

Growth of UPI Payments and Its Relationship with Banking Operations in India (2016–2024)

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ABSTRACT: The increase in the integration of Fintech is now an important aspect of banking operations in India. This study focuses on the growth of UPI transactions in India over the period of 2016-2024 and examines the relationship between UPI payments with major banking activities. It is based on the utilization of secondary data from unified payment interface, wherein essential growth measures and association analysis methods are applied. The results indicate that the volume of UPI transactions has shown a growing trend since the beginning, as transaction volumes record a CAGR of 204.25%, coupled with a rise of 42.88% in no of financial institutions participated in the UPI network, and an increase in the role of digital payment systems in India's financial infrastructure. The study manifests a significant association between the increase in UPI payments and the number of banks joining the processing of UPI transactions, reflected by a correlation coefficient of 0.98, indicating the change in transaction processing service delivery and operating techniques. Such rapid growth of UPI transaction volumes has enormously contributed to the efficiency enhancement inside the banks by reducing the banks' dependency on traditional branch-based process and has thus allowed immediate payment settlements.

KEYWORDS: Digital payments; financial technology; unified payments interface (UPI)' digital financial inclusion; Indian banking system; payment infrastructure; banking operations.

INTRODUCTION

The Unified Payments Interface (UPI) was launched in the month of April 2016, and since then, there has been a complete metamorphosis in the payment system in India. This change has been brought about in a short period, less than a decade, through the widespread use of an account-to-account online and instantaneous transaction processing system, along with several other platforms; one such platform is the Unified Payments Interface (UPI), which was launched by the (NPCI). It was earlier intended as a cheaper mode for inter-Bank payments, which would enable peer-to-peer fund transfer instantly. Now, UPI is the most popular payment gateway, which affects the payment settlement patterns as well as the processing patterns of financial organizations. UPI's growth has been phenomenal! According to NPCI statistics, it emerged from millions of transactions in its early years to billions in the 2020s. Between 2017 and 2024, UPI saw a massive surge in transaction numbers and amounts, with annual volumes jumping from under 20 million in 2017 to over a whopping hundred billion in the mid-2020s. Plus, its Year-over-Year growth rates have outpaced NEFT, RTGS, and Cards. Such observations, as recorded in NPCI press releases and overall industry research, not only indicate adoption in digital consumption by urban users but also mark penetration among rural and semi-urban populations with advances in smartphone and internet accessibility.

The integration of UPI has been accompanied by a significant shift in the functions played by the conventional commercial banks. The integration of UPI into the banking systems has required changes in the overall architecture of processing, real-time settlement systems, as well as the modes of servicing, which ultimately affected the cost of handling transactions in a number of banks. The link between the expansion of UPI and banking systems has been substantiated by research studies. By adopting the extended adoption model, Razi-ur-Rahim (2024) makes it clear that when banks keep their customer acquisition process updated by utilizing the simplified identifier (VPA) system in UPI and update their systems accordingly for real-time API functions, the pace of UPI adaptation increases [2]. These changes in technology lead to changes in the workload of branches and electronic settlement systems in later stages. The changes caused by UPI in the structure of transactions in banks and shifting regular and low-value transactions from the counters of banks to the mobile environment, in turn, affecting the branches of banks and human resource

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allocation in banks, have been pointed out by ICRIER and other research institutions in working papers and other research papers/case studies prepared by them [3].

However, attention must also be drawn to the institutional presence of the Unified Payments Interface (UPI). As of the mid-2020s, a "multitude" of banking institutions as well as third-party apps is operating on the UPI framework, and the data available through the National Payments Corporation of India indicate the extensive nature of banking participation and are prodding a settlement increase of the economy as a whole. The concentration risks found innately within the UPI framework have spurred the attention of both regulators and market analysts within the span of equal proportions of time as well. At the same time, regulators and market analysts alike have spurred a recognition of the concentration risks found innately within the UPI framework, including assessments of regulatory policies related to market share maxima (extended through the year 2026), using "contemporary" market share figures illustrative of the degree of these governance problems. [1]

Various debates on policy have highlighted the correlation existing between the growth of UPI and financial inclusion. Recently, academic analyses have pointed out that the use of UPI networks has spread even in the rural and semi-urbans and used on public digital services like utility bill payment and government collections. Although the beneficiary growth for the economically and socially marginalized section is still restricted due to elements related to digital literacy, device possession, and cybersecurity concerns, and also cases of increase in instances of fraud have called for an intensive analysis of the value added services for the protection of consumers, it is essential that the gross growth figures and the disaggregated data analysis on the demographics of UPI accounts and usage and the outcomes be integrated into an analysis.

