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Does Priority Sector Lending Affect Banks' Financial Performance?

- Tofayel Ahmed[*]
- Rajib Kumar Das[**]

Abstract

The study investigates the impact of Priority Sector Lending (PSL) on the financial performance of 31 banks operating in Bangladesh from 2012 to 2021. Out of 31 banks, the study includes 27 Private Commercial Banks (PCBs) and 4 State Owned Commercial Banks (SOCBs). Banks' lending for agricultural sectors and Cottage, Micro, Small and Medium Enterprises (CMSME) are considered as lending for priority sectors. The study employs the Random Effect estimator to measure banks' profitability due to PSL. Also, it uses panel-corrected standard errors to verify the robustness of the estimation obtained from the Random Effect estimator with VCE robust standard error. The study shows no significant relationship between the banks' lending for priority sectors and the profitability of banks (ROA). Based on the primary survey, the study finds that bank lending in the priorities sector faces problems of a poor selection of PSL borrowers, a shortage of personnel at the bank level to supervise PSL loans, a lack of financial awareness among PSL borrowers, and an increase in NPL. The study also reveals that the size of the banks' assets (TA), NPL and ADR show a negative relationship with ROA. CAR, GDP, and INF show a significant and positive relationship with ROA. No significant relationship is found between CIR and ROA. The study suggests regulators should address weaknesses in regulatory oversights and implement stringent monitoring mechanisms so that banks increase significant involvement in PSL with adequate personnel and capacity development and borrowers' lack of financial literacy.

Keywords: Priority Sector Lending; Profitability; Random Effect Model; Panel Corrected Standard Errors
JEL Classification: H81

1. Introduction

1.1 Background

Based on ownership structure, the Bangladeshi banking sector may be roughly divided into three divisions. State-owned Commercial Banks (SOCBs), Local Private Commercial Banks (PCBs), and Foreign Commercial Banks(FCBs) make up the three categories. There are now six SOCBs, forty three PCBs, and nine FCBs. The central bank of the nation, Bangladesh Bank (BB), oversees and

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controls the operations of the 35 Non-bank Financial Institutions (NBFIs) that are now functioning in Bangladesh as well as all the scheduled banks.

Considering the importance of the financial performance of banks, economic growth is influenced favorably by bank profitability in both the short- and long term (Paul & Laurent, 2018). For a nation like Bangladesh, bank-based financial development helps to spur economic expansion and raise the nation's growth rate (Sumaira & Bibi, 2022). For an economy to be robust and resilient, banks must execute with consistency and positive profitability (Gaur & Mahopatra, 2019). Financial stability is improved by increased bank profitability, which may help economic growth since successful banks are better equipped to retain profits, boost core capital, provide greater returns to shareholders, and raise capital more readily in the markets (Flannery & Rangan, 2008).

In addition, a key component in explaining how policies affect the economy is the function that bank lending plays (Kishan & Opiela, 2000).

More crucially, bank management must comprehend bank lending behaviour in order to ensure the stability of a financial system. Developing nations have significantly injected large sums of money into state-controlled banks in the previous several decades to support economic development. This causes the banking sector in developing economies to significantly increase loan growth. The bank credits support these nations' economic growth. However, in these nations, government control over bank lending is significant (Qian et al., 2015). Therefore, any blip in the banking industry's performance might prove to be a significant barrier for the whole economy.

Banks provide loans for a variety of economic uses, including consumer finance, transportation, agriculture, industry, and construction. Banks often provide loans to various industries where the return is highest. Some industries, nevertheless, suffer operational and expansional financial challenges.

Approximately 41% of SMEs in the least developed nations, 30% of SMEs in middle-income countries, and 15% of SMEs in high-income countries said that access to financing was a key barrier to their growth and development in a World Bank survey from 2014. Numerous studies have shown that small businesses may

perform far better when they have access to outside funding. One of the most important elements affecting a company's capacity to develop is access to sufficient and timely financing (Kale, 2016).

Given the significance of agricultural credit and economic growth, using the ARDL technique, Ayeomoni & Aladejana (2016) examined the relationship between agricultural loans and economic growth in Nigeria for the years 1986 to 2014. This investigation demonstrated that there are long-term and short-term links between agricultural credit and economic growth.

Given the significance of agricultural lending and the expansion of the economy, using a co-integration bound testing methodology, Okosodo (2016) looked at the effects of agricultural credit on Nigeria's economic development from 1980 to 2014. According to this study, increasing bank credit distribution and lowering lending interest rates should be put into practice to support Nigeria's agricultural economy.

To determine how agricultural financing affects farmers' agricultural productivity, a case study on agricultural loans and their effects on farm output in Nepal's Kailali District was done in 2014 by Nepal Rastra Bank, the central bank of Nepal. The survey's findings suggested that agricultural financing aids in raising farmers' agricultural production in the research region.

Furthermore, using state-level data from 1995–1996 to 2011–12, Narayanan (2015) investigated the link between agricultural credit and agricultural GDP in India. Saleem and Jan (2011) explored the effect of agricultural credit on agricultural GDP in a particular area of Pakistan. According to the study's results, an increase in agricultural loans is quite sensitive to a rise in agricultural output. Saleem & Jan (2011) used a linear regression model based on the Cobb-Douglas function using data from 1990 to 2008 to examine the effect of agricultural credit on agricultural GDP in Pakistan. This research concluded that increased loan availability may boost agricultural output.

In the context of Bangladesh’s agricultural finance and agricultural production, For the years 2000 to 2019, Islam (2020) conducted an empirical investigation of the effects of agricultural financing on agricultural productivity

in Bangladesh. Along with other control variables, the research looked at the short- and long-term correlations between agricultural finance and agricultural production. The study's results showed that there were both short- and long-term correlations between agricultural loans and productivity, with other dynamic factors like inflation, interest rates, and government spending on agriculture also having an impact on agricultural productivity. The research concluded that there should be a rise in agricultural loan growth in order to promote agricultural productivity and support economic development.

Additionally, Sarker (2018) conducted research to ascertain the role of banks in Bangladesh's agricultural growth, and the study's findings demonstrate the importance of banks in agricultural development via the distribution of agricultural loans. This research revealed that agricultural loans from banks increase production of agricultural in the economy of Bangladesh.

Moreover, Miah et al. (2020) claimed that Bangladesh has historically had a mostly agricultural economy. Her population is mostly rural, with agriculture serving as the main source of income. They found that bank loans to SMEs that are provided by banks and financial institutions had a favorable effect on the production of the SME sector.

Priority Sector Lending (PSL) or directed lending initiatives ensure that financing is timely and sufficient for vulnerable societal groups (Kumar, 2016). Due to the significance of inclusive economic development and job creation, governments and regulators often work to increase access to disadvantaged sectors via tailored credit programs and incentives. Priority sectors are those that are most vulnerable. Priority Sector Lending (PSL), or directed credit programs, is widely used in both emerging and established nations to channel money at low-interest rates to certain sectors that are essential for the balanced and long-term growth of the respective economies (Kohli, 1997).

In the context of priority sectors, in its national industrial strategy, the government of Bangladesh (GoB) identifies key industries. According to the National Industrial Policy of Bangladesh, agriculture and the CMSME sectors are given top attention in order to achieve balanced development via national

economic, social, and environmental preservation. Additionally, GoB wants the nation to accomplish all of its Sustainable Development Goals (SDGs) by the year 2030. Bank finance and appropriate policies for the key sectors (CMSMEs and agriculture) are essential for the country's inclusive development in this respect.

