International Journal of Economic Practices and Theories (IJEPT)
ISSN: 2247-7225
Volume 2026, Issue 1

Emerging Role of Fintech in Indian Economy

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Abstract

In emerging markets like India, FinTech has changed how financial services are delivered. Advances in digital public infrastructure and a move towards mobile-first design have driven financial inclusion and made it possible for people to make payments in real-time. However, while there is an increasing number of users and transaction volumes recorded in prior scholarly research, there are very few applications of structured economic analysis on how FinTech has impacted the greater economy of India and whether our regulatory institutions have sufficient capacity to properly manage the trade-offs that financial innovation creates with respect to consumer protection and financial resilience. This study is an effort to fill this gap by conducting a multi-dimensional analysis of India's FinTech ecosystem utilizing institutional evidence and policy evaluation for the period from FY 2014-FY 2024. Analysis of FinTech data accrued before and after COVID reveals that UPI transactions grew exponentially from 91 crore in FY2017-18 to 17,000 crore in FY2023-24, highlighting the accelerated level of digital integration that is occurring in both household and business activity. Using Rogers' Diffusion of Innovations and Schueffel's FinTech framework as a basis, this study assesses digital infrastructure readiness, market penetration, and governance agility within the FinTech ecosystem, and provides policymakers with insights into how to generate sustainable and inclusive digital financial development.

Introduction

The financial sector has experienced one of the greatest transformations in history over the past 20 years with the rapid introduction of new technologies in every area of finance. This transformation has changed not only how international finance operates but more importantly, how it is structured. Financial technology (FinTech), simply defined, is the utilization of digital technology to deliver financial services through the means in which individuals access, transmit and regulate their financial transactions (Chemmanur et al., 2020). FinTech has enabled digital payments, mobile banking, data-driven lending and automated finance, all of which have resulted in greater efficiencies, lower transaction costs and greater access to sources of finance. As digital ecosystems evolve in both developed and developing countries, FinTech is anticipated to be a critical structural component to creating the new finance and changing economies (IMF & World Bank, 2019).

India's fintech sector has rapidly developed and transformed over the last 5 years and is one of the most obvious examples of this transformation in developing nations. The public digital infrastructure that India's government has created – for example the Digital Aadhaar Identity System, the Unified Payments Interface (UPI), and the Indian technology stack as a whole – has dramatically advanced the development of India's digital finance ecosystem, and consequently, there are many more people than ever using digital financial services in India (PwC, 2023). The infrastructure establishment, increase of smartphone use, government-sponsored financial inclusion efforts, and ongoing experimentation and innovation of the regulatory framework, have led to India becoming one of the world's innovators of digital finance and establishing itself as a global leader in real-time digital payments. The creation of infrastructure by the government intended to support innovation in the private sector will ultimately provide more opportunities for digital payment penetration into the financial services market.

A fast-growing fintech sector in India should not be thought of as an isolated event but should be put into the context of larger economic factors, namely digital financial services that help many people get funding or make transactions more convenient. Also, as users move toward adopting technology to perform tasks more quickly than before, there is also now a new set of structural concerns associated with user onboarding and expanding their usage through innovative technology. These include cyber security vulnerabilities, consumer protection concerns, fragmentation of regulation, data privacy, and systemic risk among others that have been created through the introduction of new products and services into the marketplace (International Monetary Fund and World Bank, 2018). The established and developing regulatory framework is a combination of regulations under various initiatives such as the Regulatory Sandbox, digital lending guidance, and the Account Aggregator framework which are aimed at creating a balance between the introduction of innovative technology and ensuring the stability of the financial system. However, whether or not these types of initiatives will ultimately provide the stability necessary to ensure the kind of economic resiliency necessary for long term growth remains to be seen.

Earlier research has often been focused exclusively on India and its use of financial technology (fin-tech). This includes looking at user adoption trends, transaction growth, adoption speed and expansion rates associated with digital payment systems in India. However despite having some descriptive evidence on the trend of adoption and entry into the market — studies conducted to date have primarily, though not exclusively, treated the regulatory developments and technological developments as distinct areas of study; therefore there has been very little opportunity to understand how the combined convergence and interdependence between these two areas have contributed to the evolution of the economic framework of India, and in particular whether the overall regulatory framework being developed will effectively balance innovation with consumer protection and systemic risk. The lack of studies focusing on the convergence of innovation and regulation limits an adequate understanding of the long term viability and structural resiliency of India’s fintech community.

Fintech's hybrid development in the Indian context can be observed in stark disparity between private emerging sector innovations and the public digital infrastructure. Unlike developed nations, where FinTech is driven via market forces in and out of its ecosystem, India provides an example of a FinTech ecosystem that is significantly influenced by state-sponsored platforms as well as by entrepreneurial technical solutions (PwC, 2023). To obtain an in-depth understanding of how these two different sectors interact we must analyze them across multiple dimensions rather than each dimension as an independent variable to complete our analysis; we must do a simultaneous analysis of infrastructure readiness, how behaviours will respond to the introduction of new technologies and the agility with which governance can be carried out.

Therefore, this study aims to achieve a broad evaluation of FinTech's recently evolving role within India's economic landscape through a combined evaluation, focusing on both its economic impact and also how regulatory issues affect FinTech activities during this ten-year period (FY2014-FY2024). This research will further investigate market dynamics of pre and post-COVID-19 global fintech adoption and structural changes resulting from such rapid changes, including new ways of interacting with money at the global level as defined by the IMF & World Bank (2019). Ultimately, we will measure whether or not India's fintech ecosystem is being led by both innovative and sustainable development through various analyses including total volume (transactional) of digital transactions made and relative dynamics of financial inclusion and organisational responses to changing regulatory environments.