There appears to be an enormous gap in comprehensive empirical studies that establish the connection between the development of UPI and the operational-level outcomes affected in the banking system, including changes in the time for processing, cost of transactions, structure of transactions at branches, and employee productivity, despite the availability of an immense base of reports in this industry. This research effort helps in fulfilling this need, as it critically analyzes the development in UPI with association analysis between 2016 and 2024, using NPCI transaction data and legal files, in order to make sense of the association between payments in UPI and bank participation and other observable signs of banking activities. In an effort to go beyond descriptions in terms of magnitude and to make sense of changes in financial intermediary practices due to payment innovation in India, this manuscript seeks to integrate descriptive statistics and association analysis.

LITERATURE REVIEW

Giulio Cornelli et al. (2024) states the Unified Payments Interface (UPI)'s rapid growth in "The organisation of digital payments in India: lessons from the Unified Payments Interface (UPI)". The Objectives centre on identifying success factors and market organization effects. Key variables include UPI Volumes, TPAP market shares, and investments. Findings highlight open architecture, zero fees, data regulations, and private partnership getting 81.8% of the digital payment volumes, enhancing inclusion but facing some problems and scalability issues.

Rajas Saroy et al (2023) dug into how payment tech is shaking up banks in their paper, "Impact of Digital Payment Adoption on Indian banking sector's efficiency". They're looking at how digital payments affect Indian commercial banks' cost and technical efficiency. The study evaluates from 2011 to 2019 using DEA and GMM. The digital index (NEFT, ATM's, PoS, cards, NPAs, etc.) the results demonstrate that digital payment adoption significantly improves cost efficiency but not technical efficiency; efficiency gains arise through reduced input costs; efficiency shows persistence.

Pandey (2025) explores how digitalization is reshaping Indian banking in "Transforming Indian Banking: Digitalization, Customer Experience and Operational Efficiency". The study looks at digital adoption among users and its effects on customer satisfaction and operational efficiency, focusing on transaction speed, digital adoption, customer satisfaction, and loyalty.

Srivastava, S., & Shunmugasundaram, V. (2025) in a study on Mobile payment FinTech services adoption: comparing three models is to aim the motive behind the present study is to examine the perception, satisfaction, adoption intention, challenges and usage of Mobile Payment FinTech Services (MPFS). It also assesses the influence of demographics (gender and age) on perception, satisfaction, adoption intention, challenges and usage by primary data collected through questionnaire administered online and offline in Delhi NCR by using variables such as Social influence Perceived ease of use Perceived usefulness Government support Convenience App & website design Perceived benefit Trust Satisfaction , Adoption Intention, Challenges Perceived risk Lack of facilitating conditions Operational constraints Usage and findings adoption Intention Challenges. Demographics & Usage Significant difference in usage between male vs female Significant difference in usage between young vs old.

Asif, Mohammad et al. (2023) in The Impact of Fintech and Digital Financial Services on Financial Inclusion in India aimed to determine the impact of fintech and digital financial services on financial inclusion in India using primary data using Behavioural

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Intention (BI), Social Influence (SI), Service Trust (ST), Usability (UB), Use of Fintech for Financial Inclusion (FTFI). This study investigated the impact of behavioural intention, trust in fintech service, usability of fintech service, and social influence of people on the usage of fintech services for financial inclusion.

Gulati, A., & Singh, S. (2024) in *The Changing Landscape of Financial Services in the Age of Digitalization: A Bibliometric Analysis* aims to examine and uncover emerging trends in digital financial services (DFS) research using bibliometric analysis and to highlight future research agendas and thrust areas using Bibliometric analysis Techniques used are Performance analysis, Bibliographic coupling, Co-authorship analysis, Co-citation analysis Keyword co-occurrence analysis with Number of publications Citations Authors Journals Institutions Countries Keywords Research clusters/themes the findings covered Review DFS research using performance analysis Identify key authors, journals, institutions, and countries Examine the intellectual structure of DFS research Identify frequently studied topics Propose future research directions.

