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FinTech Enabled Financial Inclusion: Evidence from India's Digital Payment Revolution

Anukriti Mishra[1], Dr. Kranti Singh[2]

[1]Research Scholar, Department of Commerce, University of Lucknow, Lucknow, India

Email: anukritimishra000@gmail.com

ORCID: https://orcid.org/0009-0000-7760-4409

[2]Professor, Department of Commerce, Netaji Subhash Chandra Bose Govt. Girls P.G. College, Lucknow, India

Email: drkrantisingh@gmail.com

ABSTRACT

FinTech growth changed India's banking and payment ecosystem. The Unified Payments Interface (UPI) and government led financial inclusion initiatives like the Pradhan Mantri Jan Dhan Yojana (PMJDY) have significantly contributed to this change. This study examines the statistical relationship between FinTech driven digital payment adoption and financial inclusion in India from 2014 to 2025. The study is built on secondary data obtained from the National Payments Corporation of India (NPCI) and the PMJDY portal. For analysis, it employs trend analysis, descriptive statistics and correlation analysis to evaluate patterns of digital transaction growth and account ownership. Data from the NPCI and the PMJDY portal show clear trends. UPI transactions grew exponentially since 2018. UPI transaction values correlate strongly with PMJDY account growth. Access to formal banking increases digital payment usage. Rural areas hold the majority of new PMJDY accounts. Rural account penetration succeeded in reaching underserved populations. Digital payments and policy led inclusion support each other. India continues its transition toward a digital financial system. The results provide insights for policymakers and financial firms. They must design strategies that integrate account penetration with digital usage. This approach ensures inclusive and sustainable financial development.

Keywords: FinTech, Financial Inclusion, Digital Banking, UPI, PMJDY.

INTRODUCTION

Financial inclusion has turned out to be a pillar of inclusive growth in the 21st century and it makes sure that everybody can have access to necessary financial services at an affordable and sustainable price. In India, this outline has been taken forward by an unprecedented blend of policy interventions as well as technology-driven innovations. Government-directed programs like the Pradhan Mantri Jan Dhan Yojana (PMJDY) built on this momentum by opening millions of bank accounts, thereby extending the coverage of the formal banking network ((Nimbrayan et al., 2018). These initiatives have been strengthened by the fast

expansion of digital finance, particularly the UPI, which has revolutionized Indias' method of transacting as it offers low-cost, interoperable and real-time payment systems (Sahoo et al., 2024).

Across the globe, the importance of digital finance in driving inclusion has been highly documented. The Global Findex Database (2025) points to mobile penetration and digital payment systems having provided opportunities for millions of people in low and middle - income economies to access savings, credit and remittance services. Yet, it also emphasizes the continuing challenges of digital literacy, infrastructure shortfalls and gender inequalities that limit the transformative potential of financial technologies (*The Global Findex Database 2025*). These concerns have been brought up in Indian research as well, which observes that even with a 15-fold rise in digital payments between 2017-18 and 2024-25, there exists a digital divide among rural families and disadvantaged groups (Koley, 2025).

Parallelly, FinTech innovation outside of payments including machine learning driven lending models and blockchain based welfare delivery is transforming credit distribution, transparency and trust in (Tantri, 2020; Singh et al., 2025). However, the increased rate of growth also poses new threats to instability, cybersecurity and uneven adoption among socio-economic segments *(Cevik, 2020*). This tension highlights the necessity to develop a multifaceted perspective on how financial technologies promote inclusion but also introduce new policy and operational challenges.

Against this background, the study examines the statistical link between FinTech-enabled digital banking adoption and financial inclusion in India, particularly for UPI, IMPS and PMJDY. Through the analysis of transaction values and account ownership patterns in rural and urban areas, the study aims to determine if the increase in digital banking results in greater financial inclusion. In the process, it adds to the global body of literature on digital finance as well as to the country-specific literature on India's progress towards an inclusive and tech-enabled financial landscape.

