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# Financial Inclusion through Retail Transactions in the Digital Era: Evidence from India

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***Abstract :*** This study investigates the role of digitalisation, financial depth, and cash dependence in shaping retail payments as a proxy for financial inclusion in India. Using monthly data, the analysis applies the Autoregressive Distributed Lag (ARDL) bounds testing approach to examine both short-run and long-run dynamics between retail payments, total digital payments, broad money, and currency in circulation.

The results reveal that digital payments exert a strong and statistically significant positive effect on retail transactions in both the short run and the long run, underscoring the transformative role of technology in promoting financial inclusion. Broad money shows a positive but weak influence, suggesting that financial depth alone does not automatically translate into inclusive financial activity. By contrast, currency in circulation has a negative long-run effect, highlighting the inhibiting role of cash dependence.

These findings suggest that India's financial inclusion agenda is being driven primarily by digital adoption, while cash dependence continues to act as a structural barrier. Policy implications include the need to expand digital infrastructure, strengthen financial literacy, reduce reliance on cash, and ensure that financial depth is effectively channelled into accessible retail services. Overall, the study contributes to the literature by positioning retail payments as a meaningful proxy for financial inclusion and by empirically demonstrating the centrality of digitalisation in reshaping India's payment ecosystem.

Key words: Financial inclusion, Retail Payments, Digital Payments, Currency in Circulation, Broad Money, ARDL.

## INTRODUCTION

In recent years, India has emerged as one of the fastest-growing digital economies in the world, with the rapid adoption of innovative payment technologies fundamentally transforming the financial landscape. The government's policy thrust towards a "less-cash economy," combined with the proliferation of smartphones, the Unified Payments Interface (UPI), Aadhaar-enabled payment systems, and fintech innovations, has redefined how individuals and businesses conduct transactions. This surge in digitalisation is not merely a technological advancement; it also represents a crucial driver of financial inclusion, as it enables wider participation in the formal financial system by reducing barriers of cost, distance, and access. The financial inclusion agenda in India has long recognised the importance of ensuring affordable, accessible, and secure financial services for all sections of society, and retail payments serve as a direct indicator of this participation.

Financial inclusion is widely recognised as a key driver of economic development, particularly in the digital era where technology-enabled financial services are transforming access and usage patterns. Digital financial services such as mobile payments, card-based transactions, and internet banking have significantly lowered barriers to participation in the formal financial system by reducing costs, improving convenience, and extending services to previously excluded groups. When individuals and businesses are able to transact through secure and affordable digital platforms, they not only gain access to the formal economy but also experience improvements in income opportunities, savings behaviour, and financial resilience.

The potential benefits of financial inclusion extend beyond access to payments. Retail transactions carried out through formal and digital channels enable households to save more effectively, invest in productive activities, and reduce their dependence on informal or cash-based systems. For instance, the adoption of digital payments allows individuals to build a financial history, making it easier to access credit, while also helping households manage financial risks by providing reliable channels for receiving remittances and government transfers. By lowering transaction costs and improving efficiency, digital payments contribute to greater financial stability and security for households and small businesses.

In the Indian context, digitalisation has played a transformative role in advancing financial inclusion. Initiatives such as UPI, Aadhaar-enabled payment systems, and mobile banking have enabled millions of people to enter the formal financial system, particularly in rural and semi-urban areas. At the same time, excessive reliance on cash continues to pose challenges, as high currency circulation often undermines the transition towards a more inclusive, transparent, and efficient payment ecosystem. Broad money growth, while expanding financial resources, must therefore be channelled effectively into formal and digital modes of transaction in order to strengthen the link between financial development and inclusive growth.

Overall, financial inclusion through retail transactions in the digital era represents not only an outcome of technological innovation but also a critical pathway for inclusive development. By fostering participation in the financial system, encouraging savings and investment, and

reducing cash dependence, digital payments and monetary aggregates can play a decisive role in shaping India's future trajectory of inclusive growth.

Despite the growth in digital adoption, India continues to display a strong reliance on cash. Currency in circulation has expanded considerably, even after the temporary decline caused by demonetisation in 2016. This coexistence of rising digital payments and persistent cash dependency reflects the complexity of India's financial landscape, where modernisation and traditional practices run in parallel. At the same time, broad money supply, which represents the overall depth of liquidity in the financial system, plays a complementary role by providing the resources that facilitate greater economic activity and financial transactions. The direction and magnitude of these relationships, however, depend on whether liquidity circulates through formal and digital channels or remains concentrated in cash-based modes.

Given this backdrop, it is essential to explore how digitalisation, monetary aggregates, and cash usage collectively influence financial inclusion in India. While several studies have examined the role of financial development in economic growth, or the determinants of inclusion more generally, limited empirical work has focused on the nexus between digital payments, broad money, currency in circulation, and retail transactions. This creates an important research gap. Addressing this gap, the present study investigates the long-run and short-run dynamics among these variables, with total retail payments serving as the proxy for financial inclusion.

By employing the bounds testing approach to cointegration and the error correction mechanism, this paper seeks to answer three key questions: Does the expansion of digital payments significantly enhance retail transactions? To what extent do broad money and currency in circulation influence financial inclusion? And is there evidence of a stable long-run equilibrium among these variables? Situating the analysis within India's policy context characterised by financial sector reforms, the push towards a digital economy, and evolving monetary dynamics the study offers empirical insights into how digitalisation and liquidity conditions are shaping financial inclusion in the country.

