

Impact of Fintech-Digital Payments on financial inclusion in India

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Abstract

Financial digital payments in India are increasing. These include the Unified Payments Interface (UPI), Immediate Payment Service (IMPS), and Aadhar Enabled Payment System (AePS), along with other digital payment methods. The Pradhan Mantri JanDhan Yojana (PMJDY) supports this surge in digital payments by providing bank accounts and availability of financial services for the vulnerable groups. The government's financial inclusion initiative aims to offer basic financial services to those who are out of formal banking channel. To measure financial inclusion, the government calculates the Financial Inclusion Index, which is a composite index based on several variables. This study uses secondary data on the Financial Inclusion Index, UPI, IMPS, AePS, and PMJDY. Descriptive statistics and correlation analysis show a strong link between growing financial inclusion in India and FinTech-driven digital payments, particularly UPI and IMPS. PMJDY role is significant as large number of accounts and deposits are opened in this initiative. However, the study has limitations related to a small sample size and multicollinearity.

Keywords: Fintech, UPI, IMPS, PMJDY, Digital Financial Infrastructure, Financial Inclusion, Financial Inclusion Index.

1. Introduction

Financial inclusion is considered a way to reduce poverty by providing basic financial services such as savings, credit, insurance, payments, and other affordable digital transactions. These services help users lower risks, increase investments, and build wealth, supporting businesses as well. Financial inclusion creates opportunities, generates jobs, reduces poverty, and empowers marginalized groups, including women, by enabling them to make household financial decisions. It is important because exclusion from these services makes people vulnerable to income inequality and pushes them further into poverty (Abhijit V Banerje, 2011). To ensure equal economic opportunities, income equality, and sustainable growth, financial inclusion is essential. Governments are heavily investing in FinTech-driven digital payments as they can significantly speed up the financial services sector. Digital payments help develop better products and services using innovative technology while improving delivery mechanisms (Morse, 2015).

1.1 Fintech in India

Fintech industry is experiencing growing exponentially in past few years. As per KPMG report, investment in fintech around the globe is hitting level of USD 58.2 billion in 2023. Sector share in global financial services is bound to increase from meager 2 percent to almost 25 percent of world revenue in banking sector estimated about USD 1.5 trillion by 2030. Major areas of interest of investors in fintech sector are Payments and the AI-focused fintech solutions.

India is leading the fintech evolution from the front as till 2024 as it is estimated to reach around USD 429 billion in 2029 from USD 110 billion in 2024 at a CAGR of 31 percentage. India ranks third on global platform with over 9000 fintech entities holding 14 percent share in startup funding in the country. India floats 20 percent over global average in adoption rate of fintech as India's fintech adoption rate is 87 percent in comparison to world average of 67 percent. With policy support, favorable environment, Institutional support, technological innovation and promotion of digital public infrastructure, fintech is expected to continue its fast growth in India.

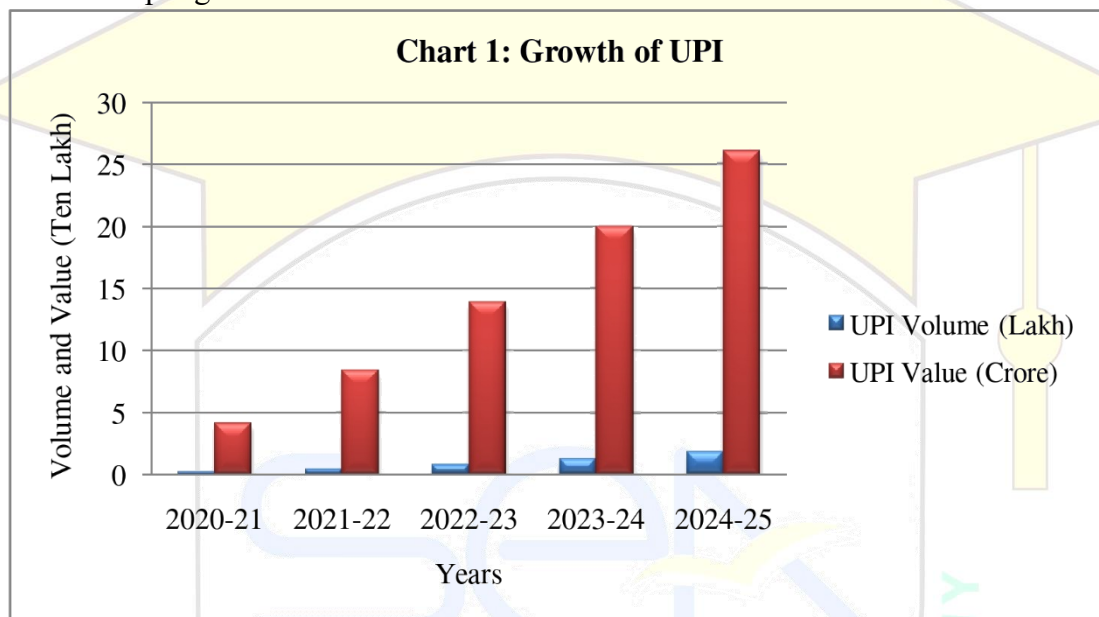
1.2 UPI in India

Unified Payment Interface is a seamless system which runs via mobile application which may be related with any participating bank, powers multiple bank accounts, merge several banking features bringing fund routing, merchant payments and peer to peer payments under one roof. In India UPI volume has increased from 223306.64 Lakhs in 2020-21 to 1858660.25 Lakhs in 2024-25 and UPI value has increased from 41,03,658 Crore in 2020-21 to 2,60,56,955 Crore in 2024-25.