LITERATURE REVIEW

Digital Finance and the Revolution of Inclusion in India

The past decade has witnessed a historic transformation in India's financial sector, spurred by government policies and FinTech platforms. Research points out that PMJDY has been the driving force of inclusion, with more than 31 crore accounts being opened in its first few years, mostly in rural India, thus alleviating poverty and bringing households into the formal financial system ((Nimbrayan et al., 2018)). Securing this, Aadhaar-based services and Direct Benefit Transfers (DBT) have entrenched access among newly banked individuals. Research emphasizes that while account ownership has expanded, challenges remain in terms of digital literacy, rural access and gender disparities (Koley, 2025 ; Reserve Bank of India, 2019; The Global Findex Database 2025).

The expansion of digital payments has strengthened this transformation. The RBI’s Digital Payment Index shows a 15-fold increase in transaction volumes between 2017-18 and 2024-25, largely driven by UPI and policy support (Koley, 2025). Research has established that the simplicity of UPI usage, interoperability and costless design have contributed to it being the most popular digital payment instrument, lowering consumption of cash and promoting a cashless economy (Sahoo et al., 2024). However, studies also highlight

ongoing challenges like the digital divide, poor rural infrastructure and insufficient digital confidence levels among some segments, which impede universal access to digital finance.

FinTech Innovations and Systemic Challenges

In addition to access, recent literature highlights how FinTech innovations are influencing credit, entrepreneurship and financial behaviour for everyday consumers. Lending models in India based on machine learning have showed the capability to increase loan approvals and lower default risk without intensifying discrimination, as long as fairness guarantees are used (Tantri, 2020). Comparative research indicates that adoption varies greatly between rural and urban consumers, with young people and educated segments indicating quicker uptake for mobile wallets and apps, while rural families are hindered by factors associated with literacy and infrastructure ((Bakhtiyorovna, 2023; Setiawan et al., 2025). In parallel, African mobile money platforms and Chinese digital ecosystems provide data that FinTech can drive entrepreneurship and mobility, although local contexts heavily influence results (Chen, 2025; Oppong & Mathibe, 2025). New and emerging technologies are also discussed in the literature. Blockchain technology, for example, is considered as a means of building trust and efficiency in welfare delivery, especially in urban slums in India, although evidence on scalability and corruption reduction is still limited (Singh et al., 2025). Macro-level studies, however, note that the accelerated growth of FinTech can also create systemic risks like volatility, liquidity stress and cybersecurity threats and that effective regulatory supervision is therefore crucial ((Cevik, 2025; Ioannou et al., 2024)

Research Gap

The available literature has so far analysed the progress of digital finance in India, most of it either concentrates on policy interventions such as PMJDY or on the growth of digital payment such as UPI separately. The correlation of financial inclusion schemes (PMJDY) with FinTech adoption (UPI/IMPS) establish how policy-driven account penetration is transmitted into greater digital transaction activity is missing in most studies. Additionally, most existing research highlights descriptive growth patterns but fails to empirically verify the relationship between account holding and online transaction volumes and neither indicates the rural-urban split of inclusion advantages using evidence from data.

Objectives

1. To examine trends in digital transactions (UPI and IMPS) in India.
2. To analyse the relationship between FinTech adoption and financial inclusion indicator (PMJDY account penetration).
3. To highlight the impact of financial inclusion scheme, PMJDY on urban and rural areas.

RESEARCH METHODOLOGY

Research Design

The study adopts a descriptive and analytical research design to examine the relationship between digital payment adoption and financial inclusion in India. Specifically, it investigates the association between the growth of UPI transactions and the expansion of bank accounts under the PMJDY.

The descriptive component focuses on identifying trends in digital transaction growth and account penetration over time, while the analytical component statistically evaluates the association between financial inclusion indicators and digital payment usage. The study also incorporates a comparative assessment of rural and urban account distribution to understand regional patterns of financial inclusion.

Data Sources and Data Collection

The study is based entirely on secondary data collected from reliable and publicly accessible institutional sources. The datasets used include:

- National Payments Corporation of India (NPCI): Annual transaction value and volume data for UPI and IMPS from 2014–2025.
- PMJDY Official Portal: Data on total PMJDY accounts, including rural and urban distribution, from 2015–2025.
- Government and institutional publications: Supporting policy reports and financial inclusion statistics for contextual interpretation.

