

Financial Inclusion through Agent Banking in Bangladesh: A Panel Data Analysis of Outreach Determinants

Organization,
Bangladesh Bank

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Submitted in Partial Fulfillment of the Requirements for the Degree
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19th April, 2026

Internship/Project Report Approval Form

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Letter of Transmittal

19th April, 2026

Dr. Shamsuddin Ahamad

Associate Professor & Director, Graduate Business Program

University of Liberal Arts Bangladesh (ULAB)

Subject: Submission of Internship Report on “Financial Inclusion through Agent Banking in Bangladesh: A Panel Data Analysis of Outreach Determinants”

Dear Sir,

With due respect, I would like to submit my internship report titled “Financial Inclusion through Agent Banking in Bangladesh: A Panel Data Analysis of Outreach Determinants” as a part of the requirements for the completion of my undergraduate program in Bachelor of Business Administration (BBA) at the University of Liberal Arts Bangladesh (ULAB).

This report combines theoretical knowledge gained throughout my studies with practical insights from my internship at Bangladesh Bank. I hope that the content of this report meets your expectations and I look forward to receiving your valuable feedback.

Sincerely,

Nazia Azra Indika

ID: 221011068

Bachelor of Business Administration (BBA)

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Part A

Chapter 1 Internship Preparation

1.1 Motivation to do an internship

As a Finance and Economics student, being able to translate my academic knowledge into real-world practice is extremely important, and doing so at the Bangladesh Bank is the icing on the cake. The internship is the final learning opportunity, allowing us to gain practical expertise after nearly four years of academic journey. It also connects theoretical learning with practical institutional experiences. My internship at the Bangladesh Bank, specifically in the Financial Inclusion Department, enhanced my understanding of the central bank's policies and operations, specifically in the area of financial inclusion strategies.

Understanding Central Banking Operations

One of the main motivations behind undertaking this internship was to gain exposure to how a central bank functions beyond textbook theory. Academic courses discuss monetary policy, financial regulations, and banking systems; however, observing how these policies are implemented in practice offers a deeper understanding on the country's financial structure.

Working in the Financial Inclusion Department allowed practical insight into how policies are designed to expand banking services to unbanked and underbanked populations.

Gaining Knowledge About Financial Inclusion

Another major motivation was to understand financial inclusion initiatives in Bangladesh. Started in July 2015, Financial inclusion plays a critical role in poverty reduction, service expansion, digital transformation, and economic development. Through this internship, exposure was gained to policies and operations related to;

1. Agent Banking
2. Mobile financial services (MFS)
3. SME Financing
4. Digital Nano
5. No-frill Accounts

6. School & street children banking
7. Women entrepreneur financing
8. Rural banking outreach

This experience strengthened my understanding of how an inclusive financial system contributes to national inclusive economic growth.

Career-Oriented Learning

As someone interested in finance and policy-oriented roles, working at Bangladesh Bank provided valuable institutional exposure. It helped in understanding regulatory frameworks, compliance monitoring, and banking supervision related to financial inclusion.

1.2 Internship Search Process

Overview of the Internship Search Process

Unlike private sector internships, securing an internship at the Bangladesh Bank required a formal application process. The internship opportunities were identified through official communication channels and academic coordination.

A formal application was submitted, including;

1. Academic transcripts & Marksheet
2. Curriculum Vitae (CV)
3. Application letter
4. University recommendation letter
5. Passport-size photos

Selection & Placement

Following document verification, placement was granted in the financial inclusion based on the academic background major in Finance and minor in Economics. The department focuses on banking outreach, financial access expansion, and policy implementation, aligned well with the academic specialization.

Since Bangladesh Bank operates as a central regulatory authority, the internship placement process is structured and formal. Emphasis is placed on the academic background, discipline, and institutional alignment rather than competitive interviews. The absence of an interview did not reduce the rigor of the internship experience. Instead, performance expectations were maintained through supervised assignments and professional conduct standards within the department.

1.3 About the Organization

1.3.1. Overview of Bangladesh Bank

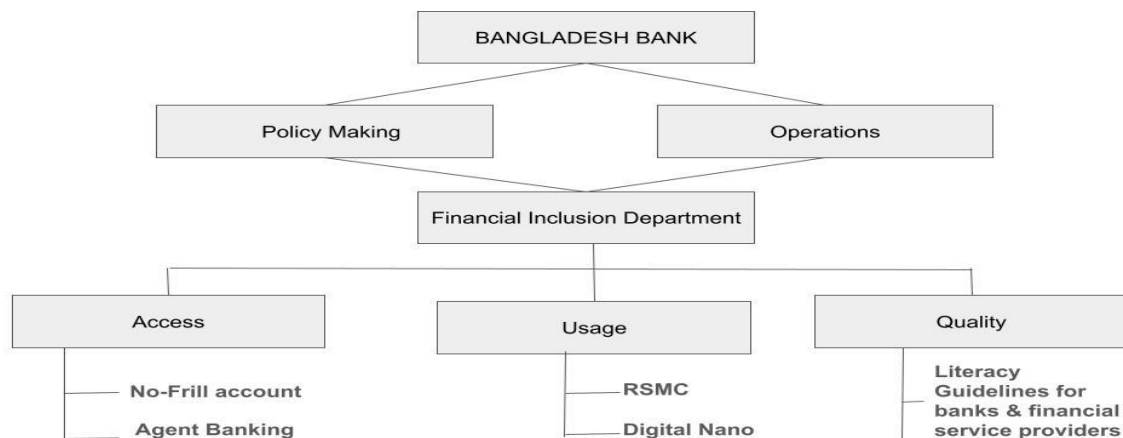
Bangladesh bank is the central and monitor authority of Bangladesh. It is responsible for;



- Formulating and implementing monetary policy
- Regulating and supervising Banks and non-bank financial institutions
- Managing foreign exchange reserve
- Ensuring financial stability
- Promoting inclusive and sustainable economic growth.

In addition to its traditional central banking roles, it actively promotes Financial Inclusion as a national development priority.

1.4 Detailed Overview of Financial Inclusion Department (FID)



Source: Designed by the author based on suggestions from the FID

Purpose and Strategic Importance

The Financial Inclusion Department (FID) plays a central role in expanding access to formal financial services across Bangladesh. Its core objective is to bring unbanked and underserved populations, specifically rural communities, women, low-income groups, and small entrepreneurs under the umbrella of the formal financial system.

Financial inclusion is viewed not merely as a banking expansion strategy but as a tool for,

- Poverty Reduction
- Economic empowerment
- Digital financial transformation
- Sustainable development

How the Financial Inclusion Department Works

FID works simultaneously in both policy-making and operations. It has two wings, one is the Financial Inclusion Wing and other one is the Supervision and Innovation Wing. It functions through regulatory circulars, refinance schemes, structured monitoring frameworks, and special targeted programs. Also, their work directly supports national goals of providing reduction, rural development, gender inclusion, and digital transformation.

1.4.1 No-Frill Account or RSMC (Refinance Scheme for Marginalized Communities)

One of the major initiatives under Bangladesh Bank's financial inclusion drive is the introduction of no-frill accounts.

Purpose;

- Provide low-cost banking access
- Simplify KYC requirements
- Encourage rural and low-income populations to enter formal banking.

These accounts typically;

- Require minimal initial deposit
- Have simplified documentation
- Allow receipt of government transfers and remittances.

Special variants include;

- Tk. 10 Farmer's Account.
- Tk. 100 Student's Account
- Tk. 50 small Entrepreneur Account.

These accounts significantly expanded former. Financial access among previously unbanked populations.

FID monitors:

- Number of No-Frill accounts opened
- Gender distribution
- Usage activity

1.4.2 Agent Banking Guidelines monitoring

Bangladesh Banking guidelines to expand banking services in rural and geographically remote areas.

Under this framework:

- Schedule banks appoint authorized agents.
- Agents provide deposit, withdrawal, remittance and limited loan services.
- Transactions are digitally connected to the parent branch.

FID oversees:

- Growth of agent outlets
- Volume of agent banking transactions
- Customer outreach in rural regions
- Compliance with operational risk guidelines.

Agent banking has become one of the most successful financial inclusion models in Bangladesh, even as of now 31 scheduled banks currently providing services to the rural unserved areas through agent banking.

1.4.3 BDT 750 Crore Refinance Scheme

Bangladesh Bank introduced a BDT 750 crore Refinance scheme aimed at supporting CMSMEs (cottage, micro, small, and medium enterprises).

Objective:

- Improve access to query for small businesses
- Support entrepreneurship development
- Enhance employment generation
- Proper gender proportion in entrepreneurs.

Under this scheme:

- Bangladesh Bank provides refinance facilities to commercial banks at 1% interest rate.
- Banks disperse loans to eligible CMSMEs at 9% maximum rate.
- Concessional interest rates are applied

FID monitors:

- Sectoral distribution
- Gender based landing
- Geographic allocation

The schemes play a crucial role in strengthening grassroots-level economic activity.

1.4.4 Mobile Financial Services and Digital Nano Loan (Digital Financial Inclusion)

Bangladesh Bank issued regulatory guidelines for mobile financial services to ensure safe and inclusive digital transactions. MFS platforms have expanded financial access by enabling:

- Person-to-person transfers
- Utility bill payments
- Government benefit disbursement
- Merchant payments

During and after the COVID-19 period, Digital transactions became essential for economic continuity.

Additionally, Bangladesh Bank introduced the Digital Nano Loan in 2021, to provide small-ticket instant loans through digital platforms.

Key features include;

- Small loan size
- Fast digital approval process
- Simplified credit assessment
- Targeted at underserved and new borrowers.

This initiative supported credit penetration while maintaining regulatory safeguards. FID plays a crucial supervisory role by monitoring transaction patterns, customer protection, compliance and outreach impact.

1.4.5 School banking scheme and literacy guidelines for all the banks and financial service institutions

The school banking scheme was introduced to promote financial literacy and early savings habits among the students. Under revised guidelines;

- The age eligibility limit was adjusted to allow broader student participation. Students till 25 years old can now open a student account and access the benefits.
- Simplified account opening procedures were introduced
- Guardian-linked oversight mechanism was strengthened till a specific age.

The objective is to create a financially aware future generation and promote long-term inclusion.

FID over here tracks:

- Number of school banking activities
- Deposit trends
- Institutional participation

This scheme aims at intergenerational financial inclusion.

The FID of Bangladesh Bank implements structured financial literacy guidelines requiring banks to conduct awareness programs on saving habits, responsible borrowing, digital transaction security and consumer rights. Special emphasis is placed on school-based financial literacy under the school banking scheme, where the students are introduced to basic banking concepts to build early saving behavior and long-term financial awareness.

At the global level, Bangladesh Bank's FID is an active member of the Alliance for Financial Inclusion (AFI) and aligns elements of its literacy and inclusion framework with principles promoted by the Organization for Economic Co-operation and Development (OECD). FID has received international recognition from AFI in 2024 and 2025.

For supervisory oversight FID applies the CAMELS rating framework known as Financial inclusion rating (FI rating) to internally assess the activities of individual banks in regards to financial literacy. Although these ratings remain confidential and are not publicly disclosed, they are critical in maintaining and monitoring the bank's operations constantly.

1.4.6 Novel Coronavirus Stimulus and Refinance Schemes

During the COVID-19 pandemic, multiple stimulus packages were implemented to sustain economic activity and to address the liquidity crisis in the post-pandemic period.

Major initiatives included:

- CMSME stimulus package (working capital support)
- Agricultural stimulus loans

- Export and free shipment credit support
- Digital disbursement of social safety net payments

These programs ensure that the small businesses, farmers and vulnerable groups of people continue to have access to formal credit during the crisis period. During this time, FID monitored this disbursement progress, inclusion coverage, rural outreach, and gender impact every quarter throughout the scheme period.

Monitoring and Data-Driven Policy Oversight

The financial engagement department operates through a structured reporting framework.

