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Impact of UPI Transactions on the Reduction of Physical Cash Usage and Banking Operations: A Study of State Bank of India (2020–2025)

Dr. K. Swapna Sri[1], Lavanya[2]

1. Associate Professor, CMR Institute of Technology, Hyderabad, Telangana, India.
Email ID: swapnasri@cmritonline.ac.in
2. Student of MBA, CMR Institute of Technology, Hyderabad, Telangana, India.
Email ID: lavanyaat23@gmail.com

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Abstract

The rapid expansion of the Unified Payments Interface (UPI) has transformed India's payments landscape and reshaped how commercial banks manage cash-based operations. This study examines the relationship between UPI transaction value and ATM cash withdrawals at the State Bank of India (SBI), India's largest public sector bank, over the period 2020 to 2025. Using secondary data drawn from the Reserve Bank of India, the National Payments Corporation of India, and SBI annual reports, the study applies descriptive statistics, trend analysis, percentage share analysis, year-on-year comparative analysis, Compound Annual Growth Rate (CAGR), correlation, and regression analysis. Results show that SBI's UPI transaction value rose from ₹6.39 lakh crore in 2020 to ₹51.83 lakh crore in 2025 (CAGR of 52.24%), while ATM cash withdrawals declined marginally from ₹34.17 lakh crore to ₹31.23 lakh crore (CAGR of -1.74%). A weak negative correlation (r = -0.27) was observed between the two series, and regression analysis confirmed the relationship was not statistically significant at the 5% level, largely owing to the limited sample size (n = 6). The findings point to a directional, though not yet statistically robust, shift away from cash toward digital payments.

Keywords: *UPI; Digital Payments; Cash Withdrawal; ATM; State Bank of India; Correlation Analysis; Regression Analysis; Banking Operations*

1. Introduction

India has rapidly emerged as one of the world's leading digital payment economies, driven by the Unified Payments Interface (UPI), launched by the National Payments Corporation of India (NPCI) in 2016, which has steadily displaced cash-intensive banking activities such as ATM withdrawals and branch visits. While UPI's overall growth in India is well documented, little research examines this shift at the level of an individual bank. This study addresses that gap by analyzing UPI transaction value and ATM cash withdrawal data for the State Bank of India (SBI) between 2020 and 2025

Objectives:

1. To examine the growth percentage trend in the value of UPI transactions of the State Bank of India over the study period from 2020 to 2025
2. To determine whether an increase in UPI usage has helped bring down reliance on physical cash.
3. To investigate the trend in ATM cash withdrawals in relation to physical cash transactions.

Statement of the Problem

Despite the rapid growth of UPI in India, limited research has directly examined its relationship with declining cash usage at the level of an individual bank, particularly with respect to ATM withdrawals at the State Bank of India. This study addresses that gap by analyzing SBI's UPI transaction value alongside ATM cash withdrawal data for 2020–2025, drawing on RBI, NPCI, and SBI reports, to assess whether rising UPI adoption has measurably reduced reliance on physical cash and how this shift has affected SBI's banking operations.

Significance of the Study

The study is significant because it extends the literature on UPI's effect on conventional, cash-based banking by focusing on a single large public-sector bank rather than the economy as a whole. The findings can inform management decisions on operational efficiency and cost management at SBI, while offering policymakers and other financial institutions evidence-based insight into the broader economic benefits of digital payment adoption.

Scope of the Study

The study is confined to India and focuses exclusively on the State Bank of India, using annual data for 2020–2025 drawn from RBI, NPCI, and SBI publications. It examines transaction-value trends rather than customer attitudes, and therefore does not capture how individual customers perceive or experience the shift to digital payments; its conclusions should not be generalized to other banks or to the wider Indian banking sector.

Limitations of the Study

The study's conclusions are constrained by several factors: it relies entirely on secondary data from RBI, NPCI, and SBI publications, which may be incomplete or subject to revision; it covers only a six-year period and a single bank, limiting Generalizability; and, since no primary survey or field data were collected, it cannot capture customer attitudes or the behavioral reasons behind observed trends. Time and resource constraints also restricted the analysis to trend and statistical techniques rather than a more exhaustive causal investigation.

