aimed at providing venture capital and industry expertise to startups in the financial technology industry.

However, the term didn’t gain popularity until the early 1990s when Citicorp Chairman John Reed used it to describe the Financial Services Technology Consortium. This project, initiated by Citigroup, was designed to promote technological cooperation in the financial sector, marking a pivotal moment in the industry’s collaborative approach to innovation.

The financial technology ecosystem includes various types of companies. While startups developing new financial technologies or services are often associated with financial technology, the sector also encompasses established technology companies expanding into financial services and traditional financial institutions adopting new technologies. This diverse landscape has led to innovations across multiple financial sectors, including banking, insurance, investment, and payment systems. Financial technology applications span a wide range of financial services. These include digital banking, mobile payments and digital wallets, peer-to-peer lending platforms, robo-advisors and algorithmic trading, insurtech, blockchain and cryptocurrency, regulatory technology, and crowdfunding platforms.

History

Foundations

The late 19th century laid the groundwork for early financial technology with the development of the telegraph and transatlantic cable systems. These innovations transformed the transmission of financial information across borders, enabling faster and more efficient communication between financial institutions. A significant milestone in electronic money movement came with the establishment of the Fedwire Funds Service by the Federal Reserve Banks in 1918. This early electronic funds transfer system used telegraph lines to facilitate secure transfers between member banks, marking one of the first instances of electronic money movement.

The 1950s ushered in a new era of consumer financial services. Diners Club International introduced the first universal credit card in 1950, a pivotal moment that would reshape consumer spending and credit. This innovation paved the way for the launch of American Express cards in 1958 and the BankAmericard (later Visa) in 1959, further expanding the credit card industry.

Digital revolution

The 1960s and 1970s marked the beginning of the shift from analog to digital finance, with several groundbreaking developments shaping the future of financial technology.

In 1967, Barclays introduced the world's first ATM in London, expanding access to cash and basic banking services. Inspired by vending machines, the ATM marked a significant step towards self-service banking.

Financial technology infrastructure continued to evolve with the establishment of the Inter-bank Computer Bureau in the UK in 1968. This development laid the groundwork for the country's first automated clearing house system, eventually evolving into BACS (Bankers' Automated Clearing Services) to facilitate electronic funds transfers between banks.

The world of securities trading was transformed in 1971 with the establishment of NASDAQ, the world's first digital stock exchange. NASDAQ's electronic quotation system represented a significant leap forward from the traditional open outcry system used in stock exchanges.

Two years later, the founding of the SWIFT (Society for Worldwide Interbank Financial Telecommunication) standardized and secured communication between financial institutions globally. SWIFT's messaging system became the global standard for international money and security transfers.

The introduction of electronic fund transfer systems, such as the ACH (Automated Clearing House) in the United States, facilitated faster and more efficient money transfers. The ACH network allowed for direct deposits, payroll payments, and electronic bill payments, significantly reducing the need for paper checks.

Rise of digital financial services

The 1980s and 1990s witnessed significant developments in financial technology, with the rise of digital financial services and the early stages of online banking. A major breakthrough came when Michael Bloomberg founded Innovative Market Systems (later Bloomberg L.P.) and introduced the Bloomberg Terminal. This innovation transformed how financial professionals accessed and analyzed market data, providing real-time financial market data, analytics, and news to financial institutions worldwide.

Online banking emerged in the early 1980s, with the Bank of Scotland offering the first UK online banking service called Homelink. This service allowed customers to view statements, transfer money, and pay bills using their televisions and telephones.

The late 1980s saw the development of EDI (Electronic Data Interchange) standards, allowing businesses to exchange financial documents electronically and streamlining B2B (business-to-business) transactions.

A significant milestone in consumer digital banking came in 1994 when Stanford Federal Credit Union launched the first Internet banking website. This service initially allowed members to check account balances online, with bill pay functionality added in 1997. However, it was not until 1999 that the first state-chartered,



Figure 2: Bloomberg Terminal Museum in Manhattan

FDIC-insured institution operating primarily online was established. First Internet Bank, founded by David Becker, marked a new era in online-only banking.

Dot-com era

The late 1990s and early 2000s marked a significant turning point in the evolution of financial technology, as numerous innovations emerged during the dot-com boom. One notable development was the rise of online trading platforms, with E-Trade, founded in 1982, leading the charge. In 1992, E-Trade became one of the first financial services companies to offer online trading to consumers, revolutionizing the way individuals interacted with the stock market.