Commercial Banks submit:

- Quarterly financial inclusion data. A monthly basis update is required.
- Agent banking performance reports
- CMSME loan statistics
- Gender segregated lending data
- Digital transaction summaries.

FID complies with and analyzes this data to measure

- Breadth of outreach
- Depth of outreach
- Regional disparities
- Gender balance
- Policy effectiveness

This evidence-based approach allows Bangladesh Bank to revise policies dynamically and strengthen the inclusion mechanism.

1.5 Institutional Work Culture Observed During Internship

The financial inclusion department operates within a highly structured regulatory environment characterized by

- Formal circular issuance processes
- Hierarchical approval mechanisms
- Strong documentation culture
- Strict data confidentiality and Analytical performance evaluation

Chapter 2 About the Internship

2.1 Job position and Responsibilities

Intern- Financial Inclusion Department

Organization- Bangladesh Bank

Responsibilities:

During the internship period my responsibilities included,

- Assisting in data compilation related to financial inclusion indicators
- Reviewing policy circulars and regulatory guidelines
- Assisting in documentation and record management
- Conducting basic data analysis using Excel
- Observing inter-departmental coordination process
- Supporting preparation of reports on school banking accounts, no frill accounts, and street children accounts.

These responsibilities required analytical thinking, accuracy, and understanding of financial regulations.

2.2 Takeaways from this Position

The internship provided me with very strong exposure to policy level financial operations.

Practical understanding of financial inclusion

It helped in understanding how central bank policies translate into measurable outcomes, such as increasing bank accounts, growth in agent banking outlets, and an expansion of digital transactions.

Analytical skill development

Working with financial data improved skills

- Data interpretation
- Report preparation

- Excel based analysis
- Policy review

Institutional insight

The internship provided a clear understanding of:

- Regulatory frameworks
- Rule of supervision and monitoring, and how important it is
- Interactions between the central bank and commercial banks.

2.3 Relating Educational Learning to the Internship Role

Academic courses such as

- Corporate Finance
- Bank management
- Financial market and institutions
- Financial management
- Money and banking

directly supported internship activities.

Concepts such as financial intermediation, risk management, regulatory compliance and economic development were practically observed within Bangladesh Banks' operation.

The internship bridges theoretical knowledge with policy implementation experience.

Chapter 3 Self-Reflection

3.1 Feedback on Internship

Professional Work Environment

Bangladesh Bank maintains a disciplined and structured work environment. Office norms promote professionalism, punctuality, and strong ethical standards. The environment is extremely suitable specifically for working women, as it is safe, compassionate, and respectful.

Learning Oriented Atmosphere

The department allowed interns to observe real policy discussion and data analysis processes from each segment individually on a weekly routine basis. Guidance was provided when clarification was needed.

Areas of Limitation

Due to confidentiality policies, access to highly sensitive data was restricted. Additionally, as a large institution the work process was sometimes formal and bureaucratic which limited flexibility.

3.2 Suggestions for Improvement

- Clear task location schedule

A structured weekly or monthly task plan should be shared with interns at the beginning of the placement. This would help interns to understand what is expected of them. This will reduce confusion about their responsibilities and allow better time management throughout the internship.

- Regular feedback sessions

Supervisors should hold short but regular feedback meetings with the interns to discuss their progress, address challenges, and provide guidance. This would make interns feel heard and also help them to improve their work quality in real time rather than only receiving feedback at the end of the placement.

- More exposure to policy meetings (where possible)

Whenever possible, interns should be allowed to sit in or observe the internal policy discussions and departmental meetings. Even as silent observers they would be able to learn as this kind of exposure significantly impacts people's understanding on how to make decisions in a real institutional setting.

- Allowing more involvement with the departmental work process

Interns should be given more hands-on roles within the department rather than being limited to supporting tasks. Assigning them to specific ongoing projects and allowing them to contribute would bring out new ideas and fresh perspectives, also this would make their experience more meaningful and to build practical skills that are directly relevant to their academic and professional development

Chapter 4 Personal Development Plan

The long-term goal is to build a career in finance, banking regulation, or economical level policy analysis.

Short term Goals

1. Strengthened knowledge of monetary policy
2. Gain deeper knowledge of inclusive finance
3. Learn financial modeling basis

Medium Term Goals

1. Develop expertise in financial regulation
2. Gain deeper knowledge of inclusive finance
3. Improves research and report writing skills

Long Term Goals

1. Pursue professional certificates like CFA or FRM and a PhD.
2. Work in regulatory institutions like banks or policy research organizations
3. Build strong analytical and ethical decision-making capabilities.

Part B

Financial Inclusion through Agent Banking in Bangladesh: A Panel Data Analysis of Outreach Determinants

Abstract

Agent banking has quietly changed how millions of people in Bangladesh access their financial services. Since Bangladesh Bank officially launched it in 2013, banks have been using local shops and agents instead of building new branches to reach more unserved and underserved people in rural areas. By 2023, over 21 million accounts have been opened through this model, and the number keeps on growing. So, the real question is what makes some banks more efficient in reaching people through agent banking than others? This study tries to answer this question by using data from 30 commercial banks in Bangladesh over the time period of 2016 to 2024. It looks at six bank-level factors like bank size, tenure, agent density, operational efficiency, liquidity strategy, and credit risk, which affect the number of agent banking accounts a bank has. The data analysis was done using different descriptive, diagnostic and robust Fixed Effects regression model, to get reliable results. The findings show that bigger banks (higher total assets) and banks that have been in agent banking longer (tenure) tend to reach more people. In contrast, banks that stretch their lending are more relative to deposits (aggressive liquidity position) and eventually reach fewer people through agent banking. Interestingly, agent density, operational efficiency, and credit risk did not significantly affect the outreach once the other factors were accounted for. The findings assist policymakers and bank managers to showcase that scale and experience are the real engines behind agent banking growth in Bangladesh, and not just how many agents a bank deploys.

Chapter 1: Introduction

1.1 Background of the study

Agent banking, a form of branchless banking using retail outlets as banking agents which has emerged worldwide as a cost-effective way to bring financial services to the underserved populations (Ivatury and Mas, 2008; Kumar et al., 2006). The model structure is that banks delegate routine transactions like cash in, cash out, deposit, bill payments, account openings to local retailers leveraging existing mobile and retail infrastructure. Such branchless bank models can dramatically extend reach, for example Kenya's M-Pesa agent network grew rapidly and significantly increased their formal financial access (Jack & Suri, 2011). Similarly, Brazil's 'correspondent' (agent) banking model expanded substantially during the 2000s, reaching the remote communities and increasing their financial penetration (Kumar et al., 2006). Through tapping into the non-bank outlets and mobile technology, agent banking lowers delivery costs and widens the coverage far beyond the traditional branches (Ivatury and Mas, 2008). Moreover, agent banking represents an innovative financial inclusion tool that delivers services outside conventional branches using information technology and retail agents, which makes the formal financial services accessible to low-income, geographically dispersed customers (Ivatury and Mas, 2008). Thus, international development agencies and central banks in the emerging countries' economy have embraced agent networks as the key to inclusion.

Agent banking is especially relevant to the financial inclusion agenda in the emerging economies as it overcomes the traditional barriers of cost and distance (Ivatury and Mas, 2008). Many developing countries have large rural populations living far from branches, making branch-based banking uneconomical. Agent banking on the other hand, reduces the service delivery costs by shifting from fixed branch infrastructure to commission-based retail models (Kumar et al., 2006). International study confirms this cost advantage more specifically in India's Business Correspondent model in which transaction costs declined significantly (Reserve Bank of India; Kumar et al., 2006). By making this traditional cost outreach trade-off, agent models allowed banks to extend their services to the low-income, remote, and underserved clients who would be excluded otherwise.

In Bangladesh, agent banking was formally authorized in 2013 by Bangladesh Bank to address the rural financial access gap (Bangladesh Bank, 2013). The growth since then has been rapid, with all scheduled banks actively participating and agent outlets expanding nationwide. These have opened millions of deposit accounts and mobilized substantial deposits specifically among rural and female clients (Bangladesh Bank, 2024). The model explicitly targets the unbanked through the union level deployment. Based on Bangladesh Bank's (2013) observation, agent banking is a less costly mechanism for providing real time banking services to remote and underserved areas. These trends underscore that since the 2013 launch, agent banking has become one of the major components and tools for financial inclusion in the country.

Given the importance of agent banking for financial inclusion, it is crucial to understand why some banks expand their outreach more effectively. Despite its rapid expansion, the growth of agent banking has not been equally smooth across all banks. Recent developments suggest that sustaining further expansion may be increasingly challenging because of network slowdown, operational disruptions, and growing pressures related to cost, competition, and service delivery in underserved areas. In this context, bank size (total assets) reflects financial capacity and strategic flexibility. A resource-based view suggests that institutions with greater resources are better positioned to implement and sustain delivery innovations like agent banking (Barney, 1991). Additionally, agent density reflects network externalities in which a large service network increases people's accessibility and value (Katz and Shapiro, 1985).

Moreover, to evaluate the financial inclusion via agents, scholars focus on two core components of outreach dimensions; breadth and depth. Breadth of outreach captures the scale or reach of services which is typically measured by the number of active clients or accounts (Schreiner, 2002). Depth captures the poverty orientation of services and is often proxied by average loan or deposit size in which smaller balances indicate service to poorer clients (Schreiner, 2002; Armendáriz & Morduch, 2005). Together breadth and depth reflect two sides of inclusion. While both dimensions are conceptually important, this study focuses empirically on breadth as its primary outcome given the comprehensive account-level data available through Bangladesh Bank's quarterly reports.

Operational efficiency, calculated by the cost-to-income ratio affects sustainability. The microfinance literature documented a cost outreach trade-off in which serving poorer clients often leads to higher operating costs (Cull et al., 2007). For these reasons, more banks may scale outreach more sustainably.

Lastly asset quality, measured by the NPL ratio, reflects risk exposure. Under the credit rationing theory it says that banks which are facing higher risk become more conservative in lending which potentially restricts their services to marginal borrowers (Stiglitz and Weiss, 1981). Several empirical evidence on banking suggest that higher NPLs are associated with constrained credit expansion and more cautious outreach behavior.

Against this backdrop, this background establishes the context and motivation for our study. Agent banking has become a vital channel for reaching the underserved and unbanked population both globally and in Bangladesh. Measuring its breadth of outreach and understanding which bank level factors drive the outreach (size, tenure, agent density, operational efficiency, liquidity strategy, and credit risk) are crucial and theoretically grounded in establishing a banking and inclusion framework. These findings carry important policy implications for refining agent banking as a sustainable and scalable financial inclusion tool in Bangladesh.

1.2 Problem Statement

Since, Bangladesh Bank formally introduced the agent banking model in 2013, it has grown into one of the country's most important tools for reaching out to the people who were previously left out from the formal financial system. Based on the recent accounts, agent banking has opened over 21 million accounts with a strong presence in the rural and underserved areas. Also, among the female clients who had little to no prior access to banking services, that growth is real and it matters.

However, this growth has not been equally smooth across all the banks and recent developments suggest that expansion is becoming more and more difficult to sustain (Bangladesh Bank, 2025; The Financial Express, 2026). The slowdown in the number of agent outlets in recent years,

closures of some agent points, operational disruptions, and rising competition from other digital financial channels indicate that banks may differ in their ability to expand outreach depending on their internal characteristics (Uddin and Sultana, 2020). For example, larger banks may be better able to absorb the operational cost and invest in wider networks. While more experienced, banks may benefit from stronger tenure, marketing learning, and institutional trust. Likewise, differences in agent density may affect how deeply a bank can penetrate underserved areas, while operational inefficiency may weaken the sustainability of outreach. In the same way, liquidity strategy and credit risk may also shape expansion, since banks facing tighter liquidity conditions or higher exposure to risk may behave more cautiously in extending their agent banking services.

But behind those numbers lies a puzzle that has not been properly examined. As not all the banks are expending their agent banking outreach at the same space. Some banks have built large and active networks that genuinely reach the underserved people. While others have barely scratched the surface. What is the actual reason behind it? Is it about how big the bank is? Is it about how long it has been running the agent banking? How efficiently does it operate? Or is it something else like how the bank designs its liquidity strategy or manages its credit risk?