2. Literature Review

Sahoo, D. K., Patnaik, B. C. M., & Satpathy, I. (2024). The adoption of unified payment interface (UPI): A review of the literature. Journal of the Oriental Institute, 73(2), 376-385.
This study reviews existing literature on the adoption of the Unified Payments Interface (UPI) in India. It identifies key factors influencing UPI acceptance, including ease of use, perceived usefulness, security, and convenience.
Singh, S. J. (2023). Digital payments, financial deepening, and cash transaction in India: A study based on the growth of UPI
The study examines the relationship between digital payments, financial deepening, and cash transactions in India. It highlights the rapid growth of UPI and its role in reducing reliance on cash while promoting greater participation in the formal financial system
Singh, A. R. (2025). The impact of the Unified Payments Interface (UPI) on the Indian economy. IJFMR, 7(5).
This research analyzes the impact of UPI on the Indian economy. The findings suggest that UPI has improved transaction efficiency, encouraged digitalization, reduced transaction costs, and supported economic growth through increased financial accessibility

3. Research Methodology

The study uses a **descriptive research** design to look at how UPI transactions affect cash usage and **State Bank of India** operations. Researchers rely on secondary data from Reserve Bank of India, National Payments Corporation of India, and SBI annual reports. They analyze information from **2019 to 2024** to spot trends.

Data Collection: Only secondary data is used, collected from:

- State Bank of India Annual Reports (2020-2026),
- RBI reports on digital payments and currency in circulation
- Ministry of Finance and Digital India reports
- Money Control and Economic Times
- Research journals and financial databases

Data Analysis

Descriptive Statistics - Mean, Percentage, and Standard Deviation to summarize data

Trend Analysis – To track UPI growth and declining cash usage over the study period

Correlation Analysis – To examine the relationship between UPI transactions and ATM cash withdrawals

Percentage Analysis – To measure year-wise changes in UPI adoption and cash usage

Comparative Analysis – To compare different payment modes before and after UPI growth

CAGR (Compound Annual Growth Rate) – To measure the growth rate of UPI transactions over the study period

Regression analysis - To measure the relationship between UPI transactions and cash transactions.

The time frame runs from **2020 to 2026** Analyzing this data helps explore how UPI has affected cash transactions and SBI operations.

Hypotheses

H_1: There is a significant negative correlation between rising UPI transactions and declining physical cash usage in State Bank of India.

H_2: UPI adoption has a significant positive impact on the reduction of low-value cash transactions and overall banking operations of State Bank of India.

4. Data Analysis and Results

Table 1. The mean annual ATM withdrawal was ₹31.93 lakh crore (SD = 1.92), indicating relatively stable cash withdrawal behavior, whereas the mean UPI transaction value was ₹28.16 lakh crore with a markedly higher standard deviation of 18.05, reflecting rapid and sustained growth in digital transaction volumes.

Table 1: ATM Cash Withdrawal and SBI UPI Transaction Value (2020–2025, ₹ Lakh Crore)

Year	ATM Cash Withdrawal	SBI UPI Transaction Value
2020	34.17	6.39
2021	28.96	11.49
2022	30.98	21.88
2023	33.53	33.41
2024	32.72	43.98
2025	31.23	51.83
Mean	31.93	28.16
SD	1.92	18.05

Indexing both series to a 2020 base of 100 (Table 2) shows that the ATM withdrawal index declined modestly to 91.40% by 2025, after dipping to a low of 84.75% in 2021 amid pandemic-related disruption. The UPI index, in contrast, rose continuously, reaching 811.11% by 2025 — an almost eight-fold increase over the base year.

