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Growth of Digital Payments in India : A Study of UPI Adoption and Its Impact on the Banking Ecosystem

*An Empirical Analysis Using Secondary Data (2018–
2025)*

Abstract : Unified Payments Interface (UPI) has transformed the digital payment landscape in India with its features of real time, interoperability, and ease of fast retail payment transactions. This study analyzes the growth path of UPI and the impact on the digital payment system and commercial banking system of India with the secondary data from FY2018–19 to FY2024–25. Data sources are authentic sources like the National Payments Corporation of India (NPCI), Reserve Bank of India (RBI), Ministry of Finance, government publications etc. Descriptive statistics and year-on-year growth analysis, simple linear regression, compound annual growth rate, Pearson's correlation is applied to study the growth of UPI and analyze the performance of UPI in comparison to other major payment systems like RTGS, NEFT and Credit Cards. The findings showed that the volume of transactions on UPI jumped significantly from 5.39 billion transactions during FY2018-19 to 185.87 billion transactions during FY2024-25, while transaction value has grown from ₹8.78 lakh crore to ₹260.58 lakh crore during the same period. The CAGR shows that UPI had the biggest growth among the selected payment systems, with the number of transactions increasing by 80.73 per cent and transaction value by 75.53 per cent. The correlation analysis between transaction volume and transaction value shows an extremely positive correlation ($r=0.996$), and the regression analysis confirms that there is a statistically significant positive trend over time in the number of transactions on UPI ($R^2 = 0.911$). The comparative analysis also reveals that UPI is accounting for about 94-95 per cent of the combined transaction count of the four payment systems analyzed (UPI, RTGS, NEFT and Credit Cards) but just 9-10 per

cent of the combined transaction value, further indicating that UPI is the leading platform for high-frequency, low-value retail transactions, while RTGS and NEFT remain the key enablers for higher-value transactions. In conclusion, the study reveals that UPI has revolutionized the digital payment landscape in India, driving the adoption of digital payment and reshaping the traditional payment systems. The results are significant for policy makers, commercial banks, payment service providers, and fintech companies in terms of enhancing the payment infrastructure, fostering innovation, and sustaining the future of India's digital payment ecosystem.

Keywords : UPI, Digital Payments, Financial Inclusion, Banking Ecosystem, India, Real-Time Payment Systems, Financial Technology (FinTech), Payment System Regulation.

1. Introduction : Payment systems are the equivalent to the "circulatory system" for any modern economy – how they adapt and evolve drives implications for monetary policy transmission and financial stability, as well as the strength of financial inclusion. India has experienced one of the quickest and most significant shifts towards retail payments ever seen in the world, from primarily cash and cheque-based payment systems to a system that is practically dominated by digital instruments over the last 10 years. The Unified Payments Interface (UPI), developed by the National Payments Corporation of India (NPCI) — a not-for-profit company incorporated under Section 8 of the Companies Act and promoted by the Reserve Bank of India (RBI) and the Indian Banks' Association (IBA), is a real-time payments platform launched in April 2016 and regulated by the Reserve Bank of India (RBI).

The primary aim of UPI was to address the fragmentation issue prevalent in the earlier electronic payment channels in India allows bank account holders in India to transfer funds in an instant way between two different banks or apps, but instead of bank account numbers or passwords, a virtual address is used. It started with a small success and has been transformed into the backbone of India's digital economy; by financial year 2025-26, UPI has been handling more than 24,000 crore transactions per year, or approximately 12,000 times more than the number of transactions processed in its initial year ([Press Information Bureau \[PIB\], 2026](#)). The phenomenon of growth is not unique; it has been accompanied by, and has been contributing to, structural transformation of the commercial banking system, the fintech sector, merchant payments systems, and efforts towards financial inclusion through schemes like Pradhan Mantri Jan Dhan Yojana (PMJDY) and Digital India.

While the question of consumer adoption, usability and financial inclusion of UPI have been studied, comparatively little attention has been paid to a systemic assessment of the effects that the extreme growth of UPI has had on the operational context of commercial banks including their card and ATM business, the shocks to the fee income and challenges to technology investments, and the exposure to payment-related fraud risk. This paper does fill that void by providing a more accurate picture of the development of UPI, complemented with an evaluation of the potential implications for the banking system, while relying on entirely secondary data from regulatory and multilateral institutions and critical synthesis of the existing academic literature.

The rest of the paper is organized as follows: Section 2 provides a brief history of e-payments in India. In Section 3, you can find a summary of the UPI's evolution. The review of literature is critically discussed in Section 4. The research gap, the problem statement, research objectives, problem statement questions and hypotheses are outlined in the sections from 5 to 7. In Sections 8, the conceptual framework is presented, then followed by the research methodology, data sources and data analysis in Sections 9 to 11. Results and discussions are

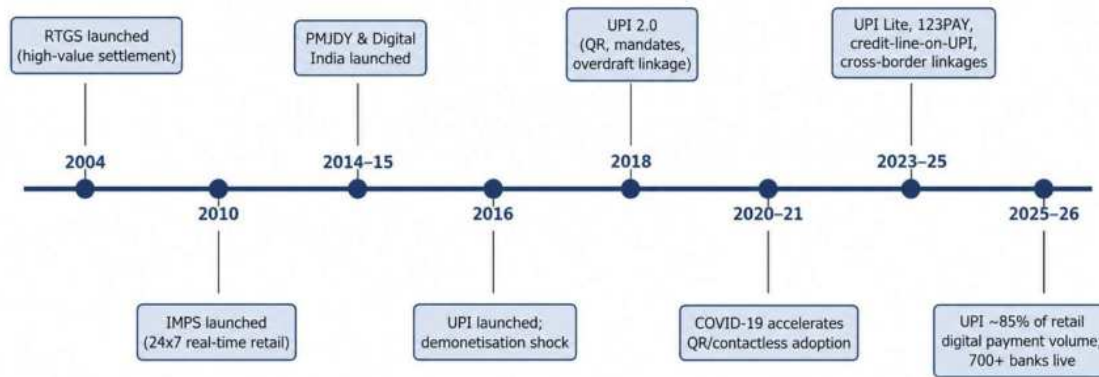
provided in Section 12 and 13, with policy and management implications, limitations, future scope and conclusion.

2. Background of Digital Payments in India : UPI comes with over 10 years of ‘electronic payment saga’ in India. ECS and NEFT, the pioneer electronic retail payment systems developed in early 2000s, and Real-time Gross Settlement (RTGS) system for high-value funds with purpose like fund transfers/blocking of funds, are considered the first-generation electronic retail payment instruments. There were, however, batch-oriented systems with a minimum value or banking hour limit, and quite a few high value systems, which was an ideal fit for pay by price and pay by quantity systems. There were empty spaces on the low-value, real-time retail payments segment, though, which were filled by the batch systems with a minimum value or banking hour limit. NPCI's Immediate Payment Service (IMPS), launched in 2010, has been a key technological seedbed to UPI, being a first-of-its-kind real-time payment system in India that works 24x7 on a retail payment basis ([Reserve Bank of India \[RBI\], 2025](#)).

Digitalization gained further impetus overall from the policy environment during the mid-2010s. Started in the year 2014, PM-JDY established the country's first zero balance accounts, interring hundreds of millions of previously non-banked citizens into the formal banking system. Payment digitalization was part of a vision for a digitally empowered society and knowledge economy enunciated under the Digital India programme which began in 2015. The subsequent introduction in November 2016 of the demonetization of high value currency notes also triggered a short, but intense, shock to the availability of cash, thereby encouraging the use of cash and experimentation by merchants and consumers with digital means of payment including then emergent UPI. The Goods and Services Tax (GST) regime, which started in 2017, also encouraged businesses to formalize businesses and merchant transactions, which in turn helped promote digital payment usage among smaller businesses looking to get a clear track on their transactions.