Until now, we do not have a clear, evidence-based answer to those questions, at least not for Bangladesh. Studies from other countries have pointed to factors like bank size, agent network density and operational efficiency as one of the most important drivers of their outreach (Uddin and Sultana, 2019; Cull et al., 2018). Most of this research only focused on the national picture or at the microfinance institutions but none of them had examined the individual commercial banks operating agent network in a specific context like Bangladesh. The methods that have been used in the earlier work mostly included cross-sectional snapshots and descriptive case studies which makes it even more difficult to say with confidence what is actually causing all of this.

Moreover, based on our literature survey, no study has yet brought all of the key factors together like bank size, tenure, agent density, operational efficiency, liquidity strategy, and credit exposure risk into a single model to see how they work together to shape the agent banking outreach. Without the complete picture, banks and regulators are left making choices based on partial evidence and intuition rather than robust findings.

Thus, this study is an attempt to see that by using bank level panel data from the Bangladesh Bank covering 2016 to 2024. It has built an unified framework to examine what actually drives the breadth of agent banking outreach among the commercial banks in Bangladesh and what that means for the future of financial inclusion in our country.

1.3 Research Questions

In light of the problem statement, the study therefore addresses the following research questions are as follows:

RQ 1: What is the current trend in the breadth of outreach in Bangladesh?

RQ 2: How do total assets, tenure, agent density, operational efficiency, liquidity strategy, and credit exposure risk influence the breadth of agent banking outreach in Bangladesh?

1.4 Research Objectives

Based on the above discussion of the problem statement and questions, the study aim to addresses the following objectives:

RO 1: To examine the breadth of agent banking outreach in Bangladesh.

RO 2: To analyze the effects of total assets, tenure, agent density, operational efficiency, liquidity strategy, and credit exposure risk on breadth of outreach in agent banking in Bangladesh.

1.5 Contributions of the Study

Prior work typically examined breadth (number of clients or accounts) in cross-sectional snapshots or descriptive case studies. This study aims to fill this gap in conducting a longitudinal analysis of the breadth of agent banking outreach in Bangladesh using a unified panel data framework. This study measures breadth as the total number of active agent banking accounts, following international microfinance and financial inclusion standards, and traces its evolution over 2016-2024 using bank-level panel data from Bangladesh Bank.

By 2023, agent networks in Bangladesh had amassed over 21.2 million Accounts with substantial rural deposits, underscoring the scale of outreach achieved through the agent model. Global experiences such as M-Pesa in Kenya, where more than 23,000 agents reached roughly 40% of the adults within four years, further illustrate how a dense agent network can dramatically accelerate financial inclusion (Jack and Suri, 2011). Situating Bangladesh within this broader evidence, the study provides systematic empirical documentation of how agent banking breadth has expanded over time.

Unlike earlier studies that focused on isolated factors, this study jointly incorporates multiple bank level drivers like total assets, tenure, and agent density alongside with operational efficiency, liquidity strategy, and credit risk in a single model. This integrated approach highlights how resources, scale, cost structures, and risk jointly shape the breadth of agent banking outreach. The analysis is grounded in Resource-Based View and Financial Intermediation Theory, linking bank capacity and intermediation efficiency to the ability to sustain and extend agent networks.

Methodologically, this study applies fixed effects panel regression with bank clustered robust standard errors and complements this with Driscoll-Kraay fixed effects estimates to address heteroskedasticity, serial correlation, and cross-sectional dependence. This offers more robust casual interference than prior cross-sectional approaches and provides new evidence on how efficiency and risk indicators are associated with the breadth of inclusion through agent banking. In doing so, the study addresses key theoretical and empirical gaps in the literature on financial inclusion and agent banking networks.

Chapter 2: Literature Review

Outreach is used to refer to the effort by financial institutions to extend banking services to an ever wider audience with breadth of outreach capturing the scale and reach of those outreach (Jonathan Conning, 1999).

2.1 Breadth of Outreach

The breadth of outreach is the number of clients banks can serve (Mark Schreiner, 2002). Agent banking, a type of branchless banking, has great potential to extend the distribution of financial services to poor people who are not reached by the traditional bank branch networks. It allows banks to maintain a delivery channel & give access to customers with banking services. Use of these third-party outlets that act as agents for financial service providers enable customers to perform functions that require their physical presence, like cash handling and customer due diligence for account opening (Ivatury et al. 2008). The indicator used to measure the breadth of outreach of agent banking is; total number of agent banking accounts. Out of many indicators total agent banking accounts aligns directly with established financial inclusion measurement standards. CGAP World Bank's framework defines outreach of breadth as “number of clients that are active at a given point in time specifically including depositors and savers alongside borrowers to capture the institution’s reach independent of loan portfolio constraints (Rosenberg, 2009). Lafoucade et al. (2005) operationalized breadth as the number of active clients which emphasized a cumulative metric suitable for deposit focused channels like agent banking. Bangladesh Bank reports 21.20 million agent banking accounts as the primary inclusion metrics and directly linking the account growth to geographic breadth in unbanked areas (Khan, 2025). Nigeria's CBN targeted agent account openings as breadth (proxy) where each account signifies one more financially included citizen. Mohamed and Elgammal (2024) used ‘number of active borrowers’ analogous to accounts as a social outreach breadth in branchless banking MFIs, confirming their scalability validity. Another international study linked deposit taking MFIs client numbers to greater breadth (Hartarska and Nadolnyak, 2007). Based on the findings, total agent banking accounts robustly measure breadth.

2.1.1 Relationship between Breadth of Outreach with Total Assets

Total assets, commonly used as a proxy for bank size, reflects an institution's financial strength, their operational capacity and ability to mobilize and allocate their resources effectively. In the context of agent banking, total assets indicate a banks 's capability to invest in technological infrastructure, agent recruitment, liquidity management, monitoring systems, and rural expansion. Larger banking systems are generally considered beneficial for financial inclusion because they support diverse financial instruments and delivery channels which are capable of serving broader population segments (Ozili, 2021). Even empirical evidence supports this association, for instance Nisha (2020) finds that agent banking significantly increases financial inclusion by expanding access to formal financial services, particularly rural areas, with outcomes largely dependent on network scale and geographic coverage. Although bank size is not directly measured, the expansion mechanisms identified; like technological innovation and investment in agent infrastructure implicitly requires substantial financial capacity. Kabir et al. (2024) similarly documented that the deployment of agent banking in Bangladesh enhances inclusion by expanding agent presence and service availability in rural areas. Mas and Radcliffe (2011) argued that branchless agent networks reduce the geographic barriers and extend formal banking services by going beyond its traditional branch models. Basically, reinforcing the importance of institutional scale in outreach expansion. Even though the studies do not directly estimate the effects of total assets, they collectively highlight the critical financial strength and instructions scale in influencing both of the outreach dimensions.

The relationship is theoretically grounded in the Resource-Based View (RBV) which was developed by Jay Barney (1991) which posits that firm performance is driven by valuable and strategically deployable resources. In banking, the total assets constitute a core financial resource that enhances institutional capability, technological investment capacity, and operational resilience. Empirical applications of RBV in the banking literature supports this reasoning. For example, a research by Allen Berger and Bouwman (2013) showcased that banks with stronger capital and asset bases are more resilient and better positioned to expand their operations and withstand any sort of risk exposure. Another similar study by Athanasoglou et al. (2005) found that bank specific characteristics, including size, significantly influenced performance and

efficiency. From the RBV perspective larger total assets provide the financial slack necessary to invest in agent banking infrastructure, digital platforms, monitoring systems, and liquidity management, thus facilitating both geographic expansion and sustained service provision to underserved clients.

The relationship is further supported by Financial Intermediation Theory brought by Douglas Diamond & Philip Dybvig (1983) which explain that Banks improve economic efficiency through liquidity, transformation and risk management. The theory also says that larger banks benefit from diversification advantages and greater funding stability also proved by a study which found that larger banks tend to exhibit stronger stability and profitability under certain regulatory conditions (Kunt et al. 2012). In the context of agent banking, scale efficiency enables larger banks to operate an extensive agent network profitably, even in geographically dispersed and low-income areas. Thereby, strengthening outreach breadth while maintaining affordable services that promote deeper financial inclusion. Based on the empirical evidences and theoretical findings, the hypothesis can be drawn as such;

H1: Total assets has a positive relationship with breadth of agent banking outreach.

2.1.2 Relationship between Breadth of Agent Banking Outreach with Tenure

Tenure is defined as the length of time agent banking has been operational. It is a critical determinant of outreach performance. As the agent banking system matures they accumulate operational experience, build institutional trust, strengthen agent capabilities and expand their geographic presence. With due time this maturity contributes to both the breadth of outreach through an increase in number of agents, accounts and geographic coverage. Since the introduction of agent banking in 2013 in Bangladesh there has been a consistent increase in accounts, deposits, and remittance flows indicating that longer operational tenure is associated with expansion in outreach scale and service penetration (Amir, 2021). When the tenure increases, service familiarity increases, operational challenges gradually become solvable and customer trust and confidence strengthens which creates a favorable situation for outreach growth. Empirical studies support the positive association between tenure and outreach outcomes. Evidence from rural India shows that

agent effectiveness, transaction and performance indicators improves as networks mature, suggesting the fact that long term tenure enhances operational stability and outreach (Gupta and Singh, 2013). Another Bangladeshi research indicates that as agent banking becomes more established service quality, agent competency and customer satisfaction increases significantly reinforcing the continuity and expansion of it over the time (Rifat, 2025). Similar findings revealed that better awareness and adoption over years of operation are associated with improvements in outreach confirming a positive relationship between tenure and account expansion (Barua, 2025). Bangladesh's central bank trend reports further revealed that agent outlets, transaction, and customer accounts have increased steadily since the launching of agent banking highlighting the argument that duration of operation improves outreach outcomes.

The positive association between the tenure of agent banking and outreach performance can be theoretically anchored in Financial Intermediation Theory which claims that banks exist to reduce information asymmetry, transaction costs and monitoring inefficiencies between savers and borrowers. As agent banking operation matures, banks accumulate borrower specific information, strengthen delegated monitoring mechanisms and improve liquidity management which mitigates adverse selection and moral hazard. Empirical application of this framework to financial inclusion is provided by Demirguc-Kunt (2017) who demonstrated that stronger bank based intermediation significantly enhances inclusion outcomes by expanding access and improving service penetration among the underserved populations which extends the logic to agent banking as longer operational tenure enhances intermediation efficiency, institutional credibility and relationship banking eventually facilitates geographic expansion and sustainable inclusion of lower income clients. Peterson Ozili (2023) in his Institutional Theory of Financial Inclusion argues that financial inclusion improves as regulatory quality, governance mechanism and institutional support evolves over the time which link to agent banking when its tenure increases, regulatory framework, customer protection systems and supervisory mechanisms become more defined eventually reducing participation barriers and increased outreach results. Collectively based on both empirical and theoretical evidence the hypothesis can be drawn as;

H2: Breadth of agent banking outreach has a positive relationship with tenure.