The research is multi-faceted and involves examining FinTech from three dominant angles: technical diffusion, redefining the meaning of FinTech beyond its current definitions, and promoting growth in a more inclusive way. We will explore three different dimensions of the digital transformation of finance in India: (1) the readiness to support existing infrastructure, (2) the degree to which finance has penetrated into markets in India, and (3) the speed and effectiveness of the governance of these technologies. By utilizing an integrated methodology, the researchers hope to shed light on how the combination of government-owned physical infrastructure, innovative private sector financial solutions, and flexible regulatory environments could potentially impact the way that India provides financial access to its citizens using new technologies.

The aim of this study is to develop a better understanding of how sustainable FinTech-led development can be achieved in developing countries, by connecting research into how FinTech is being used to governance institutions. These findings will inform how policy can strengthen the ability for governing institutions to work together; to protect the rights of consumers; and, to promote the inclusive growth of digital financial services through innovation-based solutions. Therefore, India represents an example of the rapid evolution of fin-tech within the larger historical context of the financial industry, as well as an environment in which to examine the relationship between innovation and the changing nature of regulatory frameworks and regulatory resiliency as we continue to learn about the benefits and challenges associated with modern financial systems.

Review of Literature

One of the largest changes within the global financial system over the last several decades has been the rise of Financial Technology (FinTech). This is because FinTech combines digital technology with existing banking practices to create new ways of doing business. There is a consensus in the literature that the primary purpose of FinTech is to enhance the efficiency, innovation, and accessibility of financial markets to customers. FinTech has witnessed rapid growth globally since the introduction of digital technology infrastructure, changes in consumer preferences and behaviours, as well as through increasing reliance upon mobile and cloud computing technologies (IMF & World Bank, 2019). As an example, in India, where people are faced with several structural challenges, FinTech has taken on a much more important role due to issues such as financial exclusion, high transaction costs and limited physical bank branches.

The Indian FinTech sector has undergone massive expansion during the last 10 years due principally to governmental initiatives supporting digitalisation and financial inclusion. Reports show that India is now one of the fastest expanding FinTech markets due to investments in public digital infrastructure (i.e. payments and identification), increased access to smartphones, and institutional investment. (PwC Report, 2023). Simultaneously, researchers point out that if the FinTech sector is left unsupervised, there is significant risk associated with consumer protection and data privacy as well as increasing risks to the overall health of the financial services industry. Thus, there must be robust regulation surrounding FinTech. (IMF & World Bank, 2018).

The goal of this literature review is to compile and summarise a range of published academic studies, government publications, and market research around the impact that FinTech is having on the economy of India and how the current regulatory frameworks have impacted this emerging industry. By doing a comparative analysis of both global literature as well as literature specifically related to India; the literature review will identify common themes, regulatory obstacles, or "gaps," that would support an investigation of this ongoing research topic.

FinTech refers to financial innovations that are implemented through technology, which creates new business models, applications, processes and/or products that significantly impact the financial services industry (Chemmanur et al., 2020). A number of academic studies have classified FinTech based on the specific segment (i.e., payment solutions, digital lending, wealth management, insurance tech). A number of enabling technologies exist within the FinTech classifications including AI, blockchain, and cloud computing models. As such, FinTech is often discussed within the context of broader frameworks for digital transformation and financial innovation.

Several scholars offer different perspectives on the interaction between Fintechs and traditional financial institutions. Some research indicates that fintechs pose a significant risk to established banks by providing lower prices than traditional forms of banking (i.e., credit card transactions) and higher quality customer service (in particular, in terms of payment processing and providing loans). In contrast, other research concludes that fintechs will work closely with established banks to establish an ecosystem of collaboration to improve service delivery and operational efficiencies. This view is supported by research from the banking and financial markets, which shows that banks continue to form partnerships with fintechs, particularly in developing nations, where both fintechs and banks are beginning to see opportunities to use each other's resources to expand their respective businesses further.

FinTech has a role in combating information asymmetries and decreasing transaction frictions by using innovative technologies to make it easier for previously underserved communities to gain access to financial products and services, therefore following the principles behind inclusive growth models in the development literature. In India, researchers have identified that in addition to being an area of convenience for users, the application of FinTech is also an important means for formalising economic activities and integrating informal economic players into the broader financial system (Dhevan et al, 2025).

A significant amount of research has shown that there has been a rapid growth of FinTech in India and it has added to the volume of economic activity. While the empirical studies indicate that digital payments have been a foundation for the growth of FinTech in India and have been spurred by the widespread use of mobile-based payment systems, empirical research has also shown that the volume of digital transactions has dramatically increased following the COVID pandemic, facilitating an even greater transition to a "cash-light" economy (Dhevan et al, 2025). Increased transaction speed, better visibility and enhanced convenience have also been associated with recent developments in this area.