Costa, D., Querci, F., & Santulli, R. (2025) in *Competition or cooperation? Disentangling the Bank–FinTech interaction through a hybrid literature review* aims to examine whether banks and FinTech companies compete, cooperate, or adopt hybrid (coopetition) strategies, and to provide a structured framework explaining different Bank–FinTech interaction models and their effects on banks using Hybrid Literature Review Combines: Bibliometric analysis Structured systematic review Based on: Tranfield et al. (2003) review protocol Performance analysis Science mapping Sense making approach with Number of publications Authors Journals Countries Keywords Interaction Strategies Collaboration types Bank performance outcomes and findings Examine how banks and FinTech firms interact Identify motivations behind interaction strategies Classify types of Bank–FinTech interactions Analyse bank-specific drivers of interaction strategies Examine the effects of FinTech interaction on bank performance Propose future research directions.

Objective

1. To examine the growth trend of UPI transactions in India
2. To analyse the expansion of bank participation in the UPI network

HYPOTHESIS:

H₀₁: There is no significant growth trend in UPI transaction volumes in India during the study period.

H₁₁: UPI transaction volumes in India exhibit a significant positive growth trend during the study period.

METHODOLOGY

This current study is based on secondary data spanning the period 2016–2024, marking the onset and subsequent spread of the UPI system in the Indian environment. Data associated with the volume and financial magnitude of UPI transactions has been gathered from the published data of NPCI and RBI, respectively, while data associated with the cumulative banks participating in the UPI system has been gathered from NPCI's published reports and payment system indicators published by RBI. This analysis has been done using both descriptive and analytical tools, wherein fundamental growth parameters like annual growth rate and Compound Annual Growth Rate (CAGR) have been used for scrutinizing UPI transaction and banking participation trends during the specified period. To find out the relationship between both, increase in UPI transactions and their associated increase in banking participations Correlation analysis has been applied by taking UPI transaction volume and bank participation under UPI as main variables.

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Analysis and Findings:

MONTH/YEAR	2016-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
APRIL	0	7.2	190.08	781.79	999.57	2641.06	5583.05	8863.26
MAY	0	9.36	181.48	733.54	1234.5	2539.57	5955.2	9415.19
JUNE	0	10.35	246.37	754.54	1336.93	2807.51	5862.75	9335.06
JULY	0.09	11.63	273.75	822.29	1497.36	3247.82	6288.4	9964.61
AUGUST	0.09	16.8	312.02	918.35	1618.83	3555.55	6579.63	10586.02
SEPTEMBER	0.09	30.98	405.87	955.02	1800.14	3654.4	6780.8	10555.69
OCTOBER	0.1	76.96	482.36	1148.36	2071.62	4218.65	7305.42	11408.79
NOVEMBER	0.29	105.02	524.94	1218.77	2210.23	4186.48	7309.45	11235.29
DECEMBER	1.99	145.64	620.17	1308.4	2234.16	4566.3	7829.49	12020.23
JAN	4.46	151.83	672.75	1305.02	2302.73	4617.15	8036.89	12203.02
FEB	4.38	171.4	674.19	1325.69	2292.9	4527.49	7534.76	12102.67
MARCH	6.37	178.05	799.54	1246.84	2731.08	5405.65	8685.3	13440
AVERAGE	1.488333333	76.26833333	448.62667	994.608	1860.8375	3830.63583	6979.26167	10927.48583

Trend for Average UPI Transaction Volume per Month in India (2016–17 to 2023–24)

The empirical findings reveal an increasing trend of UPI transactions from time period 2016–17 to 2023–24, thereby indicating fast pace of digital payment adoption in India. During the initial stage (2016–17), the adoption level of UPI was trivial, with average monthly transactions being close to zero and with only 1.49 average monthly transactions annually, denoting its nascent stage after launching successfully. There is a visible marked increase during 2017–18, with average monthly transactions rising to 76.27, denoting initial adoption by consumers as well as by financial entities. However, the rate of increase dwains with a significant acceleration from 2018–19 itself, with average monthly transactions rising to 448.63 and then advancing to 994.61 in 2019–20, denoting momentum building from banks as well as consumer acceptance and habituation towards UPI transactions. The period after 2020–21 represents a crucial turning point within which average monthly transaction volumes surpassed 1,860 and then spiked sharply to 3,830 in 2021–22 and then reached a peak at nearly 6,979 in 2022–23. By 2023–24, the average monthly UPI transaction volumes rose to 10,927 levels, clearly underlining dominance by UPI as a payment channel within India. The significantly high level of transactions being witnessed during the end months of each financial year—with even visible peaks during October and March months—further provides insight into a natural peak for digital payment trends during festivals and peak periods for economic activity. Overall, empirical trends denote a transformation from a fledgling payment system to a mature and full-fledged digital payment system within less than a decade.