2.1.3 Relationship between Breadth of Outreach with Agent Density

Agent outlets represent the operational backbone of agent banking models, enabling banks to extend their services beyond traditional branch infrastructure and penetrate geographically underserved and dispersed areas. The density of agent outlets which is relative to branch networks are commonly expressed as agent density (agent outlets per branch). This captures the extent to which a bank can leverage the alternative banking channels to expand their outreach growth. Several evidence from Bangladesh highlights the rapid expansion of agent banking networks and their contribution to outreach growth, Uddin and Sultana (2019) reveal that a substantial increase in the number of agent outlets and associated accounts. Their findings revealed how expanding physical agent presence enabled Banks to rapidly increase their financial access into the previously unserved areas. Bangladesh Bank's quarterly report (Q3, 2023) and LAPO Nigeria case (IFC, 2020) both supported the fact that agent outlet function is 'network pillar' scaling the outreach, which facilitates geographic coverage and service penetration. To broaden the steady horizon Mas and Radcliffe (2011) claimed that expanding the agent networks allows the banks to overcome their geographic barriers and infrastructural constraints which are associated with branch-based banking also enabling both client reach and service availability. To support their study Mbugua (2024) qualitatively linked the growth of agent outlets to enhance breadth of outreach in Kenya, showcased that an increase in outlet density led to a greater customer access and network expansion. The relationship can be explained by several theoretical perspectives. Transaction Cost Theory introduced by Coase (1973) said that organizations adopt governance structure that minimizes their transaction and operational costs (Williamson, 1981). In financial services, traditional branch banking involves high fixed costs related to infrastructure, staffing and monitoring. In contrast agent banking relies on existing retail infrastructure significantly reducing service delivery costs. Ivatury and Mas (2008) argued that the branchless banking models dramatically lowered the cost of customer acquisition and transaction processing by leveraging retail agents instead of full service branches which makes outreach to low income and geographically remote clients economically sustainable. Additionally, lower transaction costs make it feasible for banks to serve customers whose small transaction sizes would otherwise be unprofitable.

The Agency Theory (Jensen & Meckling, 1976) also supports this relationship by conceptualizing agent banking as a principal agent arrangement. Banks (principals) delegate transactional services to contracted agents (agents) in doing so, reducing internal operational burdens and infrastructure costs. Also, the delegation improves efficiency and scalability by allowing banks to extend service points without proportionally increasing administrative overhead. Therefore, higher agent density strengthens behavioral engagement, increasing transaction frequency while attracting new users. Despite all the theoretical and empirical groundings, connecting the agent expansion with improved financial inclusion outcomes, limited empirical evidence directly examines how the agents' banking outlets per branch influences breadth of outreach in the Bangladesh context. To address this gap, the study proposes the following hypothesis;

H3: Agent density have a positive relationship with the breadth of outreach in agent banking

2.1.4 Relationship between Breadth of Outreach and Operational Efficiency

Bank efficiency, commonly measured by the cost to income ratio, reflects how effectively a bank converts operating expenses into income and is a critical determinant of the sustainability of agent banking operations. In the context of financial inclusion, maintaining efficiency while expanding outreach is essential because high operating costs can undermine long-term viability. The relationship between cost efficiency and outreach in financial inclusion represents a fundamental tension in development of finance which has critical implications for agent banking as an alternate delivery channel. Mohamed and Elgammal (2023) study was done through an international sample of MFIs which stated that increasing branches banking points of services is associated with productivity enhancement and improved social outreach; measured via number of active borrowers though this occurs at the expense of adverse profitability outcomes in the short-term. However, their study introduced quadratic specifications which unveiled a parabolic relationship between branchless banking adoption and MFIs profitability eventually indicating that a positive relationship exists between MFIs profitability with extensive branchless banking networks. The efficiency-outreach trade-off has been documented in broader microfinance literature. Hermes et. al (2011) with stochastic frontier analysis of 435 MFIs found that institutions with lower average

loan balances showcase lower cost efficiency because serving a financially excluded population inherently involves higher per unit transaction costs. This finding was backed up by another study done by Cull et al (2009) who used global data and demonstrated that high operation cost per unit loan enabled smaller loans to poorer borrowers.

The breadth cost relationship significantly exhibits a greater consistency across institutional contexts. Agent banking emerged as a technological institutional innovation specifically designed to relax the cost outreach constraint. The Central Bank of Kenya (2012) regarded the banking sector growth to adoption of cost-effective delivery channels, including the agent banking model because it enhanced access while enabling banks to push operational costs downwards (REPEC). Based on India's branchless banking program business correspondents accounted for 91% of banking outlets reported by March 2016 which represented a dynamic shift from just 51% in March 2010, demonstrating the scalability of the agent model (Vijayan et al. 2018). Most viability of agent banking depends on the transaction volumes as agents earn commission on every transaction, making a shift to bank-based welfare payments extremely important for enhancing the agent's earnings and making it profitable for them to visit the unserved areas regularly to serve both poor and non-poor households. Uddin and Sultana (2020) found that agent banking is growing as a cost-effective distribution channel for the banks in Bangladesh as well, with banks distribution channels going rapidly through modern technology while minimizing their cost up to 20% of branch equivalent expenses. However, this cost structure of agent networks requires extremely careful management while agent reduces the infrastructure cost but the fact that the commission-based model creates an ongoing variable costs.

Agency Theory explains how delegating banking services to commission-based agents can improve cost structure by converting fixed cost into variable cost while aligning incentives through monitoring mechanisms (Jensen and Meckling, 1976). Financial Intermediation Theory further supports this as efficient operations with lower cost-to-income ratios allow banks to serve a larger number of clients at lower marginal cost which is important for breadth of outreach. On the other hand, high operational costs increase the marginal cost of serving financially excluded operations which constraint outreach. Essentially, agent networks act as an intermediation mechanism by reducing per unit transaction costs, banks can perform the intermediation function more efficiently

which is consistent with FIT. Cull et al. (2009) demonstrated that lower operational efficiencies allow institutions to serve smaller loans to poorer clients which align with the FIT. Collectively the empirical and theoretical evidence suggests that broader outreach through scalable agent networks enhances operational efficiency. Based on this argument the following hypothesis is proposed;

H4: Operational efficiency has a negative relationship with breadth of outreach.

2.1.5 Relationship between Breadth of Outreach and Liquidity Strategy

The liquidity strategy of a bank represents a fundamental liquidity and lending intensity metric, which reveals institutional strategic priorities regarding resource allocation between deposit mobilization and credit extension with critical implications for the breadth of outreach in agent banking networks. High liquidity-oriented lending position indicates that banks may rely on non-deposit funding sources to support loan expansion, reflecting increased liquidity risk, as highlighted in the bank liquidity creation framework developed by Berger and Bouwman (2009). The theoretical linkage between liquidity strategy and outreach operates through competing resources allocation mechanisms. Institutions that are pursuing higher lending intensity always prioritize larger, less risky loans to optimize their return on their loan portfolio. Based on Hermes et al. (2011) revealed via stochastic frontier analysis that lower average loan balances reduce the efficiency, implying that liquidity strategies characterized by higher lending intensity favor larger loans that generate economies of scale. Latent class growth analysis of MFIS over 10 years found that the most useful strategy for achieving a self-sufficiency was improving efficiency by lowering their operating costs through derivating from the mission which was serving poor clients with larger loans, had a positive but small effect on self-sufficiency (Serrano-Cinca et. al 2023). This evidence demonstrated that leveraged growth and lending intensity allowed institutional expansion, but may shift outreach towards larger borrowers as institutions prioritize larger loans to manage their higher financial costs. Hartarska and Nadolnyak (2007) analyzed 114 MFIs from 62 countries which showed that less leverage MFIs achieved better operational self-sufficiency suggesting that institutions with higher leverage face pressure to adjust their outreach profile for financial sustainability.

Additionally, their study revealed that MFIs collecting savings reach more borrowers, indicating there may be indirect benefits from deposit mobilization which enables breadth of outreach, a finding directly relevant to the agent banking's deposit focused model. A report from Bangladesh Bank has revealed that agent banking showed extraordinarily low liquidity utilization levels (very low loan-to-deposit ratios) with deposits of BDT130.40 billion against their loan disbursements of only BDT1,086.95 million in September 2020 which is less than 1% LDR. The data suggested that the agent banking operation prioritizes deposit mobilization over credit extension, which fundamentally diverges from the traditional banking lending intensity patterns (Uddin and Nazrul, 2020). Another recent data from March 2021 shows that total deposit through agent banking at BDT 17,000 crore with loan displacement of only BDT 2,500 crore, representing a conservative liquidity strategy (LDR of 14.03%) with only 9 out of 27 agents operating banks having disbursed any loans. Remaining banks are reluctant to provide loans to SMEs through agent channels (Bangladesh Bank, 2021). International evidence reveals that increasing the branchless banking points of service improves social outreach which is measured as number of active borrowers by which the expansion simultaneously increases its average loan sizes and initially worsen the profitability before achieving the positive returns at scale (Abdulai and Tewari, 2017). The liquidity strategy outreach relationship exhibits complex and potentially non-linear dynamics. Different theoretical predictions grounded in Hartarska and Nadolnyak's (2007) finding that MFIs collecting savings reach more borrowers suggest that conservative liquidity strategies which emphasize deposit mobilization can support greater breadth, while high lending intensity may expand outreach and tilt it towards larger, more profitable borrowers.

Financial Intermediation Theory posits that banks exist to pool funds and reduce information asymmetries ultimately channeling deposits into loans (Allen & Santomero, 1997; Scholtens and van Wensveen, 2003). In agent banking this implies the bank must supply agents with cash and e-float so that they can mobilize deposits and extend their credit remotely. Scholtens and Wensveen emphasize that intermediaries "absorb risk on the scale required by the" by virtue of their diversified balance sheets, thus without adequate liquidity provision agents cannot serve customers consistently constraining breadth of outreach. The relationship can further be explained by trade-off theory of capital structure which claims that banks optimally balance funding for expansion

against distress costs; expanding the agent network raises expected returns (from additional deposits and fees) but also require more stable funding to back the float else insolvency risk arises (Beltrane, 2025). Similarly, risk return optimization aka Portfolio Theory treats agent outreach as an investment choice; banks expand until the marginal return on new agents (net of operational cost) equals the marginal liquidity risk, implying that riskier expansion must offer higher returns (Abensur & Carvalho, 2022). Cull et al. (2018) found that ‘effective liquidity management’ is strongly associated with higher transaction volumes supporting the empirical evidence. These theoretical and empirical insights lead to the following hypothesis;

H5: A more aggressive liquidity strategy in agent banking correlates with shallower breadth of outreach.

2.1.6 Relationship between Breadth of outreach and Credit Exposure Risk

Credit exposure risk represents loans where borrowers have failed to make the principal or interest payments for typically 90 days or more, directly reflecting the credit risk and asset quality which fundamentally constrains bank's lending capacity and outreach capabilities. Several theoretical and empirical literature studies reveal a complex bidirectional relationship between credit exposure risk and financial inclusion outcomes with critical implications for agent banking networks operating in high risk financially excluded markets (Cull et al. 2007) (Zhang et al. 2011) (Ozili, 2021). High credit exposure risk levels (High NPL ratios) signal impaired asset quality which constrains bank's willingness to extend their credit to riskier borrower segments including many of the low income and rural clients targeted by agent banking networks. Chen et. al (2018), analyzed 31 provinces in China from 2005 to 2006 by using panel data with fixed effects and the study revealed the significant negative impact relationship between inclusive finance and commercial banks non-performing loans after the financial crisis. The findings demonstrated that financial inclusion can effectively help commercial Banks maintain asset quality stability. The finding was supported by Zhang, Zhou and Zaidi (2022) by using panel data from 21 OECD countries with Driscoll-Kraay standard errors and found that higher NPL ratios impact financial inclusion negatively, through a long-term relationship, implying that banks with bad loans are less likely to engage in financial inclusion initiatives anytime soon. Ozili and Adamu (2021) examined

48 countries using fixed effect panel regression and found that the greater the financial inclusion in some contexts, increase NPLs demonstrating contextual heterogeneity in the credit exposure risk outreach relationship.