Table 1: Growth of UPI (Volume and Value)

Year	UPI Volume (Lakh)	UPI Value (Crore)
2020-21	223306.64	4103658
2021-22	459561.30	8415900
2022-23	837143.73	13914932
2023-24	1311294.68	19995086
2024-25	1858660.25	26056955

Source: www.pib.gov.in

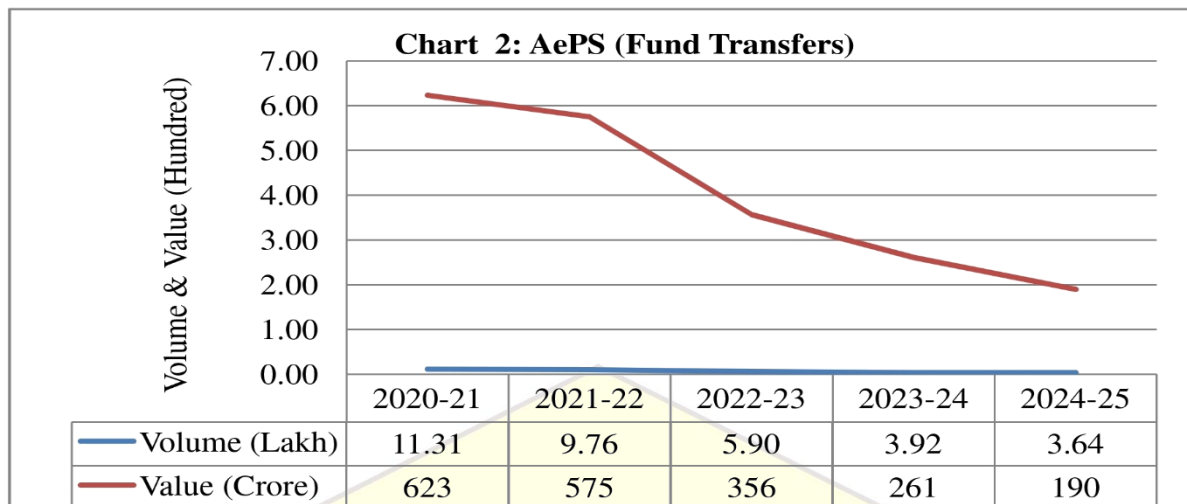


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1.3 Aadhar Enabled Payment System (AEPS): Volume and Transactions

To improve financial inclusion RBI constituted two working groups for suggestions MicroATM standards and Central Infrastructure and Connectivity of Aadhar based transactions involving RBI, 'Unique Identification Authority of India' (UIDAI), NCPI, 'Institute for Development and Research in Banking Technology' along with some other stakeholders. On recommendations of these working groups AePS is launched model led by bank, developed to facilitate transactions at Point of Sale - MicroATM using Aadhar authentication through the Business correspondents (BCs) of any bank. Anyone can transact using AePS with inputs: Bank Name, Aadhar Number and Biometrics captured during enrolment.

Objectives of this initiative is to provide a bank customer with banking services such as Cash deposits and withdrawal, inter and intra bank transfers, mini statement and balance enquiry directly from business correspondent. Another major objective of this initiative is to facilitate Central and State Government schemes disbursements including NREGA, Social Security/Handicapped /Old Age Pension etc. through support of UIDAI after biometric authentication. It also serves other objective of Government of India and RBI like electronic transfers in retail payments, safe and secure inter operability across different banks and building a foundation for complete Aadhar enabled Banking system.



Source: www.pib.gov.in and Prepared By Author

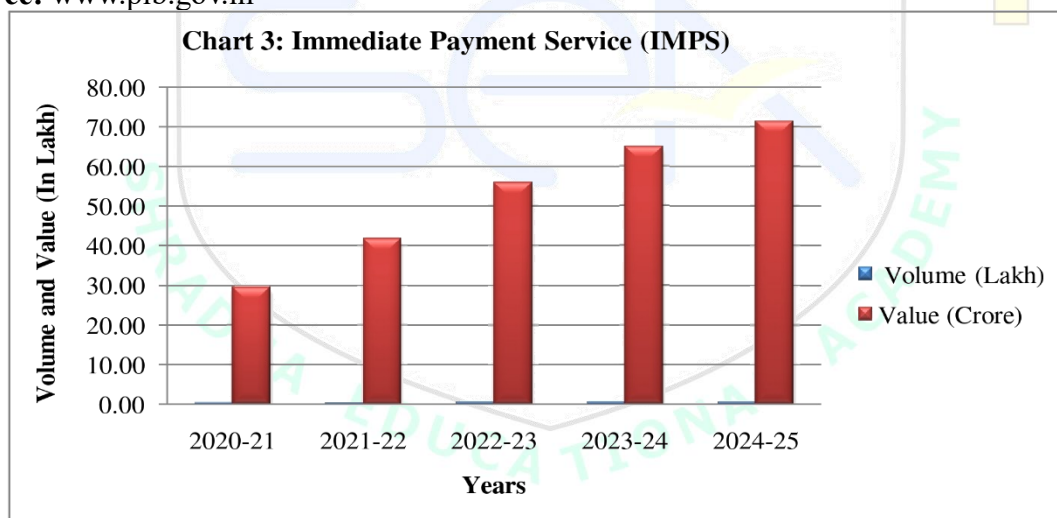
1.4 Immediate Payment Service (IMPS): Volume and Value

IMPS service was launched in 2010 which helps in transferring funds economically in real time i.e. 24x7. Before this service fund transfer can be done only during banking hours through NEFT and RTGS. Further this service can be accessed through multiple platforms like Mobile, Internet, Bank Branch, ATM and SMS.