Another pivotal moment was the founding of PayPal in 1998. PayPal's success in creating a secure and user-friendly online payment system demonstrated the viability of digital payment solutions and paved the way for numerous subsequent financial technology startups.

The early 2000s also saw the emergence of innovative business models in the financial services industry. Web-Bank, established in 1997, began offering a “rent-a-charter” model in 2005, providing the necessary banking infrastructure and regulatory compliance for financial technology startups to offer banking services without obtaining their own charters. This model would later prove crucial in enabling the growth of numerous financial technology companies.

Post-2008 financial crisis

The 2008 financial crisis served as a catalyst for the rapid growth of the financial technology industry, as declining trust in traditional financial institutions created opportunities for innovative, technology-driven solutions. The early days of the post-crisis era saw the emergence of digital currencies, with e-Gold serving as a precursor to the development of Bitcoin. While e-Gold, which allowed users to create accounts denominated in grams of gold and enable instant transfers, ultimately faced legal challenges and closure, it laid the foundation for future digital currencies.

The invention of Bitcoin in 2008 by an anonymous creator using the pseudonym Satoshi Nakamoto marked a turning point in the evolution of digital currencies and decentralized finance. Bitcoin's use of blockchain

technology sparked a wave of development in the field of cryptocurrencies, opening up new possibilities for secure, transparent, and decentralized financial systems.[better source needed]

As the financial technology landscape continued to evolve, new payment processing companies entered the market, offering developer-friendly APIs that dramatically simplified online payment integration. By lowering the barriers to entry for e-commerce and online financial services, these companies played a crucial role in enabling the growth of new financial technology startups and driving innovation in the sector.

The partner banking model, which emerged in the early 2000s, gained significant traction in the post-crisis era. This model expanded beyond its initial “rent-a-charter” concept, evolving into more comprehensive partnerships between traditional banks and financial technology companies. These collaborations allowed for rapid innovation and market entry, as financial technology leveraged the regulatory compliance and infrastructure of established banks while bringing their own technological expertise and customer-centric approaches. This further accelerated the growth of the financial technology sector, enabling the proliferation of digital-first financial services. The maturation of this model paved the way for the rise of neobanks, which challenged traditional banking paradigms by offering fully digital experiences, redefining customer expectations in the banking sector.

The increasing adoption of smartphones drove the development of mobile-first financial technology solutions. Square’s introduction of a mobile card reader in 2009 enabled small businesses to accept credit card payments using smartphones, democratizing access to payment processing and highlighting the transformative potential of mobile technology in the financial services industry.

The evolution of mobile payment systems continued with the launch of Google Wallet in 2011 and Apple Pay in 2014, which further popularized mobile payments and demonstrated the growing consumer demand for convenient, secure, and user-friendly payment solutions.

This period also saw the rise of peer-to-peer (P2P) payment applications. These platforms revolutionized how individuals transfer money, enabling quick and easy transactions between users. By allowing fast, direct transfers through mobile devices, P2P payment apps significantly reduced the friction in personal financial transactions, making it simpler for people to split bills, share costs, or send money to friends and family.

Accelerated growth of digital finance

The global COVID-19 pandemic, which began in early 2020, had a profound impact on the financial technology industry, accelerating the adoption of digital financial services and highlighting the importance of technology in ensuring the resilience and accessibility of financial systems. As lockdowns and social distancing measures forced businesses and consumers to rely more heavily on digital channels, financial technology solutions experienced a surge in demand.

Mobile-first financial technology applications saw unprecedented growth during this period. Many trading platforms reported significant increases in new user accounts, with some seeing millions of new funded accounts added in the early months of the pandemic. Similarly, payment and money transfer apps experienced substantial user growth, with some platforms more than doubling their monthly active users over a three-year period, indicating a massive shift towards digital financial services.

The events of 2020 also exposed the limitations of traditional financial institutions in meeting the needs of consumers and businesses in times of crisis. Financial technology companies, with their agile and technology-driven business models, were better positioned to respond to the challenges posed by the rapidly changing environment, offering innovative solutions for remote banking, contactless payments, and digital lending.