All data were compiled and organised year-wise to ensure consistency across variables. Transaction values were measured in crore rupees, while account ownership figures were recorded in crore accounts.

Variables Used

The key variables considered include:

- UPI Transaction Value (₹ Crore) – Indicator of FinTech adoption.
- IMPS Transaction Value (₹ Crore) – Comparative digital payment benchmark.
- Total PMJDY Accounts (Crore) – Indicator of financial inclusion.
- Rural PMJDY Accounts (Crore)
- Urban PMJDY Accounts (Crore)

The transaction value of UPI was treated as the primary dependent indicator of digital payment adoption, while PMJDY account penetration was used as the primary explanatory indicator of financial inclusion.

Data Analysis Techniques

The study employs the following statistical tools:

- Trend analysis was used to examine the growth pattern of UPI and IMPS transaction values over time. Line graphs were constructed to visualise divergence in digital payment adoption trends.
- Descriptive analysis was applied to evaluate the expansion of PMJDY accounts across rural and urban regions, highlighting patterns of inclusion.
- To examine the relationship between financial inclusion and digital payment growth, Pearson's correlation coefficient (r) was computed between total PMJDY accounts and UPI transaction values.
- Graphical Representation- Scatter plots with fitted regression lines and confidence intervals were constructed to visually assess the strength and direction of association between variables.

All statistical analysis and visualisations were conducted using R programming software.

Limitations

The research is grounded in secondary data, which might limit a broader understanding. The analysis is also limited to rural-urban differences without addressing other socio-economic factors like gender or income group. In spite of these, the application of correlation analysis and the use of multiple secondary sources guarantee a coherent and evidence-backed awareness of the role played by digital payment in financial inclusion.

FINDINGS AND INTERPRETATION

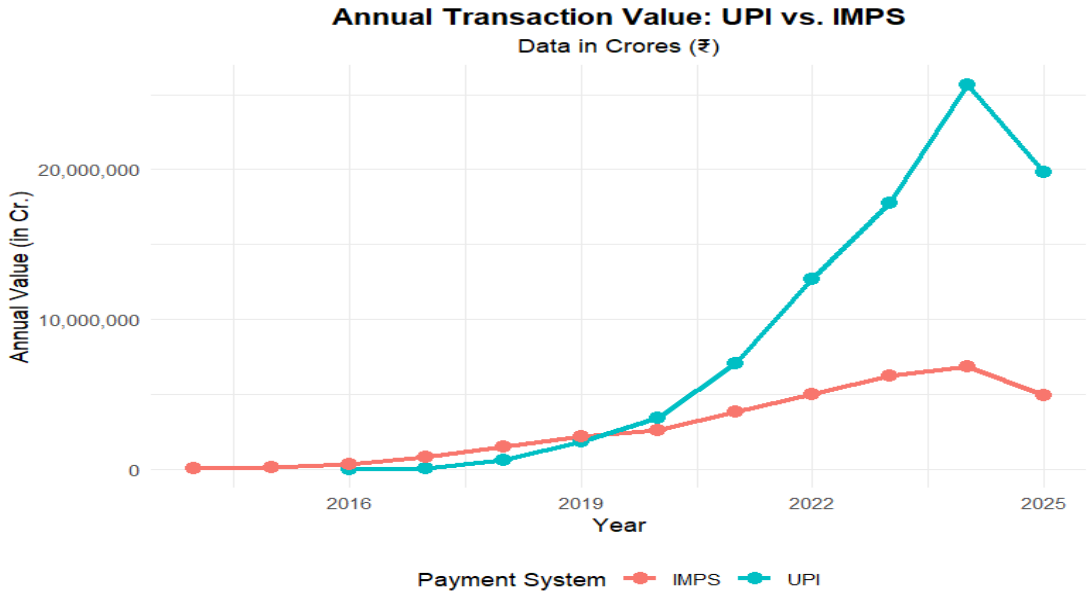


Figure 1: Growth of UPI and IMPS transaction values in India (2014-2025)

Source: Visualization generated by author via R-programming

The line graph plotting UPI and IMPS transaction amounts reveals a clear divergence in growth trends. IMPS, first introduced as an interbank payment system, showed gradual and modest growth year on year. UPI transactions, meanwhile, started at small levels in 2016 but have observed exponential growth from 2018-19 onwards. UPI transaction amounts caught up with those of IMPS by 2019, but the difference increased strongly in the following years.