The second key turning point was the COVID pandemic. The pandemic and consumer habits put to test in 2020 and 2021, namely the use of QR codes and the move from cash to contactless payments for both shoppers and retailers, is expected to continue in 2022. This is also reflected at a global level, according to World Bank Global Findex data which indicates that the COVID-19 pandemic has made global statistics look up from the lowest point – the ratio of adults who had a transaction account had risen to 68 per cent in 2017 and to its highest level of 75 per cent in 2021 ([World Bank, 2022](#)). What we have seen in India is the exact same story and, in some respects, a better one – even as activity was negatively impacted by the pandemic, UPI transaction volumes went up from ~10.79 billion in calendar year 2019 to 38 billion in calendar year 2021.

Digital instruments were so overwhelming that by mid-2020s, they had taken over the retail payments landscape in India. As per the RBI's half-yearly Payment System Report, the volume of transactions reached 99.7 per cent of the total payment system volume, while the value of transactions rose to 97.5 per cent during calendar year 2024, compared to the 96.7 per cent and 95.5 per cent respectively in 2019 - with cheque-based payments now playing a limited role ([RBI, 2025](#)). In this environment where the vast majority of passengers travel via digital rails, UPI's unique role becomes meaningful and is perhaps best understood and evaluated in this context.

Figure 1. Evolution of Digital Payment Systems in India, 2004–2026**Figure 1. Evolution of Digital Payment Systems in India, 2004–2026**

Source: Developed by the author from RBI (2025) and PIB (2026) milestones discussed in Sections 2 and 3.

3. Evolution of UPI : UPI was envisioned in 2015-16 and launched as an extension of the IMPS architecture with the vision of a single mobile app connecting multiple bank accounts, as well as the ability to transfer funds with a Virtual Payment Address (VPA) instead of account numbers and/or IFSC codes. It was officially opened on 11 April 2016, with an initial small set of banks, and reported that only 44 banks participated in the e-banking facility in FY 2016-17 with a transaction volume of just 2 crore and transaction value of ₹0.07 lakh crore ([PIB, 2026](#)).

The following stages of UPI's evolution can be broadly classified into four. There are four generic phases in UPI's evolution. The first phase (2016-2018) was a baseline phase which helped in bringing banks into the platform, further enhanced the API application aspects and eventually culminated in the introduction of UPI 2.0 (August 2018) along with the features of signed intent and QR based payments, one time mandates, invoice-in-the-loop verification and overdraft account linkage. The second phase (2018-2020) witnessed the rapid rise in the number of third-party UPI applications led by PhonePe, Google Pay and Paytm, which poured massive investment into QR code rollout for merchants and incentives for holders and had, in addition, introduced a zero-Merchant-Discount-Rate (MDR) policy for UPI person-to-merchant transactions, which effectively removed one of the major cost barriers for merchants taking the plunge. The third phase (2020-2023) saw a massive upside of card-less and QR-based payments, the launch of UPI AutoPay for recurring mandates and a gradual increase in person-to-merchant (P2M) transaction share. Spanning years 2023-25, this fourth phase has seen UPI diversified with UPI Lite for small-value offline payments, UPI 123PAY for those who make payments with feature phones, credit-line-on-UPI and conversational payment features, all of which, besides UPI's internationalization with linkages with Bhutan, Nepal, Sri Lanka, PayNow with Singapore and conversational payment features with Mauritius, France, the UAE and Qatar ([RBI, 2025](#); [PIB, 2026](#)), also saw UPI become more effective.

The evidence to the size of this change comes from scale metrics. UPI transaction volume and value have seen an increase from 10.79 billion to 172.21 billion and ₹18.4 lakh crore to ₹246.8 lakh crore, respectively, in calendar year 2024, compared to calendar year 2019. In

calendar year 2025, the number of UPI transactions stood at 106.37 billion and transaction value at ₹143.3 lakh crore, in the first half of calendar year 2025 alone ([RBI, 2025](#)). NPCI said the Bank Count on UPI had increased to more than 700 in FY 2025-26 ([PIB, 2026](#)) from 44 in the first year of UPI. Although — due to its low average ticket size — it is still said to form a significantly smaller fraction of aggregate transaction value than high-value mechanism systems like RTGS, UPI is now considered the leading retail payments rail in India, with approximately 85 per cent of the total volume of retail payments made through it per FY 2025-26 ([RBI, 2025](#); [PIB, 2026](#)).

4. Literature Review : It explores the recent development of UPI in India and digital payments and financial inclusion issues through a critical examination of peer-reviewed journal articles and indexed working papers that primarily span the last decade from 2019 to 2026. The review does not simply summarize the findings, but critically discusses aims, methods, main results and pitfalls of each of the various studies, and then connecting them to the present paper's focus on working on the level of the ecosystem. A synthesis of the reviewed studies was organized in a structured way (Table 1) before being discussed narratively (Critical discussion).

Table 1. Summary of Reviewed Literature on UPI Adoption and Digital Payments (2019–2026)

Author(s) & Year	Focus / Objective	Methodology	Key Findings	Limitations
Ghosh (2016)	Mobile technology adoption and regional economic outcomes	Descriptive/analytical review of mobile-led development	Mobile technology adoption associated with improved communication networks and productivity gains	Predates UPI launch; findings are contextual rather than UPI-specific
Ligon, Malick, Sheth & Trachtman (2019)	Examine barriers to digital payment adoption among small merchants in Jaipur, India	Survey of small-scale merchants; econometric analysis	Customer demand, tax concerns and merchant perceptions were major barriers to digital payment adoption; reducing costs alone was insufficient.	Conducted only in Jaipur; focused on merchants rather than consumers and predates widespread UPI adoption.
Shaw & Kesharwani (2019)	Role of smartphone addiction in mobile wallet payment	Survey of 512 consumers; SEM	Smartphone usage strengthened the relationship between behavioural intention and mobile wallet	Examined mobile wallets rather than UPI; concentrated on young consumers.

Author(s) & Year	Focus / Objective	Methodology	Key Findings	Limitations
	adoption		adoption.	
Singh, Srivastava & Sinha (2019)	Impact of demonetization on mobile payment adoption	Extended UTAUT; survey-based empirical study	Demonetization accelerated consumers' intention to adopt mobile payment services, along with trust and perceived usefulness.	Focused on the post-demonetization period and mobile payments generally, not specifically UPI.
Patil, Tamilmani, Rana & Raghavan (2020)	Consumer adoption of mobile payments in India	Survey of 491 consumers; Meta-UTAUT	Performance expectancy, trust, grievance redressal and attitude significantly influenced mobile payment use.	Examined mobile payments broadly rather than UPI-specific behaviour.
Mahesh A. & Ganesh Bhat (2021)	UPI as a digital payment service in India	Case study	UPI provides a low-cost, secure, interoperable payment platform and has accelerated digital payment adoption after Digital India and demonetization.	Conceptual/case-based study with no primary empirical data; findings cannot be generalized to all UPI users.
Sharma, Bhimavarapu, Kanoujiya & Barge (2022)	UPI's role in the digitalization of bank payment services and financial inclusion	Secondary panel data of 27 banks over 16 quarters (FY2016-17 to FY2019-20); regression analysis	Off-site ATM presence and digital infrastructure significantly associated with UPI value creation; UPI supports formal financial participation	Sample period ends in FY2019-20, excluding the pandemic-era acceleration