YEAR	VOLUME OF UPI TRANSACTION
2016-17	1.488333
2017-18	76.26833
2018-19	448.62667
2019-20	994.608
2020-21	1860.8375
2021-22	3830.63583

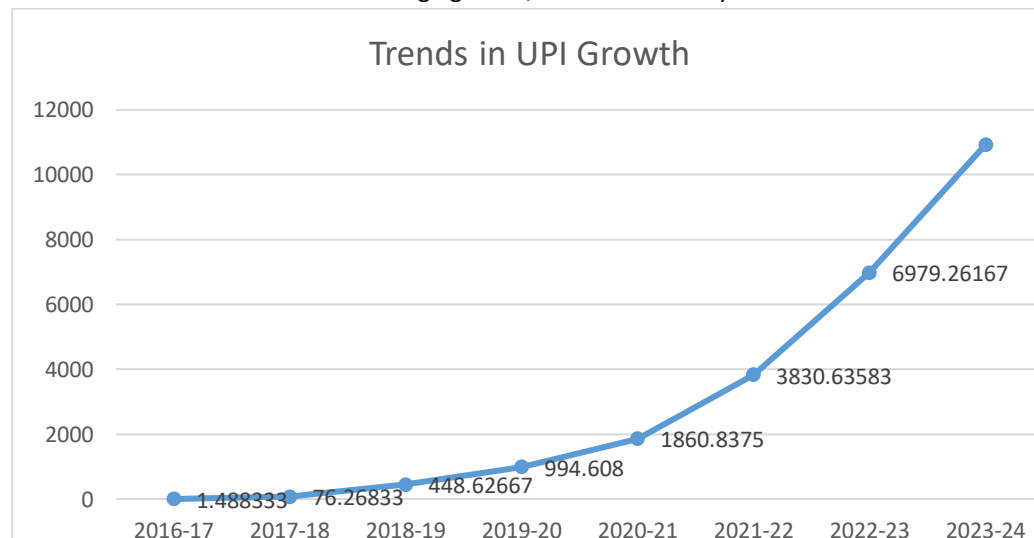
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2022-23	6979.26167
2023-24	10927.48583
CAGR	204.25%

Growth Trend in UPI Transaction Volumes in India (2016–17 to 2023–24)

The year-on-year average transaction volumes reflect an extremely rapid acceleration in the adoption of UPI in India throughout the period from 2016-17 to 2023-24. Starting from a negligible level of 1.49 in 2016-17, the volumes of UPI transactions grew to 76.27 in 2017-18 and further to 448.63 in 2018-19, which reflects a movement from an experimental phase to an early adopter phase. The pace of this growth picked up in the next years, with average transaction volumes progressing to 994.61 in 2019-20 and thereafter dramatically attaining over double to 1,860.84 in 2020-21, representing a period in which not only UPI grew in importance but increased usage of contactless payment methods as well. The following years, in the post-COVID period, represent an even sharper trend, with the transaction volumes averaging 3,830.64 in 2021-22, 6,979.26 in 2022-23, and an astonishing 10,927.49 in 2023-24, thus accentuating, with conclusiveness, the ubiquitous nature of UPI as an overarching payment

This also confirms that the CAGR of 204.25 percent is an indication of how quickly the transaction volumes have grown on the UPI system. Such a high growth rate indicates that there was a small base for this growth to start from, as well as how quickly the UPI system has adopted a smartphone culture and is now a part of daily transactions. On the one hand, the extent of growth indicates the effective spread of digital payment solutions, but on the other, it also points to the entering of the system into its mature phase, where the absolute values continue to show large growth, but the rates may stabilize.