The Priority sectors—CMSMEs and agriculture—play a substantial role in the Gross Domestic Product (GDP) for all kinds of economies. Statistics from the World Bank (2018) show that SMEs account for roughly 90% of all firms and more than 50% of all jobs globally. In developing nations, formal sector SMEs often contribute up to 40% of GDP, and the overall statistics are much greater when informal SMEs are included (World Bank, 2018). Beyond their contributions to the GDP and employment, SMEs also help to create new businesses, strengthen social networks, improve the living conditions of the poor, boost export revenues, lessen social discontent, meet the demands of several major companies, and so forth (Hossain & Ibrahim, 2020). Long-lasting SMEs may provide economic stability for owners, workers, and their families by delivering a consistent source of income (Bianca, 2016).

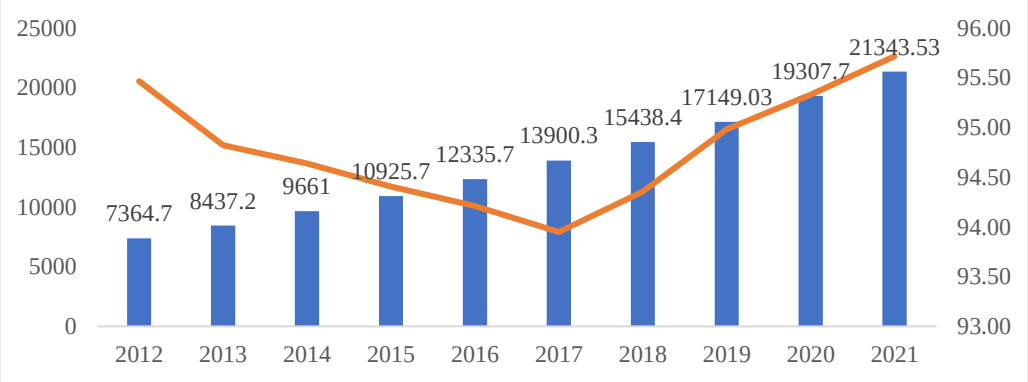
In Bangladesh, the agriculture industry directly contributes 11.63 percent of the GDP in 2021. Agriculture employs around 41% of all workers, according to the Bangladesh Bureau of Statistics 2017 Labour Force Survey (LFS). Additionally, the agricultural industry has been crucial in supplying the country with the nourishment it needs, guaranteeing food security, raising export revenues, and raising overall income levels. Additionally, agricultural finance is crucial for achieving the three main SDG pillars as part of achieving the SDGs.

1.1.1 Priority Sector Lending (PSL) and Financial Performance of Banks in Bangladesh

Figure-1.1 depicts the contribution of banks to total assets. Over the last 10 years, banks have contributed more than 90% of the assets. Despite a fall from 2013 to 2017 in the contribution of banks to assets, a trend toward growth began in 2018. According to the ownership criterion, PCBs accounted for 67% of all assets, followed by SOCBs (27%), and FCBs (3%). The y-axis on left side

represents amount of total assets in the financial sector in billion BDT and y-axis on right side indicates the contribution in percentage.

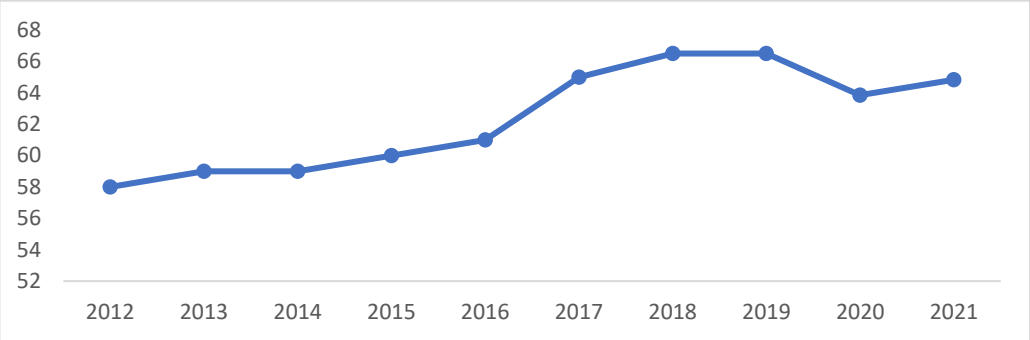
Figure 1.1: Trend of Banks' Contribution in Assets as Compared to Non-bank Financial from 2012 to 2021



Source: Bangladesh Bank, 2022

Historically, when looking at the asset structure of banks across time, loans and advances made up the largest portion of the assets of the banking industry. Figure 1.2 shows an increasing trend in loans and advances over time (2012 to 2021). In 2021, loans and advances were up 64.83 percent of total assets, up from 58 percent in 2012.

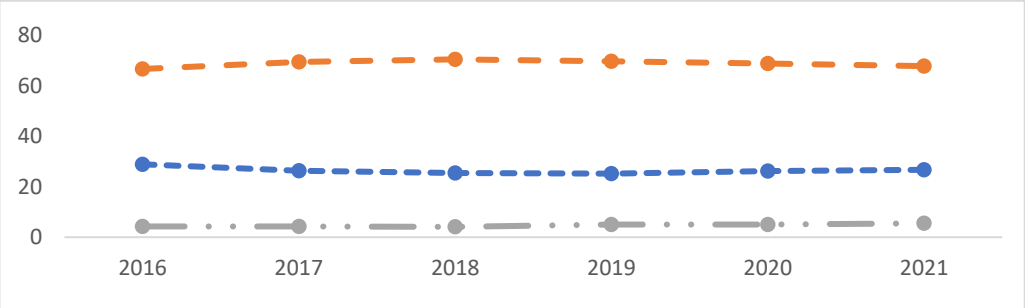
Figure 1.2: Trends of Bank Lending from 2012 to 2021



Source: Bangladesh Bank, 2022

Figure-1.3 shows the percentage of loans and advances allocated to each bank for the years 2016 to 2021. PCBs and SOCBs hold bigger proportions of loans and advances over time due to the distinct bank structures (2016 to 2021). The proportions of loans and advances made by SOCBs, however, reflect a falling trend starting in 2017.

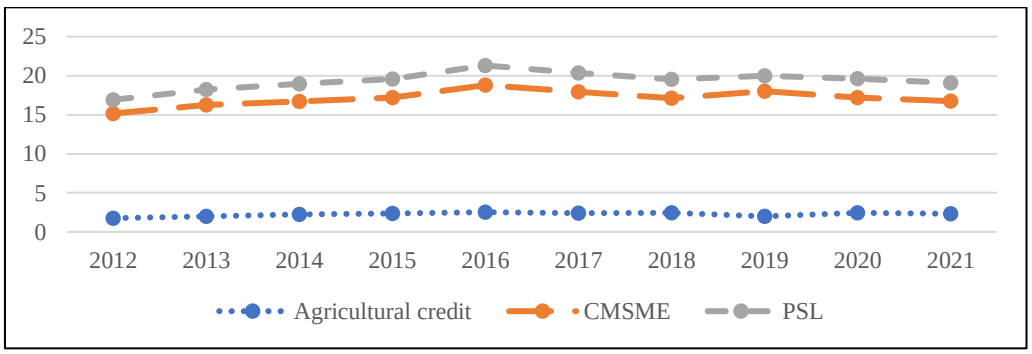
Figure 1.3: Bank Group-wise Lending (in percent) from 2016 to 2021



Source: Bangladesh Bank, 2022
Note: SOCBs stand for State Owned Commercial Banks, PCBs stand for local Private Commercial Banks and FCBs stand for Foreign Commercial Banks

Banks provide loans and advances to several economic sectors. The percentage of PSL in banks' overall lending from 2012 to 2021 is shown in figure 1.4. Figure 1.4 displays the PSL's insignificant upward rise. In 2021, banks lend the most money (42.08 percent) to industries associated with RMG and commercial purposes (Appendix-1).