The economic significance of Fintech is evident through industry research. PwC (2023) states that India has one of the largest Fintech ecosystems worldwide, housing many thousands of startups working in the areas of payments, lending, and developing technology to facilitate these activities. The Fintech ecosystem has attracted significant amounts of investment, which have driven innovation, particularly in urban financial markets. The literature states that the adoption of Fintech will produce increased productivity in the financial services sector due to cost and turnaround reductions resulting from automated and digital methods of providing financial services. The literature also highlights the contributions of the Reserve Bank of India and The National Payments Corporation of India in creating the Fintech environment in India. The introduction of interoperable payment systems and real-time settlement systems is cited as major factors enabling Fintechs to achieve scale and create trust in the system. Overall, Fintech is positioned in the literature as a major driver of economic modernisation in India, however, most studies provide descriptive information about use or adoption of the technology and little to no information about longer-term economic impacts of Fintech on India.

Financial Inclusion is a widespread topic of discussion in Indian FinTech literature. Many academic and policy studies conclude that the development of FinTech has increased access to formal financial services for people living in rural areas, small and medium-sized enterprises (MSMEs), and informal workers, who have traditionally been excluded from the formal banking system. Digital payment and mobile banking solutions are identified as methods that reduce barriers to entering the financial system and decrease reliance on physical bank branches (IMF & World Bank, 2019).

India serves as an example of how to successfully integrate FinTech with a country's public digital infrastructure. Current literature suggests that combining these three types of infrastructure (digital identities, payment methods, and mobile connectivity) builds a scalable solution to foster inclusion in finance as a whole. Additionally, research shows that large numbers of small business owners now have more access to loans thanks to FinTechs using nontraditional sources of information to assess potential borrowers (PwC,2023), and thus these new technologies create an environment that promotes greater resilience and entrepreneurial opportunities.

The use of technology to promote financial inclusion has potential benefits, but there is also a risk of many of the same drawbacks associated with this affordable solution. The risk for an individual's inability to read and interpret digital media, taking on excessive amounts of debt from accessing loans more easily; and for individuals and families without access to smartphones or the internet to be excluded from financial inclusion through FinTech. Therefore, there is much potential for FinTech to help millions of underserved individuals and businesses globally, and many agree that regulations will be essential in supporting the growth of safe and responsible FinTech innovation (IMF & World Bank, 2018). While regulatory frameworks provide guidance on this important area of the economy, the regulatory environment is expected to support the development of new technology while also protecting the overall stability of financial systems (IMF & World Bank, 2019).

The research on regulation in India indicates that the industry has developed a progressive regulatory framework for companies operating in India. In addition, the Indian government has created several regulatory frameworks, such as the regulatory sandbox, which allow companies to experiment with innovative technologies in a controlled environment, with minimal risk exposure. Finally, the industry has found that the regulatory framework in India has taken a proactive approach to establishing standard payment systems; developing KYC compliance processes; and creating and enforcing consumer protection laws (PwC, 2023).

India's regulatory structure has been aligned with many of the same discussions taking place at the global level, as indicated by the Bali FinTech Agenda. Moreover, analysts have pointed out that there are elements of India's regulations that reflect the best practices of various countries around the world with respect to several of the most important issues relating to data governance, anti-money laundering (AML) and counter-terrorism financing (CFT) compliance and the use of technology to support supervision (IMF & World Bank, 2018). Additionally, even though new technologies have evolved at a more rapid pace than the ability of existing regulatory frameworks to keep pace with, there are still many grey areas that remain relative to new and emerging business models, such as digital lending and embedded financing, that are just beginning to develop.

As per previous research, while everyone believes we need regulations for growth of FinTech, there are several challenges associated with this growth. Additionally, there is an ongoing theme within all of the studies regarding this area of economic development, which is that there is a gap between; innovation and regulatory compliance for businesses within this industry. Some feel that there are excessive regulations placed upon FinTech start up businesses, which will ultimately lead to losses in innovation; whereas others feel a lack of regulations for FinTech creates substantial risk for consumers and the entire financial system (Chemmanur et al., 2020). In fast-growing economies such as India, this conflict is only heightened.

Furthermore, data privacy and Cyber Security have become a growing concern among Academics and Public Policy Analysts. The increase in the number of Digital Platforms used by Businesses means that there is also an increased likelihood of exposure to Cyber Threats and of the Misappropriation of Consumer Data; however, The Challenge to Regulators is compounded by the increased use of Regulatory Arbitrage, where Companies do not operate within the Traditional Boundaries of Regulation, making it increasingly difficult to Regulate those Companies (IMF & World Bank, 2019).

The regulatory asymmetry faced by banks vis-à-vis non-bank fintech players has also been an area of concern raised by several industry experts in the report. There are several experts who point out that the difference in the compliance levels and requirements imposed on banks compared to non-bank fintech companies is likely to result in competition being distorted between these two groups of companies as well as create systemically dangerous issues. As a result, this indicates the need for a coherent and adaptable regulatory structure that accommodates technological developments as they take place.

There are many unanswered questions concerning the development of FinTech (Financial Technology) companies in our country. The majority of research to date has focused on documenting the increasing number of users of fintechs and the growth in transaction volumes. The impact of the adoption of FinTechs on the overall economy, including, but not limited to, productivity, the increase in jobs, and the long-term outcome of sustained economic growth, has not been well documented.

The second major limitation of existing research is that while much of the literature discusses regulation using descriptive language, it fails to critically assess how well India's current regulatory framework provides an appropriate balance between innovation, consumer protection, and financial stability. There are few examples of integrated analyses which measure the actual outcomes of regulation rather than simply the intent of regulation.

The third limitation of existing research is that the majority of the literature has treated the development of FinTech as a separate phenomenon from the regulation of FinTech. Few integrated studies have examined the economic impact of FinTech and the corresponding regulatory framework that governs it together, particularly in the Indian context. This lack of integration hampers a complete understanding of how this sector has developed.