A study from China's financial inclusion program revealed that broader financial inclusion reduces commercial banks' non performing loans by enabling better risk by the distribution across diversified borrower segments (Chen et al, 2018). Morgan and Pontines (2018) reveal that lending to SMEs is considered a good financial inclusion improves the financial stability by reducing the NPLs and probability of default by financial institutions. Their findings suggest that serving more clients can enhance asset quality, but the agent banking context introduces distinction operation challenges that complicate their relationship. Agent banking is all about serving the rural low-income population with limited financial literacy and volatile income streams inherently which elevates the credit exposure risk. Recent evidence identifies financial inclusion as a double edged sword as it can reduce NPLs through better intermediation but may also increase NPLs when institutions expand rapidly into the previously unserved populations without adequate risk management. Research on microfinance institutions in Kenya where they used data from 2013 to 2017 and established that NPL ratio has a significant positive relationship with financial performance despite loans being the main income generating assets which suggests that institutions must carefully manage their NPL outreach trade-off (Kitonyi et al, 2019). The synthesis reveals that the relationship between credit exposure risk and outreach is contingent on the institutional capacity, regulatory environment and borrower characteristics. High NPL levels tend to constrain breadth by forcing banks to ration credit and retreat from riskier market segments, whereas well managed expansion supported by appropriate risk management systems can maintain acceptable NPL levels while allowing banks to extend services to more clients.

Some theoretical evidence can back this relationship for instance, Financial Intermediation Theory says that banks should intermediate funds by extending credit to promote growth but it warns that excessive lending can deteriorate asset quality resulting in higher non-performing loans. As NPL rises, banks tend to pull back and focus on stabilizing their balance sheets before pursuing further expansion (Ari et al. 2019). Moreover, Portfolio Risk Theory (Markowitz, 1952) suggested that diversification can reduce the overall risks to align this with agent banking; a high NPL portfolio

may compel banks to seek geographic or client type diversification or to favor lower risk exposure (Zamore et al. 2019). To sum all the empirical and theoretical findings it's evident that high credit exposure leads banks to moderate the breadth of agent banking outreach, whereas low NPL levels give banks greater latitude to extend services into new and more challenging markets. Based on the all of the findings and frameworks the study suggest the following hypothesis,

H6: Higher credit exposure risk (NPL ratio) in agent banking operations has a negative relationship with the breadth of outreach.

Chapter 3: Research Methodology

This chapter describes the empirical methodology to examine the determinants of breadth of outreach performance in agent banking in Bangladesh. The study investigates the impact of bank specific characteristics, operational efficiency, liquidity strategy, and credit risk on breadth of outreach. The chapter presents the research designs, data sources and samples, variables measurement, empirical model specification, data analysis techniques, and ethical considerations.

3.1 Research Design

This study employs a quantitative panel data analysis to examine the relationship between bank characteristics and agent banking outreach dimensions in Bangladesh. Panel data has been utilized because it enables analysis of both cross-sectional and time series variation across banks, effectively controlling for unobserved heterogeneity and providing robust causal interference.

3.2 Data Source and Samples

Secondary data is sourced from the Bangladesh Bank quarterly agent banking reports (2016Q1-2025Q4) and scheduled banks' financial statements. Bangladesh Bank publishes agent banking data on a quarterly basis. In this study, considered only the fourth quarter (Q4) observation for each year as the figures are cumulative and most accurately reflect each bank's full year position. This approach is consistent with established practice in banking panel studies where end to period values are preferred just to avoid within year seasonal fluctuations (Athanasoglou et al., 2005; Berger and Bouwman, 2013). The sample comprises 30 commercial banks actively operating agent banking services. The unbalanced panel data set spans 9 years from 2016 to 2024, yielding 270 bank-year observations depending on the variable availability.

3.3 Variables Measurement

Dependent Variable (Outreach Dimension)

Table 1: Dependent Variable

Outreach Dimension	Measurement	Source	Rational
Breadth	Total agent banking accounts (log)	Bangladesh Bank quarterly reports	Number of active accounts is the standard breadth indicator in financial inclusion measurement frameworks and is directly reported by Bangladesh Bank as the primary outreach metric.

Independent Variables

Table 2: Independent Variables

Variable	Measurement	Source	Expected Sign
Total Assets (TA)	Log of Total assets	Banks' financial statements	Positive (+) H1
Tenure (TEN)	Years since agent banking launch	Scheduled bank level data	Positive (+) H2
Agent Density (AD)	Agent outlets per branch	Bangladesh Bank quarterly reports	Positive (+) H3
Operational Efficiency (EFF)	Cost-to-Income ratio	Banks' financial statements	Negative (-) H4
Liquidity Strategy (LDR)	Loan-to-deposit ratio	Banks' financial statements	Negative (-) H5
Credit Risk (NPL)	NPL ratio	Banks' financial statements	Negative (-) H6

Control Variables

- Capital Adequacy Ratio: CAR growth (%)
- GDP growth: Annual Bangladesh GDP growth (%)
- Inflation: CPI inflation (%)

3.4 Empirical Model Specification

Model: Breadth of Outreach

$$BO_{it} = \beta_0 + \beta_1 TA_{it} + \beta_2 TEN_{it} + \beta_3 AD_{it} + \beta_4 EFF_{it} + \beta_5 LDR_{it} + \beta_6 NPL_{it} + \beta_7 CAR_{it} + \alpha_i + \lambda_t + \varepsilon_{it}$$

Where:

- i represents bank
- t represents time
- α_i captures unobserved time-invariant bank-specific fixed effects
- λ_t denotes year fixed effects.
- ε_{it} is the idiosyncratic error term
- TA stands for total assets
- TEN stands for tenure
- AD stands for agent outlets density
- EFF stands for operational efficiency
- LDR stands for liquidity strategy
- NPL stands for credit risk
- CAR stands for capital adequacy risk.

Capital adequacy ratio (CAR) is included as an explicit control variable. Inflation and GDP growth were excluded from the fixed effects specification as they are time-varying but cross-sectionally invariant macroeconomic variables that are fully absorbed by the year fixed effects (λ_t). They are however retained in the correlation analysis to assess their bivariate associations with the study variables.

Standard Errors are clustered at the bank level for two reasons. First, since each bank is observed over nine years, observations from the same bank are likely to be correlated with another over

time. Second, the sample period includes major shocks such as the COVID-19 pandemic and regulatory changes by Bangladesh Bank which may have affected the banks differently based on their size and network maturity. Clustering at the bank level corrects for these within bank dependencies and produces standard errors that are robust to both heteroscedasticity and serial correlation which enable reliable inference on the estimated coefficient.

3.5 Data Analysis Techniques

3.5.1 Descriptive Statistics

Descriptive statistics were used to summarize the characteristics of the variables. Mean, standard deviation, minimum and maximum values were computed to understand the distribution and validity of the data. This step provided an overview of the financial structure and outreach performance of the agent banking institutions.

3.5.2 Normality Test (Skewness and Kurtosis)

Skewness and kurtosis statistics were calculated to assess the distributional properties of the variables. The statistics indicated moderate departures from normality for some variables, which are acceptable for linear panel models mainly when robust standard errors are employed.

3.5.3 Correlation Analysis

Pearson correlation analysis was conducted to examine the direction and strength of association between variables and to detect potential multicollinearity issues.

3.5.4 Multicollinearity Test (VIF)

Variance Inflation Factor (VIF) was calculated to test multicollinearity among independent variables. A VIF value below 10 indicated absence of severe multicollinearity.

3.5.5 Fixed Effects and Random Effects Models

To account for the heterogeneity across banks both fixed effects (FE) and Random Effects (RE) models were estimated.

- The Fixed Effects model controls for time-invariant bank-specific characteristics
- The Random Effects model assumes that individual specific effects are randomly distributed and uncorrelated with the regressors.

3.5.6 Hausman Test

The Hausman specification test was conducted to determine whether the Fixed Effects or Random Effects model was more appropriate. A significant Hausman test result favoured the Fixed Effects estimator which indicates that unobserved bank specific effects are correlated with the explanatory variables.

3.5.7 Fixed Effects Regression with Cluster-Robust Standard Errors

Based on Hausman test results, the main empirical model is estimated using a Fixed Effects regression with bank-clustered robust standard errors. This approach exploits within bank variation over time, controls for unobserved time invariant bank characteristics, and corrects the standard errors for heteroskedasticity and within bank serial correlation. Year dummies are included to capture common macroeconomic and regulatory shocks.

3.5.8 Model Diagnostics and Robustness Check

To ensure the stability and reliability of the results, several diagnostic tests were performed. Firstly, a group-wise heteroscedasticity was tested using the Modified Wald test, which indicated significant heteroscedasticity across banks. Later on, Cross-sectional dependence was examined using the Pesaran CD test which confirmed correlated errors across banks. Also, Serial Correlation was assessed with the Wooldridge test for autocorrelation in panel data, which detected first-order serial correlation.

Given the joint presence of heteroscedasticity, cross-sectional dependence, and serial correlation, the Driscoll-Kraay Fixed Effects estimator was applied as a robustness check. This estimator produces standard errors that are robust to all three forms of dependence and was used to verify that the core Fixed Effects results are not sensitive to the choice of variance-covariance estimator.

3.6 Ethical Considerations

The study relied exclusively on public available secondary data. No confidential or personal data were used. All sources were properly acknowledged to ensure academic integrity.

Chapter 4 Findings and Discussion

The outcome of this study is presented in four distinct sections. The first section illustrates descriptive statistics and correlation analysis to provide an overview of the data characteristics and preliminary association among the variables. Subsequently, the second section discusses the diagnostic and model selection test including Hausman specification. The third section presents and interprets the main regression result based on the cluster-robust fixed effects model. Lastly, the fourth section discusses the robustness check through heteroskedasticity, cross-sectional, serial correlation and Driscoll–Kraay fixed effects estimation.

4.1 Descriptive Statistics

Table 3: Descriptive analysis

Variables	Obs	Mean	Std. Dev.	Min	Max	Skew	Kurt
Breadth	270	10.557	2.558	1.099	15.769	-.455	3.868
Total Assets	270	413000	405000	24730	2474863	2.592	10.773
Tenure	270	3.233	2.753	0	9	.444	2.04
Density	270	4.272	8.605	.007	51.562	3.612	17.027
Efficiency	270	267.892	3550.834	-101.43	58397	16.339	267.986
Liquidity	270	85.036	13.69	36.09	140.97	-.672	6.031
Credit Risk	270	7.789	11.045	0	90.72	4.66	30.231

Table 3 presents the descriptive statistics for all the variables across the sample size of 30 commercial banks operating agent banking services in Bangladesh over the period of 2016-2024 (N = 270 bank year observations). The variation in sample size reflects some missing agent banking data for certain banks in earlier years of the observation window, consistent with the staged rollout of agent banking operations.

The breadth of outreach has a mean of 10.557 (SD = 2.558) which is ranging from 1.099 to 15.769. The distribution is slightly negatively skewed -0.455 with kurtosis of 3.868 indicating a near normal distribution and confirming the appropriateness of the natural log transformation of total active agent banking accounts.

Among the independent variables, the total assets averages BDT 413,000 million (SD = 405,000) with strong positive skew of 2.592 and high kurtosis 10.773, reflecting the well-documented size concentration in Bangladesh's banking sector where a small number of large state-owned and private commercial banks dominate. Tenure ranges from 0 to 9 years (mean = 3.233 and SD = 2.753), consistent with the progressive entry of banks into the agent banking system since its formal introduction in 2013. The near-symmetric distribution skewness = 0.444 and kurtosis = 2.04 confirms adequate variation for the panel estimation. Agent outlet density averages 4.272 outlets by branch (SD = 8.605) with right skew 3.612 and high kurtosis 17.027, these indicate a small cluster of banks with highly developed agent networks alongside a majority operating at lower density. Operational efficiency measured by the cost-to-income ratio of banks exhibit an extreme distributional irregularity with mean = 267.892 and SD = 3,550.834 with skewness 16.339 and kurtosis 267.986, driven by outlier observations that inflate the upper tail. Liquidity strategy which is proxied by loan-to-deposit ratio has a mean of 85.036% and SD 13.69 with a mild negative skewness of -0.672 while credit exposure risk averages 7.79% (SD = 11.045) with noticeable right skew 4.66 and high kurtosis 30.231, which is consistent with the concentration of high NPL ratios among a subset of banks in Bangladesh.

4.2 Correlations Analysis

Table 4 reports the bivariate relationship with a Pearson correlation matrix. The correlation analysis reports pairwise Pearson correlation with exact p-values for all the studied variables. Two key patterns can be observed.