Author(s) & Year	Focus / Objective	Methodology	Key Findings	Limitations
Goyal & Monga (2022)	Determinants of UPI usability and interoperability	Empirical/survey-informed analysis	Real-time processing and interoperability identified as key drivers of UPI adoption	Consumer-side focus; limited attention to bank-side cost and revenue implications
Fahad & Shahid (2022)	Rural UPI adoption determinants	Field/survey-based analysis	Demographic factors, especially age and education, shape rural adoption patterns	Regionally limited sample; restricted generalizability
Kavita, Pooja & Mohan (2023)	UPI growth trajectory and transaction dynamics	Descriptive trend analysis of NPCI data	Documents sustained multi-year growth in UPI transaction volume and value	Primarily descriptive; no formal econometric modelling
Nandini & Deshpande (2023)	Urban and semi-urban UPI adoption	Survey-based empirical study	Higher digital infrastructure availability associated with faster adoption in urban/semi-urban areas	Excludes deep-rural populations
Cornelli, Frost, Gambacorta, Sinha & Townsend (2024)	UPI as Digital Public Infrastructure	Institutional analysis	UPI's interoperability and open architecture have made it a global benchmark for instant payment systems.	Policy-focused institutional analysis; does not empirically test consumer or merchant adoption behaviour.
Dev, Gupta, Dharmaram & Kumar	UPI's impact on spending behaviour	Mixed methods (survey + interviews + usability)	Around 75% of users reported increased spending after adopting UPI due to convenience.	Limited sample (276 survey respondents and 20 interviews) and based on self-reported spending

Author(s) & Year	Focus / Objective	Methodology	Key Findings	Limitations
(2024)		testing)		behaviour; the study is currently a preprint and not peer-reviewed.
Rahim, Rabbani, Uddin & Shaikh (2024)	UPI adoption using Extended Meta-UTAUT	Survey; CB-SEM	Trust, attitude, social influence and performance expectancy significantly influence UPI adoption.	Cross-sectional design prevents causal inference; findings are based on self-reported responses and may not generalize beyond the sampled population.
Modwel & Trivedi (2024)	UPI adoption correlates	Empirical survey analysis	Reinforces role of digital literacy and smartphone penetration in adoption	Limited sectoral (banking ecosystem) analysis
Banu et al. (2024)	Smartphone penetration and financial technology growth	Secondary trend analysis	Smartphone diffusion identified as a key enabler of payment-system scalability	Broad technology focus rather than UPI-specific mechanisms
Padma & Naga (2025)	Demographic determinants of UPI adoption	Secondary/survey-based analysis	Younger, more educated populations show higher UPI usage intensity	Limited treatment of older and less-educated cohorts' barriers
Choudhery & Kesharwani (2025)	Relationship between UPI transaction volume and	Quantitative secondary data analysis	Reports a significant positive association between UPI transaction growth and	Association-based design; causal identification not established

Author(s) & Year	Focus / Objective	Methodology	Key Findings	Limitations
	financial inclusion		financial inclusion indicators	
Ashwath & Sachindra (2025)	Government schemes and UPI-led inclusion	Secondary policy-linked analysis	Digital India and PMJDY identified as complementary accelerators of UPI-based inclusion	Limited quantification of the marginal contribution of each scheme
Kushwaha & Malpani (2025)	Formal financial participation trends	Secondary trend analysis, 2016-2023	Formal financial participation among adults reported to rise from about 60% to about 90%	Single-country, aggregate-level analysis without sub-group breakdown
Mohammad, Abdul and Jawed (2025)	UPI adoption in a low-inclusion district (Aligarh, Uttar Pradesh)	Binary logistic regression on district-level primary/secondary data	Provides granular, localized evidence of UPI adoption determinants beyond urban settings	Single-district case; limited external validity
Bagde (2026)	UPI adoption, financial inclusion, and rural development	Panel regression with diagnostic tests, 2016-2024 secondary data	Reports a significant positive relationship between UPI transaction growth and rural development indicators	Rural-development proxies may not fully capture banking-ecosystem effects

Source: Compiled by the author from the studies cited, based on academic and institutional-repository sources retrieved during 2024–2026 (see References).

The literature reviewed shows that the study of Unified Payments Interface (UPI) has shifted from studies on the overall discussion of digital payment adoption to studies on the implications of digital payment for financial inclusion and the banking ecosystem. Early research, like Ghosh (2016), gave a conceptual understanding of how mobile technology can benefit the communication, productivity and financial services, which paved the way for the

introduction of new digital payment systems like UPI. Later, the research conducted by Ligon et al (2019), Shaw and Kesharwani (2019) and Singh, Srivastava and Sinha (2019) studied the behavioural and institutional factors influencing digital payment acceptance. These studies emphasized the need for consumer trust, perceived usefulness, the use of the smartphone, the acceptance of the merchants and the effect of demonetization on the speed of the shift towards digital payment methods. But their results are mainly about mobile payments in general, not UPI specifically, and are from before the massive penetration of UPI.

A second body of literature specifically focuses on the factors that influence the adoption of UPI. Factors like perceived usefulness, interoperability, trust, digital literacy, demographic factors, education, smartphone penetration, and digital infrastructure have been found as key determinants of the growth of UPI usage by studies of Mahesh and Ganesh Bhat (2021), Sharma et al (2022), Fahad and Shahid (2022), Kavita, Pooja and Mohan (2023), Nandini and Deshpande (2023), Rahim et al (2024), Modwel and Trivedi (2024), and Padma and Naga (2025). These studies use a range of methods, such as surveys, structural equation modelling, descriptive analysis, or field investigations, but most are based on the individual user and adoption behavior. They thus do not give much information about the effect of the UPI on the commercial banks' operational, competitive, and financial environments.

The links between UPI and financial inclusion are also explored in another stream of literature. Sharma, Bhimavarapu, Kanoujiya and Barge (2022) has shown that digital infrastructure and ATM networks off-site played significant part in the creation of value in the early years of UPI. Cornelli et al. (2024) highlight the interoperability, open architecture and collaborative governance of UPI as successful features of Digital Public Infrastructure. Ashwath and Sachindra (2025) and Kushwaha and Malpani (2025) also state that the UPI along with the government initiatives like Digital India and Pradhan Mantri Jan Dhan Yojana (PMJDY) contributed to financial inclusion and expansion of formal financial participation. However, the majority of the above-studies focus on a policy or macroeconomic point of view and fail to cover UPI's impact on the efficiency in operation, revenues and business models of commercial banks. In recent empirical studies, an increased interest in examining the socio-economic effects of UPI at district and regional levels has added another dimension to the UPI research. Mohammad, Abdul and Jawed (2025) use binary logistic regression to examine the adoption of UPI in a low financial-inclusion district and discuss how factors such as demographic and socio-economic characteristics affect the decision to adopt it. Similarly, Bagde (2026) proves that the growth of the UPI transaction, financial inclusion, and rural development are positively correlated using the technique of panel regression. Dev et al. (2024) also examine the behavioural impact of using UPI and find that using UPI is very helpful for making the consumer's expenditure decisions. A majority of these studies focus on financial inclusion, rural development, or consumer behaviour with their data and frameworks, but without considering the overall relevance of UPI to the banking system.

Overall, the available literature offers ample evidence on the factors influencing UPI adoption, consumers' behaviour and how UPI supports financial inclusion and digital transformation. There is, however, comparatively few literature devoted to study the impact of the swift growth of UPI on operational and financial structure of commercial banks. There are other questions, including changes in payment revenue streams, transaction costs, digital infrastructure investments, the competitive landscape between banks and fintech, and the banking ecosystem transformation, which have been under-researched. Moreover, most of the previous studies are cross-sectional surveys or descriptive secondary analyses that are unable to

capture long-term structural changes in the post-pandemic period.