Finally, a majority of studies rely on secondary data and short term (monthly/yearly) time frames, limiting the ability to fully analyse the structural changes that were occurring due to the change in the landscape of FinTech driven transformations. Therefore, this research aims to bridge these gaps by providing a comprehensive analysis of the role of FinTech in the Indian economy and how effectively the regulatory framework that exists is enabling or constraining FinTech's growth.

Research Methodology

This research integrates both qualitative data and quantitative data to document the FinTech industry growth in India (through secondary research) by analyzing government policy's effect within this industry. Two types of information will be assessed: quantitative metrics and qualitative policy analysis. This approach will allow the researcher to view changes within the FinTech sector (such as growth in digital payments, increased financial inclusion, more robust FinTech business models and, changes in regulations) over time while breaking the study periods into pre-COVID (2014-2019) and post-COVID (2020-2024) to assess any significant differences regarding acceptance rates, during those dates the researcher will be evaluating this trend and changes over time.

The secondary data comes from multiple sources (including the Reserve Bank of India (RBI) annual reports, National Payments Corporation Of India (NPCI), World Bank data on financial inclusion, peer-reviewed materials, and published whitepapers from industry leaders, such as KPMG, EY, and NITI Aayog). This secondary data has been evaluated by the particular researcher via use of excel to organize results and by using descriptive statistics, comparing against other data points, visualizations across several timeframes to analyze changes economically and regulatory.

Analytical Framework

We will employ a multi-faceted analytical framework that combines the definitions for FinTech from Schueffel, Rogers' theory of the Diffusion of Innovations, as well as the framework for Inclusive Growth.By using an integrated approach to these three bodies of work, we will provide an in-depth view of how financial technology changes how people access, receive, and govern financial services in India through both institutional design and behavioural change.

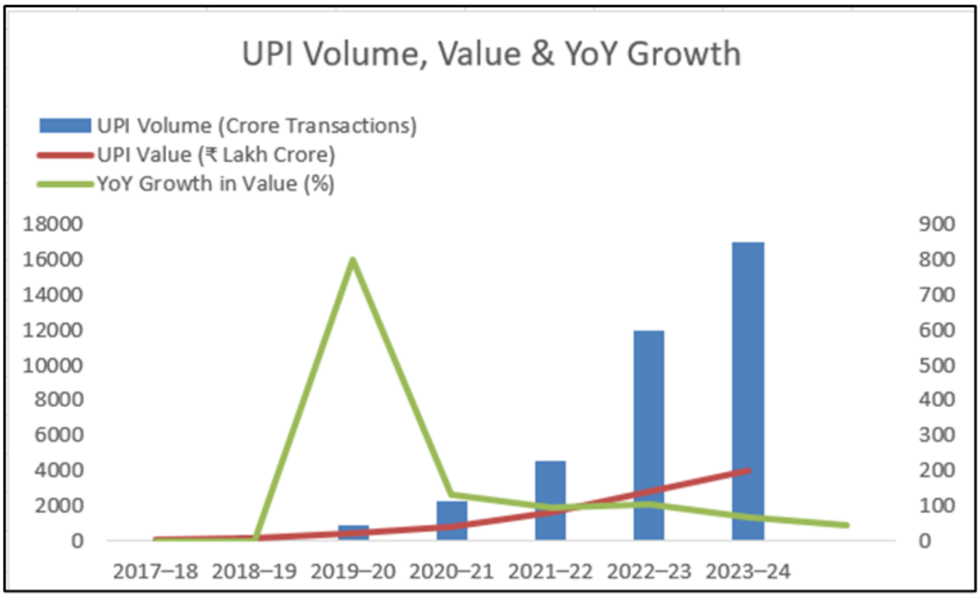
According to Schueffel, FinTech is defined as using technology or tech-based products and solutions to either enhance or change financial services that may or may not be provided by an entity that serves as an institution (Gomber et al., 2018). This definition is applicable to India based on its hybrid model, wherein state-led initiatives for infrastructure development such as Aadhaar and UPI are complemented by the large number of privately funded/founded fintech startups that qualify as financial institutions. Together, both types of actors have created mobile-first lending platforms, merchant payment systems based on QR codes, and streamlined the process for digital onboarding to banks using Aadhaar-enabled e-KYC (Mukherjee, 2025).

The adoption of financial technologies has occurred sequentially across different segments of the population, as explained by Rogers' Diffusion of Innovations theory (Arner et al., 2016). As innovators and early adopters of India's Unified Payments Interface (UPI) and other related technologies, urban digital natives (those who were born into and grew up in a digital world) and micro, small, and medium enterprises (MSMEs) were among the first to embrace UPI and other related technologies. The COVID-19 pandemic has fast-tracked the adoption of UPI and related technologies for early adopters and laggards through the use of behavioural nudges to encourage contactless payment options, as well as through direct benefit payments (DBPTs), government-sponsored welfare payments made possible by direct benefit transfer (DBT). Despite a general increase in rates of adoption of Digital Financial Technologies (DFTs), access to DFTs continues to be unequal across urban and rural areas because of barriers such as limited physical networks and/or limited digital literacy.

