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# Comparative Analysis of Digital Payment Adoption and Growth in India

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**Abstract**

Within the span of less than ten years, India has catapulted itself to become one of the world's fastest-growing digital payment markets and is moving towards a near-cashless retail environment. This paper is based only on secondary data published by the Reserve Bank of India (RBI), the National Payments Corporation of India (NPCI) and allied industry sources and compares the adoption and growth of different digital payment instruments in India from 2018 to 2025. The RBI Digital Payments Index (RBI-DPI) is used as a composite indicator and instrument-level data in volumes and values for Unified Payments Interface (UPI), credit card, debit card, and NEFT-IMPS is used to trend the indicators and calculate growth rates. The results reveal a more than fourfold growth of RBI-DPI from 100 to 493.22 from March 2018 to March 2025. The biggest growth driver is UPI, which was around 1,207 million transactions in FY2018 and is expected to touch 185 billion transactions in 2025 and make up almost 85 percent of digital payment volume by the first half of 2025. The study also shows how there is a structural shift taking place in card payments as credit card transactions grew more than double whereas debit card transactions have seen a drastic decline due to UPI taking over low value retail transactions. The paper finds that the digital payment growth in India is one of instrument substitution and not of uniform growth, and that policy, zero merchant-discount-rate economics, and ubiquity of QR code infrastructure are the key enablers. Limitations relating to secondary-data comparability and avenues for future primary research are discussed.

**Keywords:** digital payments; Unified Payments Interface (UPI); RBI Digital Payments Index; financial inclusion; cashless economy; India

## 1. Introduction

India's payments sector has seen a drastic change in the last decade. The cash and paper-based economy has been transformed into a digital, retail-payment economy that is now the subject of international study as a case of innovation through public infrastructure. The goal of this paper is to perform a comparative analysis to study the evolution and replacement of different Digital Payment Instruments between 2018 and 2025 using publicly available secondary data. The study aims to answer three questions: the overall growth in digital payments; what instruments have seen the most growth; and the relative share of each instrument in the country's total payment system.

### 1.1 Background and Context

In 2016, the watershed moment for the digital payments sector in India was when the National Payments Corporation of India (NPCI) launched the Unified Payments Interface (UPI) in April and then in November, the demonetisation drive pushed millions of consumers and merchants towards non-cash payments. This study covers the period starting August 2018 when UPI 2.0 was launched with signed intent and QR, one-time mandates, invoice verification and overdraft

linkage. In the context of quantifying the progress of digitalisation, in January 2021, the Reserve Bank of India (RBI) announced the release of RBI Digital Payments Index (RBI-DPI) with March 2018 as the base period with a value of 100. This index, which is published twice a year, is calculated as a composite of four sub-measures: payment enablers, demand- and supply-side infrastructure, payment performance and consumer centricity, and 2018 is a natural starting point for longitudinal analysis.

### 1.2 Significance of the Study

Comparative dynamics of the digital payment instruments is significant for a variety of stakeholders. The instrument level trends are relevant to policy makers and the central bank as regards direction of infrastructure investments, interchange and merchant-discount-rate policy as well as financial-inclusion in tier-3 to tier-6. The relative performance of UPI and card/bank-transfer rails affects the banks and fintech product roadmap and revenue models, particularly in the light of zero merchant fee that is applicable for UPI. India offers a unique opportunity to observe the natural experiment of the behavior change of consumers at scale, with the introduction of a low cost, interoperable public payment rail. Comparative, not single-instrument lens is therefore important because the digital growth story hides important substitution effects between instruments.

### 1.3 Objectives and Scope

The specific objectives of this study are as follows: (i) to analyse the overall growth of digital payments in India, using a composite indicator based on RBI-DPI; (ii) to compare the volume and value growth of key payment instruments – UPI, Credit cards, Debit cards, NEFT/IMPS – during the period 2018 to 2025; and (iii) to understand the substitution patterns and the drivers of differential growth. This study focuses on retail and large value electronic payment systems in India and secondary data sources published from 2018 – 2025. Certain elements like cross-border UPI expansion and central bank digital currency (CBDC) pilots and informal cash flows are not covered by the analytical core but mentioned as relevant to the context.