Table 2: Value and Volume of IMPS

Year	IMPS Volume (Lakh)	IMPS Value (Crore)
2020-21	32783.47	2941500
2021-22	46625.25	4171037
2022-23	56532.64	5585441
2023-24	60053.35	6495652
2024-25	56249.68	7139110

Source: www.pib.gov.in



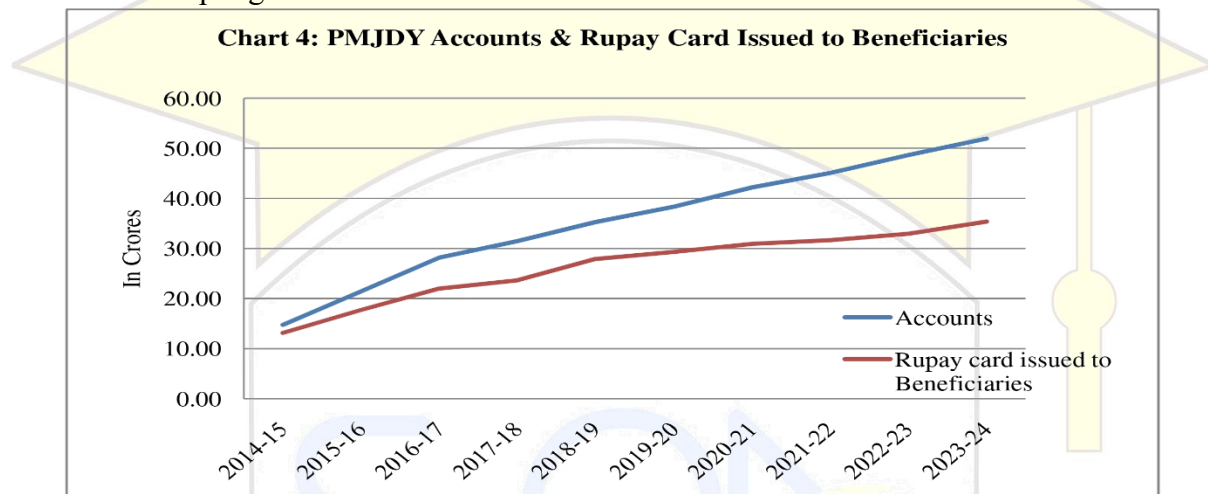
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1.5 Pradhan Mantri JanDhan Yojana (PMJDY): Accounts and Deposits

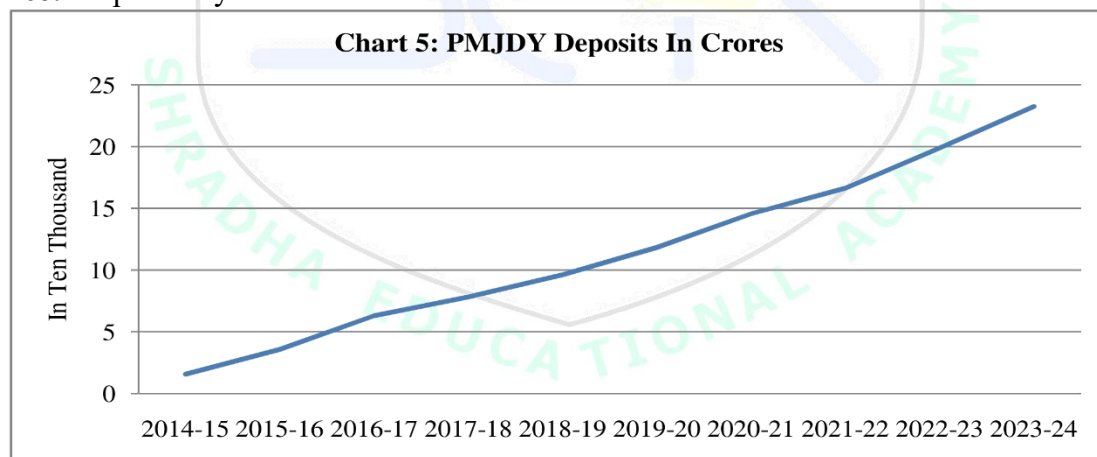
PMJDY is a scheme launched to bring unbanked weaker sections of society in formal banking system by providing financial services such as saving/deposit accounts, fund transfer, credit, insurance and pension at affordable prices. PMJDY accounts are used for transferring directly to beneficiary account under various central and state government programs related to insurance, pension, credit schemes etc. Since inception this program is growing leaps and bounds and proved to be milestone in achieving goal of financial inclusion.

Table 3: Growth of PMJDY: Accounts and Deposits

Year	PMJDY Accounts (Crores)	Rupay Card Issued to Beneficiaries of PMJDY (Crores)	PMJDY Deposits (Crore)	Deposits per Account
2014-15	14.72	13.15	15670	1065
2015-16	21.43	17.75	35672	1665
2016-17	28.17	21.99	62972	2235
2017-18	31.44	23.65	78194	2497
2018-19	35.27	27.91	96107	2725
2019-20	38.33	29.3	118434	3090
2020-21	42.20	30.9	145551	3449
2021-22	45.06	31.62	166459	3694
2022-23	48.65	32.94	198844	4087
2023-24	51.95	35.35	232502	4476