The Inclusive Growth Framework promotes the idea of using Financial Technology or "FinTech", to allow for more access to Credit, Savings and Insurance while simultaneously enhancing the Economy itself. The Jan Dhan-Aadhaar-Mobile (JAM) trinity, India Stack, and digital public infrastructure are examples of government programs aiming to ensure equal access to financial services for everyone (Sinha & Roy, 2020). In the Global Financial Index, there are now more digital accounts being opened and more people using digital means to pay for goods and services in the developing world. This bolsters the previous conclusions about the link between access to digital infrastructure and inclusion into the economy (Demirgüç-Kunt et al., 2021).However, many barriers exist that continue to prevent equal access, including low levels of financial literacy, infrastructure development challenges, and major differences in access to technology based on gender (Mukherjee, 2025).

Operationalizing the framework is achieved through three key areas of analysis. Digital infrastructure readiness is assessed through the indicators of Aadhaar-enabled eKYC, UPI penetration, and the adoption of India stack modules including eSign, DigiLocker, and eConsent as a means to reduce onboarding frictions as well as provide real-time capabilities to deliver services through public rails for private innovation (NPCI, 2024; RBI, 2023).

Financial Year	UPI Volume (Crore Transactions)	UPI Value (₹ Lakh Crore)	YoY Growth in Value (%)
2017–18	91	1	0
2018–19	374	9	800
2019–20	874	21	133.33
2020–21	2234	41	95.24
2021–22	4561	83	102.44
2022–23	12000	139	67.47
2023–24	17000	200	43.88



Market penetration is measured through several different metrics including UPI transaction volumes and values. The volume of UPI transactions has increased from 91 crore during FY2017-18 to 17,000 crore during FY2023-24 with the value of these transactions rising from ₹1 lakh crore to over ₹200 lakh crore (NPCI, 2024). There was an 800% year-on-year increase in value in UPI transactions during the peak year of FY2018-19 showing how quickly adoption occurred at the onset of this technology and growth remained steady post-COVID with an annual growth rate exceeding 100% during FY2021-22. When comparing volumes and values of UPI transactions after the onset of COVID (FY2020-24) against pre-COVID levels (FY2017-20), there was a 6.5X volume increase and a 35X increase in value during this period showing not only that adoption is widespread, but digital financial services are now more deeply integrated into both individual as well as small business transactions.

Governance agility is the third dimension. It is assessed through institutional mechanisms including the Reserve Bank of India's Regulatory Sandbox, Account Aggregator framework, digital lending guidelines established during 2022, and SEBI's Innovation Hub. In addition to ensuring that the economy of India will develop through creating balance between promoting Innovation as a result of Regulatory Regime and Consumer Protection through a dynamic and innovative framework to develop necessary regulatory solutions for consumers affected by new digital fraud and data misuse practices (Arner et al., 2016).

This analysis also includes quantitative evidence. Descriptive statistics and comparative analytical techniques will be employed to evaluate data generated by the Reserve Bank of India (RBI) and the National Payment Corporation of India (NPCI). During the period FY 2017-FY 2024 the average annual volume of UPI transactions is estimated at 5,305 crore, with an average annual standard deviation in transaction volume of 6,617 crore indicating the rapid rate at which transaction volumes are growing year-on-year. The average annual value of UPI transactions over the same time period is estimated at ₹70.6 lakh crore, with an average annual value range for UPI transactions between ₹1 lakh crore and ₹200 lakh crore; this demonstrates both significant skewness in the values and variability of UPI transaction volumes.This data demonstrates how a digital ecosystem that was previously defined solely by changes to behaviour has matured through both the behavioural changes and policy innovations that follow. (Source: Reserve Bank of India, 2023 and National Payment Corporation of India, 2024)

UPI Volume (Crore Transactions)		*UPI Value (₹ Lakh Crore)*	
Mean	5304.857143	Mean	70.57143
Standard Error	2501.023337	Standard Error	28.26394
Median	2234	Median	41
Standard Deviation	6617.085774	Standard Deviation	74.77936
Sample Variance	43785824.14	Sample Variance	5591.952
Kurtosis	0.082058576	Kurtosis	-0.21885
Skewness	1.225517253	Skewness	0.989138
Range	16909	Range	199
Minimum	91	Minimum	1
Maximum	17000	Maximum	200
Sum	37134	Sum	494
Count	7	Count	7

The incorporation of both Rogers' adoption theory and Schueffel's definition into an inclusive growth framework provides an excellent means by which to evaluate India's fintech development. The combination of public digital infrastructure, innovation in the private sector, and responsive regulation has worked together to form a very advanced fintech ecosystem within India that should serve as a blueprint for other developing nations hoping to achieve inclusive financial transformation.

Significant Milestones in India's FinTech and Core Banking Evolution

The evolution of FinTech in India has been facilitated by an accumulation of digital public infrastructure, financial reforms, and regulatory measures. From foundational inclusion activities to now a real-time interoperable financial ecosystem of today; the evolution has taken place along a very specific path from early 2000 to today (post COVID) that indicates a transition of the core banking and FinTech landscape of India.

Digital financial reform began with the introduction of the Core Banking Solutions (CBS) in the early 2000s to computerise public sector banks and to enable them to operate as one centralized process with the capability of performing transactions digitally. CBS provided the basis for future scalable retail banking operations and ultimately for the integration of FinTech platforms supported by mobile and cloud technology (RBI,2020; Singh & Roy,2020).