## 2. Literature Review

The literature on digital payments in India is vast and covers economics, information systems, public policy, financial inclusion, among others. The review is structured around four themes: growth of digital payment infrastructure, the factors behind the adoption, the public good aspect of UPI and instrument substitution and financial inclusion.

### 2.1 Evolution of Digital Payment Infrastructure

There is significant literature on the institutional structure of India's payment systems. The path on which scholars are tracking is from card and bank-transfer (NEFT, RTGS and IMPS) to mobile-first and interoperable. Researchers have highlighted that the so-called India Stack, which includes biometric identity (Aadhaar), interoperable payments (UPI) and consent-based data sharing, offers the underlying enabler which makes the Indian experience different from digitalisation through cards in other markets (D'Silva, Filková, Packer, & Tiwari, 2019). This literature portrays the RBI and NPCI as the builders of the public-utility model, where the central bank deliberately created

low-cost interoperability, instead of payments being run on proprietary networks. The launch of RBI-DPI itself marks a maturing measurement infrastructure, which will help in quantifying and benchmarking the digitalisation of payments over time (Reserve Bank of India, 2021)

### 2.2 Drivers of Digital Payment Adoption

Another stream focuses on the reasons behind consumer and merchant adoption of digital payments. Perceived ease of use, perceived usefulness, trust and social influence have been found as significant predictors of intention to use mobile payments in India (Singh & Sinha, 2020; Sahi, Khalid, & Ahmad, 2021). Demonetisation as a behavioural shock (Aggarwal, Malik, Mishra, & Paul, 2021), the COVID-19 pandemic as a trigger for contactless payments, and the zero-cost nature of UPI as an economic incentive for both parties to the market are other factors pointed out as accelerants. The demographic and infrastructural factors such as smart phone penetration, affordable mobile data, and rural-urban divide reappear as moderators of adoption (Kumar, Pal, & Patra, 2021).

### 2.3 UPI as a Public Digital Good

A new body of literature has emerged describing UPI not just as a product but as DPII – Digital Public Infrastructure with macro-economic implications. Interoperable, real-time, low-cost payment rails lower transaction frictions and drive growth of the formal economy, according to analysts at the Bank for International Settlements and others (D'Silva et al., 2019). Comparative studies place UPI alongside the Pix system of Brazil, and other real-time payment systems, and observe that the volumes of UPI have become the largest among all the real-time payment systems in the world. This strand relates the engineering choices of UPI—open APIs, a 30 percent volume cap per app to make sure there is competition, and bank-account-centric design—to outcomes like merchant acceptance and the displacement of cash (Mohan & Reddy, 2022).

### 2.4 Instrument Substitution and Financial Inclusion

The fourth theme looks at the replacement of cash and each other digital payment methods and whether this promotes financial inclusion. A few writers report that UPI has taken over the point-of-sale debit-card market, but credit cards continue to play a different part when it comes to credit access and e-commerce of larger transactions (Ghosh, 2023). Financial-inclusion scholarship is more controversial: the number of registered accounts and the number of payments made do not guarantee that accounts are used for deeper financial-inclusion, such as credit and savings (Demirgüç-Kunt, Klapper, Singer, & Ansar, 2022). This research is a part of the substitution literature as it uses the most recent secondary data to quantify the gap between credit cards and debit cards and the overwhelming dominance of UPI in retail volume.

## 3. Research Methodology

The research method in this study is quantitative, descriptive-comparative with the research data obtained being secondary data. No ‘primary survey’ or experiment is carried out but the analysis is a synthesis and comparison of published statistics from authoritative institutional sources for the period FY2018/2018 (calendar year) through to 2025.