## LITERATURE REVIEW

A substantial body of literature emphasises the importance of financial inclusion as a catalyst for economic growth and poverty reduction. Access to financial services allows households to save securely, borrow at reasonable costs, and engage more actively in economic activity (Sarma & Pais, 2011). Digital innovations such as mobile banking, card-based payments, and fintech applications—have emerged as critical enablers, lowering transaction costs and extending financial services to previously excluded populations (Demirgüç-Kunt et al., 2018). Studies in developing economies reveal that access to financial services enhances household resilience, increases income-generating opportunities, and reduces vulnerability to shocks (Allen et al., 2016).

The rise of digital payment systems has transformed the way individuals and businesses transact. Research shows that mobile money and digital payments significantly improve financial inclusion by facilitating affordable, efficient, and secure retail transactions (Jack & Suri, 2014). Digital platforms help users manage financial risks, reduce reliance on cash, and integrate into the formal financial system. Moreover, digital transactions create transaction records, enabling individuals and small businesses to access formal credit (Donovan, 2012). At a macro level, digitalisation improves efficiency, broadens the tax base, and enhances transparency in economic activity (Ozili, 2018).

Monetary aggregates play a central role in shaping financial activity. Broad money supply (M3) reflects the availability of liquidity and the depth of financial markets, which supports greater economic transactions and financial inclusion (King & Levine, 1993). However, the extent to which money supply contributes to inclusion depends on whether funds circulate through formal financial institutions or remain tied up in informal and cash-based channels. High currency in circulation often signifies reliance on cash-intensive modes of payment, which can undermine financial inclusion and limit the effectiveness of financial deepening (Sharma, 2016). Research shows that excessive cash use reduces transparency, hinders digital adoption, and constrains the long-run gains from financial sector reforms (Chakraborty & Roy, 2017).

Recent studies have also examined the growing acceptance of digital payments in specific sectors of the Indian economy. Kumar, Mishra, Vishwakarma, and Upadhyay (2025) explored investor perceptions regarding the adoption of digital payment systems in the FMCG sector using PLS-SEM. Their findings suggest that confidence in digital payment infrastructure and consumer-friendly features significantly influence adoption decisions. This reinforces the view that digitalisation not only transforms retail payments at the macro level but also shapes behaviour and preferences at the sectoral and microeconomic levels. By linking technological ease, investor confidence, and consumer trust, the study highlights the broader role of digital platforms in advancing financial participation findings that resonate with the present study's emphasis on digitalisation as a driver of financial inclusion through retail transactions.

While the global literature demonstrates the role of digital payments and financial access in promoting inclusion, and Indian studies provide valuable insights into policy initiatives and adoption trends, empirical research that jointly examines digital payments, broad money, and currency in circulation as determinants of retail transactions remains scarce. Existing studies often focus on either financial development and growth, or on digitalisation and inclusion separately, without explicitly modelling the interaction among monetary aggregates, cash dependence, and digital adoption. This study addresses that gap by employing retail transactions as a proxy for financial inclusion and examining its determinants in the context of India's evolving financial landscape.

## OBJECTIVES OF THE STUDY

1. To examine the relationship between financial inclusion, represented by retail transactions, and its key determinants digital payments, broad money supply, and currency in circulation in the Indian context.
2. To investigate the long-run equilibrium association among retail transactions, digitalisation, monetary aggregates, and cash usage using the bounds testing approach to cointegration.
3. To analyse the short-run dynamics of retail transactions with respect to changes in digital payments, broad money, and currency in circulation through the error correction mechanism (ECM).
4. To evaluate the impact of digitalisation in promoting financial inclusion in India, while assessing how cash dependence and monetary conditions influence this process.

## RESEARCH METHODOLOGY

Data Source and Period of Study

The study relies on secondary data collected from official sources such as the *Reserve Bank of India (RBI), World Bank Global Financial Development Database,* and relevant government publications. The study uses monthly data spanning from November 2019 to July 2024, providing a total of 57 observations. This period is particularly relevant as it captures multiple phases of India's financial landscape: the pre-

pandemic baseline, the COVID-19-induced acceleration of digital payment adoption, and the post-pandemic period marked by the rapid expansion of the Unified Payments Interface (UPI) and other digital platforms. The chosen time frame also overlaps with important policy developments, including financial sector reforms and the government's continued push towards a digital and inclusive economy.

**Econometric Approach**

To examine the relationship between financial inclusion (proxied by retail transactions) and its determinants digital payments, broad money supply, and currency in circulation the study employs the **Autoregressive Distributed Lag (ARDL) model** developed by Pearson, Shin, and Smith (2001). This framework is particularly suited for the present analysis for several reasons.

First, the ARDL methodology allows the inclusion of regressors that are a mixture of stationary I(0) and first-difference stationary I(1) variables, provided none are integrated of order two I(2). This flexibility is important, as macroeconomic and financial variables often exhibit mixed integration properties. Second, the approach is appropriate for relatively small sample sizes, making it well-suited to the dataset used in this study, which covers 57 monthly observations. Third, the ARDL model enables simultaneous estimation of both **short-run dynamics** and **long-run equilibrium relationships**, which is crucial for analysing how digitalisation and monetary aggregates affect financial inclusion in both time horizons.