Figure 1.4: Trend of Agricultural Credit, CMSME (in percent) from 2012 to 2021



Source: Bangladesh Bank, 2022
Note: PSL stands for Priority Sector Lending, CMSME stands for Cottage, Micro, Small and Medium Enterprises

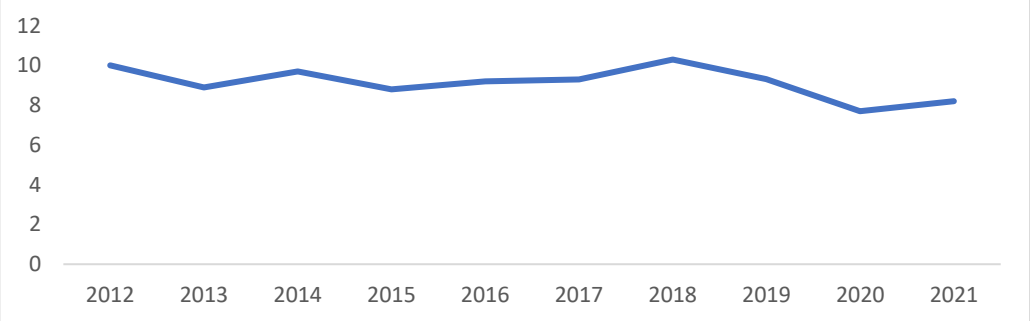
The percentage of GDP that Small and Medium-sized Enterprises (SMEs) contribute to in China is 60%. (Pandey, 2015). India's SMEs are responsible for 40% of the country's GDP (Weerakkody, 2015), while those in Thailand are responsible for 37% (Rojanasuvan, 2014), and those in Pakistan are responsible for 30%. (Shahzad, 2014). Despite this enormous potential, the SME sector's contribution to Bangladesh's GDP remains smaller than in many other nations. In Bangladesh, the contribution of SMEs to GDP is estimated at 20.25 percent (ICAB, 2021).

Moreover, from 2012–2021, there is a downward tendency in agriculture's contribution to GDP (Appendix-2). The agriculture sector's percentage of GDP was 16.58 percent in 2012 but is projected to fall to 11.63 percent by 2021 (Statista, 2022).

Non-performing Loans (NPLs) as a percentage of total loans and advances are a crucial indication of asset quality when evaluating the financial performance of the banking sector in Bangladesh. The banking industry's NPL ratio reached 8.2 percent at the end of 2021's December. At the end of 2021, the gross NPL ratio for FCBs was 3.9% while the ratio for SCBs was 32.1%.

For the same time frame, the PCB ratio was 5.4%. The ratio of NPL to total loans and advances shows a fluctuating banking industry from 2012 to 2021. The rate of Non-performing Loans (NPLs) rose steadily during the next four years. Even though it fell in 2020, it shot up to 8.2 percent the following year.

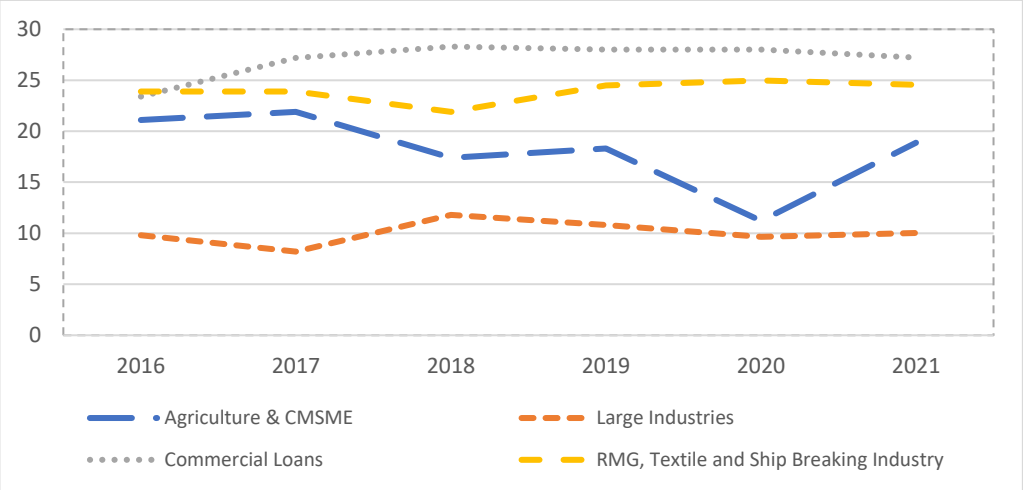
Figure 1.5: Trend of Aggregate (All Banks) NPL Ratio from 2012 to 2021



Source: Bangladesh Bank, 2022

Figure-1.6 shows the concentration of NPLs across different sectors of the economy for 2016 to 2021. As data for sectoral NPL are not available in the reports of Bangladesh Bank, the figure 1.6 does not include NPL data from 2012. The highest NPL was observed in commercial loans (27.22) in 2021, whereas NPL of Priority Sector Lending (PSL) was 18.88 in 2021, which is much below than Ready Made Garments and the textile industry.

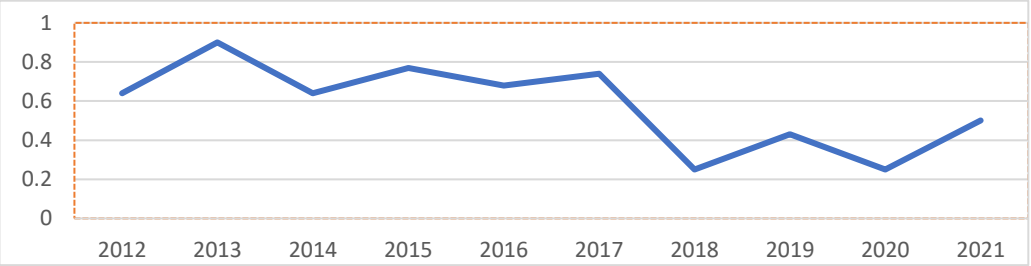
Figure 1.6: Trends of Sector-wise NPL Ratio from 2016 to 2021



Source: Bangladesh Bank, 2022

Although various indicators are used to determine earnings and profitability, the most representative and widely used one is Return on assets (ROA). Though ROA experienced an decreasing trend from 2012 to 2017, however it shows a decreasing trend afterward (Figure-1.7).

Figure 1.7: Trends of Aggregate (All banks) ROA of from 2012 to 2021



Source: Bangladesh Bank, 2022

With the aforementioned facts and numbers, it is clear that even if the National Industrial Policy has prioritized CMSMEs and agriculture, the portion of PSL is not significantly growing in comparison to the contribution of the key sectors to the nation. Furthermore, compared to other sectors, commercial loans, and RMG sectors, NPL in PSL is significantly lower. Thus, the following two inquiries are raised:

Q1: Does PSL affect the profitability of banks in Bangladesh?

Q2: What could be the possible reasons from banker's perspective if PSL did not have an impact on the profitability of banks?

To assess the influence of PSL on the financial performance of banks, very little research has been done in the context of Bangladesh. Therefore, it is essential for banks to analyse the connection between PSL and profitability so that they can continue to finance weaker industries without jeopardizing their financial stability.