With the rollout of Aadhaar beginning in 2009, later establishing the UIDAI as an institution responsible for issuing Aadhaar, biometrics became the tool for eKYC and thus the backbone for digital onboarding and digitized service delivery models (Mukherjee,2025; Arner et al.,2016). The launch of PMJDY in 2014 resulted in over 400 million bank accounts being opened and an accelerated pace of financial inclusion at scale (Sinha & Roy,2020). Almost immediately thereafter came the launch of India Stack, which included open APIs ie. eSign, DigiLocker and UPI, all of which were key components to enabling digital finance (NPCI,2023; Gomber et al.,2018) .

The demonetization policy in 2016 was an inflection point that catalyzed a movement towards cashless transactions. Concurrently, NPCI launched UPI as a mobile-first, interoperable payment platform. This innovative approach enabled instantaneous movement of money between banks and allowed FinTechs to create scalable payment applications on government infrastructure (RBI,2017; Arner et al.,2016).

In 2019, the Reserve Bank of India established the Regulatory Sandbox framework to enable secure experimentation of FinTech solutions as well as the Account Aggregator (AA) frameworks which were introduced in 2021, allowing for consent-based data sharing among financial institutions (RBI,2021).

The COVID-19 pandemic caused a wave of digital transformation and the widespread distribution of DBT (Direct Benefit Transfer) digital payment services, demonstrating the value of having digital rails in place (Sinha & Roy, 2020). Moreover, there have been many new initiatives in the area due to rising volumes and the need to address regulatory issues related to the increased adoption of digital payment channels, including UPI AutoPay (8.5 million) and UPI Lite (2 million). The Reserve Bank of India (2022) has issued updated guidelines for digital lending as well.

As illustrated above, these examples show that both the private and public sectors have worked together effectively in developing a common digital banking ecosystem. CBS has provided the foundational elements of creating a cohesive digital banking infrastructure; Aadhaar and the India stack provide for a seamless onboarding experience for users and provide access to various types of financial products and services; UPI allows for open-ended opportunities for innovative new ways of providing credit, making payments, and data governance; and the transformation of the banking ecosystem has not only resulted from new technology but from an institutional organizational flexibility that enables banks to be responsive to changes in financial behaviour quickly (Mukherjee,2025; Arner et al.,2016; Gomber et al.,2018).

Comparative Analysis of India and Global FinTech Leaders

The established digital infrastructure of India as well as its capacity to innovate via mobile-first solutions, have set it apart from the rest of the world's Fintech evolution thus far, and this trend is expected to continue on its current pace of development.

In conjunction with India's advanced digital infrastructure, there are numerous examples of countries (UK and USA) with developed Fintech industries that are also experiencing incredible expansion in their respective markets. However, both countries are experiencing new successes and ongoing challenges with the stage of development of their Fintech industries.

India accounted for about forty-six percent of the total amount of real-time digital transactions in the world in 2022, while the USA and UK accounted for only 1.3% and 1.1%, respectively (NPCI,2023; ACI Worldwide,2023; Chakravorti,2022).

The above figures clearly demonstrate that India is the leader in terms of real-time digital transactions; these trends are driven by the Unified Payments Interface (UPI), a highly efficient and low-cost payment system designed based on the principles of an open API. The UPI operates on a shared, open payment infrastructure and allows both public and private enterprises to develop their systems on top of the existing UPI system, enabling scalability through the use of the same infrastructure to deliver payment services instead of creating their own payment systems (Gomber et al.,2018; Sinha & Roy,2020).

As mentioned earlier, the USA has created a very fragmented ecosystem for Fintech, which is severely impeded by a lack of central coordination and underlying capacity issues. For example, Zelle and Venmo do not have the same level of interoperability that is available through UPI in India and they also often charge fees to consumers for transactions. The UK has also attempted to address this with its Open Banking initiative under PSD2. However, this has focused on consumer data rights and portability and has not provided the same breadth of adoption or real time capabilities as UPI (Buckley et al.,2020; Ghosh & Ghosh,2021).

From a regulatory perspective, the approach to regulation in India is mainly reactive, but it is also getting more coordinated. The introduction of the Regulatory Sandbox by RBI, the Account Aggregator framework and the digital lending guidelines are all examples of how RBI has tried to manage systemic risk without inhibiting innovation. While progress is being made with these measures, there is still no unified regulatory framework in India (RBI,2022; Mukherjee,2025). In contrast, Singapore's Monetary Authority of Singapore provides consolidated regulation of financial services, while the FinTech sector in India has three different types of regulators (RBI, SEBI and IRDAI), which creates a great deal of regulatory overlap and compliance friction .

Developed countries are generally more protective of their consumers' personal information than developing countries since the developed countries have a better regulatory framework in place than developing countries do. For example, Europe has stricter regulations regarding consumer protection than the United States does through the GDPR (General Data Protection Regulation) and California's (C.C.P.A) California Consumer Privacy Act (Arner et al.,2016; Zetzsche et al.,2020).

On the other hand, while India has made significant strides toward providing tools for people to access their financial capabilities using digital means through JAM Trinity (Jan Dhan-Aadhaar-Mobile) and DBT (Direct Benefits Transfer) programs, it also has many challenges when it comes to accessing digital devices in rural areas (Sinha & Roy,2020).

In summary, the FinTech industry in India has created a digital public infrastructure (JAM) and is able to scale rapidly due to low-cost solutions and is therefore experiencing rapid adoption rates by consumers for payment products; on the other hand, India is having difficulties developing a regulatory framework around cyber security, unified regulation (all financial products), and consumer rights. Whereas developed countries do not have as many FinTech companies as India does due to their inability to provide the same level of public digital infrastructure, their company regulatory structure, privacy norms, and institutional capabilities are far more robust than India's.