**Retail Payments and Financial Inclusion**

Retail payments represent one of the most direct and practical channels through which individuals and businesses participate in the financial system. They include everyday transactions such as the use of cards, mobile wallets, Unified Payments Interface (UPI), and other digital instruments, as well as conventional modes of payment. As these transactions reflect how frequently and effectively people engage with formal financial services, they serve as a meaningful proxy for financial inclusion.

In the Indian context, retail payments have gained particular importance due to the rapid expansion of digital infrastructure and financial reforms in the past decade. Initiatives such as the *Jan Dhan Yojana*, Aadhaar-enabled payment systems, and the launch of UPI have provided millions of households with access to formal financial services. The volume and value of retail transactions thus mirror the progress of financial inclusion, showing not only access but also the actual usage of financial services.

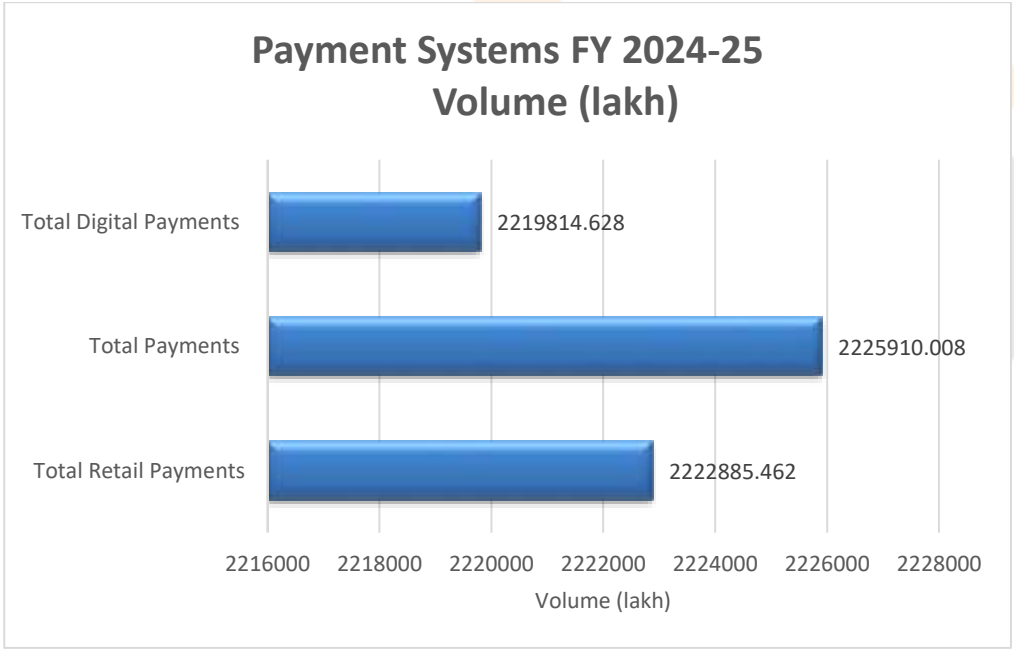
Moreover, retail payments highlight the interplay between digitalisation and traditional cash usage. While digital payment adoption has increased substantially, a significant share of transactions in India is still conducted in cash, reflected in the high currency in circulation. This duality makes retail payments an ideal indicator for capturing both the advances and the challenges of achieving financial inclusion in the digital era. By analysing retail transactions alongside determinants such as digital payments, broad money, and cash usage, the study offers valuable insights into the evolving nature of inclusive finance in India.

**Dominance of Retail and Digital Transactions in India's Payment Ecosystem**

To better understand the structure and composition of India's payment ecosystem, it is important to examine the relative contribution of retail payments, digital payments, and total payments in terms of both value and volume.

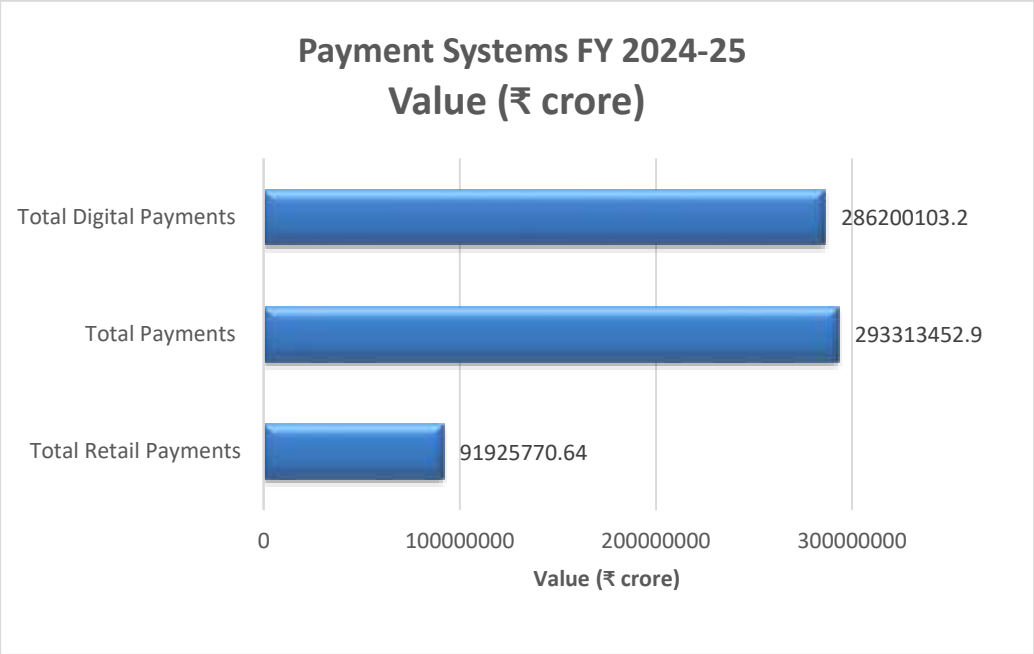
The analysis of Reserve Bank of India's Payment System Indicators ecosystem for FY 2024–25 highlights the overwhelming dominance of retail and digital transactions in both value and volume terms. As shown in Graph1 and 2 Total payments during the period amounted to 22,25,910 lakh transactions, of which retail payments alone contributed 22,22,885 lakh transactions, indicating that almost all transactions in the payment ecosystem are retail in nature. Within this segment, digital payments accounted for 22,19,815 lakh transactions, reflecting the near-universal adoption of digital channels for day-to-day financial activities.

