American Journal of Governance and Management (AJGM)

VOLUME 1 ISSUE 1 (2026)



PUBLISHED BY
E-PALLI PUBLISHERS, DELAWARE, USA

American Journal of Governance and Management (AJGM)
Volume 1 Issue 1, Year 2026
https://journals.e-palli.com/home/index.php/ajgm

Advancing Towards a Cashless Society: Digital Financial Payment System Growth and Policy Actions for a Future Smart Bangladesh

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Article Information

Received: August 22, 2026
Accepted: November 03, 2026
Published: November 14, 2026

Keywords
Cashless Society, Digital Payment, Financial Inclusion, Internet Banking, Payment Systems, Smart Bangladesh

ABSTRACT

This study examines the expansion and composition of digital financial payments in Bangladesh and distinguishes transaction growth from evidence of cash substitution. Secondary monthly data from three Bangladesh Bank statistical tables cover July 2024–June 2025. Descriptive statistics, endpoint growth rates, linear time trends, Pearson correlations, and exploratory ordinary least squares regressions are supplemented by residual diagnostics, robust standard errors, and sensitivity analyses. Internet banking customers increased by 28.8%, transaction numbers by 73.5%, and nominal transaction value by 26.8%; average value per transaction declined by 26.9%. Card-channel value increased by 18.8%, while the separate issued-card transaction series increased by 18.9%. ATM and cash recycling machine transactions accounted for an average 88.0% of monthly card-channel value, compared with 12.0% for POS and e-commerce. Internet banking volume and value were strongly correlated (r = .955), but diagnostic checks identified non-normal trend residuals, heteroskedasticity in the POS regression, and influential observations. Twelve monthly observations cannot establish recurring seasonality, long-run relationships, or causal effects. The study contributes a measurement distinction between access, recorded usage, and merchant-oriented settlement; it does not demonstrate an economy-wide reduction in cash use. Policy implications include monitoring active merchant payments, transaction reliability, and consumer outcomes alongside account and card issuance. These priorities require evaluation with longer time series and direct evidence on cash payments.

INTRODUCTION

Bangladesh's digital transformation has been articulated through the Smart Bangladesh agenda. Payment systems are an important part of this transformation because they enable households, firms, and the state to transfer money quickly and securely. Broadband connectivity and digital government provide enabling infrastructure, but access alone does not establish whether payments are routinely settled digitally. The World Bank's (2025) Digital Service Transformation for Access and Resilience project document emphasizes inclusive and resilient broadband and digital services, providing relevant policy context for this distinction.

International policy literature treats transaction accounts and payment services as foundations of financial inclusion (Committee on Payments and Market Infrastructures & World Bank Group, 2016). However, greater digital use does not necessarily benefit all groups equally. The Organisation for Economic Co-operation and Development (OECD, 2025) emphasizes the continuing importance of access to cash for consumers who depend on it. A cash-light transition therefore needs to consider inclusion and choice alongside technological expansion.

Recent research presents Bangladesh as an emerging but uneven cashless economy. Huda *et al.* (2024) discuss its transition toward digital payment use; Hasan *et al.* (2024) identify rural adoption challenges; and Sultana *et al.* (2025) examine the conditions associated with continued cashless technology use among SME entrepreneurs. These studies explain adoption conditions, but they do not make aggregate transaction growth equivalent to reduced cash dependence.

This article brings together recent Bangladesh Bank data on internet banking, card-based channels, and issued cards. It asks three questions: How did recorded access and usage change during July 2024–June 2025? How did transaction composition differ across channels? What evidence-based monitoring priorities follow from these patterns? The term cashless society describes the policy motivation; the empirical analysis concerns a limited set of digital and cash-related banking transactions.

Objectives of the Research

- To examine changes in internet banking customers, transaction activity, issued cards, and card-based channels.
- To distinguish expansion in digitally recorded banking activity from evidence of cash substitution.
- To compare the relative contribution of ATM, POS, CRM, and e-commerce transactions within their common reporting table.
- To identify policy monitoring priorities, while separating implications of the observed data from mechanisms suggested by previous research.

LITERATURE REVIEW

The literature links payment digitalization to financial inclusion, efficiency, and institutional design. Frost *et al.* (2024) associate fast-payment adoption with

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features such as public-sector involvement, non-bank participation, and a wider range of use cases. Aurazo and Franco (2024) report suggestive cross-country evidence concerning financial inclusion, while acknowledging identification limitations. The World Bank (2021a, 2021b) discusses implementation considerations and QR-code arrangements. Together, these sources indicate that infrastructure and governance can shape adoption without guaranteeing cash replacement.