Source: www.pib.gov.in

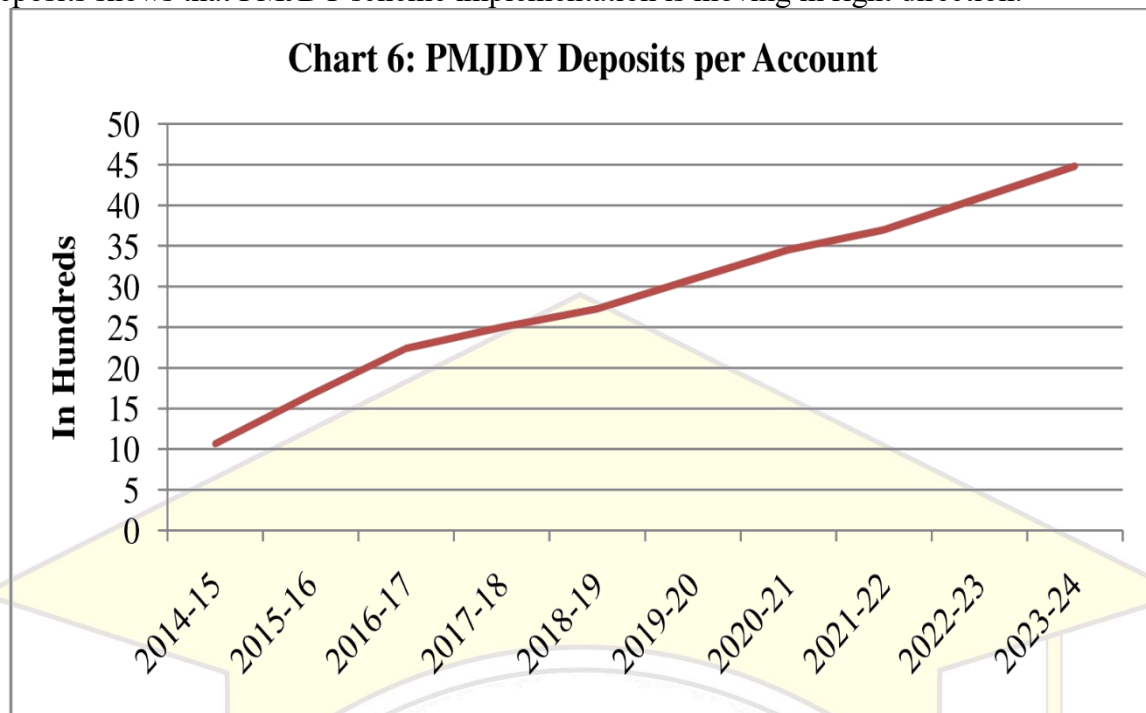
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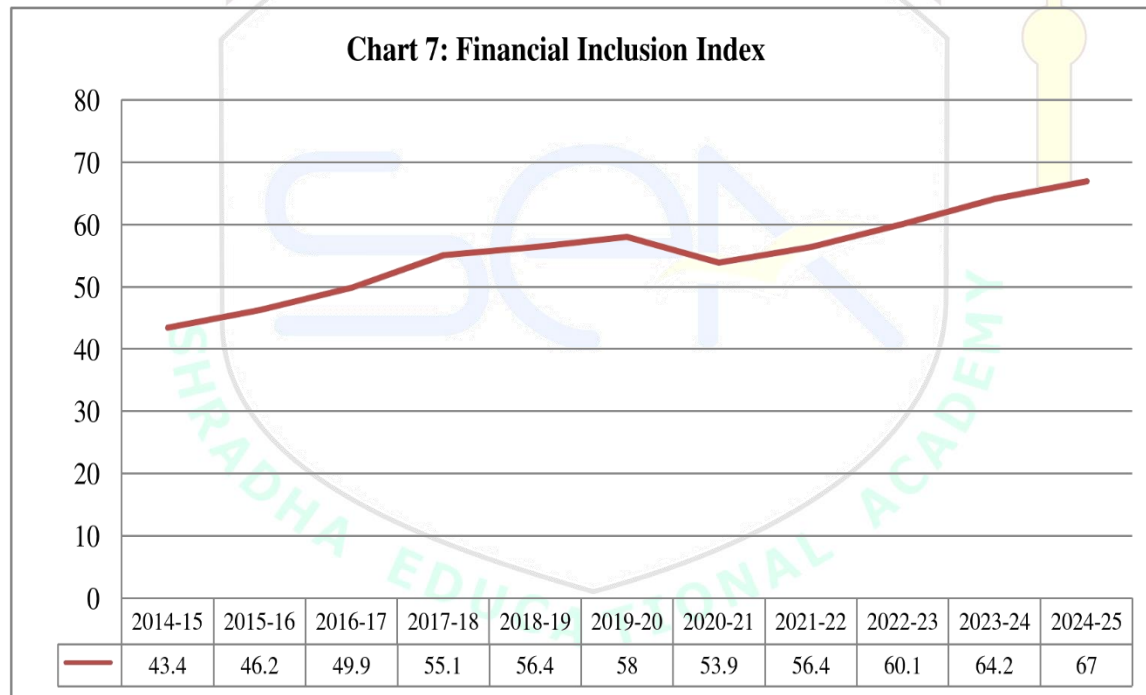
PMJDY account increased from 14.72 crores in 2014-15 to 51.95 crores in 2023-24. Rupay cards issued on these accounts have also increased from 13.15 crores in 2014-15 to 35.35 crores in 2023-24. PMJDY is not just increasing the number of accounts but is also mobilizing saving. Deposits under PMJDY accounts has also increasing many fold from Rs. 15,670 in 2014-15 to Rs. 2,32,502 in 2023-24 and average deposit per account has also increased from Rs. 1065 in

2014-15 to Rs. 4476 in 2023-24. Above growth in number of accounts, RuPay cards and deposits shows that PMJDY scheme implementation is moving in right direction.