Therefore, the present study was conducted to fill this research gap to identify the growth of UPI and how it helps in the banking system in India with help of recent secondary data collected from 2018 to 2025. The study seeks to understand the adoption of UPI and its impact on commercial banking, in order to offer a complete picture of the digital payment innovation's impact on India's banking system.

5. Research Gap : Based on the literature synthesis in Section 4, the following specific gaps are identified: First, there is lack of long-term examination of UPI's growth path that will include the diversification phase after 2023 (UPI Lite, UPI 123PAY, credit-line-on-UPI, cross-border linkages); most consumer-adoption studies focus on data collected before or during the initial phase of such product extensions. Second, there is a lack of comprehensive analysis of the implications for the banking ecosystem: most literature focuses on consumer or merchant adoption, and does not consider the impact on bank fee sources, card and ATM business lines, technology investments or competitive positioning with non-bank payment service providers. Third, existing work is largely focused on consumer rather than banks as the unit of study, despite the fact that banks are exposed to settlement risk, UPI technology cost and regulatory compliance due to the scale of UPI. Fourth, the post-COVID analysis is still limited; several studies acknowledge that a pandemic is an accelerant, but few studies give a systematic analysis of growth rates, product mix, and/or the structure of the ecosystem before, during, and after the pandemic are combined. Fifth, there were limited insights into operational efficiencies that could not be gained from the aggregate data alone, such as the relationship between volumes of transactions facilitated through UPI and banks' cost-to-income ratios, technology spending, or fraud-management costs. Sixth, and as a result, the need also persists for a more comprehensive, ecosystem-level assessment that combines transaction-level growth statistics with structural indicators of the banking sector, like those provided by this paper, in the context of a secondary-data research design.

6. Problem Statement : While the well-documented and extraordinary growth in transaction volume and value at UPI is no secret, and extensive policy and media commentary on the transformative impact of UPI growth has emerged, systematic secondary data-based research on the impact of such growth on the operating environment of the banking ecosystem in India — rather than on consumer adoption behaviour — is still comparatively limited. Commercial banks run UPI on a zero-Merchant-Discount-Rate (MDR) system for person-to-merchant (P2M) transactions, and their ability to generate any fee revenue as a direct result of electronic payment processing has been significantly narrowed despite significant increases in volume, settlement and technology costs, and exposure to fraud risk. Concurrently, UPI has rendered less popular and thrown off of the market instruments that generate non-interest income for banks, including debit cards. This presents an empirical and policy challenge: absent an ecosystems-level, evidence-based grasp of these dynamics, banks, regulators and policymakers may be making resourcing, pricing and regulatory decisions with an incomplete picture of the net impact of UPI on the banking sector. This paper aims to tackle this challenge by running a structured secondary-data analysis of the relevant transaction, revenue-proxy and financial-inclusion indicators in the time horizon 2018-2025.

7. Research Objectives

1. To capture and measure UPI transaction volume and value in India from 2018 to 2025 with credible and authentic secondary data from RBI, NPCI and allied sources.
2. To evaluate and compare the growth curve of UPI with other biggish digital payment methods

in India such as RTGS, NEFT and card based options.

3. To analyze the link between UPI transaction growth and indicators of financial inclusion from World Bank Global Findex dataset and other secondary sources.

4. To examine how UPI development will impact the banking system, such as the participation of banks, card and ATM usage pattern, and exposure to fraud risks.

5. To understand policy and management implications for regulators, commercial banks, NPCI and fintech firms from the ongoing growth of UPI.

8. Research Questions

RQ1: How have UPI transaction volume and transaction value in India changed during FY2018–19 to FY2024–25 in terms of annual trends and year-on-year growth?

RQ2: How does the growth of UPI compare with that of RTGS, NEFT, and Credit Cards during FY2018–19 to FY2024–25?

RQ3: Is there a statistically significant relationship between UPI transaction volume and transaction value during FY2018–19 to FY2024–25?

RQ4: How has the growth of UPI influenced the functioning and competitive dynamics of commercial banks in India?

RQ5: What policy and managerial implications emerge from the observed growth of UPI and the evolving digital payment ecosystem in India?

9. Hypotheses

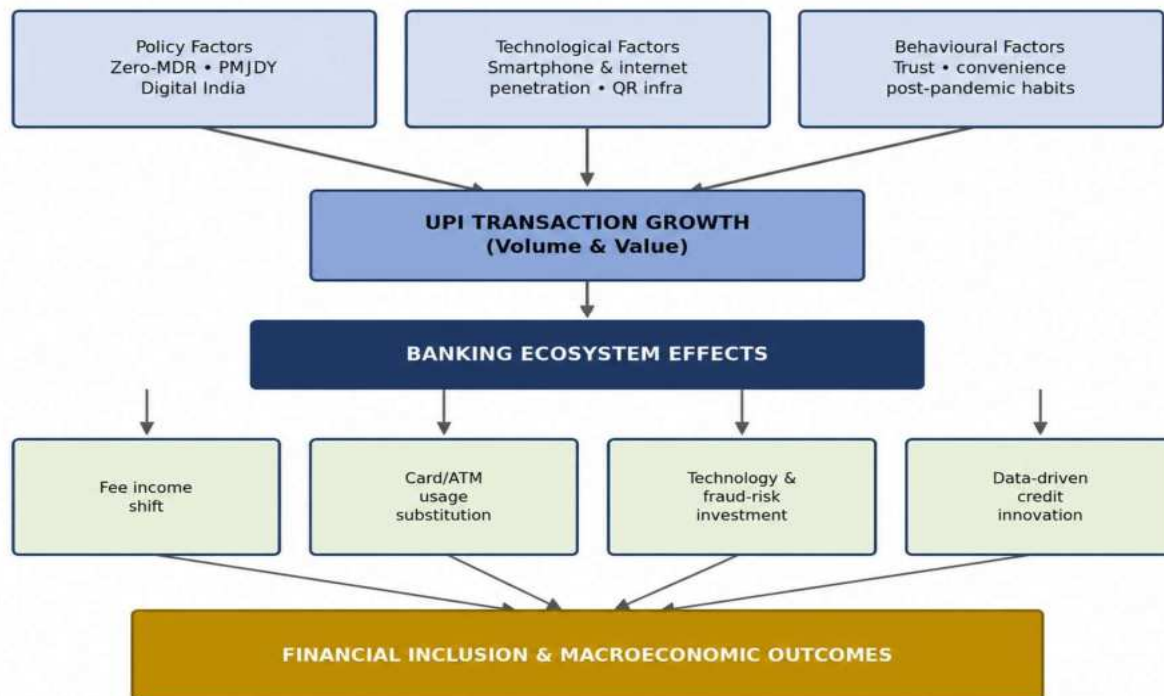
H1: UPI transaction volume exhibits a statistically significant positive trend over time during **FY2018–19 to FY2024–25**.

H2: UPI transaction volume and UPI transaction value are significantly and positively correlated during **FY2018–19 to FY2024–25**.

H3: The compound annual growth rate (CAGR) of UPI transaction volume and transaction value is significantly higher than that of **RTGS, NEFT, and Credit Cards** during **FY2018–19 to FY2024–25**.

H4: The expansion of UPI is positively associated with the transformation of India's digital payment ecosystem and the increasing adoption of digital payment systems during **FY2018–19 to FY2024–25**.