Risks and Challenges in India's FinTech Ecosystem

Although India's FinTech industry is recognized for its size, rapid advancement and innovative capacity, it still has a number of risks associated with it. Factors contributing to these risks include digitalization occurring at a very fast rate; uncertainty in how laws affect consumers; vulnerabilities among financial consumers; and reliance on technology as the main focus of the company's business model. In addition, the merger of financial service companies with real time digital infrastructures (especially UPI and mobile-only companies) has occurred faster than the ability of the institutions involved to be ready for this type of transaction which raises issues regarding fraud/cybersecurity, regulatory fragmentation, data privacy, ethical issues related to digital lending, and socio-technical exclusion (Mukherjee,2025; Buckley et al.,2020).

Surge in Digital Financial Fraud and Cybersecurity Threats

RBI and NPCI data show UPI fraud cases in India reaching over 13.4 lakh in FY2023-24, up from 2.7 lakh in FY2020-21, resulting in annual losses exceeding ₹1,000 crore (RBI,2024). UPI fraud encompasses unauthorized transactions, QR code manipulation, social engineering scams, and malicious screen sharing by attackers.Although UPI provides interoperability within many systems, its architecture often fails to apply uniform security standards across third-party applications, resulting in varying degrees of fraud protection provided by different service providers. Furthermore, lack of understanding by victims about their rights and access to resources for redress indicates insufficient levels of both personal and organizational cyber hygiene.

Cyberattacks have increasingly developed into more organized and advanced attacks that target the cyberspace of cloud-based architectures and APIs that large-scale platforms (such as the National Payments Corporation of India (NPCI) and Aadhaar's Know Your Customer (KYC) database) use to provide banking services to the unbanked and low-income communities via Direct Benefits Transfer (DBT). Compared to more developed economies, such as those located in advanced (or more developed) markets and that have regulatory frameworks requiring companies to disclose security breaches and carry insurance for losses due to cyber theft, India's Cyber Resilience capabilities are still far behind. (Zetzsche et al., 2020).

Ethical and Operational Concerns in Digital Lending

A rapid growth in unregulated digital lending apps has emerged since 2020. Almost all of these apps are from Chinese companies and have taken advantage of regulatory gaps in the system to charge exorbitant interest rates, scrape sensitive borrower data using aggressive collection methods (such as doxxing borrowers) and psychological harassment, and collect sensitive borrower information from other sources (Sinha & Roy, 2020).

To solve this issue, the Reserve Bank of India (RBI) implemented its Digital Lending Guidelines in 2022 and mandated that all digital lending be completed through RBI-approved financial Institutions. All disbursements and repayments would occur through a bank account in the borrower's name and that an informed consent process be used for data access by third parties associated with the loan. The biggest challenge going forward is enforcing these regulations in 2nd and 3rd tier cities and rural areas where the number of individuals using alternative financing is high and where there is a very low level of digital literacy.

Data Privacy and Consent Failures

The fintech applications in India often obtain a broad variety of personal and behavioural data from an array of sources, including your contacts, SMS logs, location data, biometrics and other aspects of your daily life, frequently without obtaining informed consent from you prior to use. The regulatory environment was almost entirely devoid of statutory safeguards prior to the Digital Personal Data Protection Act, 2023, allowing for widespread data harvesting and opaque cross-selling of financial products to occur (Arner et al., 2016).

Currently, however, there remains a considerable amount of uncertainty regarding cross-border data flows, data profiling and AI-based decision-making. For example, while many Buy now pay later (BNPL) and neobank applications use algorithmic credit scoring that is heavily reliant on non-traditional data collection, the reliance on non-human oversite to provide this data results in significant discrimination and inability to accurately assess the creditworthiness of users and may result in a denial of any due process (Gomber et al.,2018; Zetzsche et al.,2020).

Regulatory Fragmentation and Institutional Gaps

Different regulators manage India's FinTech industry; the RBI, SEBI, IRDAI, and MeitY are examples of organizations that have distinct responsibilities and therefore provide fragmented oversight: regulators create possibilities for businesses to utilize what in essence is regulatory arbitrage. Wealth management apps, insuretech aggregators and crypto exchanges, among other products and services, often exist in so-called grey areas. Unlike the UK's FCA and Singapore's MAS, which have consolidated supervisory frameworks in place, the Indian regulatory environment does not currently have similar structures for speed of innovation, systemic risks, and overall regulatory efficiency (Buckley et al.,2020).

India has developed innovation hubs and regulatory sandboxes within the FinTech sector to promote innovation; however, the segment still lacks certain key elements such as universal mechanisms for grievance redressal, real-time systems for monitoring risks, and institutional structures for responsible use of AI.

Digital Divide and Exclusionary Risks

While mobile usage is on the rise, not everyone has equal access to the internet or the knowledge needed to navigate digital services. A growing number of people living in rural areas lack either a working smartphone or a global positioning system (GPS) for their navigation needs. In addition, many people there have never learned how to use services like UPI (Unified Payment Interface) and do not have any knowledge about opening a bank account due to a language barrier or unfamiliarity with the service itself. Many of these vulnerable populations—such as women, older adults, and low-income individuals—face financial hardships caused by economic instability and, therefore, risk falling victim to scams or having limited access to alternative forms of finance, such as digital credit or insurance products (Sinha & Roy, 2020).