Aguilar *et al.* (2024) examine digital payments, informality, and economic growth across economies. Their broader comparative evidence cannot be reproduced through a single country's twelve-month descriptive sample. Likewise, the inclusion concerns emphasized by the OECD (2025) mean that greater transaction value should not be treated as a sufficient measure of welfare or equitable access.

Bangladesh-specific studies address different parts of the adoption process. Islam *et al.* (2024) investigate intentions and attitudes toward QR mobile payments. Hasan *et al.* (2024) discuss rural challenges, while Sultana *et al.* (2025), using evidence from 219 SME entrepreneurs, examine satisfaction and continuance intention. Huda *et al.* (2024) provide a teaching case on Bangladesh's cashless transition. These contributions contextualize the present analysis, but aggregate monthly data cannot test their individual-level mechanisms.

Two further studies clarify the distinction between payment activity and user acceptance. Karim *et al.* (2022) analyze e-wallet satisfaction using 480 responses from Dhaka and identify technology self-efficacy as relevant to satisfaction. Park *et al.* (2022) examine contactless-payment intentions among 220 respondents in Philippine travel and tourism, finding associations with perceived usefulness, ease of use, trust, and awareness. Their findings inform possible adoption mechanisms, although the different settings and survey designs limit direct comparison with national transaction totals.

The contribution of this study is a comparative measurement framework linking access stocks, usage flows, and transaction composition. Access stocks include customer and card counts; usage flows include monthly transaction numbers and values; merchant-oriented settlement is represented here by POS and e-commerce card activity. Cash substitution remains a separate outcome requiring direct cash-payment measures and a comparable denominator. This framework organizes the evidence and identifies what it cannot establish; it is not a causal test of a new adoption theory.

MATERIALS AND METHODS

This research design is exploratory, quantitative, and utilizes secondary monthly data. We created the dataset from Bangladesh Bank transaction tables present in the source file provided for this assignment, covering a 12-month period of July 2024 - June 2025. Three interconnected datasets have been analyzed: (a) customers using internet banking, transaction number and transaction value, (b) card-based channel transactions via ATM, POS, CRM, as well as e-commerce, and (c) issued cards along with debit-, credit- and prepaid-card transaction statistics. Central-bank transaction data is appropriate since the research intends to analyze aggregate market-level payment behavior rather than individual motivations.

The analytical strategy employs four techniques. First, the summary statistics of levels, means and variation are presented. Second, they visually compare period growth analysis between July 2024 and June 2025 to track month-to-month movement. Third, we have employed simple linear time trend regressions to ascertain whether the major series exhibit a statistically significant time trend across the sample. Fourth, the link between transaction volume and transaction value is measured with Pearson correlation and basic ordinary least squares (OLS) regressions. These regressions should not be read as causal structural models; instead, we treat them as concise diagnostics of usage frequency in the short monthly panel. Additional derived indicators were also created to reinforce interpretation. Average transactions per customer and average value per transaction were computed for internet banking. The charts, tables and figures reported below were prepared from these data.

Data and Findings

Internet banking transactions

Reported internet banking customers increased from 8,823,053 to 11,366,563 (28.8%), transactions from 10,550,454 to 18,305,024 (73.5%), and monthly value from Tk 827,253.0 million to Tk 1,049,350.3 million (26.8%). Transactions per reported customer rose from 1.20 to 1.61, while average value per transaction fell from Tk 78,409 to Tk 57,326. This combination indicates higher aggregate transaction intensity and a lower mean ticket value. It does not show whether the same individuals transacted more frequently or whether transaction composition changed.

March 2025 recorded the maximum transaction count (25,308,927) and value (Tk 1,313,269.8 million). The

Table 1: Internet banking indicators from July 2024 to June 2025

Indicator	July 2024	June 2025	Growth %
Internet banking customers	8,823,053	11,366,563	28.8
Internet banking transactions	10,550,454	18,305,024	73.5
Internet banking value (Tk million)	827,253.0	1,049,350.3	26.8
Transactions per reported customer	1.20	1.61	34.7
Mean value per transaction (Tk)	78,409	57,326	-26.9

Note: Source: Bangladesh Bank (n.d.); calculations from the November 3, 2026 extract. Growth is an endpoint comparison.