Source: Prepared By Author

1.6 Financial Inclusion Index in India



Source: www.pib.gov.in and Prepared by Author

Financial inclusion is crucial for economic growth by bringing vulnerable and unbanked groups into the formal banking system and providing them with equal opportunities. Governments undertake various initiatives and invest substantial funds to boost financial inclusion. To measure and monitor the success of these policies, the government has developed a multidimensional Index based on 97 indicators split into three sub-indices: 'Access', 'Usage', and 'Quality.' This Index measures financial inclusion by focusing on availability, ease of access, usage, unequal distribution, and service deficiencies.

2. Review of Literature

Fintech has the potential to promote sustainable and inclusive financial inclusion by expanding access to financial services and reducing costs through technological innovation. It can also aid in poverty alleviation by fostering economic development, establishing proper digital infrastructure to facilitate financial inclusion, and implementing effective regulatory frameworks (**Kamal, Rahmani, & Alam, 2025**). Digital infrastructure and payment systems that use biometric verification can enhance inclusion and ensure direct service delivery to beneficiaries, especially in low-income groups. This system ensures accurate and fast payments while reducing leakages (**Muralidharan, Niehaua, & Sukhtankar, 2016**). The Indian digital infrastructure consists of three layers: the Unique Identification system (Aadhar), payment systems (UPI, Aadhar Payment Bridge, AePS), and data sharing (Account Aggregator and Digital Locker). This infrastructure enables cashless, paperless, and private online digital payments. It supports financial inclusion goals and brings millions into mainstream banking services while increasing access to financial services (**Alonso, Bhojwani, Hanedar, Prihardini, Una, & Zhabaska, 2023**).

India's digital financial infrastructure relies on UPI and digital KYC to integrate the banking system. It helps establish public-private partnerships in banking and digital financial services. It is also reducing transaction costs and creating a win-win scenario (**D. D'Silva & Tiwari, 2019**). The UPI system has experienced significant growth. UPI transactions in India surpassed 15 billion in November 2024. The rise in transactions is due to its simple applications, user-friendly interface, and ease of use. It also offers multiple services and secures transactions through biometrics. Another factor is the cost, as there are currently no fees for retail users and low transaction costs for others. However, issues like digital fraud need to be addressed with proper regulations. All of this promotes UPI adoption, which in turn supports India's financial inclusion efforts (**Cornelli, Frost, Gambacorta, & Townsend, 2024**). India has developed a sound digital finance infrastructure and is implementing relevant policies. This FinTech initiative is also helping to close the gender gap in usage of financial services. Women have benefited from the Business Correspondent Model in improving usage of financial services. Authors use a multi-level framework to compare macro and micro parameters. The study indicates that more work is required to achieve gender equality. Factors at the individual, family, and community levels are crucial in determining women's access to financial services (**Duvendack, Sonne, & Garikipati, 2023**).

The government's financial inclusion initiatives, such as opening numerous bank accounts and building digital infrastructure, have created significant opportunities for retail credit growth in various sectors like housing, retail, self-help groups, MSMEs, and agriculture. Public sector banks need to align with policy initiatives, leverage available infrastructure, and utilize digital payment data along with the Business Correspondent Model by developing their own UPI applications and systems (**Sinharay, 2024**). The lower adoption rate of digital payment systems in early stages received a boost during and after the COVID-19 pandemic, resulting in a significant increase in usage. This paper analyzes the use of PhonePe across the country. Early adopters continue to lead in its usage. Data from districts and state governments are used, and a cross-sectional regression method is applied. The study finds that income, education, digital literacy, and access to finance are important factors. However, financial inclusion cannot be solely attributed to these elements. Policymakers should consider these factors when creating policies (**ICRIER, 2024**). The study explores how financial inclusion drivers like financial literacy and policy initiatives contribute to sustainable growth. It uses PLS-SEM modeling to highlight that key drivers of financial inclusion are digitization, usage, and FinTech, concluding a positive impact on sustainable growth in northern India (**Pandey, Kiran, & Sharma, 2022**). In rural India, social influences, ease of use, and availability positively affect the intention to use new financial technologies, promoting financial inclusion and entrepreneurship. The study

employs SEM to evaluate FinTech's impact on financial inclusion initiatives (Goswami, Sharma, & Chouhan, 2022).

3. Research Methodology

To examine the relationship between FinTech-driven digital payments and financial inclusion, this study employs a quantitative research design. Secondary data collected from different websites like RBI, IMF, PIC etc. Data collected is related with Financial Inclusion Index, UPI, IMPS, AePS and PMJDY. Descriptive statistics and correlation analysis were used in the study.

3.1 Data Analysis: Descriptive Statistics

Study of descriptive statistics states that digital transactions in form of UPI and IMPS are increasing every year. Number of accounts and deposits are also showing increasing trend year on year. Growth is exponential and states the importance of these measures in achieving financial inclusion. Financial inclusion index is also showing increasing trend.