1.1.2 Policy Initiatives for Priority Sector Lending: CMSME Financing

The policies and processes for the financing of CMSME in the country by banks and NBFIs are provided by BB, the nation's central bank. SME and Special Programs Department was established by BB in 2009 with the purpose of formulating policies for the CMSME sector, overseeing, and monitoring financing in this area. The SME & Special Programmes Department, with a particular focus on people who are financially excluded, unbanked, and women entrepreneurs, is playing a critical role in supporting the country's inclusive and sustainable economic growth through the establishment of CMSMEs. Though BB issued circulars related to CMSME financing since the inception of the said department in BB, however, in 2019, BB released a master circular or guideline on the operational aspects of CMSME financing by banks and other non-bank financial institutions, in keeping with the goals of the National Industrial Policy of Bangladesh. The following approaches are how CMSME has been defined in accordance with the guideline (Table-1.1):

The SME strategy also established goals for banks and sector-specific lending limitations for CMSME (Appendix-3). For bank financing of CMSME, BB has set certain goals and a deadline of 2024 (Table-1.2). As per the policy of CMSMEs financing by banks, banks are to set their CMSME financing target and will have to increase the total CMSME loans by 1% each year.

Based on banker-customer interactions, banks are permitted to offer 03 (three) months of grace period for loans with a term of 1 year and 03 (three) to 06 (six) months of grace period for loans with medium to long terms. In accordance with Bangladesh Bank's refinancing options, banks may also think about granting loans to women business owners up to BDT 2.5 million on personal guarantees rather than collateral (BB). The BB has provided a provision of a 2 percent incentive under which the lending banks partake of a 1 percent incentive and women entrepreneurs receive a 1 percent incentive in order to encourage more CMSME financing among women entrepreneurs.

Table 1.1: Definition of Cottage, Micro and Small Manufacturing and Service-Oriented Businesses

Industry Category	Industry	Criteria for Determining Industry Category	
		Total Fixed Asset	Number of Employees
Cottage	Manufacturing	Below BDT 1.00 mil	Not more than 15
Micro	Manufacturing	From BDT 1.0 0 mil to < BDT 7.5 mil	From 16 to ≤ 30
	Service	Below BDT 1.0 mil	Maximum 15
Small	Manufacturing	From BDT 7.5 mil to BDT 150 mil	From 31 to 120
	Service	From BDT 1.0 mil to < BDT 20 mil	From 16 to 50
Medium	Manufacturing	Above BDT 150 mil ≤ BDT 500 mil	From 121 to 300; Maximum 1000 for Ready Made Garments Industry
	Service	From BDT 20 mil to BDT 300 mil	From 51 to 120

Source: Bangladesh Bank, 2022
Note: BDT stands for Bangladeshi Taka, the currency of Bangladesh and mil stands for million.

Table 1.2: Targets and Time Limit to be Achieved by 2024 in CMSME Financing by Banks

Particulars	Targets to be Attained by 2024
Total Outstanding CMSME financing	25 percent of total financing in all sectors
Outstanding for Cottage, Micro, and Small	50 percent of total CMSME financing
Financing for Women Entrepreneurs	At least 15 percent of total CMSME financing
Financing for Manufacturing, Service, and Trade	At least 40 percent for Manufacturing, 25 percent for service, and 35 percent for trade
Provisioning Requirement for CMSMEs	0.25 percent for all unclassified loans

Source: Bangladesh Bank, 2022

1.1.3 Responses of Government and Bangladesh Bank During COVID-19

Nearly all industries, including the CMSME sector, have been impacted by COVID-19, which has resulted in firm closures, employment losses, and a decline in sales. The GoB and BB announced a number of stimulus initiatives for the CMSME sector in an effort to mitigate the effects of the COVID-19 outbreak (Table-1.3).

In addition, BB launched a loan guarantee program of BDT 2000 crore for small, cottage, and microbusiness owners to assist them in addressing the ongoing Covid-19 epidemic situation.

Table 1.3: Different forms of Stimulus Packages and Refinancing Scheme during COVID-19 in PSL (CMSME)

	Government-Funded Stimulus Package	BB Funded Revolving Refinancing Scheme
Nature	Working Capital Financing	Working Capital Financing
Target Group	CMSMEs Customers	CMSMEs Customers
Size of the Fund	BDT 200 bn	BDT 100 bn
Interest Rate for borrowers	4 percent	7 percent

Source: Bangladesh Bank, 2022
Note: BB stands for Bangladesh Bank, and bn stands for billion

1.1.4 Policy Measures for Priority Sector Lending (PSL): Agriculture Financing

BB releases its agricultural policy for the following fiscal year. In its agricultural strategy, BB designated the sector of agricultural lending as a priority. The yearly Agricultural and Rural Credit Policy 2022 to 2023 is the current agricultural policy. This policy's main goal is to increase access to agricultural financing for rural residents. The policy states that BB bases its yearly agricultural credit determination for SOCBs, PCBs, and FCBs on the demand for agricultural loans. As a result, agricultural credit limits change annually. BB bases its bank-wise aims for the agricultural sector on branch expansion and rural borrowers' demand.

The bank-wise cap for agriculture financing set by BB is displayed in table 1.4. The country's banking industry had a target of BDT 309.11 billion for agricultural and rural loans for the fiscal year (FY22), according to the central bank. The policy states that each bank must allocate at least 2.5 percent its overall loans and advances to agriculture finance. However, the BB sets agricultural credit at 2.10 percent of net loans and advances by banks in all sectors of the economy as of March 31, 2022. This is because most banks do not have enough capacity and do not have enough bank branches in rural regions.

SOCBs are essential to the distribution of financing for agriculture and rural areas. Compared to PCBs and FCBs branch networks, SOCBs branch networks are more dispersed in rural regions and span the entire nation. The cap on agricultural lending is 59.47 percent for PCBs because there are more PCBs than SOCBs and FCBs. There are no FCBs locations in rural areas.

Table 1.4: Agricultural Credit Targets for Banks (in billion BDT)

	FY2022-2023			
	SOCBs	**PCBs**	**FCBs**	**Total Target**
Disbursement Target	117.58	183.82	7.71	309.11
Bank Group Wise Target	38.03%	59.47%	2.50 %	100%

Source: Bangladesh Bank, 2022

Note: SOCBs = State-owned Commercial Banks, PCBs= Private Commercial Banks, FCBs= Foreign Commercial Banks

BB also determines how agricultural financing is distributed per sector. Three primary sectors have been selected under the policy as receiving greater attention than other agricultural sectors. Fisheries, livestock, and crops make up the three sectors. The sectoral goals for agricultural financing are shown in table 1.5 for the three primary agricultural sectors. The strategy also includes provisions for financial and non-financial rewards for the banks' lending to the agricultural sector in order to mobilize more credit to those industries.

Table 1.5: Regulatory Targets to Achieve Priority Sector Lending in Agricultural Sector

Particulars	Targets
Total Outstanding for Agricultural loan	2.5% of total loans and advance of each bank
Outstanding for Crop, Fisheries and Livestock	At least 60 % in the crop, at least 10% in fisheries and at least 10% in Livestock
Interest Rate at Borrowers' Level	8 percent, 4 percent for some specified products
Provisioning requirement	1% for all unclassified loans in agricultural sector

Source: Bangladesh Bank, 2022

However, if any bank fails to achieve the disbursement target, the policy has a provision of financial penalty to be borne by banks failing to attain the target in agricultural credit set by BB. The policy also has provisions for incentives for the banks that will achieve agricultural credit set by BB. A number of agricultural refinancing schemes are also available for banks providing agricultural credit.

Table 1.6: Different Forms of Refinance Scheme for PSL (Agriculture Sector)

Name	Purpose	Fund Size	Interest Rate	Banks' Income
Refinance Scheme for Agriculture	Ensuring food security	BDT 50 bn	4 percent	0.50 percent
Refinance Scheme for wheat and maize	For increasing the production of wheat and maize	BDT 10 bn	4 percent	0.50 percent
Refinance Scheme in Covid-19	To mitigate financial problems during the pandemic	BDT 30 bn	4 percent	1.00 percent

Name	Purpose	Fund Size	Interest Rate	Banks' Income
Refinance Scheme for Milk Production	To increase milk production	BDT 200 bn	5 percent	5 percent

Source: Bangladesh Bank, 2022

Note: The interest rate is charged at borrowers' level and banks' income is earnings provided by BB for lending in priority sectors.