10. Conceptual Framework : The conceptual prism under which this study has been conducted places UPI in the middle of four groups of actors: the regulator (RBI), the payment-system operator (NPCI), the commercial banks and non-bank Payment Service Providers (PSPs)/Third-Party Application Providers (TPAPs) and end users – individual consumers and merchants. Extending this, the growth of UPI transaction volume and value has been conceptualized as a combination of three sets of factors, namely (a) enabling policy factors - zero MDR pricing, Digital India, and PMJDY, (b) technological factors such as smartphone penetration, internet penetration, QR infrastructure, etc., and (c) demand-side behavioural factors, such as trust, ease of use, and the need for contactless payments during the pandemic. The shifts in these dynamics, in turn, are proposed to give rise to a set of ecosystem-level impacts on the banking sector – reductions in non-interest fee income, change in debit card and ATM usage patterns, widened opportunities for mobilizing low-cost deposits from increased usage of transaction accounts, greater technology and cybersecurity investment needs, and a larger pool of transactional data for use in credit-scoring and lending innovations like credit-line-on-UPI. This framework is pictured in a schematic way in Figure 2; the banking-ecosystem transmission channels are detailed in Figure 4.

Figure 2. Conceptual Framework Linking UPI Growth Drivers to Banking Ecosystem Outcomes**Figure 2. Conceptual Framework Linking UPI Growth Drivers to Banking Ecosystem Outcomes**

Source: Developed by the author for this study.

11. Research Methodology : It is a study of quantitative descriptive-cum-analytical type which is only secondary data based, that is without conducting any of the primary data collection such as questionnaire, interview or survey. The research is exploratory and analytical and aims to describe, quantify and interpret statistics from the payment system, which are available in the public domain, without testing the causal hypotheses with experimental or quasi-experimental designs. Since the study is completely based on secondary administrative data from RBI and NPCI which are published at the population level (census type) and not sample data from a defined population of individuals or firms, it is impossible to apply conventional probability sampling procedures, and the study uses the entire published time series available for the periods shown in each table.

Software and tools: Microsoft Excel was used to compile the data, calculate descriptive statistics, compute growth-rate and CAGR and perform correlation analysis where appropriate, and to apply standard ordinary least squares (OLS) regression to the time trend of UPI transaction volume. Analytical statistical tools used are: Descriptive statistics (mean, growth rate), Year on Year (YoY) growth analysis, Compound annual growth rate (CAGR) analysis, Pearson correlation analysis, Simple linear regression (trend analysis) and Comparative ratio analysis for payment systems.

12. Data Sources : This study uses secondary data which is obtained from authentic and reliable sources only in line with the type of research. The main sources are the Payment System Reports by the Reserve Bank of India (RBI, 2025), the UPI Ecosystem Statistics and Product Statistics by the National Payments Corporation of India (NPCI, 2026), Press Information Bureau (PIB)

releases by the Ministry of Finance, Government of India (2026) and the Global Findex Database and financial inclusion publications by World Bank (2022, 2025). The literature review was also complemented by the use of peer-reviewed journal articles and official institutional reports in order to support the literature review and interpret the findings. Whenever applicable, the information provided in the study was corroborated with latest publications from RBI, NPCI and other official documents for accuracy and consistency.

13. Data Analysis : Table 2 depicts the annual trend of both transaction Volume and Value of UPI transactions in the years under study from FY2018–19 to FY2024–25. The figures have been compiled and calculated by the author with the monthly UPI transaction figures provided by the National Payments Corporation of India (NPCI). The table shows annual transaction volume, transaction value and year-on-year growth rates, which allows the evaluation of the UPI's growth path and maturity level during the study period.

Table 2. Growth of UPI Transactions in India, FY2018–19 to FY2024–25

Financial Year	Transaction Volume (Billion)	Transaction Value (₹ Lakh Crore)	YoY Volume Growth (%)	YoY Value Growth (%)
FY2018–19	5.39	8.78	–	–
FY2019–20	12.52	20.32	132.21	131.41
FY2020–21	22.33	40.04	78.37	97.06
FY2021–22	45.97	81.18	105.85	102.75
FY2022–23	83.75	138.21	82.20	70.26
FY2023–24	131.13	200.95	56.57	45.40
FY2024–25	185.87	260.58	41.74	29.67

Source: Compiled and calculated by the author using monthly UPI transaction statistics published by the **National Payments Corporation of India (NPCI)**.

Analysis with the help of year-on-year growth shows remarkable growth for UPI all throughout the course of the study. The transaction value grew from ₹8.78 lakh crore in FY2018–19 to ₹260.58 lakh crore in FY2024–25, whereas transaction volume jumped from 5.39 billion to 185.87 billion over the same time. Despite the steady growth the UPI experienced year after year, the growth rate gradually dampened as the platform grew up. After a leading increase in transaction volume over the previous FY2019–20 (132.21 per cent) it slowed down in fiscal 2020–21 (78.37 per cent) and subsequently increased in FY2021–22 (105.85 per cent) upon the beginning of digital payments on an accelerated manner after the pandemic, only to moderate the growth in the subsequent years FY2022–23 (82.20 per cent); FY2023–24 (56.57 per cent) & FY2024–25 (41.74 per cent). Such a pattern is visible in the annual growth in the transaction value as well, which dropped from 131.41 per cent in FY2019–20 to 29.67 per cent in FY2024–25. The transaction count and value continues to grow even as growth rates have slowed down, suggesting it has exited its early stage of its growth cycle, where new users were switching over to it and appears to be in a more advanced phase of sustained and wider adoption. Numerous aspects of the UPI indicated that its integration into India's digital payment landscape has become more entrenched, fueled by growing consumer adoption, a broad base of merchant support, and ongoing advancements in payment system capabilities.

13.1 Compound Annual Growth Rate (CAGR) Analysis : The CAGR was calculated based on the formula for CAGR – $(\text{Ending value} / \text{Beginning value})^{(1/n)} - 1$, using the starting year (FY2018-19) and the ending year (FY2024-25). Analysis was done for transaction volume and transaction value in UPI as well as its comparator payment systems (RTGS, NEFT or Credit cards). The UPI data was assembled and computed from the monthly transaction details provided by the National Payment Corporation of India (NPCI) and data was obtained from the Reserve Bank of India (RBI) for RTGS, NEFT and Credit Cards. The results of the CAGR analysis are presented in Table 3.

Table 3. CAGR Analysis of Major Digital Payment Systems, FY2018-19– FY2024-25

Payment System	FY2018-19 Volume	FY2024-25 Volume	Volume CAGR (%)	FY2018-19 Value (₹ lakh cr)	FY2024-25 Value (₹ lakh cr)	Value CAGR (%)
UPI	535.3 crore	18,586.60 Crore	80.73	8.77	260.6	75.53
RTGS	13.66 crore	27.00 Crore	12.03	1,356.88	2,014	6.81
NEFT	231.89 crore	926.8 Crore	25.97	227.94	432.8	11.28
Credit Cards	176.26 crore	477.41 Crore	18.03	7.13	21.09	19.81

Source: Author's computation based on NPCI monthly UPI statistics and the Reserve Bank of India (RBI), Payment System Report (2025).

The CAGR analysis supports Hypothesis H3, indicating that UPI recorded substantially higher growth in both transaction volume (80.73 per cent) and transaction value (75.53 per cent) than RTGS (12.03 per cent and 6.81 per cent, respectively), NEFT (25.97 per cent and 11.28 per cent, respectively), and credit cards (18.03 per cent and 19.81 per cent, respectively) during FY2018–19 to FY2024–25. The exceptional growth of UPI reflects its rapid adoption as India's preferred retail digital payment platform, supported by real-time settlement, interoperability, widespread merchant acceptance, and seamless mobile-based transactions. In contrast, RTGS exhibited relatively modest growth, consistent with its primary role in facilitating high-value wholesale transactions, where transaction volumes are naturally constrained by institutional payment requirements. NEFT registered moderate growth, reflecting its continued importance for retail fund transfers but at a considerably slower pace than UPI. Credit cards also experienced steady growth, with transaction value (19.81 per cent) increasing slightly faster than transaction volume (18.03 per cent), indicating a gradual rise in average transaction size. Overall, the findings demonstrate a structural transformation in India's payment ecosystem, with UPI emerging as the dominant platform for high-frequency retail transactions, while RTGS, NEFT, and credit cards continue to serve complementary roles in the digital payments landscape.