Graph1: Payment System Indicators




Source: NPCI

Graph2: Payment System Indicators




Source: NPCI

In terms of value, total payments stood at ₹2,93,31,3452 crore, with digital payments contributing ₹2,86,20,0103 crore, representing more than 97 percent of the overall value. Retail payments, on the other hand, accounted for ₹91,92,571 crore, underscoring their importance in facilitating consumer and business-level financial inclusion. These figures confirm the transformative role of digitalisation in reshaping India's payment ecosystem, with UPI, NEFT, and card-based systems driving growth, while traditional paper-based instruments now account for only a marginal share.

**Trends in Retail Payments: Volume and Value Analysis**

Retail payments in India comprise a diverse set of instruments that facilitate transactions for individuals and businesses. According to RBI's *Payment System Indicators (FY 2024–25)*, total retail payments include five major categories:

- Credit Transfers:

These cover systems such as Aadhaar-enabled Payment System (AePS), IMPS, NACH Credit, NEFT, and UPI. UPI enables instant, real-time transfer of funds between bank accounts through mobile devices, integrating multiple bank accounts into a single platform. Among these, UPI dominates in terms of volume, reflecting its mass adoption, while NEFT leads in transaction value, highlighting its importance for high-value retail transactions.

- Debit Transfers and Direct Debits:

This category includes BHIM Aadhaar Pay, NACH Debit, and NETC. NACH Debit is a mandate-based system for recurring payment collections like EMIs and utility bills from customers' accounts. NETC, on the other hand, is the National Electronic Toll Collection system that uses RFID technology to facilitate automatic and seamless toll payments for vehicles at toll plazas. It is widely used for recurring payments like utility bills, loan instalments, and automated debits, making it important for both convenience and financial discipline.

- Card Payments:

Credit cards and debit cards continue to play a significant role in consumption-related payments. While debit cards are used more for smaller, everyday transactions, credit cards contribute a higher value share, especially in e-commerce and high-value retail spending.

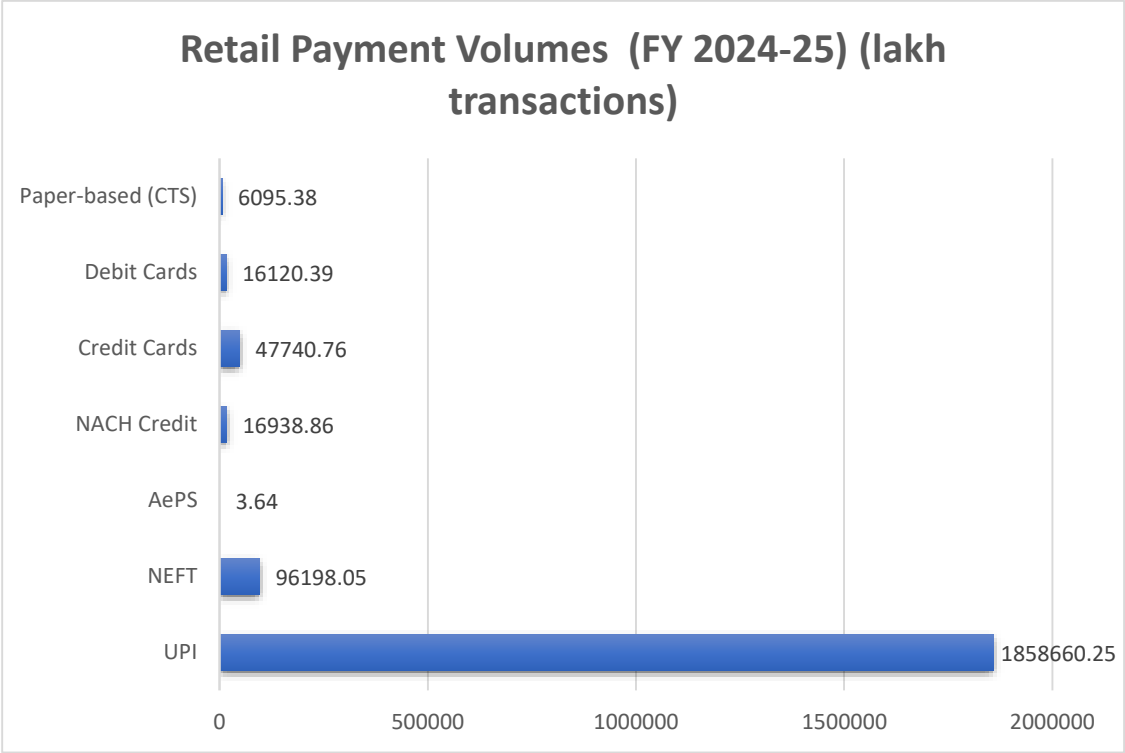
- Prepaid Payment Instruments:

This category includes mobile wallets and prepaid cards, which are increasingly popular for low-value, quick transactions. They have supported digital adoption, especially among younger and first-time users.