Table 4: Correlation analysis

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Breadth	1.000									
(2) Total assets	0.389*	1.000								
(3) Tenure	0.676*	0.208*	1.000							
(4) Density	0.573*	0.009	0.299*	1.000						
(5) Efficiency	0.025	0.017	0.017	-0.029	1.000					
(6) Liquidity	-0.151*	-0.245*	0.166*	-0.230*	-0.007	1.000				
(7) Credit Risk	0.053	0.290*	0.234*	-0.107	-0.019	0.043	1.000			
(8) CAR	-0.077	-0.305*	-0.106	-0.032	0.004	-0.005	-0.636*	1.000		
(9) Inflation	0.254*	0.224*	0.691*	0.037	-0.042	0.160*	0.357*	-0.172*	1.000	
(10) GDP	0.295*	0.248*	0.732*	0.073	0.042	0.178*	0.191*	-0.060	0.674*	1.000

Note: * $p < 0.05$. Figures in parentheses represent exact p-values

First, breadth of outreach is significantly and positively correlated with total assets ($r = 0.3895$), tenure ($r = 0.6761$) and agent outlet density ($r = 0.5734$) with all three having a p-value of less than 0.001. Breadth is negatively and significantly correlated with liquidity strategy ($r = -0.1509$, $p = 0.030$) which is consistent with H5. Efficiency ($r = 0.025$, $p = 0.7208$) and credit risk ($r = 0.0529$, $p = 0.449$) exhibit no significant bivariate relationship with breadth which provides an early indication of the null hypothesis confirmed in multivariate analysis.

Secondly, tenure is strongly correlated with inflation ($r = 0.691$, $p < 0.001$) and GDP growth ($r = 0.7316$, $p < 0.001$) both reflecting the macroeconomic expansion that coincided with the agent banking's scaling period. NPL ratio is strongly and negatively correlated with capital adequacy ratio ($r = -0.636$, $p < 0.001$) which is consistent with the theoretical link between asset quality deterioration and capital erosion. The potential multicollinearity implications of these inter-predictor correlations are formally assessed through VIF diagnostics below.

4.3 Multicollinearity Diagnostics

Table 5 shows the Multicollinearity that was assessed through Variance Inflation Factors (VIF).

Table 5: Multicollinearity Analysis

Variable	VIF	1/VIF
Tenure	2.330	0.430
Inflation	2.300	0.435
Credit Risk	2.260	0.442
GDP	2.150	0.464
CAR	2.050	0.487
Density	1.300	0.768
Total Assets	1.190	0.839
Liquidity	1.180	0.844
Efficiency	1.010	0.986
Mean VIF	1.750	

All VIF values fall well below the conventional threshold of 10 (Hair et al., 2019) which confirms the absence of severe multicollinearity. The highest VIF is recorded for tenure 2.330 followed by inflation 2.300, NPL ratio 2.260, GDP growth 2.150 and capital adequacy ratio 2.05. The mean VIF across the models is 1.75 and all the tolerance values (1/VIF) exceed 0.40. The result validates the simultaneous inclusion of all specified variables in the regression model without multicollinearity-induced coefficient instability.

4.4 Hausman Specification Test and Model Selection

Table 6: Hausman Test

Test	Chi-square	p-value	Decision
Hausman specification test	27.21	0.0072	Fixed Effects preferred

The Hausman (1978) specification test was conducted to select between the Fixed Effects and Random Effects estimators for the breadth of outreach. For the breadth model, the Hausman test yields $\chi^2(12) = 27.21$ ($p = 0.0072$), rejecting the null hypothesis that individual effects are uncorrelated with the regressors at the 1% significance level. Fixed Effects estimation is therefore the consistent and appropriate estimator for breadth because the unobserved time-invariant bank-specific characteristics are systematically correlated with the independent variables. This is theoretically consistent with the Resource-Based View, which says that the institutional capabilities driving agent banking breadth like brand recognition, branch networks, established agent relationships are precisely the time-invariant bank attitudes captured by fixed effects.

4.5 Regression Result

Table 7 presents the Breadth of outreach with the clustered FE model (Fixed Effects) with bank clustered standard errors (within $R^2 = 0.692$) results.

Table 7: Fixed Effect Regression Analysis

Breadth	Coef.	Std. Err.	t-value	p-value
Total assets	0	0	3.68	.001***
Tenure	.619	.072	8.55	.000***
Density	-.034	.023	-1.50	.144
Efficiency	0	0	-0.31	.757
Liquidity	-.038	.015	-2.49	.019**
Credit risk	.005	.008	0.56	.577
CAR	-.019	.028	-0.69	.495

Mean dependent variable	10.557	SD dependent variable	2.558
R-squared	0.692	Number of observations	270

*** $p < .01$, ** $p < .05$, * $p < .1$

4.5.1 Discussion on the Findings

Total asset ($p = 0.001$ at 5% significance level) is positively and significantly associated with breadth of outreach. Each unit increase in total assets (BDT million) is aligned with an increase in logged active agent accounts holding all the factors constant. While the coefficient is small in absolute terms. Therefore, it supports the hypothesis H1.

The findings describe that banks with greater financial resources can invest more extensively in agent recruitment, technology infrastructure, liquid provision and monitoring systems and this findings is consistent with the Financial Intermediation Theory (Diamond and Dybvig, 1983). This finding also support Ozili (2021) who argues that larger banking systems support broader financial inclusion by enabling diverse delivery channels and Kabir et al. (2024) from the Bangladesh context that agent banking development is driven by a bank's capacity to expand agent presence in rural areas which is a process that inherently demands balance sheet scale. Nisha (2020) similarly finds that agent banking's inclusion gains are largely dependent on the network investment capacity because it implicitly requires substantial financial resources. This evidence collectively confirms the Resource-Based view (Barney, 1991) which claims that firms with greater resources are better positioned to sustain delivery Innovations and that holds in Bangladesh's agent banking context as well.

Tenure ($p < 0.001$) is the single most powerful and precisely estimated predictor of breadth. Each additional year of agent banking operation is associated with a 0.619 unit increase in logged active accounts after controlling for bank fixed effects, year effects and all the other predictors. The 95% confidence interval of [0.471, 0.768] is entirely positive, supporting the H2 and notably tight, meaning that it underscores the precision of this estimation.

The findings support the Financial Intermediation Theory as the operational experience accumulates, banks progressively reduce information asymmetries with clients and agents, strengthen delegated monitoring mechanisms, and expand geographic coverage (Diamond and Dybvig, 1983). The strong within-bank effect has been identified through changes in tenure over time within the same bank. This rules out the possibility that this finding simply reflects pre-existing differences between early and late entrants. The finding is directly consistent with the Bangladeshi evidence of Rifat (2025) who finds that expansion over time leads to more established agent banking networks. Barua (2025) similarly reveals that better awareness and adoption over years of operation are associated with improvements in outreach indicators which confirms a positive relationship between tenure and breadth. Evidence from rural India further strengthens this pattern with Gupta and Singh (2013) demonstrating that agent effectiveness and performance indicators improves as networks mature eventually suggesting that longer operational tenure

enhances outreach stability across comparable emerging market contexts. At the institutional level Institutional Theory of Financial Inclusion argues that as regulatory frameworks, customer protection systems, and supervisory mechanisms become more defined over time, participation barriers reduce and outreach results increase this dynamic is clearly operative in Bangladesh's post 2013 agent banking rollout (Ozili, 2023).

Agent outlet density ($p = 0.144$) is not statistically significant in the fixed effects specifications. The negative point estimation even though not statistically significant is particularly striking given the strong positive bivariate correlation of $r = 0.573$ observed in Table 7. This sign reversal occurred because banks with more outlets per branch also tend to be larger and more established. Once the fixed effects model controls for these time invariant bank characteristics and tenure captures operational maturity, the additional marginal effect of outlet density on breadth disappears entirely. In other words, it is not outlet density itself driving breadth growth, but rather the underlying size and experience of the banks that density was previously proxying for in the unadjusted bivariate analysis. The finding rejects hypothesis 3.

Uddin and Sultana (2019) reveal that a substantial increase in the number of agent outlets is associated with rapidly increased financial access into the previously unserved areas in Bangladesh however, this evidence relies on cross-sectional and descriptive approaches that cannot isolate the within bank marginal effect of density after controlling for bank-level heterogeneity. Mas and Radcliffe (2011) similarly, argue that expanding agent network allows banks to overcome geographic barriers and infrastructural constraints associated with branch level banking while Mbugua (2024) qualitatively links growth in agent outlet density to enhanced breadth in Kenya. The divergence from these studies is attributable to methodological differences as the prior cross-sectional framework conflates institutional scale and maturity with outlet density effects, while the within-bank fixed effects identification employed here absorbs that heterogeneity and isolates the pure density contribution. Bangladesh Banks' quarterly data further suggest that for banks with more mature networks, adding further outlets yields diminishing gains in account breadth when once most reachable communities are already served the additional outlets attract few genuinely new customers. While Transaction Cost Theory (Coase, 1973; Williamson, 1981) predicts that more service points reduces access costs and expands outreach, it also assumes a straight line

relationship and does not account for the saturation point where geographic coverage is already extensive.

Operational Efficiency is not statistically significant and the coefficient is negligibly small based on the p value of 0.757 at 5% significant level. This null finding is consistent with the Bangladesh Bank agent banking context where cost-to-income ratio of the parent bank is insufficiently sensitive to agent channel expansion, as agent operations represent a relatively small portion of total banking activity for most institutions. The null finding (failed to reject the H4) is also consistent with the broader microfinance literature. Hermes et al. (2011) using the stochastic frontier analysis of 435 MFIs found that institutions with lower average loan balances serve more financially excluded populations and exhibit lower cost efficiency which indicates a direct efficiency outreach trade-off. Cull et al. (2009) similarly demonstrated using global MFI data that high operational cost per unit loan enables smaller loans to poorer borrowers, with profit maximizing institutions sacrificing depth for efficiency gains in a process formalized as 'mission drift'. Theoretically both Agency Theory (Jensen and Meckling, 1976) and Financial Intermediation Theory (Diamond and Dybvig, 1983) would predict that efficient institutions can serve more clients at lower marginal cost by expanding their breadth. However, another study by Uddin and Sultana (2020) document that agent banking in Bangladesh operates with a commission-based cost structure that is approximately 20% of equivalent branch expenses which effectively decouples agent channels from parent bank's overall cost to income ratio. The parent banks efficiency ratio is driven primarily by branch operations, staff expenses, and loan loss provisioning but none of which are directly sensitive to agent account expansion and these render the cost-to-income ratio uninformative as a within bank predictor of breadth in Bangladesh context. Branchless banking markets differ fundamentally from mature MFIs models partially matching with this divergence (Mohamed and Elgammal, 2023).

Liquidity strategy is negative and statistically significant at the 5% level with a p-value of 0.019. Banks with higher loan-to-deposit ratios indicate more aggressive lending relative to deposit mobilization which are associated with lower breadth of agent banking outreach. This result supports the H5 directly and is economically relevant within the Bangladesh context where agent banking is predominantly a deposit driven channel with sector wide loan to deposit

ratios historically below 1% as of September 2020 with a deposit of BDT 130.40 billion against loan disbursements of only BDT 1,086.95 million (Uddin and Nazrul, 2020). Only 9 out of 27 agents banking banks have distributed any loans as of March 2021 (Bangladesh Bank, 2021). Banks with existing high lending postures divert liquidity management attention and capital allocation away from agent banking expansion which constrains their geographic outreach. This finding is in line with a previous study of Hartarska and Nadolnyak (2007) who analyzed 114 MFIs from 62 countries and revealed that MFIs collecting savings reach more borrowers indicating that deposit mobilization strategies are structurally analogous to Bangladesh agent banking model which facilitates broader client reach. It also aligns with another study by Serrano-Cinca et al. (2023) whose latent class growth analysis of MFIs over 10 years find that leveraged, lending intensive strategies improve self-sufficiency but at the cost of serving poorer clients with larger loans this demonstrates that higher lending intensity compromises outreach of breadth as institutions drift toward larger and more profitable borrower segment. The Financial Intermediation Theory (Diamond and Dybvig, 1983) further support the findings as adequate liquidity to provision is a precondition for agents to consistently mobilize deposits and serve their customers and banks with high LDRs face competing demand for liquidity that constrain their ability to maintain this provision at scale.