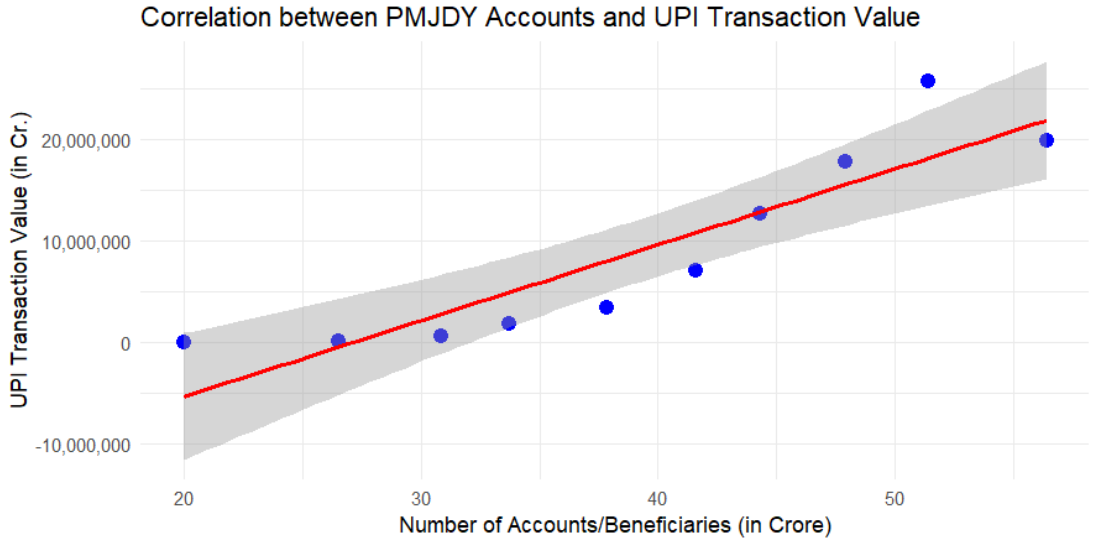
The results clearly indicate UPI's rapid adoption as the preferred digital payment mechanism. While IMPS continues to grow, its trajectory remains relatively stable, whereas UPI reflects sharp acceleration, with transaction values multiplying several times within a short span. This trend highlights UPI's success as a scalable and user-friendly FinTech platform.

Interpretation

The report highlights the revolutionary impact of UPI in transforming India's digital payment landscape. The rapid growth of UPI has been driven by the factors of interoperability of banks, absence of cost to customers for transactions, smartphone penetration and robust policy initiatives. The IMPS, although secure, falls short of similar ease and flexibility for everyday low value transactions.

The supremacy of UPI over IMPS also shows a wider behavioural change: consumers increasingly prefer mobile-first, instant and low-cost payments. This lends confidence to the point that FinTech innovations are

not merely supplementing but also phasing out conventional digital banking routes. Yet, the graph also shows the concentration of growth in some years, like during the COVID-19 outbreak, indicating that outside shocks can speed up technology adoption. From the financial inclusion point of view, the expansion of UPI indicates increasing access to digital financial services.



Correlation.r.	t.value	df	p.value	X95..CI.Lower	X95..CI.Upper
0.906	6.05	8	0.000305	0.643	0.978

Figure 2: Relationship between PMJDY accounts and UPI transaction values.