- Paper-based Instruments:

Despite the growth of digital payments, cheques (CTS) continue to account for a sizeable value of retail payments, indicating the persistence of traditional payment modes in high-value transfers and business transactions.

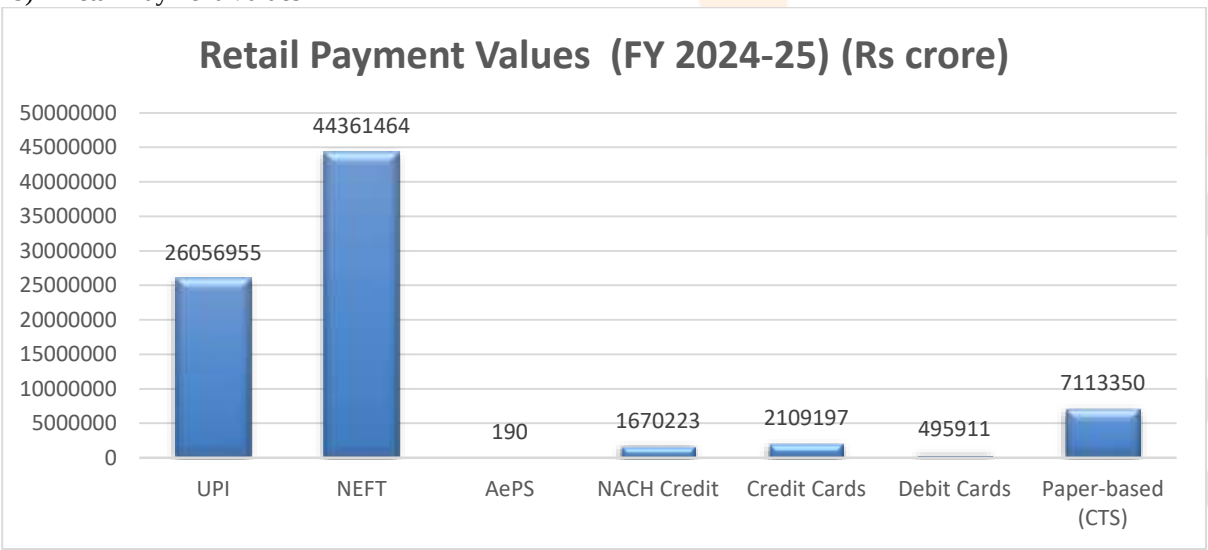
a) Retail Payment Volumes




Source: NPCI

The data on retail payment volumes reveals the overwhelming dominance of UPI transactions, which accounted for 18,58,660 lakh transactions, far surpassing all other modes combined. This reflects the mass adoption of UPI as the preferred medium for everyday payments across individuals, households, and businesses. In comparison, NEFT transactions recorded 96,198 lakhs, while card payments contributed significantly less, with credit cards at 47,740 lakh and debit cards at 16,120 lakh transactions. Other instruments such as NACH Credit (16,939 lakh) and Paper-based instruments (6,095 lakh) continue to play a role but remain much smaller in volume. AePS transactions are negligible in terms of volume (3.64 lakh), highlighting their limited usage. Overall, the volume data underscores that UPI has become the backbone of India's retail payment system, driving inclusion and usage at a mass scale.

b) Retail Payment Values




Source: NPCI

In terms of value, the picture is more diversified. NEFT continues to dominate, with transactions amounting to ₹44,36,1464 crore, highlighting its role in high-value retail and business transfers. UPI ranks second, with a total value of ₹26,05,6955 crore, showing its growing relevance not only for small-value payments but also for larger transfers. Traditional paper-based instruments (CTS) still retain importance, with a value of ₹71,13,350 crore, reflecting the continued reliance on cheques for high-value settlements in business and institutional contexts. Credit cards (₹21,09,197 crore) contribute significantly more than debit cards (₹4,95,911 crore), showing a consumer preference for credit-based spending in higher-value retail transactions. Meanwhile, NACH Credit (₹16,70,223 crore) is important for recurring payments such as salaries, subsidies, and pensions, while AePS remains minimal (₹190 crore).

**Model Specification and Explanation**

To examine the determinants of financial inclusion through retail transactions, the study specifies an Autoregressive Distributed Lag (ARDL) model where Total Retail Payments (TRP) is taken as the dependent variable. The independent variables include Total Digital Payments (TDP), Broad Money (BM), and Currency in Circulation (CIC), which capture the extent of digitalisation, monetary depth, and reliance on cash, respectively.