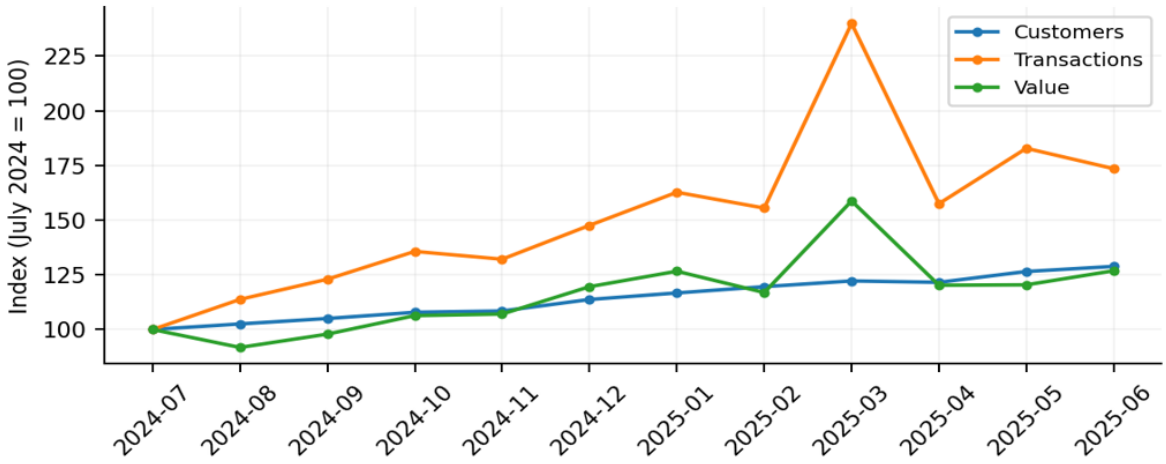


Figure 1: Internet banking growth indexed to July 2024

simultaneous peak may reflect common calendar or economic influences, but one observation cannot identify a recurring seasonal effect. Customer counts were smoother than activity flows; the customer series also declined between March and April, so its growth was not uninterrupted.

The fitted monthly trend slopes were 233,424 customers (R^2 = .987), 840,276 transactions (R^2 = .605), and Tk 29,154 million (R^2 = .514). Conventional p values were < .001, .003, and .009, respectively. However, all three trend models had Shapiro–Wilk p values below .05. These slopes summarize within-window movement and should not be used as validated long-run forecasts. Full diagnostic results appear in Appendix A.

The volume–value model yielded a slope of Tk 35,951.5 million per million transactions, R^2 = .912, and r = .955. The customer–transaction correlation was .809. Excluding March reduced the volume–value R^2 to .803; the first-difference R^2 was .851. Thus, positive co-movement was not confined to March or to levels alone. Nevertheless, value equals transaction count multiplied by average ticket size, so a strong volume–value relationship is partly inherent in the measurement and is not evidence that digital payments displaced cash.

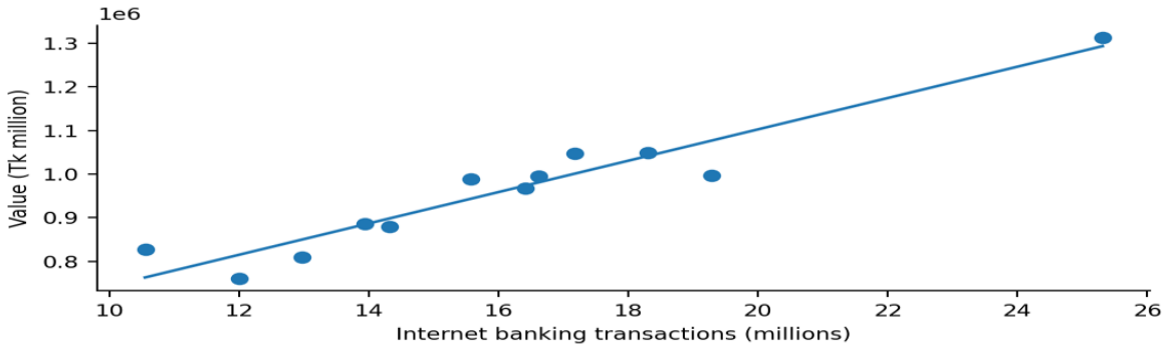


Figure 2: Internet banking transaction count and value

ATM, POS, CRM, and E-Commerce Transactions Made Using Cards

Mean monthly card-channel value was Tk 442,338.0 million. ATM and CRM jointly accounted for an average 88.0% of monthly value, while POS and e-commerce accounted for 12.0%. These are shares within the four-channel table, not shares of all payments in Bangladesh. The composition indicates that much recorded card activity remained connected to cash-related banking operations.