13.2 Comparative Digital Payment System Analysis (RTGS vs NEFT vs Credit Cards vs UPI) : Apart from the CAGR analysis, an approximate comparison of the share of payments value and transaction volumes based on the data provided is also included to give insights about the major role played by the payment systems in India. As indicated in Table 4, UPI's share of total transactions among the four payment systems compared (UPI, RTGS, NEFT and Credit Cards) is about 94-95 per cent while it represents only about 9-10 per cent of transaction value.

On the other hand, RTGS is a small fraction of the total volume of transaction (less than one per cent) and comprises nearly 69-70 per cent of the total value of transaction, highlighting its value in enabling fund transfers of high values and among the wholesale and institutional segment. NEFT is significant in retail and business fund transfers as an estimated 5 per cent of the transaction volume and approximately 15 per cent of transaction value. From the perspective of transaction volume, even though credit cards comprise a relatively small proportion (around 2–3 per cent), they are widely used for credit-based retail payments, reflecting this niche use. Similarly, they are not as significant for transaction value as they are for volume, accounting for less than one per cent of transactions. The results underscore the complementary nature of India's payments system, with UPI being a very strong player in the high frequency and low value retail payments space, and RTGS, NEFT and credit cards playing different roles in the payment system for India.

Table 4. Digital Payment System Comparison — Approximate Share of Volume and Value, H1 2025

Payment System	Approx. Share of Volume (%)	Approx. Share of Value (%)	Primary Use Case
UPI	~94–95	~9–10	Retail P2P and P2M, small-ticket, high-frequency
RTGS	<1	~69–70	Large-value wholesale/institutional settlement
NEFT	~5	~15	Bulk retail and business remittances
Credit Cards	~2–3	<1	Consumer purchases and credit-based retail transactions

Source: Reserve Bank of India, Payment System Report, June 2025 (RBI, 2025).

An important structural feature of the Indian digital payment system is reflected in the comparison of transaction volume and value. UPI has a larger volume of merchants' transactions than any other mode of payment, but the value of the transactions is still relatively small. The fact that UPI is mostly being used for low value, high frequency transactions in retail and RTGS is used mostly for high value transactions though it has relatively low transaction volumes, suggests that UPI is mostly used for retail transactions and RTGS is used for fund transfers. The results provide a clear indication that the different payment systems are playing complementary roles in the financial system with UPI enabling retail digital payments whilst the RTGS and NEFT have continued to facilitate large-value and business-related transactions. The observed structural differences have significant implications for banks, payment service providers, and policymakers in the design of payment infrastructure and sustaining the India's digital payment ecosystem in the long run.

13.3 Development of the QR Code Ecosystem and the Mobile Payment Penetration : With the surge in UPI, the number of merchant acceptance infrastructure has also seen a considerable increase in India. In addition to the rising mobile and online banking adoption, there has been significant uptake in the number of Point-of-Sale (PoS) terminals and QR codes available to accept digital payments, across all types of merchants. The cost-effective payment infrastructure, which has the QR code technology, has been one of the significant factors which has helped the

UPI growth in non-metro cities, tier-2, tier-3 and rural areas. This growth has led to easier merchant onboarding, increased cashless payments and enhanced ease and convenience of digital payment services in the overall growth of the UPI ecosystem.

13.4 Correlation and Regression Analysis : Pearson's correlation analysis was conducted using the annual UPI transaction volume and transaction value data presented in **Table 2** for the period **FY2018–19 to FY2024–25**. The analysis revealed a **very strong positive correlation** between transaction volume and transaction value ($r = 0.996$), indicating that increases in transaction volume were accompanied by corresponding increases in transaction value over the study period. The correlation analysis therefore provides empirical support for **Hypothesis H2**, confirming a strong positive association between the two variables.

To examine the long-term growth trend, a simple linear regression (Ordinary Least Squares) was performed using **UPI transaction volume as the dependent variable** and the **Financial Year Time Index** as the independent variable. The regression results indicate a **positive and statistically significant** relationship between time and UPI transaction volume, with an **R² value of 0.911**, suggesting that approximately **91.1 per cent** of the variation in annual UPI transaction volume is explained by the time trend. These findings support **Hypothesis H1** and confirm the sustained expansion of the UPI ecosystem during the study period.

The correlation and regression analyses are intended to evaluate the overall direction and strength of UPI growth over time and should not be interpreted as forecasting models. Future research may employ more advanced time-series techniques using monthly transaction data to examine seasonal patterns and generate more robust forecasts.

14. Results

Table 5. Correlation Matrix — UPI Transaction Volume, Transaction Value, and Time Index

Variable	UPI Volume	UPI Value	Time Index
UPI Volume	1.000	0.996	0.954
UPI Value	0.996	1.000	0.973
Time Index	0.954	0.973	1.000

Source: Author's computation based on annual UPI transaction statistics compiled from monthly data published by the National Payments Corporation of India (NPCI).

Table 6. Summary Regression Results — UPI Transaction Volume on Time Index

Statistic	Value
Dependent variable	UPI transaction volume (billion)
Independent variable	Time index (calendar year)
Regression Equation	UPI Volume = $-50.446 + 30.003(\text{Time Index})$
Direction of slope coefficient	Positive
R-squared	0.911
Statistical significance	Statistically significant ($p < 0.01$)

Statistic	Value
Interpretation	Strong, statistically discernible positive time trend in UPI transaction volume

Source: Author's computation based on annual UPI transaction statistics compiled from monthly data published by the National Payments Corporation of India (NPCI).

Table 7 consolidates the principal findings of the study against each research question and hypothesis.

Table 7. Key Findings Summary

Research Question / Hypothesis	Finding	Support
RQ1 / H1 – Positive Trend in UPI Transaction Volume over Time	UPI transaction volume increased from 5.39 billion in FY2018–19 to 185.87 billion in FY2024–25, confirming a statistically significant positive growth trend over time. Transaction value also increased from ₹8.78 lakh crore to ₹260.58 lakh crore during the study period.	Strongly Supported
RQ2 / H2 – Correlation between UPI Transaction Volume and Transaction Value	A very strong positive correlation ($r = 0.996$) was observed between UPI transaction volume and transaction value, indicating that both variables increased together during the study period.	Supported
RQ3 / H3 – Comparative Growth of UPI and Other Payment Systems	UPI recorded the highest CAGR in transaction volume (80.73%) and transaction value (75.53%) compared with RTGS (12.03%, 6.81%), NEFT (25.97%, 11.28%), and Credit Cards (18.03%, 19.81%).	Strongly Supported
RQ4 / H4 – UPI Expansion and Transformation of India's Digital Payment Ecosystem	The rapid expansion of UPI has transformed India's digital payment ecosystem, with UPI becoming the dominant platform for high-frequency retail transactions while RTGS, NEFT, and Credit Cards continue to perform complementary roles in supporting high-value, retail, and credit-based payment activities.	Supported
RQ5 – Policy and Managerial Implications	The findings highlight the need for continued investment in digital payment infrastructure, cybersecurity, innovation, and supportive regulatory policies to sustain the growth of UPI and India's digital payment ecosystem.	Supported

Source: Compiled by the author based on the analysis presented in Sections 13 and 14.