Credit risk is also not statistically significant showing the p value of 0.577. The near-zero coefficient suggests that within-bank changes in NPL ratios over the sample period do not systematically constrain or expand agent banking outreach, and it failed to reject the null hypothesis (reject H6). The results directly contradict several studies, like Zhang et al. (2022), who used panel data from 21 OECD countries find that higher NPL ratios negatively impact financial inclusion through a long-term relationship which implies that banks with impaired loan portfolios are less likely to engage in inclusion initiatives. Ozili and Adamu (2021) examined 48 countries using fixed effects panel regression and also found contextual evidence linking credit risk exposure to constrained outreach. The credit rationing prediction of Stiglitz and Weiss (1981) would similarly expect that banks facing higher NPLs become conservative and restrict services to marginal borrowers which includes agent banking clients as well. However, the null finding is explained by the structural installation of agent banking operations from traditional lending portfolios in Bangladesh in which agent channels are primarily used for deposit mobilization and

remittances rather than credit delivery. As the NPL ratio reflects exposure from the bank's lending book and within-bank increases in NPL, there is no direct transmission pathway to agent account expansion since agent operations are not credit financed and do not compete with the lending for capital attention. These findings highlight the fact that credit risk-based theories of outreach constraint which are derived predominantly from the MFI models, require careful contextual adjustment when applied to Bangladesh's deposit-focused agent banking model.

Capital adequacy ratio is not significant as well, indicating that regulatory capital buffers do not independently drive agent outreach variation within the sample after controlling for other bank characteristics with a p-value of 0.495.

The overall model fit is very strong and it is within the R^2 of 0.692 which indicates that the specification explains 69.2% of the within-bank variation in breadth over the time and the F-statistic ($F= 2,664.93$, $p < 0.001$) is highly significant, confirming that bank-specific effects contribute meaningfully to breadth variation.

Table 8: Summary table (Expected and Actual result comparison)

Variable	Expected Sign	Actual Sign
Total Assets	Positive (+)	Supported
Tenure	Positive (+)	Supported
Density	Positive (+)	Rejected
Efficiency	Negative (-)	Rejected
Liquidity	Negative (-)	Supported
Credit Risk	Negative (-)	Rejected

4.6 Model Diagnostics and Robustness Check

Although the main fixed Effects model with cluster robust standard errors addresses within bank heteroskedasticity and serial correlation, a panel covering 30 Banks over nine years may carry additional violations that this estimator does not fully correct for. Three formal diagnostic tests were therefore conducted to check for group wise heteroscedasticity, cross-sectional dependence and serial correlation. Since all three violations were confirmed simultaneously and the cluster robust estimator does not address cross-sectional dependence, a robustness check using the Driscoll-Kraay fixed effects estimator was applied as it simultaneously corrects for all three conditions.

4.6.1 Modified Wald Test

Table 9: Heteroskedasticity Test

Test	Statistic	p-value	Decision	Implication
Modified Wald Test (Heteroskedasticity)	$\chi^2(30)=$ 1457.88	0.0000	Reject H_0	Groupwise heteroskedasticity present

The Modified Wald Test for groupwise heteroskedasticity yields a chi-squared statistic of 1457.88 ($p = 0.000$) which leads to the rejection of the null hypothesis of homoskedasticity at the 1% significance level. This confirmed the presence of groupwise heteroskedasticity across the 30 sampled banks which indicates that the variance of error terms differs significantly across the cross-sectional units. This finding is consistent with the inherent size heterogeneity among Bangladeshi banks where the large state-owned banks and small private banks co-exist in the panel which naturally produce an unequal error variances (Uddin and Sultana, 2020).

4.6.2 Pesaran CD Test

Table 10: Cross-sectional Dependence

Test	Statistic	p-value	Decision	Implication
Pesaran CD test (Cross-sectional Dependence)	CD = -3.713	0.0002	Reject H_0	Cross-sectional dependence exists

The Pesaran CD test yields a statistic of -3.713 ($p = 0.0002$), eventually rejecting the null hypothesis of cross-sectional dependence at 1% significance level. The average absolute pairwise correlation of 0.575 confirms that common macroeconomic shocks and Bangladesh Bank regulatory changes affect multiple banks simultaneously, which is consistent with Ozili's (2023) Institutional Theory of Financial Inclusion.

4.6.3 Wooldridge Test

Table 9: Serial Correlation

Test	Statistic	p-value	Decision	Implication
Wooldridge (Serial Correlation)	$F(1, 29) = 196.778$	0.0000	Reject H_0	Serial correlation present

The Wooldridge test for autocorrelation yields $F(1, 29) = 196.778$ ($p = 0.000$) confirming the presence of first order serial correlation. This is economically intuitive as agent banking outreach is a cumulative process where account growth in one year compounds into further growth the following year consistent with the tenure argument of Rifat (2025) and Barua (2025).

4.6.4 Driscoll–Kraay Fixed Effects Estimation

Due to the above discussed diagnostics tests, this study conducted the Driscoll-Kraay Fixed Effect as follows;

Table 11: The Driscoll-Kraay Fixed Effects Test

Breadth	Coefficient	DK Std. Error	t	P > t
Total Assets	0.000	0.000	1.850	0.101
Tenure	0.619	0.071	8.740	0.000
Density	-0.034	0.008	-4.090	0.003
Efficiency	-0.000	0.000	-0.200	0.850
Liquidity	-0.038	0.010	-3.800	0.005
Credit Risk	0.005	0.004	1.270	0.241
CAR	-0.019	0.019	-1.010	0.343

The Driscoll-Kraay results are largely consistent with the main model confirming that the core findings are robust to the choice of standard error correction. Tenure ($\beta = 0.619$, $p < 0.01$) remains the strongest positive predictor with an identical coefficient to the main model, validating H2 and aligning with Rifat (2025) and Gupta and Singh (2013). Liquidity ($\beta = -0.038$, $p < 0.01$) retains its negative and significant effect validating H5 and remaining consistent with Hartarska and Nadolnyak (2007) and the deposit-focused nature of Bangladesh's agent banking sector (Uddin and Nazrul, 2020).

Outlet density ($\beta = -0.034$, $p = 0.003$) became statistically significant under Driscoll-Kraay whereas it was insignificant under the main model. The direction remains negative in both

specifications, which further reinforces the rejection of H3. The gain in significance suggests that inflated standard errors from unaddressed cross-sectional independence has suppressed the effect in the main model. This continues to stand in contrast with Uddin and Sultana (2019) and Radcliffe (2011) whose cross-sectional frameworks cannot isolate the within-bank marginal effect of density.

Total assets lose significance under the Driscoll-Kraay ($p = 0.101$) though the coefficient direction and magnitude remain unchanged. Suggesting that the asset breadth relationship is positive but partially driven by common time trends across larger banks rather than a purely within-bank dynamic. Efficiency ($p = 0.850$) and Credit risk ($p = 0.241$) remain insignificant across both estimators confirming the null findings for H4 and H6. The within R^2 of 0.6916 is preserved confirming that the model's explanatory power is stable across specifications.

Chapter 5 Implications and Recommendations

5.1 Implications and Policy Recommendation for the Regulatory Body and Commercial Banks

Help Smaller Banks Use Shared Agent Networks

This study shows that larger banks have a strong advantage in expanding agent banking as they have more assets and resources. To reduce this gap, Bangladesh Bank can update its agent banking guidelines so that smaller banks are allowed to use existing agent networks of larger banks under a formal sharing arrangement instead of building separate networks from scratch. Brazil provides a strong example for it. Through its correspondent banking model banks partnered with retail outlets to reach every municipality in the country and by the late 2000s all 5,564 municipalities had at least one access point. About one quarter of the people were served through correspondents (Kumar et al., 2006; Dvara Research, 2024). Recently in Uganda, FINCA and Centenary Bank signed a bilateral agreement to share one agent network under the Scale2Save program which proves that even competing banks can successfully share agent infrastructure when the framework is clear (WSBI, 2021; Nyamu 2021). Bangladesh Bank can build on these lessons by setting standard rules for interoperability, risk sharing, and customer protection in shared-agent arrangements.

Introduce a Tiered System That Rewards Long-Running Agent Banking

The result of this study shows that tenure, meaning how long a bank has been operating as an agent banking is the most powerful driver of outreach. This means policy should encourage banks and agents to stay in the system for many years, not just expand quickly in the short term. A practical way to do this is a three-level (tiered) system where permissions and services expand as banks and their agents remain active and compliant over time.

Early Stage (Year 1-2); banks and agents will be offering basic services like deposits, withdrawals, remittances, and account opening. This is the starting point for a new entrance similar to the current practice in Bangladesh.

Established (Year 3-5); after at least three years of continuous operations and meeting minimum activity and compliance standards, banks will automatically qualify for a wider menu like utility

bill payments, microfinance sign-ups, higher transaction limits, and improved commission packages for agents.

Established (Year 6 and beyond); banks and agents with six or more years of clean operation will receive the broadest permissions, such as microcredit disbursements, pension and social protection enrollment and full handling of government-to-person payments. These agents can be treated as the functional equivalent of small branches for reporting purposes.

India's experience supports this suggestion too as the Reserve Bank of India's National Strategy for Financial Inclusion treats Business Correspondents as a key 'frontline' channel and allows long-standing, fixed point BC outlets to be recognized similarly to branches in some respects (Reserve Bank of India, 2019). Recent updates to the BC framework also emphasize agent training, certification, and performance-based remuneration, rewarding continuity and service quality rather than what transaction counts (Economic Times BFSI, 2026). A similar tiered approach in Bangladesh, anchored in Institutional Theory (Ozili, 2023) which would convert long-term commitment into a concrete regulatory and commercial advantage.

Consider setting Minimum Liquidity and Float Standards for Agent

A negative link between a high loan-to-deposit ratio and outreach breadth points to a recurring operational challenge because when agents run out of cash, or e-float customers cannot complete transactions and gradually stop using the service. One way to address this could be to introduce minimum liquidity guidelines for agents' operations, like a suggested minimum float level relative to average daily transactions and basic documentation of how banks plan to keep agents funded during their busy periods.

MicroSave Consulting's research across Ghana, Tanzania, Zambia and Senegal found that liquidity shortages are the most common cause of agent downtime and that predictive monitoring and master-agent oversight can meaningfully reduce this problem (Njeru et al., 2018). Studies from Kenya similarly suggest that agents' ability to mobilize deposits is closely linked to having reliable cash and e-float available (Olwande and Katanja, 2015). Even light-touch guidelines in this area which are grounded in bank liquidity management principles, could help close a gap that currently limits outreach in practice (Berger and Bouwman, 2009; Abensur and de Carvalho, 2022).

Consider Reviewing How NPL-Related Rules Apply to Agent Banking

The result this study shows that a bank's NPL ratio has no significant effect on its agent banking outreach, which is very consistent with the deposit led nature of the channel. As of 2021, agent banking in Bangladesh carried a LDR of just 14% and most banks were not distributing loans through agents at all (Bangladesh Bank, 2021; Uddin and Nazrul, 2020). Based on this, it may be worth examining whether blanket restrictions tied to NPL levels are appropriate for a channel that is functionally separate from a bank's lending operations.

Stiglitz and Weiss (1981) explain why high NPLs make banks cautious about extending their credit but this logic doesn't straightforwardly extend to deposit-taking or remittance services. Evidence from the Democratic Republic of Congo suggests that agent banking was able to expand outreach even within a financially fragile sector with elevated NPLs (Cull et al., 2018). Revising how prudential use applies to deposit-focused agent channels could be a useful step towards allowing more banks to participate in outreach without compromising financial stability.