E-commerce value grew fastest (57.6%), followed by CRM (38.5%), POS (29.4%), and ATM (4.4%). The combined POS/e-commerce share increased from 10.2% in July to 11.9% in June, a 1.8 percentage-point change using unrounded shares. This is a change within card-channel composition, not an estimated decline in economy-wide cash use.

Average monthly ticket values were approximately Tk 10,431 for ATM, Tk 10,732 for CRM, Tk 4,628 for POS, and Tk 3,467 for e-commerce. These differences describe transaction mix rather than the price of providing payment services. The data do not identify transaction purpose, merchant coverage, or whether customers substituted one payment instrument for another.

Table 2: Composition of card-based channel transactions

Channel	Mean value Tk million	Mean monthly share %	Value growth %	Mean ticket Tk
ATM	231,762.2	52.5	4.4	10,431
POS	32,153.3	7.3	29.4	4,628
CRM	157,778.5	35.5	38.5	10,732
E-commerce	20,644.0	4.7	57.6	3,467
Total	**442,338.0**	**100.0**	**18.8**	**8,867**

Note: All series have n = 12. Shares and tickets are averages of monthly ratios; they need not equal ratios of period totals.

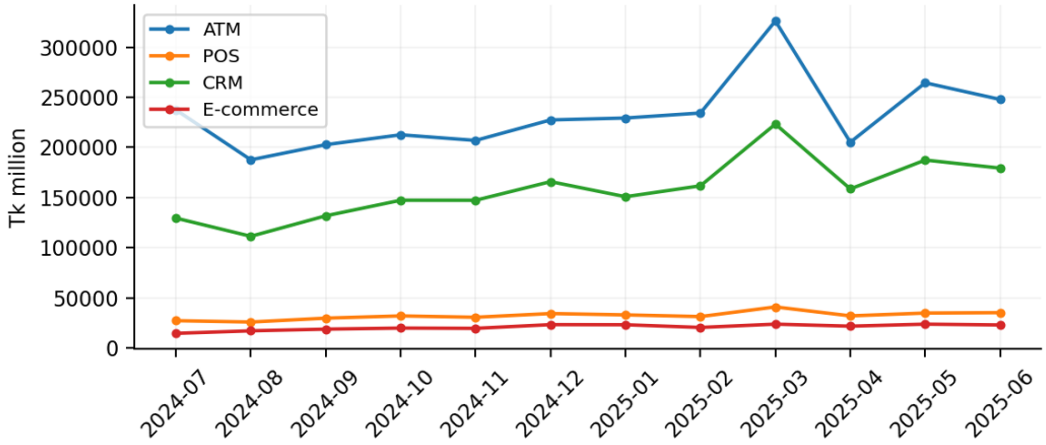


Figure 3: Monthly value by card-based channel

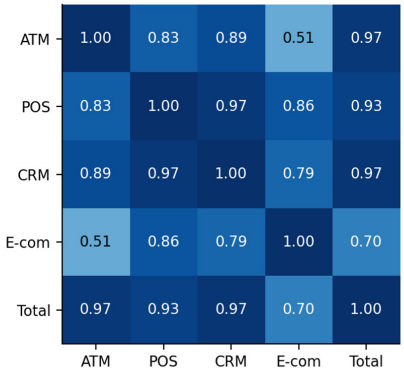


Figure 4: Correlations between monthly card-channel values

Note: All correlations use twelve months. Total includes each component, creating part–whole dependence.

ATM and total channel value correlated at .967, CRM and total at .975, and POS and e-commerce at .858. Other pairs were less strongly associated, including ATM and e-commerce (approximately .51). Shared monthly influences and accounting aggregation can generate these patterns. Positive correlations do not establish either complementarity or substitution between payment instruments.

Issued Cards and Transaction Statistics

Using Bangladesh Bank's revised June observation, net issued debit cards increased from 37,432,352 to 43,151,639 (15.3%), credit cards from 2,520,446 to 2,946,233 (16.9%), and prepaid cards from 6,542,072 to 7,039,117 (7.6%). Total issued-card transaction value rose from Tk 405,549.5 million to Tk 482,004.3 million (18.9%). This total remains separate from the channel-based total described above.