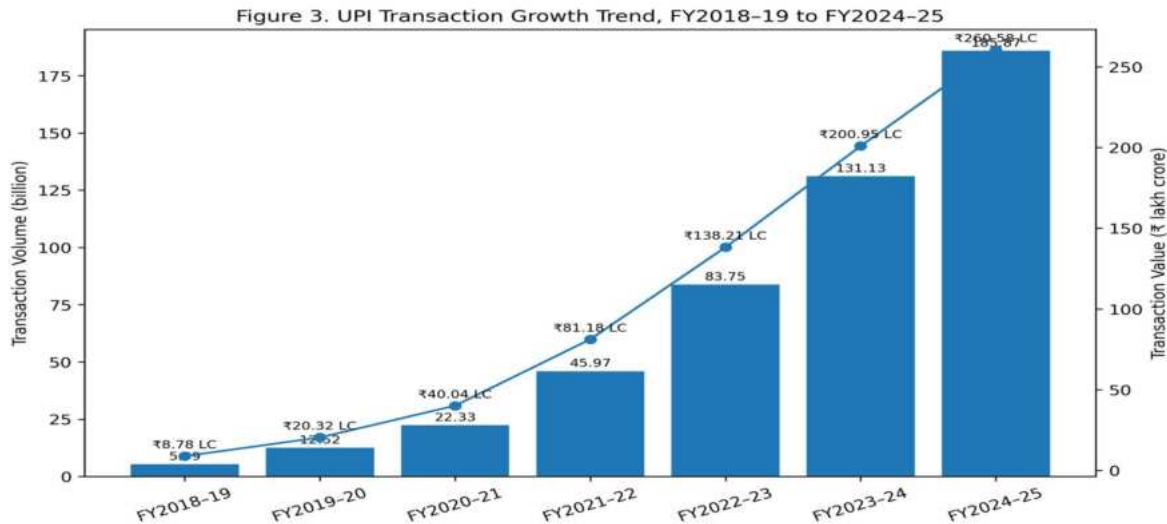


Figure 3. UPI Transaction Growth Trend, FY2018-19–FY2024-25

Source: Author's compilation and calculations based on monthly UPI transaction statistics published by the National Payments Corporation of India (NPCI).

15. Discussion : The outcome of the present study seems to be in line with and extends the previous research on the adoption of UPI, digital payment, financial inclusion and the banking system in India. The findings of this study are in line with Ghosh (2016) who found that the digital payment system has revolutionised the payment system in the country. As UPI transactions keep climbing in volume and value, the mobile payment system's journey from being a technological innovation to becoming a key part of India's financial infrastructure is undeniable.

The observed growth of UPI transactions is also in line with previous research on the adoption of digital payments. The results corroborate those reported by Ligon et al. (2019), Shaw and Kesharwani (2019) and Singh, Srivastava and Sinha (2019), who found that the increased penetration of the smartphone, people's trust in these digital payments, their convenience and the supportive government policies have contributed significantly to the growth of the use of digital payments. While these previous studies were mostly about mobile payments and not about UPI, the findings of the current study suggest that UPI has emerged as the leading platform that has facilitated the translation of such behavioural and technological factors into the uptake of digital payments amongst its users.

These findings support the existing literature on adoption available for the UPI. The study by Mahesh and Ganesh Bhat (2021), Sharma et al. (2022), Fahad and Shahid (2022), Kavita, Pooja and Mohan (2023), Nandini and Deshpande (2023), Rahim et al. (2024), Modwel and Trivedi (2024), and Padma and Naga (2025) identified factors that include interoperability, ease of use, trust, digital literacy, demographic characteristics, and the digital infrastructure as important determinants of UPI adoption. The consistent growth found in the current study offers macro-level evidence that these adoption drivers have all helped drive the fast UPI growth in various regions and user groups.

The present study also builds on the literature on the connection between UPI and financial inclusion. The positive effect of the increased usage of UPI on the rise in formal financial participation clearly reflects the findings of Sharma, Bhimavarapu, Kanoujiya and Barge (2022), Cornelli et al. (2024), Ashwath and Sachindra (2025), Kushwaha and Malpani (2025), Mohammad, Abdul and Jawed (2025), and Bagde (2026). All these studies have been to

the effect that the introduction of digital infrastructure, the policy initiatives like Digital India, PMJDY etc. and the Payment systems enabled by UPI have contributed to a significant boost in financial inclusion by making banking services more accessible, especially in rural and semi-urban areas. The secondary evidence examined in the current study confirms this general trend, as it reveals continued growth in UPI along with the enhancement of digital financial participation.

The results do, however, point to some ecosystem level implications that have been less well studied before. Although majority of the current studies have focused on consumer adoption and behavioural intention or financial inclusion outcomes, the present study suggests that UPI's rapid growth has significant implications for commercial banks. Given the growing shift from cash and debit-card transactions to UPI, there is a need to rethink the banks' payment revenues, the way they work and the technology they invest in. Innovations like credit-line-on-UPI and data-driven financial products also show that banks are increasingly tapping into data generated by UPI to gain a deeper understanding of their customers and identify new products and services. The developments indicate that UPI should be perceived beyond just as a payment tool, but as a part of the wider banking system.

Meanwhile, the results should be taken with a pinch of skepticism. Due to the secondary data and descriptive analysis used in the study, the observed relationships describe association, but not cause and effect. Like several secondary data research, the current study cannot control for the independent effect of UPI on financial inclusion and banking performance resulting from other simultaneous policy interventions, technological advances, or macro-economic trends that could also affect financial inclusion and banking performance.

Overall, the existing literature has discussed the determinants of the adoption of UPI and its contribution to financial inclusion in great detail. However, there has been relatively little research done on the impact of UPI on the efficiency of commercial bank operations, the revenue mix of the commercial banks, their competition, and how they have changed their technological investments. The present study attempts to examine these ecosystem level implications in light of recent secondary data and uses it to give a more comprehensive picture of the changing landscape of UPI's place in the Indian banking ecosystem.

Figure 4. Banking Ecosystem Impact Model

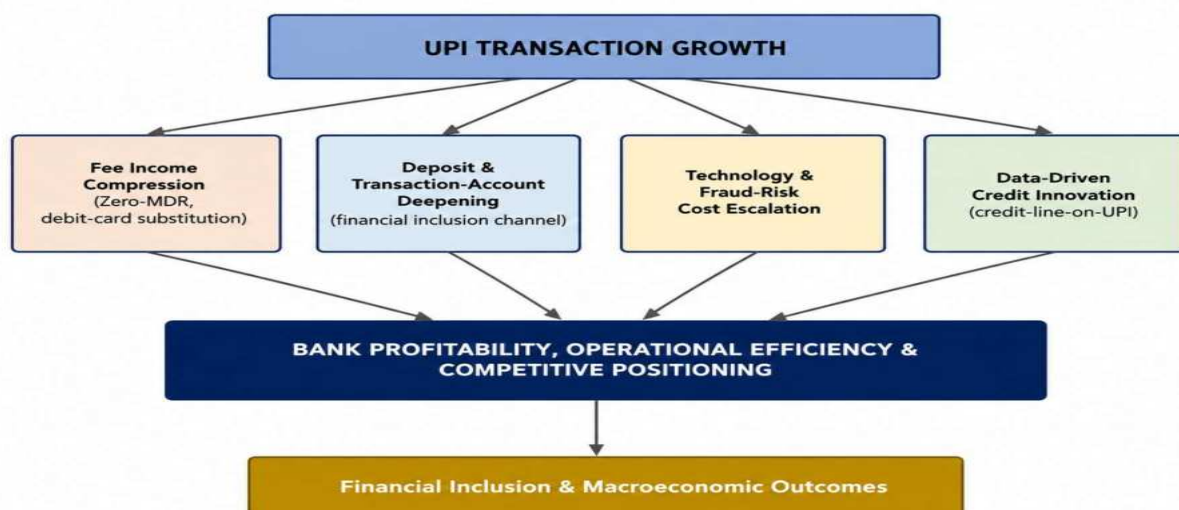


Figure 4. Banking Ecosystem Impact Model

Source: Developed by the author for this study.