During this period, venture capital valuations for financial technology companies soared, driven by low interest rates and a booming stock market. The surge in financial technology investments was marked by significant capital inflows, leading to higher valuations and more frequent exits via IPOs and SPACs. Several prominent financial technology companies achieved record-breaking valuations, further underscoring the sector's growth and investor confidence.

The shift towards digital financial services during this period also accelerated the adoption of blockchain technology and cryptocurrencies. As central banks around the world explored the possibility of issuing digital

currencies, the interest in decentralized finance and non-fungible tokens grew, opening up new avenues for innovation in the financial technology sector.

The financial technology landscape in Africa is on the rise, with active companies reaching 1,263 in 2024, a significant increase from 1,049 in 2022 and 450 in 2020. Nigeria leads the financial technology sector, accounting for 28% of all financial technology companies on the continent.

Industry landscape

The financial technology industry includes a diverse range of financial services and technologies, categorized into several key areas. Many companies operate across multiple areas or create new niches that blur these distinctions.

Revenue models

Financial technology companies utilize various revenue models, often combining multiple approaches to diversify income streams.

Transaction fees form a primary source of income for many financial technology businesses, particularly payment processors and cryptocurrency exchanges. These companies typically charge a percentage of each processed transaction. Some companies have expanded this model to include premium fees for services like instant payouts, catering to merchants who require immediate access to funds. Interchange fees represent another significant revenue stream, particularly for firms offering payment cards.

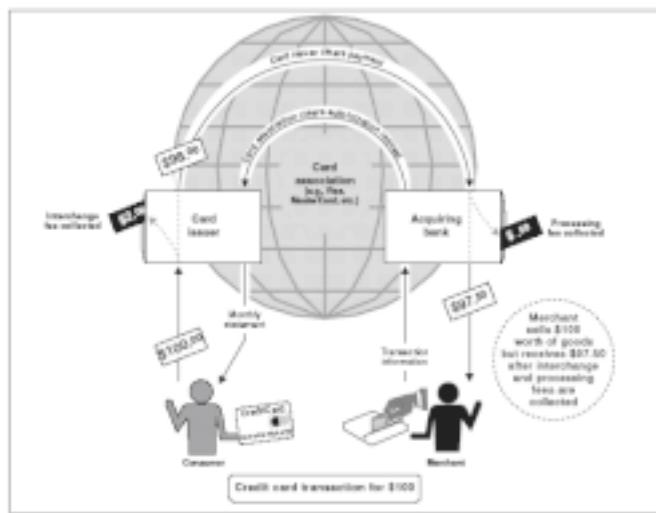


Figure 3: GAO report image explaining interchange fees

Subscription and freemium models allow companies to offer basic services at no cost while charging for advanced features or premium tiers. This approach is common among digital banks and financial management platforms. In the business-to-business (B2B) sector, usage-based pricing is prevalent, especially for API services. Financial technology infrastructure providers often charge based on the volume of API calls or transactions processed, enabling other businesses to access specialized financial services without developing them internally.

Interest-based revenue is crucial for many financial technology companies, particularly in the banking and lending sectors. Digital banks and investment platforms typically earn interest on customer deposits and cash balances. Lending platforms often combine interest revenue with loan sales, selling portions of their loan portfolios to other institutions or investors.

Data-driven revenue models, while potentially lucrative, have faced increasing scrutiny and regulation. Some

firms engage in data monetization, selling aggregated or anonymized user data to third parties. However, this practice has raised privacy concerns and regulatory challenges. A less controversial approach involves leveraging user data for targeted advertising and lead generation, earning revenue through product recommendations and referral fees while providing free services to users.

Some revenue models, such as payment for order flow (PFOF) used by certain brokerage firms, occupy a regulatory gray area. While PFOF allows for commission-free trades, potentially benefiting retail investors, it has faced scrutiny due to concerns about conflicts of interest and best execution practices.

Controversies

As financial technology companies seek to disrupt traditional financial services, some have been criticized for prioritizing growth over compliance, security, and consumer protection.

In a notable controversy, cryptocurrency exchange FTX collapsed in November 2022, facing accusations of deceptive practices, improper handling of client assets, and insufficient risk controls.

Sam Bankman-Fried, FTX's founder and CEO, was later convicted of wire fraud, conspiracy, and money laundering.