The variables selected for this study are designed to capture the determinants of financial inclusion in India with a focus on retail transactions. Total Retail Payments are taken as the dependent variable since they reflect not only access but also the actual usage of financial services, making them a more accurate proxy for financial inclusion than simple account ownership. On the explanatory side, Total Digital Payments are included to measure the impact of digitalisation, which has been at the core of India's financial inclusion drive through platforms like UPI, IMPS, and mobile wallets. Digital payments are expected to have a positive effect, as they reduce transaction costs, improve convenience, and broaden participation in the formal system. Broad Money (M3) is incorporated as an indicator of financial depth and liquidity, representing the resources and infrastructure available to support greater retail activity and inclusion. Finally, Currency in Circulation is included to capture the reliance on cash-based transactions, which often fall outside the formal financial system and hinder digital adoption. A negative relationship is expected in this case, as excessive cash dependence reduces transparency and slows the transition to inclusive digital finance. Together, these variables capture both the enabling and constraining forces shaping financial inclusion in India's evolving payment landscape.

The functional form of the model is expressed as:

$$TRP_t = f(TDP_t, BM_t, CIC_t)$$

In its econometric form, the ARDL$(p, q_1, q_2, q_3)$ model can be written as:

$$TRP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i TRP_{t-i} + \sum_{j=0}^{q_1} \beta_{1j} TDP_{t-j} + \sum_{j=0}^{q_2} \beta_{2j} BM_{t-j} + \sum_{j=0}^{q_3} \beta_{3j} CIC_{t-j} + \varepsilon_t$$

Where:

- $TRP$ = Total Retail Payments (proxy for financial inclusion)
- TDP = Total Digital Payments (indicator of digitalisation)
- $BM$ = Broad Money (proxy for financial depth and liquidity)
- $CIC$ = Currency in Circulation (indicator of cash dependence)
- $\alpha_0$ = intercept term
- $\alpha_i, \beta_{1j}, \beta_{2j}, \beta_{3j}$ = short-run dynamic coefficients
- $\varepsilon_t$ = error term

The ARDL bounds testing approach (Pesaran, Shin, and Smith, 2001) is then applied to examine the existence of a long-run cointegration relationship among the variables. If cointegration is established, the model is reparametrized into an Error Correction Model (ECM), which captures both short-run dynamics and the speed of adjustment towards long-run equilibrium.

The ECM is expressed as:

$$\Delta TRP_t = \phi_0 + \sum_{i=1}^{p-1} \phi_i \Delta TRP_{t-i} + \sum_{j=0}^{q_1-1} \psi_{1j} \Delta TDP_{t-j} + \sum_{j=0}^{q_2-1} \psi_{2j} \Delta BM_{t-j} + \sum_{j=0}^{q_3-1} \psi_{3j} \Delta CIC_{t-j} + \lambda ECT_{t-1} + \nu_t$$

Where:

- $\Delta$ denotes first differences,
- $ECT_{t-1}$ is the lagged error correction term derived from the long-run equation,
- $\lambda$ indicates the speed of adjustment back to equilibrium, expected to be negative and statistically significant.

**Results and Discussion**

**Unit Root Tests**

Table 1:

| **ADF Test** | | |
|---|---|---|
| Series | At Level I(0) | At First Difference I(1) |
| Total Retail Payments | 0.06 | 0.01 |
| Total Digital Payments | 0.44 | 0.01 |
| Currency In Circulation | 0.01 | |
| Broad Money | 0.18 | 0.01 |

Source: Author's own calculation

The stationarity of the variables was examined using the Augmented Dickey-Fuller (ADF) test, The results, presented in Table 1 and the results indicate a mix of integration orders. Total Retail Payments and Total Digital Payments were found to be non-stationary at level but became stationary after first differencing, suggesting that they are integrated of order one, I(1). Broad Money also followed a similar pattern, being non-stationary at level but stationary at first difference, thereby classified as I(1). In contrast, Currency in Circulation was stationary at level itself, indicating integration of order zero, I(0). The presence of both I(0) and I(1) variables justifies the use of the Autoregressive Distributed Lag (ARDL) model, which is specifically designed to handle regressors of mixed integration orders without requiring all variables to be of the same order.