Table 2: Trend Analysis — Index Numbers (Base Year 2020 = 100)

Year	ATM Trend (%)	UPI Trend (%)
2020	100.00	100.00
2021	84.75	179.81
2022	90.66	342.41
2023	98.13	522.85
2024	95.76	688.26
2025	91.40	811.11

Percentage-share analysis (Table 3) tells a similar story: ATM withdrawals accounted for 84.25% of combined transaction value in 2020 but only 37.60% in 2025, while UPI's share rose from 15.75% to 62.40% over the same period, with the two series crossing in 2022–23.

Table 3: Percentage Share Analysis of ATM Withdrawals and UPI Transaction Value in Total Transaction Value

Year	ATM Share (%)	UPI Share (%)
2020	84.25	15.75
2021	71.60	28.40
2022	58.61	41.39
2023	50.09	49.91
2024	42.66	57.34
2025	37.60	62.40

Year-on-year growth rates (Table 4) reinforce this pattern. ATM withdrawals fell sharply in 2021 (-15.25%, largely attributable to pandemic-related disruption), recovered modestly in 2022–23 (+6.98% and +8.23%), and turned negative again in 2024–25 (-2.42% and -4.55%). UPI transaction value, by contrast, grew in every year of the study period, peaking at 90.43% growth in 2022 before moderating to 17.85% by 2025 — a deceleration consistent with a maturing, large-base technology rather than a slowdown in adoption.

Table 4: Comparative Year-on-Year (YoY) Growth Analysis, 2020–2025 (₹ Lakh Crore)

Year	ATM Value	ATM Abs. Δ	ATM YoY %	UPI Value	UPI Abs. Δ	UPI YoY %
2020	34.17	–	–	6.39	–	–
2021	28.96	-5.21	-15.25	11.49	+5.10	+79.81
2022	30.98	+2.02	+6.98	21.88	+10.39	+90.43
2023	33.53	+2.55	+8.23	33.41	+11.53	+52.69
2024	32.72	-0.81	-2.42	43.98	+10.57	+31.64
2025	31.23	-1.49	-4.55	51.83	+7.85	+17.85

Pearson correlation analysis between ATM withdrawal (X) and UPI transaction value (Y), computed from the cross-products in Table 5, yielded r = -0.27, indicating a weak negative association: as UPI transaction value rose, ATM withdrawals showed only a slight downward tendency, remaining within a comparatively narrow ₹28–34 lakh crore band even as UPI value grew nearly eight-fold.

Table 5: Correlation Analysis Computation — ATM Withdrawal (X) and UPI Transaction Value (Y)

Year	X (ATM)	Y (UPI)	X^2	Y^2	XY
2020	34.17	6.39	1167.59	40.83	218.35
2021	28.96	11.49	838.68	132.02	332.76
2022	30.98	21.88	959.76	478.73	677.85
2023	33.53	33.41	1124.26	1116.23	1120.24
2024	32.72	43.98	1070.60	1934.24	1438.99
2025	31.23	51.83	975.31	2686.35	1618.66
Σ	191.59	168.98	6136.20	6388.40	5406.85

Table 6 summarizes the resulting compound annual growth rates: ATM withdrawals registered a CAGR of -1.74%, compared with a CAGR of +52.24% for UPI transaction value, underscoring the scale of the shift toward digital payments relative to the modest decline in cash withdrawals.

Table 6: Compound Annual Growth Rate (CAGR), 2020–2025

Particulars	Base Year (2020)	End Year (2025)	CAGR (%)	Nature
ATM Cash Withdrawal	34.17	31.23	-1.74	Declining
SBI UPI Transaction Value	6.39	51.83	+52.24	Explosive growth

To test H_2 directly, simple linear regression was run with UPI transaction value as the independent variable (X) and ATM withdrawal as the dependent variable (Y); the underlying computation is shown in Table 7. With $\bar{A}$ = 28.1633 and $\bar{A}TM$ = 31.9317, the regression equation obtained was $\hat{Y}$ = 31.7408 + 0.0068X, indicating that for every ₹1 lakh crore increase in UPI transaction value, ATM withdrawal is predicted to change by only 0.0068 lakh crore — an economically negligible slope.