Source: Visualization generated by author via R-programming

The scatter plot with regression line shows the relationship between the number of PMJDY accounts/beneficiaries and the value UPI transaction. The blue data points indicate that as the number of accounts rises, UPI transaction values also increase substantially. This relationship is captured by the upward-sloping red regression line, with the surrounding grey band representing the 95% confidence interval. The fitted regression line suggests a strong positive relationship. With every increase in the number of PMJDY accounts, the value of UPI transactions also increases uniformly.

The correlation coefficient, $r = 0.906$, indicates a highly positive correlation. The corresponding t-value (6.05) on $df = 8$ is statistically significant at $p < 0.001$, indicating the strength and reliability of the relationship. The 95% confidence interval for the correlation is between 0.643 and 0.978, which further indicates that the true correlation is highly positive and not likely by chance.

Interpretation

The findings confirm that the growth of PMJDY accounts, a flagship Indian financial inclusion program, is closely connected to the increase in UPI transaction values. This suggests that the increased base of banked individuals has been contributing directly to increased digital payment use. As formal banking services become available to more people through PMJDY, they increasingly engage in UPI enabled transactions, which shows that financial inclusion policy complements FinTech development.

The strength of the correlation highlights UPI's role as a key driver of digital financial activity in newly banked populations. It suggests that the availability of basic bank accounts not only enables savings and transfers but also fosters participation in more advanced digital financial ecosystems. This aligns with India's policy goal of moving from mere financial access to meaningful financial inclusion, where technology is leveraged to deepen usage.

From a wider context, the discovery leans towards the policy-technology cooperative effect: whereas PMJDY widened account penetration, UPI offered an inexpensive, free and easy-to-use transaction mechanism. Together, they facilitated the move towards the cashless economy.

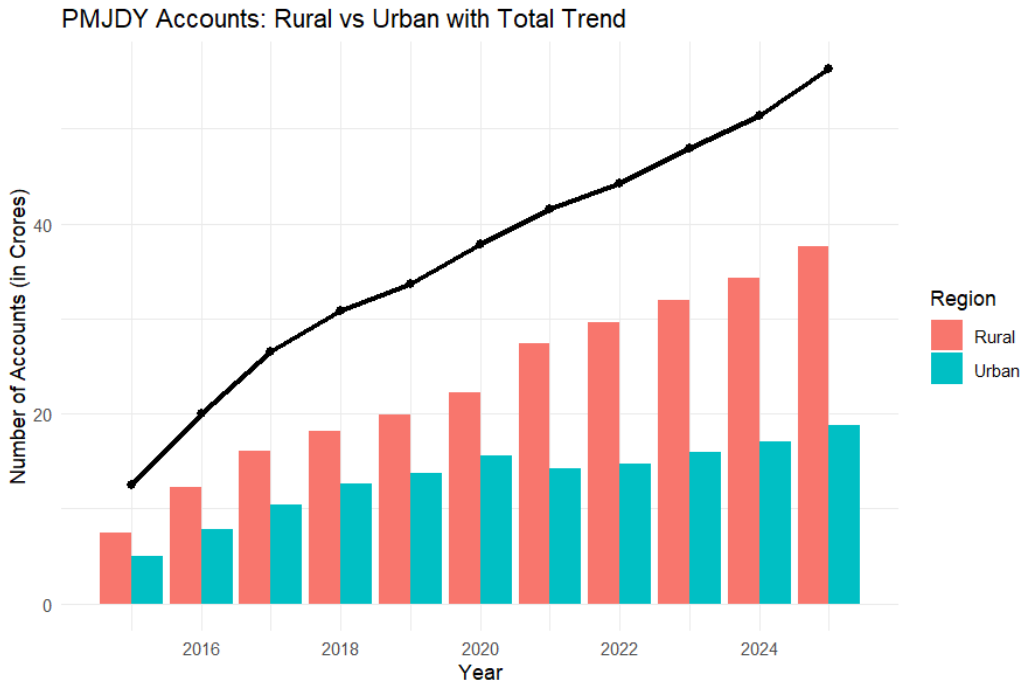


Figure 3: Rural and urban distribution of PMJDY accounts (2015–2025)

Source: Visualization generated via R-programming

The bar graph illustrates the comparison between the rural and urban distribution of PMJDY accounts during the period from 2015 to 2025 and also the general growth trend line. The number of accounts indicates a steady climb, increasing from roughly 12 crores in 2015 to almost 57 crores by August 2025.