Table 4: Descriptive Statistics

	count	mean	std	min	25%	50%	75%	max
financial_inclusion_index	11	55.50909	7.098937	43.4	51.9	56.4	59.05	67
upi_volume_lakh	5	937993.3	658943.5	223306.6	459561.3	837143.7	1311295	1858660
upi_value_crore	5	14497306	8792065	4103658	8415900	13914932	19995086	26056955
aeps_fund_transfers_volume_lakh	5	6.90756	3.468815	3.64	3.92499	5.89998	9.76	11.31283
aeps_fund_transfers_value_crore	5	400.8642	190.9861	189.55	260.5737	356.3957	574.89	622.9119
imps_volume_lakh	5	50448.88	11063.39	32783.47	46625.25	56249.68	56532.64	60053.35
imps_value_crore	5	5266548	1712080	2941500	4171037	5585441	6495652	7139110
pmjdy_accounts_crores	10	35.722	11.95995	14.72	28.9875	36.8	44.345	51.95
pmjdy_deposits_crore	10	115040.5	70716.67	15670	66777.5	107270.5	161232	232502
deposits_per_account	10	2898.3	1074.366	1065	2300.5	2907.5	3632.75	4476
rupay_card_issued_to_beneficiaries_of_pmjdy	10	26.456	7.136968	13.15	22.405	28.605	31.44	35.35

Source: Prepared by Author

3.2 Correlation Analysis

Correlation matrix shown in table 7 suggests that UPI transaction volume and value are highly correlated with financial inclusion Index ($r = 0.99$ and 0.997 , respectively) suggesting UPI adoptions contribution towards financial inclusion. Volume and Value of IMPS are also positively correlated with financial inclusion ($r = 0.85$ and 0.98 , respectively) which means they play positive role in promoting access to digital banking. PMJDY(number of accounts and deposits) shows strong correlation with financial inclusion ($r=0.936$ and $r=0.907$) which means they play crucial role as enabler for using financial services. Deposit per accounts in PMJDY has high correlation with UPI transactions and RuPay issuance ($r=0.998$ and $r=0.983$) which suggest PMJDY accounts are helping in penetration of digital financial services. Lastly Rupay card issuance show strong positive correlation with FII and UPI transactions ($r=0.94$ and $r=0.993$).

In contrast to above high correlation volume and value of AePS transactions are rather showing negative correlation with financial inclusion index ($r = -0.97$ and -0.98 , respectively). This shows that even though AePS considered very important initiative in reaching rural and backward areas it does not contribute in financial inclusion as expected.

Table 5: Correlation Analysis

	financial_inclusion_index	upi_volume_lakh	upi_value_crore	aeps_fund_transfers_volume_lakh	aeps_fund_transfers_value_crore	imps_volume_lakh	imps_value_crore	pmjdy_accounts_crores	pmjdy_deposits_crore	deposits_per_account	rupay_card_issued_to_beneficiaries_of_pmjdy
financial_inclusion_index	1	0.990958	0.997923	-0.97089	-0.98408	0.851016	0.986472	0.935697	0.906704	0.931788	0.94019637
upi_volume_lakh	0.990958	1	0.99644	-0.9333	-0.96224	0.780746	0.96096	0.993209	0.99859	0.998125	0.9932878
upi_value_crore	0.997923	0.99644	1	-0.95675	-0.97583	0.830617	0.98065	0.998828	0.999472	0.999317	0.98327098
aeps_fund_transfers_volume_lakh	-0.97089	-0.9333	-0.95675	1	0.991815	-0.92802	-0.98812	-0.99173	-0.99038	-0.99172	-0.95873358
aeps_fund_transfers_value_crore	-0.98408	-0.96224	-0.97583	0.991815	1	-0.8793	-0.9857	-0.98086	-0.98272	-0.98439	-0.95415995
imps_volume_lakh	0.851016	0.780746	0.830617	-0.92802	-0.8793	1	0.922174	0.962045	0.941622	0.943028	0.87664805
imps_value_crore	0.986472	0.96096	0.98065	-0.98812	-0.9857	0.922174	1	0.995716	0.987639	0.988489	0.94809986
pmjdy_accounts_crores	0.935697	0.993209	0.998828	-0.99173	-0.98086	0.962045	0.995716	1	0.979661	0.997916	0.99131487
pmjdy_deposits_crore	0.906704	0.99859	0.999472	-0.99038	-0.98272	0.941622	0.987639	0.979661	1	0.988575	0.95115534
deposits_per_account	0.931788	0.998125	0.999317	-0.99172	-0.98439	0.943028	0.988489	0.997916	0.988575	1	0.98259678
rupay_card_issued_to_beneficiaries_of_pmjdy	0.940196	0.993288	0.983271	-0.95873	-0.95416	0.876648	0.9481	0.991315	0.951155	0.982597	1

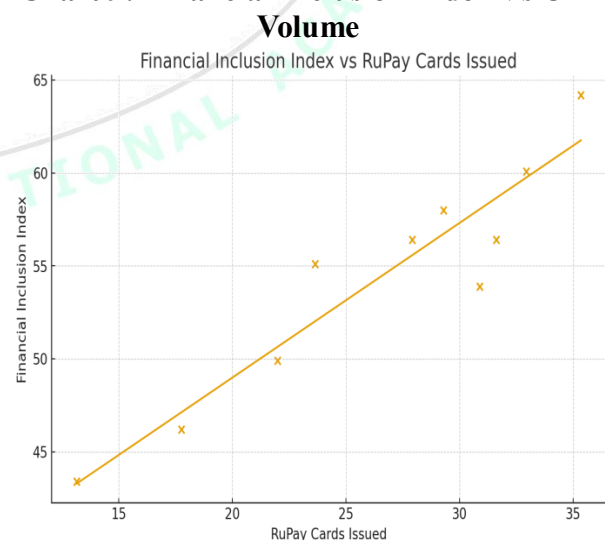
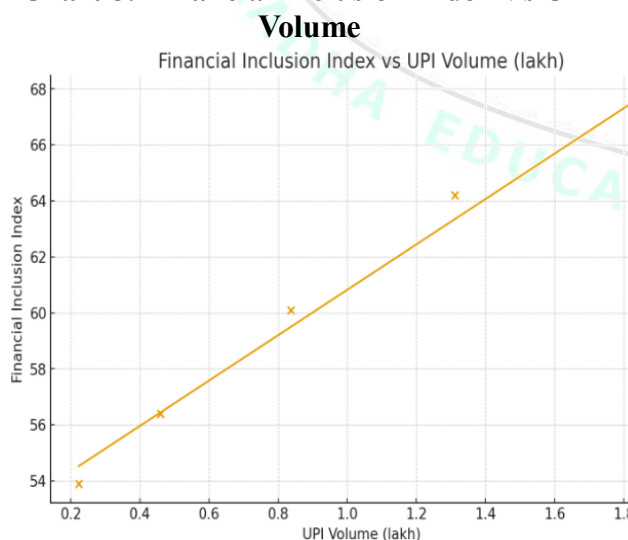
Source: Prepared By Author