Table 7: Regression Analysis Computation — UPI Transaction Value (X) and ATM Withdrawal (Y)

Year	X (UPI)	Y (ATM)	X^2	Y^2	XY
2020	6.39	34.17	40.83	1167.59	218.35
2021	11.49	28.96	132.02	838.68	332.75
2022	21.88	30.98	478.73	959.76	677.84
2023	33.41	33.53	1116.23	1124.26	1120.24
2024	43.98	32.72	1934.24	1070.60	1439.03
2025	51.83	31.23	2686.35	975.31	1618.65
Σ	168.98	191.59	6388.40	6136.20	5406.85

The regression sum of squares (SSR) was 0.0748 against a total sum of squares of 18.4151 (Table 8). The resulting F-statistic (F = 0.0163) was well below the critical value ($F_{0.05,1,4}$ = 7.71), and the t-statistic for the slope (t = 0.128, SE = 0.0530) was far below the two-tailed critical value of 2.776 (df = 4, α = 0.05). Both tests indicate that, on this six-year sample, the linear relationship between UPI growth and ATM withdrawal is not statistically significant, even though a directional negative trend is evident descriptively.

Table 8: ANOVA Summary for the Regression Model

Source	SS	Df	MS	F
Regression (SSR)	0.0748	1	0.0748	0.0163
Residual (SSE)	18.3403	4	4.5851	–
Total (SST)	18.4151	5	–	–

Table 9: Summary of Hypothesis Testing

Hypothesis	Statistical Basis	Result
H_1: Negative correlati between rising U transactions and declining ca usage	Pearson r = -0.27 (trend & correlati analysis)	Supported (weak negati relationship)
H_2: UPI adoption significan reduces low-value ca transactions / improv banking operations	Regression: F = 0.0163, t = 0.128 (n.s. 5%)	Not statistically support (n = 6 limits power)

5. Discussion of Findings

The findings address each objective in turn. SBI's UPI transaction value grew substantially, from ₹6.39 lakh crore in 2020 to ₹51.83 lakh crore in 2025 (CAGR +52.24%), confirming a clear, accelerating adoption trend, while ATM withdrawals declined only modestly (CAGR -1.74%), with the sharpest single-year fall in 2021 (-15.25%) coinciding with pandemic-related disruption. ATM's share of combined transaction value nearly halved, from 84.25% to 37.60%, while UPI's share rose correspondingly and overtook ATM withdrawals from 2023 onward. Together, these results support a directional shift from cash toward UPI-based digital payments, consistent with frameworks such as ATM and Diffusion of Innovation, though the weak correlation (r = -0.27) and statistically insignificant regression suggest UPI growth alone does not fully explain the decline; the findings nonetheless carry practical implications for SBI's branch and ATM network planning, where even modest reductions in cash withdrawals can yield meaningful cost savings at scale.

6. Suggestions and Recommendations

1. Continue customer education on UPI security, convenience, and use cases, particularly in rural and semi-urban markets where adoption still lags urban areas.

2. Strengthen fraud-prevention infrastructure and conduct regular customer awareness workshops to sustain trust in digital channels.

3. Use cash back and loyalty incentives selectively to encourage continued migration of low-value transactions to UPI.

4. Progressively right-size ATM and cash-handling infrastructure in line with observed withdrawal trends, reducing cash-management costs without compromising access for customers who still rely on cash

7. Conclusion

This study examined the relationship between UPI transaction value and ATM cash withdrawals at SBI over 2020–2025. UPI transaction value grew nearly eightfold (CAGR +52.24%), while ATM withdrawals declined only marginally (CAGR -1.74%), and the two series showed a weak negative correlation (r = -0.27) that was statistically insignificant at the 5% level. The evidence therefore supports a directional, gradual shift from cash to digital payments rather than a strong, statistically demonstrated substitution effect, and given the modest sample size (n = 6), findings should be treated as indicative rather than conclusive.

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