### 3.1 Data Sources

Information collected from Reserve Bank of India (RBI Digital Payments Index releases), National Payments Corporation of India (NPCI product statistics), Press Information Bureau of the Government of India and trusted financial-data aggregators reporting NPCI and RBI data. In case of identical indicators reported by more than one, the releases from RBI and NPCI were given preference. The quantities for monetary amount are lakh crore (or trillion) rupees and the quantities for volume are in millions or billions of transactions, as appropriate for each table.

### 3.2 Variables and Analytical Approach

Each instrument is analysed with respect to two core dimensions — volume of transactions (number of transactions) and value of transactions (rupee amounts transacted). Overall digitalisation is measured in a composite RBI-DPI. Analytical approach is comparative and based on trends: year-on-year growth, period growth, compound trends and share-of-total calculations are utilized to gauge the relative standing of each instrument. The study is descriptive, therefore no inferential hypothesis testing is done, but the contribution is in the structured comparison and interpretation of the data collected from the secondary sources.

### 3.3 Limitations

There are three caveats. There are a number of series that are reported on different time periods, ranging from financial year to half-year to calendar year, and this is known as source heterogeneity, meaning that cross-instrument comparisons are indicative only. Second, some UPI transactions are not identifiable at the granular level into categories or states. Thirdly, secondary data cannot reveal consumer motivations, informal cash substitution and distributional effects, which require additional primary research. Such caveats are re-visited in the conclusion.

## 4. Results and Analysis

The secondary information collected is aggregated and presented under five tables and the comparative patterns are interpreted. Table 1 shows RBI-DPI composite, Table 2 shows UPI growth, Table 3 shows overall digital payments, Table 4 compares credit and debit cards and Table 5 compares bank-transfer rails (NEFT and IMPS) with UPI's share of digital payments volume.

### 4.1 Overall Digitalisation: The RBI Digital Payments Index

The RBI-DPI is the best single indicator of the progress of payment digitalisation. The index increased by over four times from its base of 100 in March 2018 to 493.22 in March 2025 as indicated in Table 1. The growth was highest in the early years and during the pandemic, as the index increased from 207.84 in March 2020 to 270.59 in March 2021, a period when people were forced to pay for things through contactless and online methods due to lockdowns.

Table 1. RBI Digital Payments Index (RBI-DPI), March 2018 to March 2025 (Base: March 2018 = 100)

| Period | RBI-DPI Score | Change from Base (×) |
|---|---|---|
| March 2018 (base) | 100.00 | 1.0× |
| March 2019 | 153.47 | 1.5× |
| March 2020 | 207.84 | 2.1× |

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|---|---|---|
| March 2021 | 270.59 | 2.7× |
| March 2022 | 349.30 | 3.5× |
| March 2023 | 395.57 | 4.0× |
| March 2024 | 445.50 | 4.5× |
| September 2024 | 465.33 | 4.7× |
| March 2025 | 493.22 | 4.9× |

Source: Compiled from Reserve Bank of India RBI-DPI releases (2021–2025).

The path of the trajectory in Table 1 shows growth that is continuing but slowing down. The fourfold-plus increase reflects the deepening along infrastructure and performance indicators and the RBI attributed the same to the performance of supply side infrastructure and payments. The growth rate has slowed down since 2022, indicating a maturing market with increased penetration rates.

### *4.2 UPI: The Engine of Growth*

UPI is the key driver for India's digital payment growth. Table 2 demonstrates that activities are not only growing, but also transaction volume has increased from around 1,207 million in FY2018 to over 185 billion in calendar 2025, while the value follows suit. This growth was unprecedented in such magnitude—in just 7 years—and is hard to find in other similar economies.