1.2 Statement of Problem

The fact that the Government of Bangladesh (GoB) and Bangladesh Bank (BB), the central bank of the country, are supporting policy and refinancing through a series of stimulus packages that concentrate on the Priority Sector Lending (PSL), Cottage, Micro, Small and Medium Enterprises (CMSMEs), and agricultural sectors is positive, but the proportion of PSL to total loans is not rising as quickly as was anticipated. For instance, the amount of lending to CMSMEs by all banks in 2016 was 23% of the total loan in all sectors. This percentage dropped to 18% in 2021, but each bank must reach 25% in CMSME lending by 2024.

Additionally, under the previous regulations of the central bank, each bank was required to set aside 2.5% of its total loans for agricultural financing; however, due to a lack of staff and rural branch locations, Bangladesh Bank, the nation's central bank, now sets an annual target of 2.10 percent of all loans based on the outstanding balance in each quarter of all banks, which is less than the original target of 2.5%.

Now the problem arises while complying with the regulatory targets by keeping 2.1 percent of its overall loans towards the financing of agriculture and 24 percent for CMSME financing by 2024, banks might be losing investment opportunities for other profitable sectors if PSL does not have any positive impact on profitability. As banks deal with depositors' money and investors invest for more return from their investment, so depositors and shareholders of the banks would expect a good return from their deposits and investment. Considering all, it begs the issue of whether PSL has an impact on bank profitability.

Moreover, this calls into question what really matters for the declining trend of Priority Sector Lending (PSL) by banks. In this context, examining the effect of PSL on the financial performance of banks is crucial to boost the preferred sector for accomplishing the intended economic aim of the government of Bangladesh and Bangladesh Bank, the central bank of the country. As a result, the study's goal is to determine how PSL impacts bank profitability.

1.3 Research Objective

The study's main goal is to examine empirically whether Priority Sector Lending (PSL) affects profitability of banks. The paper also looks for regulatory framework of PSL and potential explanations for the empirical findings. Furthermore, by adjusting for a number of additional internal and external factors affecting bank profitability in Bangladesh, individual banks will be able to assess the significance of PSL to profitability. Additionally, by assessing how PSL affects profitability, commercial banks may be better able to take the necessary corrective action to satisfy PSL goals as periodically set by the government.

1.4 Significance of the Study

The study contributes in many different ways. First, in order to simplify PSL laws, the study's findings will help regulators and bankers better comprehend the connection between PSL and profitability. The study's results also help policymakers choose the best resources when they set goals for bank lending in high-priority industries. Finally, this research broadens our understanding of PSL.

1.5 Organisation of the Study

With the problem statement in chapter one, the remainder of the study is organized as follows: in chapter two, an extensive literature review and hypothesis development of PSL is placed. Chapter three covers the data and methodology of the study. Chapter four discusses empirical results and findings of the study. Finally, the chapter covers the conclusions and limitations of the study.

2. Literature Review

2.1 Introduction

With the exception of India, there has not been much research on the effects of PSL or government-directed lending on bank performance, despite the fact that PSL is practiced in a number of nations. Based on the literature reviews in this section, it is evident that numerous studies have been undertaken to determine how PSL affects bank financial performance in India.

However, almost no literature review on the effect of PSL on bank profitability in the context of Bangladesh is found. However, a sizable number of research studies on the variables affecting Bangladeshi bank profitability have been found. This section also provides a few studies on how green finance or SME financing affects bank profitability.

2.1.1 Priority Sector Lending: Conceptual Aspects and Country Experience

Priority Sector Lending

Priority Sector Lending (PSL) or Directed Credit Programs refers to providing loans to specific priority sectors with restricted access to formal credit at lower interest rates and on preferential terms and circumstances. Different formats of PSL or Directed Credit Programs exist. The most popular types of directed credit programs include loan guarantees, interest rate subsidies, mandated lending requirements, refinance plans, and development financial institutions.

Most Common Reasons Behind Priority Sector Lending

Banks are compelled, under mandated lending regulations, to lend a set percentage of their portfolio to particular industries. In refinancing programs, banks are given the opportunity to borrow money from the central bank at a rate that is lower than what other banks would typically charge for a specified purpose. Governments set interest rate limits (on deposits, loans, or both), which may vary by sector or loan length, and levy a below-market interest rate for a specified line of credit. In credit guarantees through guarantees, a portion of the

loan's risk is borne by the lending institution. institutions for financing development. Specialist credit is offered by specialized institutions. To support bank lending, the concept of priority sectors adaptation was introduced. That displays credit being extended to each bank with a national priority (Sudin et al., 2022).

Currently, the adoption of lending quotas by banks' regulatory bodies is the most widespread method of priority sector lending in Asia. Such quotas are also used in Thailand, the Philippines, India, Indonesia, and Thailand. Alternately, Malaysia and Vietnam require interest rate breaks for financing to prioritized industries.

Although the Priority Sector Loans (PSL) idea was originally introduced in India in 1967, the first PSL targets were first set in 1974 at a lower interest rate than non-priority sector lending. The Reserve Bank of India (RBI), the country's central bank, instructed all privately and publicly owned banks to reach the objective of at least 40% of total loans (Parida & Jain, 2016). Agriculture, micro, small, and medium-sized companies (MSME), education, export credit, renewable energy, and housing finance are priority industries. However, the process of including priority sectors changes over time based on national economic strategy (Bag & Islam, 2017).

Priority Secotr Lending in Global Context

The majority of Indonesia's directed lending came to an end when the country liberalized and deregulated its banking industry by eliminating interest rate caps, criteria for allocating loans, restrictions on branch network growth, and entrance hurdles. The key exception to this was the special "program credit," which allowed commercial banks to channel their funding to priority industries like MSMEs. The banks bared little, if any, of the credit risk for these loans because they were subsidized credit programs and they acted as channeling rather than executing institutions. In Indonesia, SMEs must receive 20% of the overall credit portfolio held by banks. (Prasetyantoko & Rosengard, 2011).

In Thailand, banks must provide SMEs with loans that are at least equal to 20% of their deposits. Banks will also need to lend to the agricultural sector at a rate of 14% and small businesses at a rate of 6%. In the Philippines, lending to SMEs must make up at least 8% of the total lending portfolio, with 6% going to small businesses and 2% going to medium-sized businesses. In Vietnam, banks are obligated to give credit not more than 200 basis points over the deposit rate ceiling to lending to the agriculture, SMEs, export, and technology sectors, which are considered priority sectors. The loan rate cannot be more than 200 basis points over the base lending rate for SMEs, which are regarded as the priority sector in Malaysia. The loans with this interest rate must be less than or equal to MYR 500,000 (Asia Focus, 2014).

By means of directive 17/067, Nepal Rastra Bank (NRB), the country's central bank, established rules for lending to the underprivileged. The definition of the "deprived" in NRB Directive 17/067 includes low-income and particularly socially backward women, Dalit people, blind, hearing-impaired, physically disabled individuals, marginalized and small-form workers, craftsmen, labourers, and landless squatters' families. The "A", "B", and "C" class licensed institutions were required to lend at least 3%, 2%, and 1.5% of the total amount of outstanding loans and advances, respectively, under Directive 17/067. All institutions with licenses for "A," "B," and "C" classes are now required to flow at least 5% of all outstanding loans and advances on a mandatory basis (Monetary Policy FY 2018/19) (Oli,2021).