Debit transactions accounted for 91.6% of monthly issued-card value on average, compared with 7.4% for credit and 1.1% for prepaid cards; rounding can cause shares to sum to slightly more than 100%. Debit dominance describes the instrument mix, but does not establish that transactions were retail purchases rather than cash withdrawals or other uses.

Credit-card value grew by 32.8%, prepaid by 23.4%, and debit by 17.8%. Debit nevertheless accounted for most total value because of its much larger base. Growth in card stocks is not equivalent to growth in active users: one person may hold multiple cards, and issued cards may be inactive.

The debit–total correlation is .999532, which rounds to 1.000 at three decimals but is not mathematically perfect. The revised debit-stock–debit-value correlation is .597. These statistics describe co-movement; their difference

Table 3: Issued cards and transaction values

Indicator	July 2024	June 2025	Growth %
Debit cards issued	37,432,352	43,151,639	15.3
Credit cards issued	2,520,446	2,946,233	16.9
Prepaid cards issued	6,542,072	7,039,117	7.6
Debit transaction value	374,771.0	441,516.5	17.8
Credit transaction value	26,535.2	35,249.7	32.8
Prepaid transaction value	4,243.3	5,238.1	23.4
Total issued-card value	405,549.5	482,004.3	18.9

Note: Values are Tk million; card stocks are counts. June debit-card stock is revised in the source workbook.