Table 2. Growth of UPI Transactions, FY2018 to 2025 (volume in millions; value in lakh crore rupees)

| **Period** | **Volume (million)** | **Value (₹ lakh crore)** | **Avg. Ticket (₹)** |
|---|---|---|---|
| FY 2017–18 | 1,207 | 1.10 | ~912 |
| FY 2019–20 | 12,519 | 21.32 | ~1,703 |
| FY 2021–22 | 45,968 | 84.16 | ~1,831 |
| FY 2023–24 | 97,295 | 199.96 | ~2,056 |
| FY 2024–25 | 1,72,200 | 260.00 | ~1,510 |
| CY 2024 | 1,72,210 | 246.80 | ~1,433 |
| CY 2025 (full year) | 1,85,000+ | 299.70 | ~1,348 |

Source: Compiled from NPCI UPI Product Statistics and RBI Payment System Report (2025). Figures rounded; FY = financial year, CY = calendar year.

There are two aspects of Table 2 that are analytically significant. To begin with, the pace of value growth has been slower than the growth in volume, causing the average ticket size to decline from more than ₹1,700 to around ₹1,348 in 2025. This suggests that UPI is on a path to retail penetration, with more and more small transactions now happening on a day-to-day basis. Second, person-to-merchant (P2M) transactions have now become the dominant proportion of the volume with the high share of payments under ₹500, validating the fact that UPI has now emerged as the preferred payment mode for small retail businesses like tea stalls, Kirana shops, etc.

### *4.3 Aggregate Digital Payments and the Decline of Cash*

Table 3 provides an overview of where UPI fits in the overall payment system. In calendar 2019, digital transactions stood at 3,248 crore and the value was ₹1,775 lakh crore, which has increased to 20,849 crore and ₹2,830 lakh crore respectively in calendar 2024. Digital payments grew to 99.7 per cent of transaction volume and 97.5 per cent of value by 2024 and, throughout the first half of 2025, this trend has continued.

Table 3. Aggregate Payment System Transactions, CY2019 to H1 2025 (volume in crore; value in lakh crore rupees)

| Period | Volume (crore) | Value (₹ lakh crore) | Digital Share (Volume) |
|---|---|---|---|
| CY 2019 | 3,248 | 1,775 | 96.7% |
| CY 2024 | 20,849 | 2,830 | 99.7% |
| H1 2025 | 12,549 | 1,572 | 99.8% |

Source: Compiled from RBI Payment System Report, June 2025.

The overall trend in Table 3 further shows that virtually all of the increase in payments is coming from digital channels, with paper-based instruments like cheques becoming a small proportion (about 2.3 per cent of value) of overall payments. The near-universal digital share by volume suggests that India has now firmly transitioned to a digital first retail payments era, despite the significant value share of cash and the volume share of unmeasured informal payments.

### *4.4 Card Payments: Divergence Between Credit and Debit*

The most remarkable substitution effect in the study is displayed on the card segment. Table 4 indicates that credit card transactions increased in volume by about 100 percent and in value by nearly 200 percent from 2019 to 2024, while debit card transactions declined by more than 30 percent in value and almost 20 percent in volume over the same period. Debit cards, which were the main tool for retail transactions, are now limited to cash withdrawals from ATMs and are getting replaced by UPI for various other transactions.

Table 4. Credit Card vs. Debit Card Transactions, CY2019 to H1 2025 (volume in million; value in lakh crore rupees)

| Period | Credit Vol. (mn) | Credit Val. (₹ lc) | Debit Vol. (mn) | Debit Val. (₹ lc) |
|---|---|---|---|---|
| CY 2019 | 2,087 | 7.10 | 4,953 | 6.83 |
| CY 2024 | 4,472 | 20.40 | 1,738 | 5.15 |
| H1 2025 | 2,663 | 11.10 | 691 | 2.22 |

Source: Compiled from RBI Payment System Report, June 2025.

Table 4 illustrates the instrument substitution, in the card space and between UPI and cards. Online spends, credit access and higher value spends, have a unique niche of their own on credit cards and debit cards are losing their transactional value to the convenience of UPI which is free of transaction charges. Both types of cards are battling against digital alternatives, the RBI itself admits. This is what the paper's thesis is that growth of Indian digital economy isn't necessarily additive throughout the span of instruments.