Consider Shifting Reporting Focus from Outlet Counts to Active Account Use

The weak and sometimes negative effect of agent density suggests that operating more outlets in areas that are already covered may add limited value. Much of what passes for outreach growth in mature networks may reflect the opening of dormant accounts rather than meaningful financial engagement. One option worth considering is to gradually incorporate active account metrics, such as share of accounts with at least one transaction in 90 days or average transaction frequency, along with the current outlet count indicators.

India's Business Correspondent (BC) experience offers a useful reference point in this regard. BC outlets group increased from 51% to 91% of all banking outlets between 2010 and 2016. CGAP (The Consultative Group to Assist the Poorest) noted that account usage remained low because incentives focused on account opening rather than ongoing engagement (Chen, 2013). A gradual shift in measurement, even beginning with a pilot reporting category, could encourage commercial banks to redesign their agent incentives around active use rather than sign-ups, bringing Bangladesh closer to the global definition of meaningful inclusion (Schreiner, 2002; Rosenberg, 2009).

Chapter: 6 Conclusion

This study examined the determinants of agent banking outreach breadth among commercial banks in Bangladesh using a unbalanced panel data set of 30 banks over the period of 2016-2024, drawing on 270 bank year observations sourced from Bangladesh Bank quarterly agent banking reports and individual bank financial statements. Employing fixed effects panel regression model with bank clustered robust standard errors validated through a significant Hausman specification test and confirmed by Driscoll-Kraay fixed effects estimation that simultaneously corrects for groupwise heteroskedasticity, cross-sectional dependence, and serial correlation. This study provides a methodologically rigorous account of what drives the scale of agent banking inclusion in an emerging market context.

The empirical findings reveal detailed and theoretically grounded patterns. Of the six hypothesized determinants total asset (H1) and tenure (H2) emerge as positive and significant predictors of breadth, while liquidity strategy proxied by the loan-to-deposit ratio (H5) exerts a significant negative effect. Agent outlet density (H3), operational efficiency (H4), and credit exposure (H6) do not yield statistically significant effects in the main fixed effects signification. Though density archives significance under Driscoll-Kraay estimation with a consistently negative direction, reinforcing the rejection of H3 in both models.

The findings indicate that institutional scale (total assets) and operational maturity (tenure) are the twin engines of the breadth of outreach by agents in Bangladesh. Larger banks have more resources to invest in their recruitment, digital infrastructure, geographic expansion and tenure turns out to be the only significant predictor that accumulated institutional knowledge, trust, and progressive network growth over time, driving meaningful outreach. The liquidity strategy is also important, as banks with higher lending intensity divert attention and their capital away from the agent channel expansion, constraining their ability to keep agents funded and operational. Surprisingly, the density of outlets, operational efficiency and credit risk did not have any significant impact in the fixed effects framework. The increase in temporal trend since 2018 with the most dramatic increase in 2021 further signals the presence of external shocks like the COVID-19 pandemic which put structural turning points in outreach that cannot be justified by bank-level factors alone. Collectively, these results offer a comprehensive empirical response to the research questions of the study by demonstrating that Bangladesh agent banking sector sustainable outreach breadth is

constructed by scaling, experience and deposit-based liquidity management and not by outlet growth or cost-efficiency.

Despite the useful findings of this study, it has quite a few important limitations. As the analysis relies on bank-level aggregate data from Bangladesh Bank quarterly reports converted to yearly reports, individual account-level details like client income, gender, or exact geographic location could not be observed. This study was also unable to empirically examine the depth of outreach, which was intended to be measured using the average deposit balance per account. Severe non-normality in the available depth variable and the absence of disaggregated account-level data made robust estimation unfeasible within the scope of this study. Since the scale of outreach alone does not confirm that the poorest clients are being served, future research should address this gap by incorporating account-level data. Additionally, while fixed effects estimation controls for many unobserved bank characteristics, the possibility of reverse causality cannot be entirely ruled out. Future research could also address these gaps by applying a dynamic panel model to better capture causal direction.

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Appendix I

Internship Proposal Form

CS003



INTERNSHIP PROPOSAL FORM

Name:	Nazia Azra Indika
ID:	221011068
Department:	ULAB School of Business (USB)
Supervisor's Name (Faculty):	Dr. Shamsuddin Ahamad
Organization Name:	Bangladesh Bank
Internship Title:	Financial Inclusion through Agent Banking in Bangladesh: A Panel Data Analysis of Outreach Determinants

Student's signature & date
(29/01/2026)

Supervisor's signature & date
(29/01/2026)

(Submit your Research Proposal to your Supervisor for approval)

LETTER OF TRANSMITTAL

April 19, 2026.

Nazia Azra Indika

Cell: +8801773503307,

Email: nazia.azra.bba@ulab.edu.bd

Dr. Shamsuddin Ahamad

Associate Professor & Director, Graduate Business Program

School of Business

University of Liberal Arts Bangladesh (ULAB)

Mohammadpur, Dhaka 1207.

Dear Sir,

Subject: Submission of Internship Proposal.

Please find attached herewith the proposal for an internship in partial fulfillment of the requirement for a Bachelor's of Business Administration (BBA) at Bangladesh Bank, Motijheel Dhaka, from 8 January, 2026.

Sincerely yours,

Nazia Azra Indika

ID: 221011068

BBA Program

School of Business

University of Liberal Arts Bangladesh

Timeline:

Serial	Activity	Weeks											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Consultation with Supervisors	√	√	√	√	√	√	√	√	√	√	√	√
2	Secondary Data Collection		√	√	√								
3	Services Record Collection					√	√	√	√	√	√		
4	Data Analysis								√	√			
5	Draft Report Writing										√		
6	Final Report Writing											√	
7	Report Submission												√

Nazia Azra Indika

ID: 221011068

Appendix II

Internship Appointment Letter

ইন্টার্নশিপ অ্যাসাইনমেন্ট-২
 (ট্রেনিং এন্ড ডেভেলপমেন্ট উইথ)

পূর্ববর্তী পাতার পর:

-২২-

ইন্টার্নশিপের স্পেসিফিক ও ইন্টার্নশিপ প্রোগ্রামের সুপারভাইজার মনোনয়ন প্রদান প্রসঙ্গে।

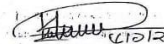
৮. পূর্ববর্তী পাতায় ডেপুটি গভর্নর মহোদয়ের ০৫/০১/২০২৬ তারিখের অনুমোদনক্রমে জানুয়ারি-মার্চ, ২০২৬ ট্রেনিংয়ে বিভিন্ন বিশ্ববিদ্যালয়ের পরিশিষ্ট-খ এ বর্ণিত ২৪ জন শিক্ষার্থীকে বাংলাদেশ ব্যাংকের প্রধান কার্যালয়ে ইন্টার্নশিপ প্রোগ্রামে অংশগ্রহণের অনুমতি দেয়া হয়। এক্ষেত্রে, শিক্ষার্থীদের ব্যবহারিক জ্ঞান ও দক্ষতা বৃদ্ধির লক্ষ্যে তাদের বিশ্ববিদ্যালয়ে পঠিত বিষয়ের সাথে সরাসরিভাবে যুক্তিযুক্ত বিভাগে স্পেসিফিক প্রদান করা সমীচীন হবে। এক্ষেত্রে, তাদেরকে প্রধান কার্যালয়ের বিভিন্ন ডিপার্টমেন্টসমূহে (পরিশিষ্ট-খ মোতাবেক) ইন্টার্নশিপের জন্য স্পেসিফিক প্রদান করা যেতে পারে।

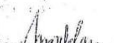
৯. এনভায়রনমেন্ট নিম্নলিখিত সিদ্ধান্তসমূহ গ্রহণ করা যেতে পারে:

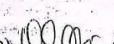
- উপরোক্ত ছকে উল্লিখিত ২৪ জন শিক্ষার্থীকে পরিশিষ্ট-খ এ তাদের নামের পাশে বর্ণিত ডিপার্টমেন্টে জানুয়ারি-মার্চ, ২০২৬ মেয়াদে ইন্টার্নশিপ করার অনুমতি প্রদান;
- ইন্টার্নশিপের সার্বিক তত্ত্বাবধানের নিমিত্ত সুপারভাইজার নিয়োগের জন্য সংশ্লিষ্ট ডিপার্টমেন্টসমূহ হতে ১ জন করে সুপারভাইজার (সুপারভাইজার বা তদুপরি পর্যায়ের) নিয়োগের জন্য অনুরোধ জানানো;
- ইন্টার্নশিপ শেষে প্রস্তুতকৃত রিপোর্টের হার্ডকপি সুপারভাইজারের অনুমোদনক্রমে এ ডিপার্টমেন্টে (ট্রেনিং এন্ড ডেভেলপমেন্ট উইথ) এবং সফট কপি ই-মেইলে (training.hrd@bb.org.bd) প্রেরণের জন্য শিক্ষার্থীদেরকে নির্দেশনা দেয়া;
- ইন্টার্নশিপকে বাংলাদেশ ব্যাংক লাইব্রেরির সুবিধাসমূহ ও ব্যবহারবিধি সম্পর্কে সম্যক ধারণা প্রদানের জন্য ০৮ জানুয়ারি, ২০২৬ তারিখে একটি Orientation Program আয়োজনের নিমিত্ত নির্বাচিত ইন্টার্নশিপের ডায়ালগ লাইব্রেরিতে প্রেরণ;
- ০৮ জানুয়ারি, ২০২৬ থেকে ৩ মাস মেয়াদে ইন্টার্নশিপের অনুষ্ঠান অগ্রাহ্যী ভিত্তিতে আইডি কার্ড ইস্যুর জন্য বেনিফিটস এন্ড এডমিনিস্ট্রেশন উইথ-কে অনুরোধ জানানো।

১০. সদয় অনুমোদনের জন্য উপস্থাপন করা হলো:


 উপপরিচালক
 (অতিরিক্ত রায় নদী)
 ০৬/০১/২০২৬


 (শাহাবুদ্দিন আব্দুল)
 সহকারী পরিচালক
 আইপি ফোন: ২১৩৬৯


 অতিরিক্ত পরিচালক
 (মোহাম্মদ আভাউর রহমান খান)
 ০৬/০১/২০২৬


 পরিচালক (এইডআরডি-২)
 (নাসিমা সুজতান)
 ০৬/০১/২০২৬

বাংলাদেশ ব্যাংক
 প্রধান কার্যালয়, ঢাকা
 ফাইন্যান্সিয়াল ইন্টার্নশিপ ডিপার্টমেন্ট
08 JAN 2026
 অতিরিক্ত পরিচালক-১/২/৩/৪/৫/৬
 ডায়েরী নং: ০৬/০১/২০২৬
 তারিখ: ০৬/০১/২০২৬



সূত্র নং-এইডআরডি-২/উপি/১০৬/১৬-১২৩

তারিখ: ০৬/০১/২০২৬

১. পরিচালক, ইন্টার্নশিপ ডিপার্টমেন্ট-১/ ইন্টার্নশিপ ডিপার্টমেন্ট-২/ বা অন্য কোনও ডিপার্টমেন্ট/ বনিতারি পরিচালক ডিপার্টমেন্ট/ ফাইন্যান্সিয়াল ইন্টার্নশিপ ডিপার্টমেন্ট/ একাউন্টস এন্ড ব্যাংকিং ডিপার্টমেন্ট/ ফরেন এক্সচেঞ্জ পলিসি ডিপার্টমেন্ট/ এসএমই এন্ড স্পেশাল প্রোগ্রাম ডিপার্টমেন্ট, বাংলাদেশ ব্যাংক, প্রধান কার্যালয়, ঢাকা।

২. পরিচালক (শাইব্রেরি), গবেষণা বিভাগ (শাইব্রেরি), বাংলাদেশ ব্যাংক, প্রধান কার্যালয়, ঢাকা।

১১১ - ১১

বিজ্ঞান বিভাগে ভর্তি হইবে-২
(ক্রমিক ও ভর্তি নম্বর উইং)

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