**Diagnostic Test results**

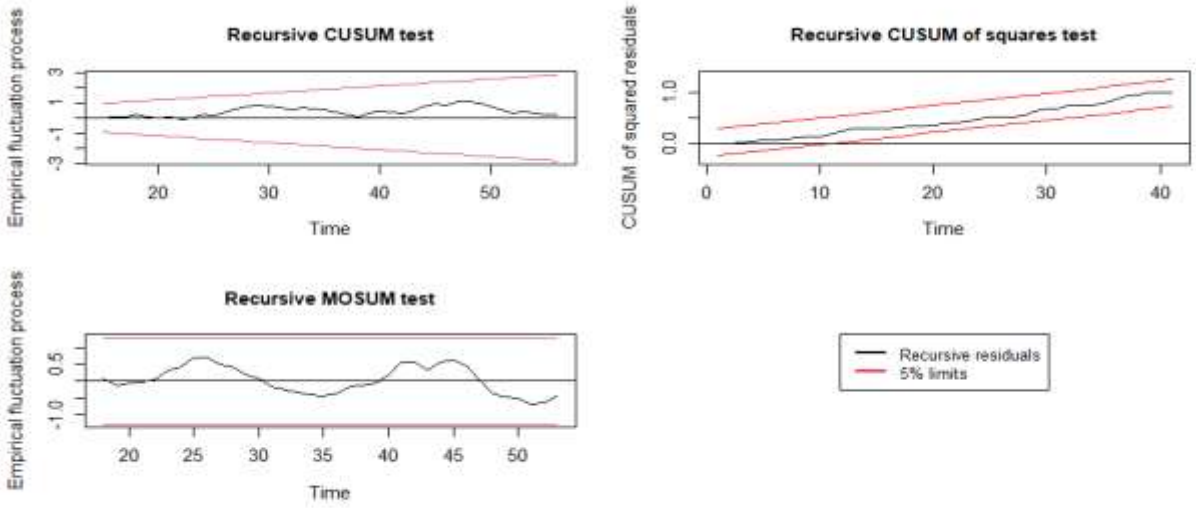
**Table2:**

| **Diagnostic Tests** | **Test Statistics** | **p - value** |
|---|---|---|
| Breusch-Godfrey Test | 0.27834 | 0.6009 |
| Ljung-Box Test | 0.06651 | 0.7965 |
| Breusch-Pagan Test | 17.957 | 0.2087 |
| Shapiro-Wilk test | 0.95864 | 0.06396 |
| Ramsey's RESET Test | 0.65133 | 0.5269 |

Source: Author's own calculation

The robustness of the ARDL model was validated through a series of diagnostic tests. The Breusch-Godfrey test (p = 0.6009) and the Ljung-Box test (p = 0.7965) confirm the absence of serial correlation in the residuals, ensuring that the model does not suffer from autocorrelation. The Breusch-Pagan test (p = 0.2087) indicates that the residuals are homoscedastic, suggesting no heteroskedasticity problem. The Shapiro-Wilk test (p = 0.0639) fails to reject the null hypothesis of normality, implying that the residuals are approximately normally distributed. Finally, the Ramsey RESET test (p = 0.5269) shows no evidence of model misspecification, confirming that the functional form of the estimated ARDL model is correctly specified. Taken together, these diagnostic checks validate the statistical soundness and reliability of the model.

The stability of the estimated ARDL model was further assessed using recursive residual-based tests, namely the CUSUM, CUSUM of Squares, and MOSUM tests.




The CUSUM test indicates that the recursive residuals remain within the 5% significance bounds throughout the sample period, suggesting that the model parameters are stable. Similarly, the CUSUM of Squares test shows that the squared recursive residuals also lie within the critical limits, confirming the absence of structural instability. The MOSUM test provides additional evidence of model stability, as the fluctuation process remains well within the prescribed boundaries. Collectively, these tests confirm that the ARDL model is structurally stable over the study period, strengthening the reliability of both the short-run and long-run estimates.

**Model Fit and Cointegration Test**

The estimated ARDL model demonstrates a strong overall fit. The Multiple R-squared (0.9353) and Adjusted R-squared (0.9179) indicate that more than 91% of the variation in Total Retail Payments is explained by the independent variables, confirming the high explanatory power of the model. The model is also statistically significant as shown by the F-statistic (53.85, p < 0.01), rejecting the null hypothesis of joint insignificance of the regressors.

| |
|---|
| Residual standard error: 173800 on 41 degrees of freedom |
| Multiple R-squared : 0.9353 |
| Adjusted R-squared: 0.9179 |
| F-statistic: 53.85 on 11 and 41 DF |
| p-value: < 2.2e-16 |

| **PESARAN, SHIN AND SMITH (2001) COINTEGRATION TEST** | | |
|---|---|---|
| | **I(0)** | **I(1)** |
| 10% critical value | 2.838 | 3.923 |
| 5% critical value | 3.415 | 4.615 |
| 1% critical value | 4.748 | 6.188 |
| F-statistic = 4.2854 | | |

To assess the presence of a long-run relationship among the variables, the Pesaran, Shin, and Smith (2001) Bounds Test was applied. The calculated F-statistic of 4.2854 lies above the lower bound critical values at both the 10% and 5% levels but remains below the upper bound at the 1% level. This provides evidence of cointegration at the 5% significance level, confirming the existence of a stable long-run equilibrium between retail payments, digital payments, broad money, and currency in circulation.

**Short-Run Dynamics (ECM Results)**

| Variable | Estimate | Std. Error | t value | Pr(>\|t\|) |
|---|---|---|---|---|
| (Intercept) | -1.33E+06 | 2.63E+05 | -5.069 | 0.00000899*** |
| ec.1 | -0.57 | 0.12 | -4.59 | 4.12e-05 *** |
| dTotal Digital Payments.t | 0.1417 | 0.00745 | 19.022 | <0.001*** |
| dBroad Money.t | -0.1303 | 0.1714 | -0.76 | 0.4516 |
| dBroadMoney.1 | - 0.33 | 0.17 | -1.951 | 0.0579 |
| d Currency In Circulation.t | -0.04 | 0.05 | -0.773 | 0.4439 |
| dCurrency In Circulation.1 | 0.0589 | 0.06 | 0.937 | 0.354 |
| dCurrency In Circulation.2 | 0.09 | 0.06 | 1.531 | 0.1334 |
| dCurrencyInCirculation.3 | 0.11 | 0.05 | 2.451 | 0.0186 * |
| dTotal Retail Payments.1 | -0.07 | 0.06 | -1.127 | 0.2664 |
| dTotal Retail Payments.2 | -0.00 | 0.07 | -0.024 | 0.981 |
| dTotal Retail Payments.3 | -0.05 | 0.05 | -0.97 | 0.3387 |

The short-run estimates highlight the immediate effects of explanatory variables on retail payments. Total Digital Payments have a positive and highly significant effect (coefficient = 0.1417, $p < 0.001$), confirming that an increase in digital transactions directly boosts retail payments in the short term. This reflects the rapid adoption of digital platforms such as UPI, IMPS, and card payments, which immediately translate into greater formal financial activity.