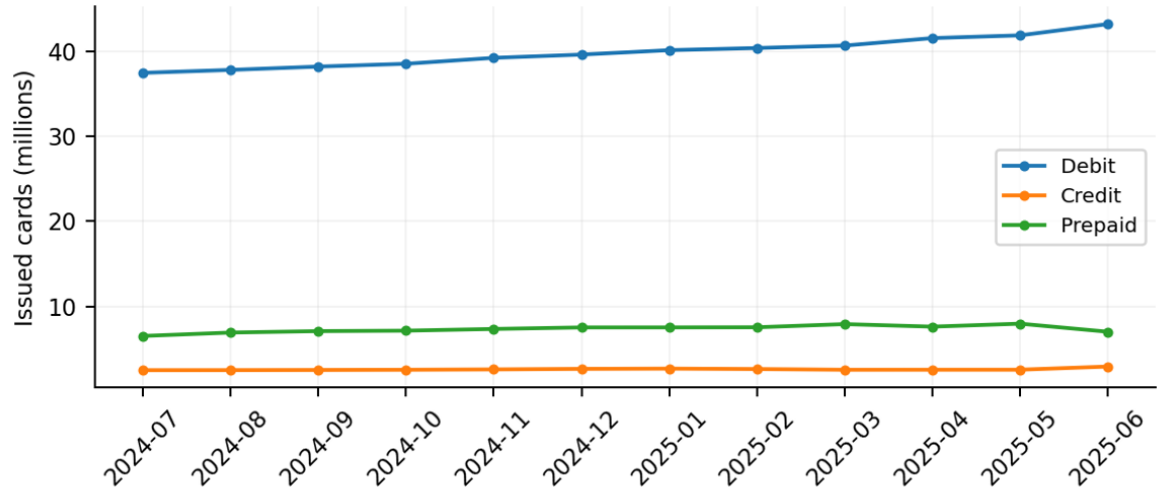


Figure 5: Net issued debit credit and prepaid cards

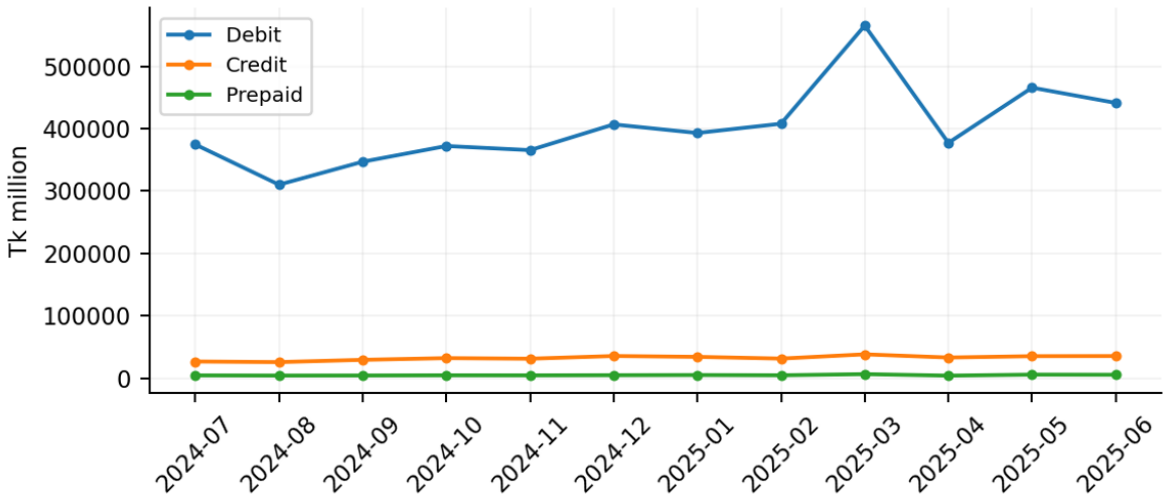


Figure 6: Monthly transaction value by card type

cannot identify the causal importance of issuance relative to usage. The high debit–total correlation is largely expected because debit is the dominant component of the total.

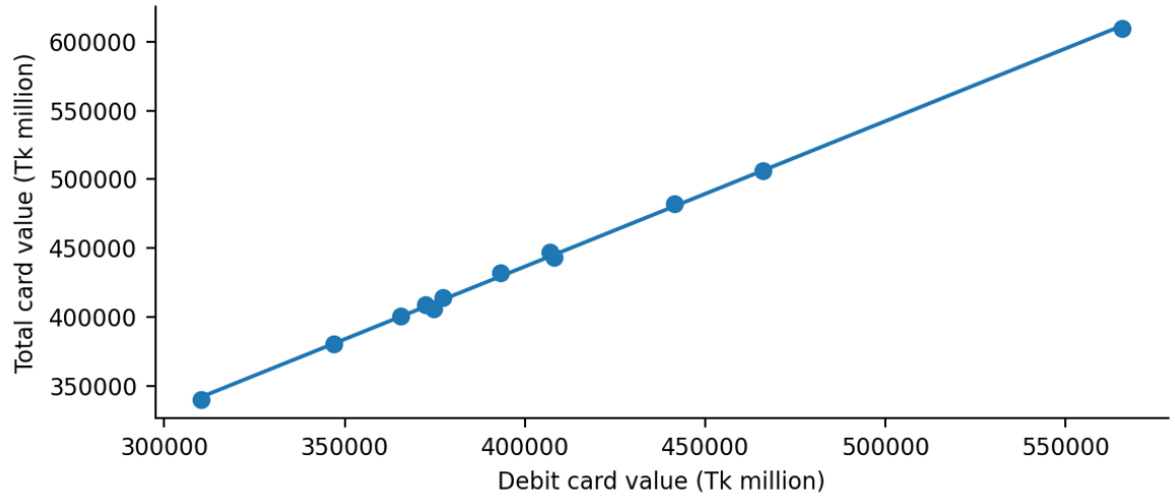


Figure 7: Debit-card value and total issued-card transaction value
Note: This is a part–whole relationship because total value includes debit value.

Regressions correlations and diagnostic results

The POS model shows evidence of unequal residual variance (auxiliary-test p = .035), and its HC3 slope standard error is 1,521.9 compared with the conventional 813.0. Durbin–Watson statistics of .912 for ATM and 1.104 for CRM flag possible positive residual persistence,

Table 4: Exploratory OLS regressions

Model	Intercept	Slope	R^2	OLS p
Internet value ~ volume	383,345.2	35,951.5	0.912	< .001
ATM value ~ volume	-56,446.9	13,009.1	0.941	< .001
POS value ~ volume	5,771.8	3,787.8	0.685	< .001
CRM value ~ volume	-5,292.3	11,090.9	0.946	< .001
E-commerce value ~ volume	-5,371.1	4,381.7	0.940	< .001
Total card value ~ debit value	**13,998.8**	**1.057**	**0.999**	**< .001**

Note: n = 12; each model has an intercept and ten residual degrees of freedom. Values are Tk million. Volume is in millions of transactions; the final model uses debit value in Tk million. P values are conventional, unadjusted, and exploratory. The final model is an accounting association.

Table 5: Selected Pearson correlations

Relationship	r
Internet customers and volume	0.809224
Internet volume and value	0.955178
ATM value and channel total	0.966695
CRM value and channel total	0.974751
POS and e-commerce values	0.858360
Debit value and card total	0.999532
Credit value and card total	0.839198
Prepaid value and card total	0.940489

Note: n = 12 for every row. Component–total correlations are not independent evidence of behavioral change.

although lag-one Ljung–Box tests do not reject at .05. The latter finding is inconclusive with twelve observations. Cook's distances exceed 1 for POS in February, CRM in March, e-commerce in July, and the debit–total model in March, demonstrating sensitivity to individual observations.