3.3 Scatter Plots Analysis

The time-series and scatter plots show a strong positive relationship between digital payments and FII. UPI and IMPS exhibit exponential growth and strong correlation with FII. AEPS volumes increased but show a weaker association. PMJDY accounts and RuPay cards display steady growth, directly supporting financial access.

Chart 8: Financial Inclusion Index Vs UPI

Chart 9: Financial Inclusion Index Vs UPI



Source: Prepared by Author

Chart 10: Financial Inclusion Index Vs PMJDY Accounts

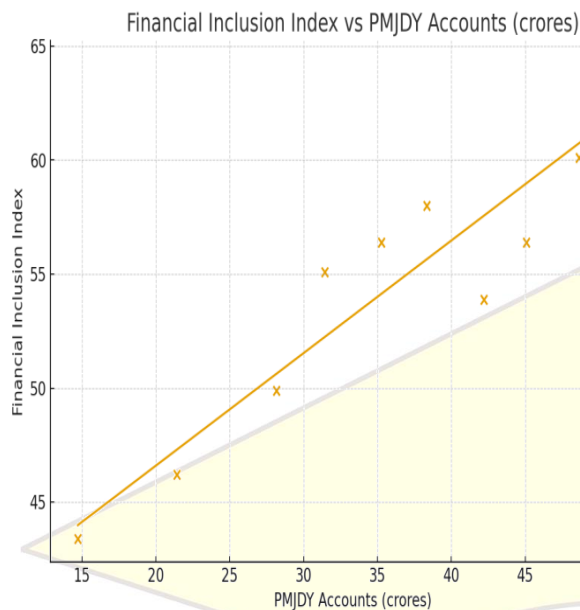
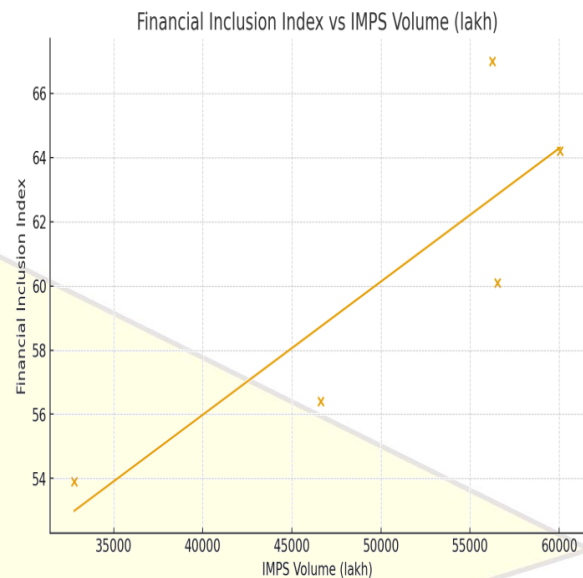
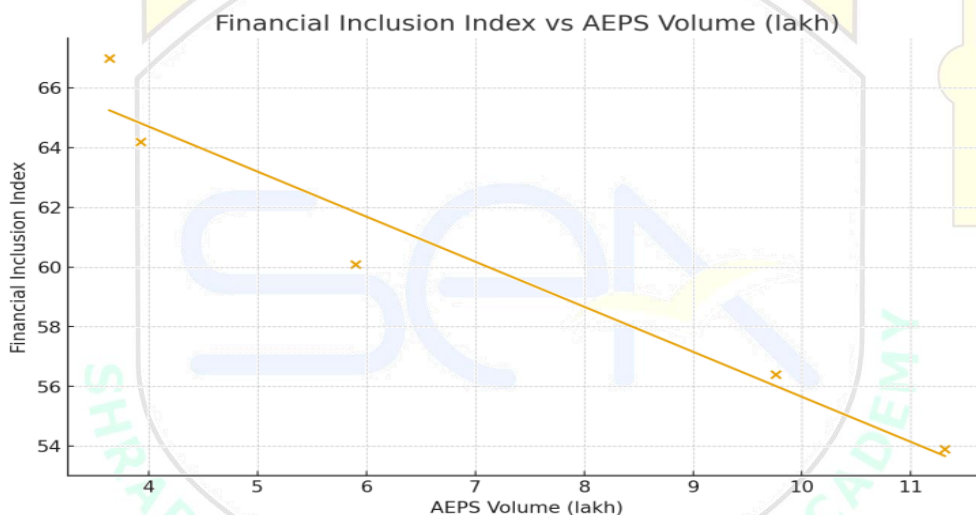