Priority financing to industrial enterprises played a significant role in the rapid economic expansion of the governments of Japan and Korea in the second half of the 20th century. Although the government no longer runs significant priority lending programs, China has substantial experience with state-directed priority lending. Export, large-scale industry, small-scale industry, and agriculture are among Japan's priority sectors. Korea's priority industries include the export, heavy, and chemical sectors (Re-Prioritizing Priority Sector Lending, Economic Impact Analysis, December 2013).

Nearly half of all bank credit in Brazil is targeted lending, which is significant since banks are mandated to direct 65 percent of the liquidity from

savings accounts towards housing finance, with 80 percent of loan value at discounted interest rates. Brazil's government uses allocated loans and state-owned banks to intervene in the credit market. Because they are controlled, the interest rates charged on those loans are significantly lower than those in the unregulated loans market (Bonomo & Martins, 2016).

2.1.2 Priority Sector Lending and Bank Performance: Global Experience

As was mentioned earlier in this section, there have been numerous studies done in India on the impact of PSL on bank profitability. For instance, Anand (1992) analyzed the economics of priority sector lending after examining the associated costs and benefits and concluded that such advances have not been and do not currently have an adverse effect on profitability. According to Niranjana & Anbumani (2002), bankers worry that the advances to the priority sector cause them to lose interest income because the lending rates are so heavily subsidized.

In their 2018 study, Brahmaiah & Ranajee looked at the variables affecting Indian banks' profitability. The study used a balanced panel dataset of 89 Indian banks operating from 2005 to 2015 and used ROA as a measure of profitability. Their conclusions showed that PSL to total loans had little bearing on profitability.

For the years 2008 to 2019, Sudin et al. (2022) looked at the connection between the profitability of Indian public sector banks and PSL. Return on Assets (ROA) was the profitability metric employed in this study. Their research showed that there was no statistically significant correlation between PSL and profitability. The findings also led to the conclusion that banks might use the PSL as an indicator of India's economic and social growth.

Examining NPAs by sector According to Rajeev & Mahesh (2020), banks in India are renowned for utilizing the social welfare motive. According to the findings, the government-specified sectors' contribution of problem loans is higher than the non-performing assets of non-priority sectors. 46 commercial banks in India were the subject of this investigation over a 14-year period (2005-2018).

However, using a sample of 45 scheduled commercial banks in India from 2004 to 2018, Gaur & Mohapatra (2020) experimentally analyzed the effect of PSL on NPL. Both static and dynamic panel regression were used in their investigation. The results revealed a statistically negligible link between PSL and NPL, indicating that bank bad loan portfolios are not significantly impacted by credit granted to government-directed sectors.

In Vietnam, Thanh et al. (2021) looked at the variables influencing the profitability of the 12 commercial banks listed on the Ho Chi Minh Stock Exchange over a five-year period, from 2015 to 2019. According to their study's findings, a large proportion of agricultural finance in overall financing might have a favourable effect on banks' profitability. Agriculture financing is positively and significantly connected with bank performance.

Ahmed et al. (2013) investigated how the PSL, Advance Deposit Ratio (ADR), operational costs, interest rate spread, deposits, and NPL affected profitability in Indonesia. Their conclusions showed that lending to priority industries and operating costs had a positive impact on rural banks' profitability.

2.1.3 Bangladesh's Priority Sector Lending: Literature Review

Priority sector credit in Bangladesh began in the early 1970s, shortly after the nation gained its independence when Bangladesh Bank instructed banks to ensure the flow of available credit to vital industries like agriculture, jute, and tea (Annual report, Bangladesh Bank 1974–1975). Despite this, these industries were not formally recognized as priority sectors. CMSME and agriculture are designated as priority sectors in the government of Bangladesh's national industrial policy. According to the policy, banks are to prioritize financing to certain sectors. In accordance with this National Industrial Policy note, all banks, SOCBs, PCBs, and FCBs are required to distribute loans to CMSMEs and agriculture, which are economically underdeveloped sectors.

2.1.4 Priority Sector Lending and Bank Performance: Bangladesh Experience

There is a very little empirical study on PSL in Bangladesh. However, there isn't much research on the impact of bank sector lending on bank profitability.

However, no research on the effect of Priority Sector Lending (PSL) on bank profitability could be found. This industry has a stake in the study being done on the effectiveness of sectoral lending in Bangladesh.

For instance, Ali et al. (2021) examined the supply and demand sides of SME loans to assess its financial performance. The analysis concluded that there was no meaningful correlation between SME lending and Bangladeshi banks' ROA. The research highlighted important variables that have an impact on commercial banks when they lend to SMEs. A primary survey was carried out using a convenience sampling method on 60 respondents who were either bank managers or senior loan officers specialized in SMEs using a pre-tested structured questionnaire to determine the factors affecting SME loans. The study found that commercial banks have a cautious approach when giving credit to SMEs and that they are reluctant to do so since these companies lack collateral and other security and there is knowledge asymmetry.

Julia & Kassim (2016) looked on how green finance affected the financial results of 30 Bangladesh-based banks from 2012 to 2014. The study found that green financing had no effect on ROE for the Bangladeshi banks that were sampled.

Rahman et al. (2018) looked into how green finance affected Bangladeshi banks' bottom lines. They conducted their investigation using information from 11 private commercial institutions that had been purposefully chosen between 2013 and 2015. ROI, ROE, and ROA were employed as the dependent factors, and the ratios of green finance to total finance, assets, and equity were used as the independent variables. The ratio of green finance to total investment did not significantly correlate with ROA and ROE.

2.1 Additional Factors Affecting Bank Profitability

Though the study attempts to find out empirically the effect of PSL on the profitability of banks in Bangladesh, however, profitability depends on other factors such as bank-specific factors and macroeconomic sectors. This subsection of literature review is vested with the factors other than PSL.

2.2.1 Country Experience with Factors Affecting Bank Profitability

The elements influencing the profitability of banks for 13 post-Soviet nations from 1996 to 2016 were found by Yüksel et al. (2018). The analysis in the study used the Generalized Method of Moments and the Fixed Effect Model (GMM). Their results demonstrated a strong postive influence of GDP and non-interest revenue on the profitability of banks.

Almaqtari et al. (2018) looked at the factors that affected the profitability, or ROA, of 69 Indian commercial banks from 2008 to 2017. The study made use of independent variables that were both bank- and macroeconomics-related. Bank size, NPL, CAR, ADR, CIR, total deposits, and the number of branches were the independent factors that were particular to each bank. The study employed pooled, fixed, random effect models with yearly GDP growth rate and inflation as the macroeconomic independent variables. Standard errors for panel correction were utilized to test the robustness of the calculated model. According to the study's findings, there is a strong positive correlation between ROA and bank size, NPL, and ADR. The rate of inflation was positively related with ROA.

In Pakistan, 25 commercial banks operating were the subject of an empirical study by Farooq et al. in 2021. For the periods from 2009 to 2018, the analysis in the study utilized a fixed effect model. The study's conclusions showed that for the sample banks in Pakistan, ROA is highly impacted by CAR, ADR, and asset size.

For the years 2008 to 2018, Phan et al. (2020) conducted an empirical investigation into the determinants of factors affecting the profitability of 10 listed commercial banks in Vietnam. ROA was utilized in the study as a proxy of profitability. Their studies demonstrated that the CIR, loan volume, annual inflation rate, and yearly GDP growth had a strong positive impact on ROA. The link between CAR and bank asset size and ROA, however, was statistically insginificant.

In Malaysia, Iskandar et al. (2021) looked at the factors affecting the profitability of 8 Malaysian commercial banks from 2011 to 2017. As independent factors, the study looked at capital sufficiency, credit risk,

managerial effectiveness, and liquidity risk. ROA and ROE were the study's dependent variables. The panel data set for the sample banks served as the foundation for regression analysis. The study found no statistically significant effects of capital adequacy on profitability. Regression results show that the most important factors influencing the bank's profitability were credit risk, management effectiveness, and liquidity risk (ROA and ROE). The variables determining bank profitability and their anticipated effect on bank performance are shown in Table-2.1.