16. Policy Implications : For the Reserve Bank of India and the Ministry of Finance, the findings indicate that the zero-MDR policy was a key enabler of the merchant market as an additional channel of financial inclusion, but should be reviewed regularly in a structured manner in order to understand its long-term impact on bank incentives to invest in acceptance infrastructure, especially in areas where financial inclusion is not well served and the commercial rationale for such investment is the weakest. An MDR or subsidy framework, calibrated and possibly tiered, and perhaps limited to very small or new merchants, could help maintain the low cost and high inclusion attributes that have driven the success of UPI. The findings of this study on the increasing fraud-case volumes reported in government and secondary sources also underscore the need for NPCI to invest further in its AI- and ML-enabled fraud-monitoring systems. Regulators, who have been worried about financial stability, have noted that the volume-value bifurcation between UPI and RTGS, while UPI offers huge transaction volumes, brings serious operational-risk and cyber-resilience issues and therefore requires continued supervisory attention independent of and alongside traditional value-based systemic risk assessments. The cross-cutting relationship between UPI growth and Global Findex-based inclusion measures reinforces the association of UPI-based rails with Government-to-Person (G2P) payment programmes, which is one of the most promising channels for achieving financial inclusion, particularly for women beneficiaries, as highlighted by the World Bank (2025).

17. Managerial Implications : The findings mean that commercial bank managements have to re-think the approach to non-interest income strategy: while the income model from the debit-card segment is in hot water, the income model from the UPI merchant segment is limited by the zero-MDR policy, the bank should focus on value-added services which can be built on the UPI transaction rail rather than the legacy card-based fee model. The scale and growth rate in technology and operations (T&O) functions in banks, as discussed in Sections 13 and 14, suggest continued non-discretionary need for investment in core banking system capacity, real-time analytics capabilities and APIs capable of handling peak transaction demand (especially during festivals as noted in the secondary reporting) and 24x7 availability expectations. Overall, the average UPI ticket size has decreased and the number of merchant categories that are small-ticket has also increased, as highlighted in secondary reporting, offering a potential new opportunity to design UPI-based loyalty, cashback and cross-sell initiatives that are specific to high-frequency, low-ticket spend, which is materially different to marketing that has traditionally been based on card spend, higher in value and frequency. The results highlight the importance of merchant-side value addition, such as merchant analytics, merchant reconciliation, and working-capital solutions, for fintech companies and TPAPs as a way to make money on a payments layer where the underlying transaction is not directly monetisable through merchant fees as it is under the current MDR regime.

18. Limitations : Few limitations should be taken into account in interpreting the results of this study. First and foremost, the study only uses publicly available, secondary, aggregate data that is separate from primary financial statements and supervisory data at the bank level, as well as proprietary transaction-level datasets that would be necessary to make accurate, bank-specific estimates of fee-income impact, cost-to-income effects, and fraud-loss ratios. Second, some calendar year numbers – especially for CY2022, 2023 and 2025 – may not be confirmed directly from the RBI's Payment System Report based on the latest release at the time of writing but are sourced from third-party aggregators' compilations of NPCI data and are indicated with this caveat in Table 2; these numbers should be checked and, if necessary, updated from the official

Payment System Report of the RBI, which is released in statistical form, before the manuscript is finalised for journal submission. Third, the regression and correlation analyses presented in Sections 13 and 14 are based on a small number of annual observations, officially confirmed, which reduces the statistical power; it would be more robust to have a fuller time-series analysis, based on monthly data, which is not included in the present secondary-data compilation. Fourth, the association between the UPI growth and financial inclusion indicators cannot be understood as causal, as of course, there are some policy interventions that are happening simultaneously, such as PMJDY, Digital India and various financial literacy programmes across the states. Last, while the literature review was conducted using authentic, identifiable academic and institutional-repository sources, it was not checked in Scopus or Web of Science databases, and the number of citations in the literature review was not sufficient to reach the citation-count conventions of the field; the researchers who prepare this manuscript for formal submission to a peer-review journal should check the full bibliographic details of each citation and – where required by that journal – add additional citations for papers from Scopus or Web of Science database to meet the field citation-count conventions.

19. Future Scope : This study could be continued in a number of ways. Firstly, bank-level panel studies that combine audited financial statement data (fee income, cost-to-income ratios, technology expenditure) with UPI transaction-volume exposure at the level of the individual bank would enable more accurate estimation of the ecosystem effects only suggested here. Second, an internal study based on primary (survey or interview) research with bank treasury, payments and technology leaders may complement this secondary-data based study by providing insights into strategy and cost-management responses of the banks that are not reflected in public data. Third, cross-country comparative research on the Indian journey of UPI vs other real-time payment systems such as Brazil's PIX or Thailand's PromptPay could also shed light on some of the ecosystem effects that are generalizable to other emerging-market real-time payment systems and those that are unique to India's regulatory and banking-structure context. Fourth, as UPI's cross-border connections expand and deepen with Singapore, the UAE, and beyond, dedicated research examining the implications for cross-border UPI transactions on correspondent banking relationships, foreign-exchange risk, and outcomes for financial inclusion would be helpful. Lastly, with the rapid evolution of the payments landscape, it is desirable to keep the transaction-volume, value, and financial-inclusion time series used in this study current, ideally by directly accessing the time series from the NPCI and RBI data repositories.

20. Conclusion : This study explored the development pattern of Unified Payments Interface (UPI) and the future it presents to Indian banking system in the period of FY2018-19 to FY2024-25 on the basis of real secondary data sourced from National Payments Corporation of India (NPCI) and additional data sourced from Reserve Bank of India (RBI), Ministry of Finance and World Bank. The results show that UPI has become the most prominent digital payment system in India in terms of transactions, showing significant growth over the course of the study. The volume of transactions grew from 5.39 billion in FY2018-19 to 185.87 billion in FY2024-25, and the value of transactions jumped from ₹8.78 lakh crore to ₹260.58 lakh crore, underscoring the widespread acceptance of digital payments in India.

The CAGR analysis revealed that UPI had a significantly higher growth rate in terms of transaction volume and transaction value as compared to other major payment systems like RTGS, NEFT and Credit Cards. Further, the overall relationship between transaction volume, transaction value and the time trend were again confirmed as strong positive relationship through correlation and regression analysis which shows that the growth of UPI has been consistent and

sustained throughout the study period. Another striking feature of the payment eco-system in India, identified in the comparative analysis, is the dominance of high value payment transactions on RTGS, driven by its usage for institutional and wholesale payments, while UPI accounts for a share of the overwhelming majority of retail transactions.

The study also shows that the speed of UPI's growth has revolutionized the banking sector by enabling digital payments, enhancing customer interaction and improving digital payments infrastructure. Concurrently, under the zero-Merchant Discount Rate (MDR) policy, the immediate revenue from transaction through fees is restricted, thus incentivizing banks to emphasize on increasing their efficiency, innovation, and providing value-added digital financial services. This highlights the complementary nature of UPI, RTGS, NEFT, and Credit Cards to cater the payment ecosystem in India in various ways.

The study offers an important contribution to the literature as it looks beyond consumer adoption and considers UPI within its broader context of its impact on the banking system. The results offer valuable guidance to policymakers, regulators, commercial banks, and fintech companies to grasp shifting digital payment trends and formulate plans for the sustainable development of India's payment ecosystem. The analysis can be further enriched with primary data from banks and payment service providers, provided by other research firms, and by analyzing how UPI influences the profitability and operational efficiency of banks in the future, as well as the implications of new innovations and international expansion of UPI.

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