### *4.5 Bank-Transfer Rails and UPI's Share of Volume*

Table 5 shows a comparison of the older electronic-transfer rails and UPI's percentage of the total digital volume. The overall volume of NEFT increased more than 3 times between 2019 and 2024, where it continued to dominate the high-value and bulk transfer category, and the volume of digital payment through UPI grew from around one-third in 2019 to around 85 percent in H1 2025.

Table 5. NEFT/IMPS Volume and UPI Share of Digital Payment Volume, CY2019 to H1 2025

| Period | NEFT Vol. (crore) | UPI Share of Digital Vol. | IMPS Role |
|---|---|---|---|
| CY 2019 | 262.2 | ~34% | Growing faster than NEFT |
| CY 2024 | 926.8 | ~83% | High-value instant transfers |
| H1 2025 | 490.5 | ~85% | Sustained adoption |

Source: Compiled from RBI Payment System Report, June 2025, and NPCI statistics.

As is clear from Table 5, the collapse in the older rails is not so much a collapse as a specialisation. NEFT and RTGS continue to dominate high-value and institutional transfers, although UPI's share of volume is around 85 percent but value is around 9 percent in H1 2025. UPI's dominant position in terms of volume and smaller in terms of value only reaffirms its identity as a high-frequency, low-ticket retail instrument, which is complementary and not a full replacement of the bank transfer facilities in case of large payment transactions.

### 4.6 Synthesis of Comparative Findings

The five tables are a cohesive comparative story when read together. Digitalisation as a whole increased by over four times (Table 1), driven by the huge growth in UPI payments (Table 2), which propelled the share of digital payments to close to universal levels (Table 3). Under this umbrella, the nature of the mix changed significantly: in retail, UPI replaced the debit cards, and credit cards found a complementary credit and ecommerce space (Table 4), while the bank-transfer rails focused on high value flows (Table 5). The enabling conditions were that UPI was under a zero merchant-discount-rate regime, acceptance of QR codes and PoS infrastructure had grown at a fast pace, there was a per-app volume cap that ensured fair competition, mobile data was cheap and there was active policy support through various measures like the Payments Infrastructure Development Fund.

## 5. Conclusion

The aim of this paper is to see the comparison of the growth and adoption of the Digital Payment instruments in India during the year 2018-2025 using secondary data. The evidence suggests that there are three main conclusions. Digitalisation has also gone up significantly with the RBI-DPI rising from 100 in 2018 to 493.22 in March 2025 and the digital payments account for near to all the retail transaction volume. Second, this growth is not broad-based, but rather substitutive, as UPI (Union Pay) has taken up about 85 percent of the digital volume, while the debit cards have been confined to everyday usage and credit cards and bank transfer rails to niche businesses. Third, on a conscious public-infrastructure approach, low cost of interoperability, high rate of QR adoption, competition and policy support, which enabled rapid adoption of QR in the retail sector at low ticket prices.

That's where comparison lens is important as the growth in the digital payments category is concealment by the composition change. A policy maker or a keen watcher of the big picture would not want to see the uptick in debit cards, NEFT's value growth, UPI's average small ticket sizes, etc. each of which have their own strategic and regulatory implications and affect long-term sustainability of the zero-MDR economics, revenue model of the payment service providers, etc.

This research study has some limitations which indicate the need for further study. There is no possibility of commenting on consumer motivation or distributional equity and informal cash substitution as the analysis is based on a combination of secondary data reported for varying time horizons – so the comparisons are indicative. This macro picture should be complemented by primary level research into merchants and consumers, the welfare effects and inclusion of cash-to-UPI migration, and the evolving opportunities for credit-on-UPI and the central bank digital money along with cross-border connectivity of UPI in the coming months. Such research will be used to analyse the hypothesis whether Indian growth model of substitution with infrastructure is continuing the growth of the true financial inclusion path or is just digitising the existing financial flows.

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