Table 2.1: List of the Variables: Dependent Variable: Return on Asset (ROA)

Variables	Priori Expectation	Sources
Total Asset (TA)	+/-	Kosmidou, 2008
Capital Adequacy Ratio (CAR)	+/-	Akbas, 2012
Cost Income Efficiency Measures	-	Akbas, 2012
Inflation (INF)	+/-	Abdel-Baki 2012
GDP	+/-	Chalermchatvichien et al. 2014

Source: Authors' Compilation from Various Journal Articles

2.2.2 Factors Affecting Profitability of Banks: Bangladesh Experience

A 2022 study by Ullah and Rahman evaluated the profitability of state-owned commercial banks and Shariah-based banks operating in Bangladesh. To examine major factors influencing the banks' financial performance, the study used panel data. The study found that the banks' profitability was positively impacted by total assets and CAR. ADR and b did not show any significant relationship with ROA.

Using panel data for the years 2014 to 2018, Jeris (2021) looked at the factors affecting the profitability of 27 private commercial banks operating in Bangladesh. The results showed that the ADR ratio was not statistically significant with bank performance, however amount of assets in banks and CAR had significant relationships with the profitability of banks. Bank profitability was unaffected by CIR and loan loss provisioning requirements. Banks' financial performance was influenced by their annual GDP growth rate, although inflation had no statistically significant impact on their profitability. whereas the impacts

of inflation on profitability are occasionally statistically minor, they have a major impact on profitability.

The variables influencing the financial performance (profitability) of Bangladeshi banks were empirically identified by Gazi et al in 2021. ROA and ROE were employed in the study as profitability indicators. 32 banks were included in the analysis for the years 2011 through 2020 based on a panel regression model. Their research revealed that profitability was influenced by the equity-to-asset ratio, deposit-to-asset ratio, debt-to-equity ratio, advance deposit ratio, and yearly GDP growth rate (ROA and ROE).

Islam (2021) examined how several bank-specific factors affected Bangladesh's banking industry's profitability. This study examines the effects of capitalization, non-performing loans, and cost on profitability using annual data from 1997 to 2019. Cost significantly and negatively impacts profitability, according to this study. There was a weak yet negative correlation with non-performing loans.

The impact of bank diversification (i.e., diversification of income and assets) on the profitability of Bangladeshi banks was examined by Uddin et al. in 2021. The authors explore unbalanced panel data from 32 banks that span 318 bank-year observations between 2007 and 2016 using a dynamic panel data model with system-generalized methods of moments. The results show a strong positive correlation between an asset and income diversity and bank profitability. The findings so demonstrate that banks can make money through asset and revenue diversification.

Hosen (2020) looked into internal bank-specific issues that affected the financial performance (profitability) of Bangladeshi banks. Based on panel regression analysis, as well as ROA and ROE as profitability indicators, the study used 23 local private commercial banks for the years 2014 to 2018. Significant relationships existed between NPL and CAR and ROA. ROA was not statistically significant by interest rate spread, bank asset size, ADR, or growth of deposits.

For the years 2007 to 2017, Akber (2019) looked at internal and external bank-specific factors that affect the profitability of Bangladeshi banks. Multiple

regression analysis served as the study's foundation. Profitability was assessed using ROE. NPL had a negative and substantial association with ROA, but CAR had a positive link with ROA.

Return on Investment (ROI) is also used as a of profitability, ROI identifies areas where money is being used efficiently, and this knowledge is useful for striking the right balance while using facilities (Terry, 1985). The ROI is most often used for the following three reasons: First of all, most individuals can readily comprehend ROI. In addition, it incorporates the three important performance metrics of size, profits, and investment. Third, it is well-liked by creditors, financial analysts, investors, and other consumers of external information (ROI Vs ROS, 2011). The ROI focuses on profits, is objective to costs and profits, also has easily accessible data, varied sized divisions, is fair to different sizes, and managers approve projects with better ROIs, to name a few benefits of employing ROI (MADPE, 2011). According to Alrafadi (2013), banks' financial performance does not dependent on ROI.

2.3 Research Gap

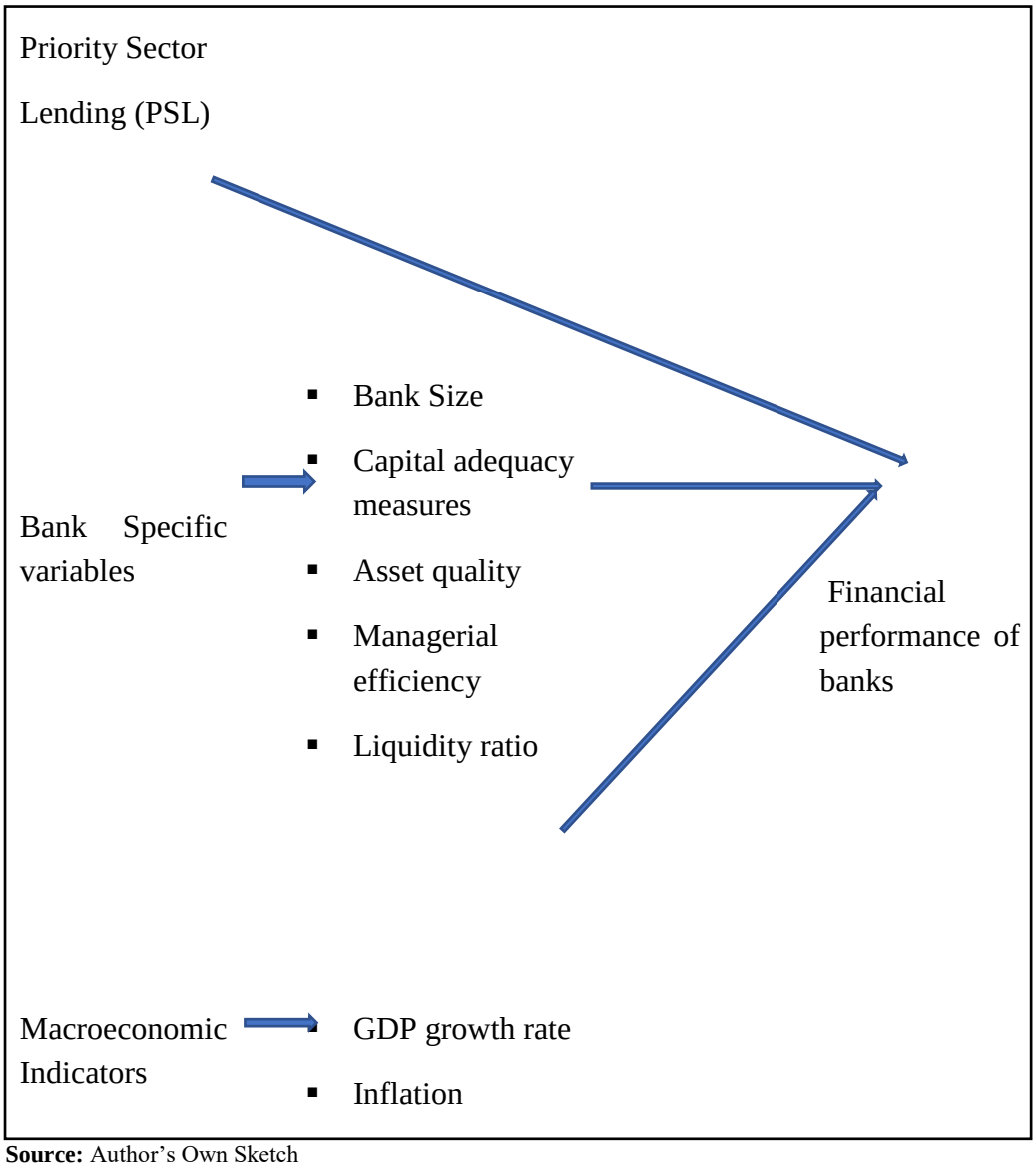
Based on a review of the literature for the global and Bangladesh contexts, it is discovered that extensive research is only available for the Indian context relating to the impact of PSL. However, no empirical study is conducted in the context of Bangladesh. Few types of research work in the context of Bangladesh have been found which are primarily concerned with the impact analysis on farm growth, whether agricultural farm or CMSME due to the Priority Sector Lending.