NUMBER OF BANKS WITH UPI

MONTH	2016-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
APRIL	21	48	97	144	153	220	316	414
MAY	21	49	101	143	155	224	323	445
JUNE	21	52	110	142	155	229	330	458
JULY	21	53	114	143	164	235	338	473
AUGUST	21	55	114	141	168	249	346	484
SEPTEMBER	25	57	122	141	174	259	358	492
OCTOBER	26	60	128	141	189	261	365	505
NOVEMBER	30	61	128	143	200	274	376	516
DECEMBER	35	67	129	143	207	282	382	522
JAN	36	71	134	144	207	297	385	550
FEB	44	86	139	146	213	304	390	560
MARCH	44	91	142	148	216	314	399	572
AVERAGE	28.75	62.5	121.5	143.25	183.416667	262.333	359	499.25

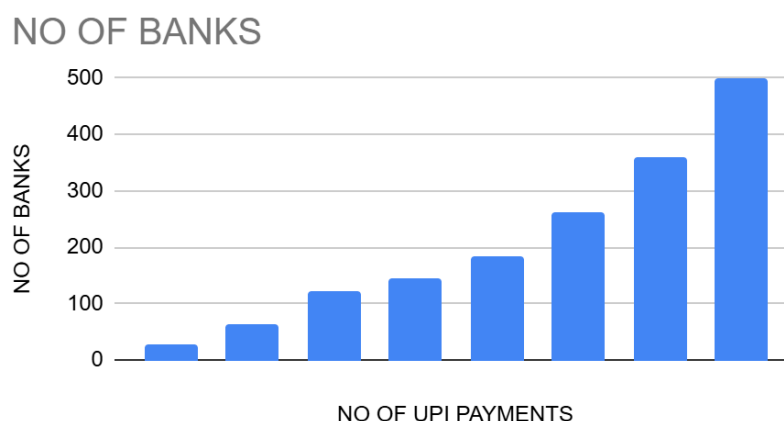
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The empirical data for the month-wise and yearly average participation of banks in the UPI system shows a regular and continuous enhancement in system participation from the time it was launched. The engagement of banks in UPI remained substantially limited in the fiscal year 2016–17, which could only muster an average participation level of just 28.75 banks per month, which corresponds to the initial stages related to system integration and preparedness levels amongst banking entities. However, this data shows a more than twofold escalation in average participation levels, which reached 62.5 banks in the fiscal year 2017–18, followed by an escalation to 121.5 in 2018–19, which reveals a continuously escalating level of confidence in the UPI system as well as a larger participation level from both public as well as private sector banks.

The period commencing in 2019–20 can be marked by a process of consolidation and gradual expansion. The average monthly bank participation in 2019–20 witnessed an extraordinary rise to 143.25, and later it further progressed to 183.42 in 2020–21, indicating continuous institutional adoption, despite prevailing disruptions in operations being triggered by the onset of the pandemic. The succeeding years reflect an evident expansion path, with average monthly bank participation reaching 262.33 in 2021–22, 359 in 2022–23, and finally reaching 499.25 in 2023–24. The continuous monthly rise in every year, from April to March, thereby symbolically representing an overall cumulative addition, rather than an irregular one, to the UPI platform.

Overall, the trend that can be inferred from the results is that the increasing presence of the UPI between the banks has contributed to the promotion of the growth of the UPI, and this reinforces the interoperability nature of the UPI. The increasing number of banks, coupled with the higher growth rate of the transaction values, reflect a shift from a phase of growth among adopters towards a stabilized phase of integration of the UPI into the banking systems.

YEARS	VOLUME OF UPI TRANSACTION	NO OF BANKS
2016-17	1.488333	28.75
2017-18	76.26833	62.5
2018-19	448.62667	121.5
2019-20	994.608	143.25
2020-21	1860.8375	183.416667
2021-22	3830.63583	262.333333
2022-23	6979.26167	359
2023-24	10927.48583	499.25
CAGR	204.25%	42.88%



CONCLUSION

This paper elucidates UPI has experienced geometric progression all along with the support it received from Government and a part of digital payments infrastructure in India during 2016-17 to 2023-24. The steep growth in the number of transactions, reflected in an astonishing compound annual growth rate of over 200 percent, marks an end to an early adoption phase and an onset of an adoption phase with greater adoption. This has paralleled an increase in the number of financial institutions participating in a UPI, thus emphasizing the interoperability nature of UPI and enhanced institutional integration. The strong positive relationship between transaction and bank participation levels strongly marks an association between the spread of UPI

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and changes in banking practices, particularly in low-value high-volume transactions and lesser reliance on branch-and-payment channels. In totality, it can be said that the above points establish UPI as an essential major structural shift in India's payments landscape and not just an evolutionary technology by bit, while concurrently requiring an exploration of bank-specific responses, regional differentials, and inclusiveness of beneficiary impact as witnessed in an expansion in digital payments.

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