In contrast, Broad Money exhibits a negative but statistically insignificant coefficient (–0.1303, $p = 0.4516$), suggesting that financial depth does not have an immediate effect on retail payments. Similarly, the short-run coefficients of Currency in Circulation are mostly insignificant, except for the third lag (coefficient = 0.11, $p = 0.0186$), which is positive and significant. This indicates that past cash usage exerts a delayed but short-term influence on retail transactions, possibly reflecting the gradual adjustment from cash to digital modes.

The lagged values of Total Retail Payments are negative but statistically insignificant, implying limited persistence in short-term fluctuations of retail activity. Most importantly, the error correction term (ec = –0.57, $p < 0.001$) is negative and significant, validating the presence of cointegration and confirming that nearly 57 percent of deviations from the long-run equilibrium are corrected within one period. This demonstrates that the system is dynamically stable and efficiently adjusts towards its long-run path.

**Long-Run Estimates**

The long-run coefficients highlight the structural relationship between retail payments, digitalisation, financial depth, and cash usage in India. The estimates indicate that Total Digital Payments have a positive and statistically significant effect (0.1704) on retail payments, confirming that the expansion of digital platforms is a key driver of financial inclusion. This is consistent with the expectation that digital platforms reduce transaction costs and improve accessibility, thereby promoting financial participation. In particular, digital payment systems such as UPI, IMPS, and mobile wallets eliminate many of the barriers associated with traditional banking, including geographical distance, high transaction charges, and time delays. By enabling real-time, low-cost, and user-friendly transactions, these platforms empower individuals who were previously excluded from the formal financial system to actively participate in it. Moreover, the convenience of mobile-based transactions reduces the reliance on physical bank branches and cash handling, thereby broadening access to financial services in rural and semi-urban areas. As highlighted in the World Bank's Global Findex Database (Demirgüç-Kunt et al., 2018), Subbarao (2020) digital financial services play a crucial role in enhancing inclusion by expanding both access and usage. In the Indian context, the rapid uptake of UPI and Aadhaar-enabled payment services demonstrates how technology-driven solutions can bridge gaps in financial participation by reaching underserved segments and integrating them into the formal economy.

Broad Money (M3) shows a positive but statistically insignificant relationship (0.0849) with retail payments in the long run. This suggests that while financial depth provides liquidity and reflects the availability of monetary resources, its direct influence on retail inclusion is limited unless accompanied by effective transmission channels through digital or banking infrastructure. Similar findings have been reported by Levine (2005) and Beck, Demirgüç-Kunt, and Levine (2007), who argue that financial depth alone does not guarantee inclusion unless supported by access and usage mechanisms.

Conversely, Currency in Circulation exhibits a negative coefficient (–0.1391), indicating that higher reliance on cash transactions hampers the growth of formal retail payments. This result aligns with studies such as Sharma (2019) and Chakrabarty (2013), which highlight the challenges of cash dependency in India, including informality, lack of transparency, and exclusion from digital channels. The negative long-run association reinforces the view that reducing cash usage is essential to accelerate financial inclusion through digital pathways.

Finally, the lagged dependent variable (–0.5688) in the long-run equation reflects the adjustment mechanism, confirming that retail payments are path-dependent but converge towards equilibrium over time.

**Conclusion and Policy Implications**

The findings carry several policy lessons for India's financial sector. First, the strong positive role of digital payments suggests that continued investment in digital infrastructure is essential, particularly in rural and semi-urban areas where financial exclusion remains high. Expanding broadband and mobile connectivity, alongside measures to improve digital literacy, can further accelerate inclusion. Second, the weak role of financial depth implies that policymakers must focus not just on expanding monetary aggregates, but on ensuring that liquidity is effectively channelled into accessible retail financial services. Third, the negative effect of cash usage underscores the need to reduce dependence on currency in circulation. Policy measures such as incentivising digital transactions, promoting interoperable payment systems, and discouraging large-value cash transactions can help shift behaviour from cash to digital. Finally, strengthening cybersecurity frameworks and consumer protection will build trust in digital platforms, ensuring sustainable and inclusive growth in retail payments.

This study examined the determinants of retail payments in India as a proxy for financial inclusion, using the ARDL-ECM framework over the period July 2020–July 2024. The results highlight that digitalisation is the primary driver of retail financial activity, while financial depth has a limited role and cash dependence continues to hinder inclusion. The long-run relationship between the variables confirms that digital adoption is central to India's financial inclusion agenda, while the error correction mechanism underscores the stability of the system.

Overall, the findings demonstrate that India's progress towards financial inclusion is inseparable from the growth of digital payments. The results reinforce the importance of policies aimed at strengthening digital ecosystems, reducing reliance on cash, and ensuring that financial depth translates into real access and usage. By addressing these challenges, India can build a more inclusive financial system that supports sustainable economic growth.

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