Leaving out March changes the POS slope from 3,787.8 to 2,930.3 and its R^2 from .685 to .570. In first differences, POS R^2 falls to .301, while internet banking, ATM, CRM, and e-commerce retain positive slopes. This pattern cautions against interpreting all high-level correlations as equally stable. Robust intervals and sensitivity results are reported in Appendix A and the accompanying files. None supplies a causal estimate of cash substitution.

Dispersion also differs by measurement type: the coefficient of variation is 8.4% for internet banking customers, 24.3% for internet banking volume, and 15.3% for internet banking value. A smoother stock series alongside more variable monthly flows is compatible with several mechanisms, including changing ticket sizes, calendar effects, and reporting adjustments. It does not by itself demonstrate market maturity.

RESULTS AND DISCUSSION

The findings establish growth in the recorded channels over the selected endpoints. They also show why access, usage, and settlement composition need separate interpretation. More customer accounts or cards expand recorded access, while transaction counts and ticket values describe activity. The larger POS/e-commerce share suggests a modest shift within the observed card channels, but the continued weight of ATM and CRM and the absence of cash-spending data prevent an economy-wide cash-substitution conclusion.

The results complement rather than confirm user-level adoption research. Karim *et al.* (2022) and Islam *et al.* (2024) examine satisfaction or attitudes, whereas this study observes aggregate transaction flows. Sultana *et al.* (2025) link facilitating conditions and satisfaction to SME continuance; the present data contain no measures of those constructs. Hasan *et al.* (2024) discuss rural challenges, but national totals cannot reveal urban–rural differences. Park *et al.* (2022) provide a relevant international comparison on acceptance factors, although evidence from Philippine travel and tourism cannot be directly generalized to Bangladesh's payment system.

The conceptual implication is that digital access can coexist with cash-related banking activity. Transaction technology and final payment behavior should therefore be distinguished in evaluating a cash-light transition. This interpretation is consistent with the infrastructure and governance emphasis of Frost *et al.* (2024), but the study does not estimate network effects or evaluate interoperability reforms. Similarly, the cross-country development relationships examined by Aguilar *et al.* (2024) remain outside the scope of the present models.

The main limitations are the short observation window, nominal values, aggregate coverage, potential reporting revisions, and the lack of a cash-payment denominator. Endpoint comparisons are sensitive to the starting and ending months. March peaks and non-normal trend residuals weaken conventional inference, and the robust estimators themselves are uncertain in small samples. Multiple exploratory tests are not adjusted for multiplicity. The two card totals have been reconciled arithmetically within their own source tables, but their coverage difference remains unresolved. Longer multi-year data, transaction-purpose classifications, direct cash-use surveys, and disaggregated merchant or household evidence are required to evaluate substitution and inclusion.

CONCLUSION

Bangladesh's recorded internet banking and card activity expanded between July 2024 and June 2025. Internet banking transactions increased by 73.5% and nominal value by 26.8%, with a 26.9% decline in average ticket value. Card-channel value rose by 18.8%, while ATM and CRM accounted for 88.0% of average monthly channel value. POS and e-commerce increased their combined endpoint share from 10.2% to 11.9%. These results document growth and composition changes in the covered channels; they do not establish that cash spending declined.

The study's contribution is to distinguish access stocks, usage flows, and merchant-oriented settlement when interpreting cashless-transition evidence. Strong correlations are descriptive, particularly when one variable is a component of another. Residual diagnostics and sensitivity checks reveal weaknesses that preclude strong inference from twelve observations. Transaction values also provide no basis for claims that ATM or CRM infrastructure is flat, inadequate, or expanding: such claims require terminal counts, geographic coverage, capacity, and service-performance data.

Policy should therefore pair digital-access initiatives with measurable indicators of sustained merchant payments, reliability, and consumer outcomes, while retaining accessible payment options. Future research should use several annual cycles and directly observed cash and digital spending to test whether changes in infrastructure or policy produce substitution. The present results provide a bounded descriptive baseline for that work.

Policy Recommendations

The following recommendations combine the observed transaction composition with mechanisms identified in prior literature. They are proposed monitoring and evaluation actions, not effects demonstrated by this study.