To ensure that FinTech is fully accessible to all users, addressing the gaps in both access and trust will be vital; without closing these gaps, the groups targeted by FinTech will only have access to a limited number of goods and services and will continue to be at risk for without a return.

Conclusion

As the FinTech sector in India evolves that will help define the future of the industry, using globally accepted methods for developing domestic financial technologies will ensure sustainable, inclusive, and resilient growth. The current level of regulation and infrastructure has provided an excellent platform for the industry to successfully continue to develop and grow. However, the growth of the FinTech sector in India is going to depend on how well new laws and regulations are developed and applied to create responsible, inclusive innovation and achieve equitable results for users (Arner et al., 2016; Zetzsche et al., 2020).

One of the important developments that has occurred with India's regulatory environment since starting in 2019, when the RBI introduced its Regulatory Sandbox for the first time, has been the establishment of the sandboxes for structured innovation. However, the number of verticals (segments of FinTech businesses) that have emerged from them and the types of businesses that have entered them have been limited to this point. In contrast, some jurisdictions (e.g. the UK, Singapore) have developed broader regulatory landscapes that facilitate the development and testing of cross-border FinTech innovations, add flexibility in terms of how regulators supervise, and provide customized performance indicators for managing risk (Gomber et al.,2018). In addition to establishing the previously-mentioned three verticals, India has a real opportunity to expand its current sandbox environment to include additional verticals such as insuretech, AI-based credit underwriting, and cross-border digital financial products. Collaboration among all four regulators (RBI, SEBI, IRDAI, and MeitY) will enable much greater coordination in managing the innovation process and providing an opportunity for transparent performance evaluations and sector-wide learning.

As important as anything else is the need to enhance digital and financial literacy. That said, even with much of India's population having access to mobile communication and bank accounts, we still have many people unable to successfully utilize any of India's digital financial services. Therefore, thus far, India has not dedicated enough resources to developing financial literacy amongst its citizens, as have been done by countries like Singapore and Australia — both of whom have introduced financial literacy into the curriculum of schools; and incorporated financial literacy as part of vocational training. To be successful, India must begin to devote resources toward changing behaviour over the long term. For example, by using existing programmes such as PMGDISHA and localised NGOs that provide financial education awareness support to provide hands-on training in vernacular forms of communication. Additionally, by embedding and utilising financial simulation and/or interactive learning tools into rural/community education models and outreach programs; there will be additional means to bridge the usage gap that exists with respect to using digital financial services/products in India (Mukherjee,2025).

India has a need for systemic strengthening to establish a consumer protection framework for digital finance. Currently, the grievance redressal mechanisms across various institutions are scattered, which creates challenges in providing coverage for newer FinTech models such as neobanks and BNPL platforms. Examples from abroad, such as the US Consumer Financial Protection Bureau (CFPB) or the UK's Financial Ombudsman Service (FOS), have both established technology-enabled, centralised models for dispute resolution and bias auditing, and proactive surveillance. An example of how India could strengthen its existing framework is to implement a unified FinTech Consumer Protection Council to streamline the aforementioned functions. By establishing in-app grievance redressal tools, algorithms for decision-making, and consent-based provisions for AI usage, consumer confidence and accountability in digital finance would both improve dramatically.

An area of focus should be the development and implementation of open banking infrastructure. The Account Aggregate framework in India represents a unique, government-backed model for secure data portability; however, adoption has occurred at inconsistent rates across India. In contrast, Europe's PSD2 framework has led to the proliferation of third-party innovation as a result of mandating of APIs and real-time consent. To achieve similar results in India, public sector institutions should be time-limited for onboarding times, financial incentives should be provided for first movers, and user-facing tools,(eg: multilingual consent dashboards) should be created to facilitate this objective.

Cybersecurity is a key area of concern as India's digital public infrastructure is one of the most used worldwide, but its level of protection is not commensurate with the amount of transactions being completed. Additionally, mobile wallets, payment gateway systems and data storage repositories are all at risk of increasing numbers of threats, so India must change its approach from a compliance-based model to a real-time defensive model with pre-emptive measures. Important lessons can be learned from global practices as important lessons, such as real-time cyber incident reporting in the European Union, or mandatory cyber-insurance in Israel. The implementation of periodic security audits, establishing a national cyber risk index and providing co-insurance or compensation to users who have been financially impacted as a result of fraud should all become mandatory requirements for the country of India.

As it stands now, there is an increasing need for industry led governance as a necessary condition to enable responsible innovation. The Reserve Bank of India's (RBI) approach to establishing Self-Regulatory Organizations (SRO's) as a component of the financial services industry has yet to gain significant traction, particularly in the areas of lending and payments. The continued use of the SRO concept internationally through the Singapore FinTech Association and Innovate Finance in the UK, has proven their ability to provide value in respect to compliance, dispute resolution, and setting ethical standards through SROs. If SROs are registered as officially recognized and governed organizations, then they can provide decentralized, rapid governance to the FinTech ecosystem in India. Ethical standards related to AI usage, marketing practices, and customer data protection could be specified within published ethical codes issued by the SROs, thereby improving the credibility of the FinTech industry and increasing consumer trust in its services.

Together, these best practices reinforce how embedding institutional resilience, consumer-focused design and international learning in the FinTech policy landscape is critical to developing an inclusive and sustainable digital financial services ecosystem for India. As India's FinTech ecosystem transitions from being a national model to a global benchmark for interoperability and inclusivity in digital financial services, innovative approaches must align with effective governance mechanisms to create pathways for equitable financial inclusion.

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