Chart 11: Financial Inclusion Index Vs IMPS Volume



Source: Prepared by Author

Chart 12: Financial Inclusion Index Vs AEPS Volume



Source: Prepared by Author

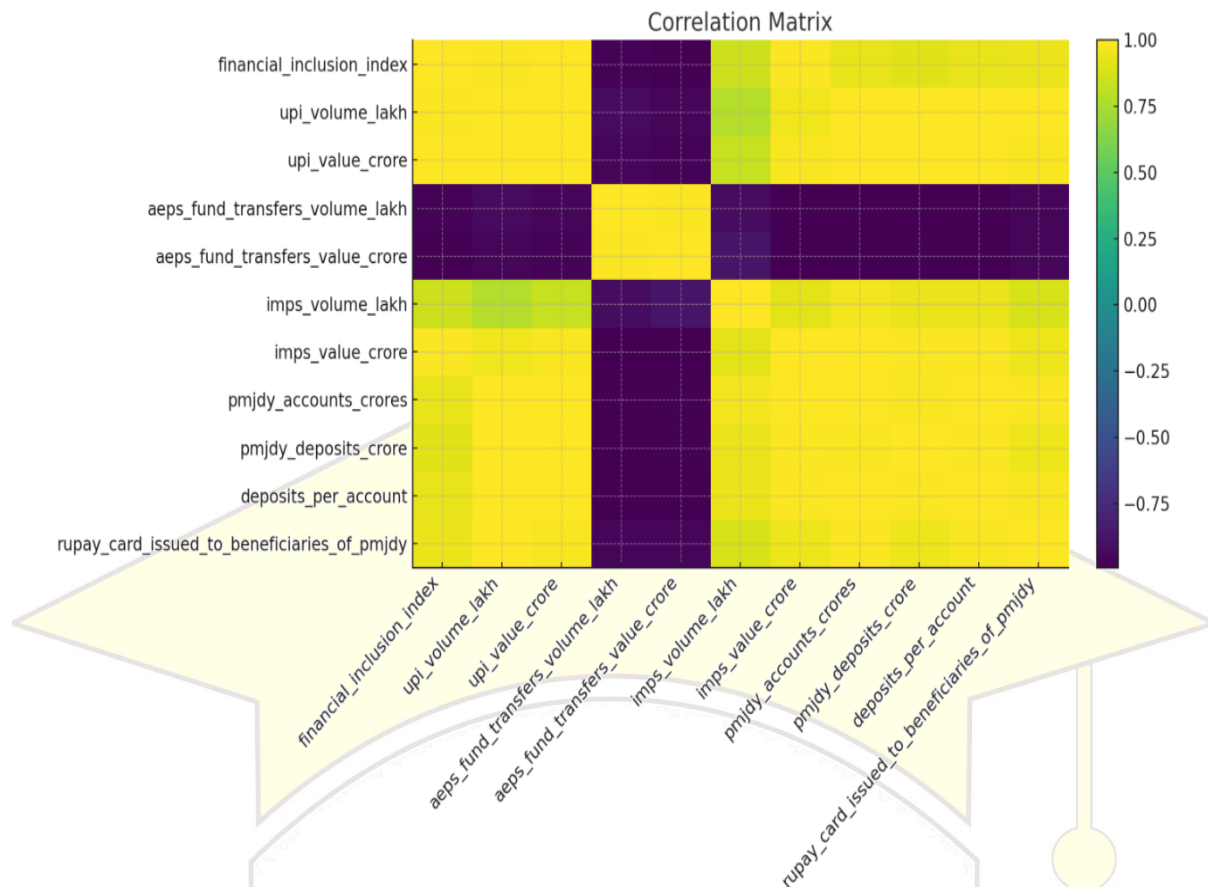
3.4 Heatmap Analysis

The heatmap displays pair-wise correlation coefficients between fintech indicators (UPI, AEPS, IMPS, RuPay cards) and financial inclusion variables (PMJDY accounts, deposits, deposits per account, financial inclusion index). The colour in heatmap ranges from dark purple which shows negative correlation to bright yellow which shows strong positive correlation.

Bright Yellow colour in chart related to UPI, IMPS and PMJDY shows strong positive correlations between them and Financial Inclusion Index. This may suggest that with increase in digital payments there is significant improvement in financial inclusion. Jan dhan accounts and deposits also show high correlation which means JanDhan accounts are mobilizing deposits as well.

Dark purple colour reflects low or negative correlations. This means AePS transactions do not contribute in financial inclusion though its has its own importance in reaching rural and backward areas. Rupay card issuance also shows weaker relationship.

Chart 13: Heatmap Showing Correlation



Source: Prepared by Author

4. Findings and Interpretations

- ❖ The correlations coefficients between digital payments through UPI/IMPS and the financial inclusion Index show very strong associations between various digital payment variables and enablers like UPI, IMPS, AePS and PMJDY and Financial Inclusion Index.
- ❖ Scatter graphs show strong relationship between UPI/IMPS and financial inclusion index. This shows that they main drivers of financial inclusion.
- ❖ AePS and RuPay are not driving financial inclusion drive and are need policy attention if they are playing important role in different aspects.
- ❖ Heatmap showed strong association among UPI/IMPS and financial inclusion. But high correlations among different variables in the study raise doubts about multicollinearity, which need to be assessed through further study.

Overall we can conclude that UPI, IMPS and PMJDY are positively impacting financial inclusion in India but it is not the case with AePS.

5. Conclusion and Suggestions

The results demonstrate a strong correlation between growing financial inclusion in India and FinTech-driven digital payments, particularly UPI and IMPS. Government initiatives like PMJDY and RuPay also playing positive role in improving access and usage. Study suggests that government should keep investing in digital infrastructure. Supportive policies and strong regulations must be framed to support the growth in transactions. UPI must be promoted as has shown strong positive correlation with financial inclusion index and this relationship must be further assessed with more wider data sets and robust statistical techniques.

6. Future Scope of Study

The present limits of sample size and multicollinearity may be addressed with more detailed (monthly/quarterly) data, which could provide stronger causal evidence.

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