1. Measure active merchant settlement. Bangladesh Bank and payment providers could report monthly POS, QR, and e-commerce payment numbers and values alongside merchants receiving at least one payment in the preceding thirty days. Report these separately from registrations and cash-related transactions. Establish a baseline before setting adoption targets; assess any

merchant-fee or onboarding pilot using repeat-use and retention measures.

2. Evaluate interoperability in practice. Track cross-provider payment success rates, failed transactions per thousand attempts, effective merchant fees, and settlement time. Compare outcomes before and after clearly dated implementation changes and, where possible, against comparable providers or areas. The present data cannot show which interoperability intervention would have the largest effect.

3. Link connectivity investment to service reliability. Monitor payment-service uptime, failed transactions associated with connectivity, and recovery time, disaggregated by urban and rural locations. These measures would connect the infrastructure priorities discussed by the World Bank (2025) to observable payment outcomes rather than infer network quality from transaction totals.

4. Publish consumer-outcome indicators. Record fraud losses per million transactions, complaint rates, median resolution time, and the proportion resolved within the applicable service standard. Evaluate digital-literacy support with pre- and post-training measures of successful transactions and fraud awareness. These are literature-informed priorities; this study contains no direct evidence of consumer-protection performance.

5. Measure cash substitution directly and preserve inclusion. Use repeated household and merchant payment diaries or surveys to estimate cash shares by both number and value of purchases, with comparable definitions over time. Track active use separately from account or card issuance and report results across location and demographic groups. Maintain access to cash for those who depend on it, consistent with the inclusion concerns identified by the OECD (2025).

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Appendix A
Diagnostic and sensitivity results

Table A1: Residual diagnostic results

Model	DW	LB (1) p	BP p	SW p	Max Cook
Customer trend	2.171	.733	.386	.028	0.432
Internet volume trend	2.560	.200	.294	< .001	0.651
Internet value trend	2.209	.612	.321	.005	0.572
Internet value ~ volume	1.827	.950	.573	.934	0.491
ATM value ~ volume	0.912	.154	.293	.567	0.330
POS value ~ volume	2.811	.090	.035	.093	1.548
CRM value ~ volume	1.104	.213	.714	.744	1.284
E-commerce value ~ volume	1.517	.563	.219	.664	4.011
Total value ~ debit value	**0.929**	**.218**	**.694**	**.667**	**1.579**

Note: n = 12 throughout. DW = Durbin–Watson; LB (1) = lag-one Ljung–Box; BP = studentized squared-residual auxiliary test; SW = Shapiro–Wilk. These are low-power exploratory checks, not certifications of assumptions.

Table A2: Robust slope uncertainty

Model	HC3 SE	HAC SE	Approximate 95% HAC interval
Customer trend	6,471.0	4,967.2	222,356.3 to 244,491.3
Internet volume trend	212,181.6	166,749.1	468,736.2 to 1,211,816.6
Internet value trend	8,828.2	8,057.4	11,201.3 to 47,107.2
Internet value ~ volume	4,801.3	3,241.6	28,728.7 to 43,174.3
ATM value ~ volume	769.6	557.1	11,767.9 to 14,250.4
POS value ~ volume	1,521.9	893.7	1,796.6 to 5,779.1
CRM value ~ volume	1,458.7	1,064.5	8,719.0 to 13,462.7
E-commerce value ~ volume	951.5	358.5	3,582.9 to 5,180.5
Total value ~ debit value	**0.018**	**0.010**	**1.035 to 1.078**

Note: HAC uses one lag, Bartlett weights, n/(n−2) correction, and t critical values with 10 degrees of freedom. Trend slopes retain each outcome's units per month; volume–value slopes are Tk million per million transactions. Total ~ debit is dimensionless. Intervals do not correct non-stationarity or identify causal effects.

Table A3: Sensitivity of volume–value regressions

Channel	Without March slope	R^2	First-difference slope	R^2
Internet	33,175.6	0.803	35,742.4	0.851
ATM	13,010.6	0.829	12,451.8	0.976
POS	2,930.3	0.570	3,491.3	0.301
CRM	9,886.9	0.933	12,230.0	0.952
E-commerce	4,358.1	0.933	4,017.6	0.818

Note: Each sensitivity model has n = 11 and an intercept. Slopes are Tk million per million transactions. Leave-one-out estimates, complete diagnostics, and residual plots are in the reproducibility package. No seasonal unit-root or cointegration test is claimed.