Broken down region-wise, rural accounts hold a greater proportion of PMJDY accounts over the period. The rural portion increased steadily from approximately 6 crores in 2015 to nearly 38 crores by August 2025, whereas urban accounts jumped from approximately 5 crores to 19 crores over the same span. Even with the growth in both regions overall, rural contribution has held much more substantial proportions, indicating the scheme's deeper penetration in rural India.

Interpretation

The findings point towards the success of PMJDY in reaching out to excluded segments through formal banking services, especially in rural areas. The statistics reflect that financial inclusion initiatives under the program have been more effective in rural areas, where traditional banking penetration was historically weak. The persistently higher rural account growth proves the effectiveness of the policy in mitigating regional imbalances in access to the financial system.

The rural-urban divide also yields significant information on behavioural and policy-oriented elements of financial inclusion. In rural settings, specific outreach programs, easy account opening procedures and direct benefit transfers (DBT) have served as powerful reasons of account generation. By contrast, urban expansion has been relatively slow, perhaps because a majority of urban households were already connected to formal banking mechanisms prior to PMJDY.

The overall upward trend line also confirms that the scheme is growing consistently, testifying to its long-term viability and popularity among the people. Especially, the increased proportion of rural accounts shows financial inclusion is no longer limited to urban-based growth but has actually penetrated grassroots levels. This rural majority also lays a strong groundwork for the development of digital payment platforms such as UPI, as evidenced in the previous figure, indicating account penetration and digital transactions development's interaction.

Policy Recommendations

- **Digital and Financial Literacy**

  Roll out focused awareness drives, particularly among women and elderly segments, to enhance usage confidence in UPI and other FinTech services.

- **Cybersecurity and Consumer Protection**

  Enhance protections against digital platform abuse and fraud to generate confidence among new consumers.

- **Public - Private Partnerships**

  Promote cooperation between policymakers, banks and FinTech players to create inclusive models that move beyond payments to credit, insurance and savings.

CONCLUSION

The paper confirms significant correlation between financial inclusion policies, especially the PMJDY and FinTech uptake growth through UPI. The strong positive correlation proves that with an increase in access to formal banking facilities, digital payments also increase, showing the complementarity between policy-initiated inclusion and technology-provided financial services.

The findings highlight the fact that while urban cities are still gaining from FinTech, rural India has experienced higher account penetration, which reflects the success of inclusive policies in narrowing enduring regional disparities. The explosive growth of UPI demonstrates how uncomplicated, low-cost and interoperable platforms can change consumer behaviour and speed up the shift to a digital economy.

Overall, the intersection of government-sponsored financial inclusion initiatives and FinTech innovations has been instrumental in transforming India's financial sector. With supportive policy interventions, consumer literacy and inclusive design of technology, FinTech can be a growth driver and also helpful in furthering financial inclusion for all socio-economic groups of the nation.

Future Scope of the Study

While the present study establishes a statistically significant association between PMJDY account growth and UPI transaction expansion, several avenues remain open for further research.

First, future studies may incorporate gender-based and income-group analysis to examine whether digital payment adoption benefits all socio-economic segments equally. Second, state-level or district-level panel data could be utilised to analyse regional disparities and identify variations in FinTech adoption across different states, particularly focusing on large states such as Uttar Pradesh. Third, future research could employ advanced econometric techniques, such as time-series or panel regression models, to explore long-run relationships and directional dynamics between financial inclusion policies and digital payment growth.

Additionally, combining secondary data with primary survey-based research would provide deeper insights into behavioural factors influencing digital adoption, including trust, digital literacy and consumer perception. Such an integrated approach would enhance understanding of whether increased digital transaction volumes translate into improved financial well-being and resilience.

Overall, future research should move beyond measuring access and transaction growth to evaluating the quality, sustainability and inclusiveness of digital financial engagement in India.

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