As banks in Bangladesh must meet the required Priority Sector Lending (PSL) target annually for agricultural finance and CMSME financing (24 percent of total lending of banks in all sectors), extensive empirical analysis on the performance of banks due to Priority Sector Lending (PSL) is crucial, however, no empirical research has been conducted in the context of Bangladesh. This gap in research relating to PSL motivates to conduct the study.

2.4 Conceptual Framework

Based on the stated theoretical underpinnings and the correlations between the variables, the conceptual framework for this study is as follows:

Figure 2.1: Conceptual Framework of Priority Sector Lending(PSL) and Bank Performance



Source: Author's Own Sketch

PSL has a positive effect on banks' profitability when it holds a lion share in lending, according to the literature review. When the sector has greater NPLs, higher monitoring expenses, and lower loan rates than other industries, PSL has a negative effect on banks' profitability.

Further, if banking assets are utilized effectively, the size of the assets has a favorable impact on profitability. Even though the balance sheet is quite large, it would have a substantial impact on the profitability of banks if the size of the assets included a sizable share of fixed assets and non-earning assets. If a larger quantity of ADR results in more capital costs, which would hurt the profitability of banks, then that might have an impact. Profitability is impacted by the Cost Income Ratio (CIR), since greater operational costs lower banks' gross profits. NPL declines when bank net revenue declines, which has a negative impact on financial performance of banks.

As a result, more banking activity is anticipated, which will have an impact on banks' performance and vice versa. The profitability of banks may also be impacted by inflation. Relatively greater inflation stimulates suppliers to create more goods in anticipation of increased sales revenues. As a result, there will be an increase in the need for bank working capital financing, which will have an impact on banks' profitability while other factors remain the same. Expected inflation may also increase wage and prices of non-labor inputs, drive up the cost of production and reduce supply, at least in the short run. However, when greater inflation decreases export and increases import, it might have a negative impact that results in less bank lending.

3. Data and Methodology

3.1 Theoretical Framework

Based on the previous literature review (Sudin et al., 2022; Saleh & Abu, 2020; Islam & Nishiyama, 2016) the theoretical framework includes PSL, bank-specific variables, and macroeconomic indicators based on the literature review and interest in the study. Using PSL as the primary independent variable, bank-specific independent variables include total assets, CAR, NPL, CIR, and ADR. Bangladesh's macroeconomic indicators include annual inflation and GDP

growth rate. ROA and ROI are used as the dependent variables to calculate a bank's profitability. Panel data are used to examine the financial performance of banks as a result of Priority Sector Lending (PSL). The following is the functional forms and regression specification for determining the effect of priority sector lending on bank profitability:

The functional form of the bank profitability model is as follows:

ROA =f (Volume of Priority Sector Lending, bank-specific internal variable, and macroeconomic factors)

The econometric model is as follows:

$$ROA_{it} = \beta_0 + \beta_1 PSL_{it} + \beta_2 LTA_{it} + \beta_3 CAR_{it} + \beta_4 NPL_{it} + \beta_5 CIR_{it} + \beta_6 ADR_{it} + \beta_7 GDP_t + \beta_8 INF_t + \beta_9 YEAR_t + \varepsilon_{it} \quad (1)$$

The functional form of the bank profitability model is as follows:

ROI =f (Volume of Priority Sector Lending, bank-specific internal variable, and macroeconomic factors)

$$ROI_{it} = \beta_0 + \beta_1 PSL_{it} + \beta_2 LTA_{it} + \beta_3 CAR_{it} + \beta_4 NPL_{it} + \beta_5 CIR_{it} + \beta_6 ADR_{it} + \beta_7 GDP_t + \beta_8 INF_t + \beta_9 YEAR_t + \varepsilon_{it} \quad (2)$$

Where,

ROA_{it}	:	Year-End Return on Average Asset of ith bank for the year 't'
ROI_{it}		Year-End Return on Investment of ith bank for the year 't'
ROE_{it}	:	Year-End Return on Average Equity of ith bank for the year 't'
PSL_{it}	:	Log of Priority Sector Lending of ith bank for the year 't'
LTA_{it}	:	Log of Year-End Total Assets of ith bank for the year 't'
CAR_{it}	:	Year-End Capital Adequacy Ratio of of ith bank for the year 't'
NPL_{it}	:	Year-End Non-Performing Loans in Percentage ith bank for the year 't'
CIR_{it}	:	Year-End Cost Income Ratio of ith bank for the year 't'
ADR_{it}	:	Year-End Advance Deposit Ratio ith bank for the year 't'
GDP_t	:	Annual GDP Growth Rate for the year 't'
INF_t	:	Annual Inflation for the year 't'

3.1.1 Hypothesis Development

Based on the key objective of the study in chapter 1 and literature review in chapter two, only one hypothesis can be developed. Based on the previous

literature review ROA and ROI are used as dependent variables while determining financial performance of banks duet to Priority Sector Lending (PSL). Though using the objectives in chapter one and the literature review in chapter two to assess the impact of PSL, bank-specific variables, and macroeconomic factors. As a result, the two hypotheses can be stated as follows:

H1: PSL affects the Return on Assets (ROA) of Banks.

H2: PSL affects the Return on Investment (ROI) of banks.

According to Uppal (2009), though the rise of priority sectors is essential, commercial banks are battling with PSL on concerns such as decreased profitability, increased NPL, and high operational expenses of keeping an account. An economy needs PSL, but a higher PSL raises NPL (Swami, 2012). Ganesan (2003) stated that credit to the priority sector subsidized interest rates has increased bank income loss ratios compared to profitability. Additionally, credits to priority sectors only come in modest numbers.

Most importantly, bank profitability greatly relies on the prompt repayment of the loan from its borrowers, while NPL results in considerable losses for banks, where the primary source of bank income is interest on loans. Sharma & Rathore (2016) investigated the impact of NPL on bank profitability and determined the negative influence on profitability of banks.

As the main variable of the study is Priority Sector Lending (PSL) and the other variables such as TA, CAR, NPL, ADR, CIR, GDP and INF are used as control variables. Finally, the stated hypotheses states that PSL may affect positively or negatively financial performance of banks, even PSL could show no relation at all with ROA, as evidenced by literature review.

3.2 Data

3.2.1 List of Variables

The study relies heavily on secondary data. Based on the availability of balanced panel data, a total of 31 commercial banks were considered for the study. Bank-level data are gathered from audited annual reports published on websites by banks. Bank-level data are collected for the years 2012 to 2021. The World Bank database is used to collect data on external factors, inflation, and GDP growth rate. Table 3.1 shows the sample selection procedure.

Bangladesh currently has 61 licensed banks in operation. FCBs are excluded from the analysis due to their different ownership structure from local PCBs and SOCBs in Bangladesh.. 13 of the 52 local PCBs and SOCBs were established after 2012, for which no data is available. Furthermore, data from eight banks—five SOCBs and three PCBs—is not included because it is not included in their annual reports. With these exclusions, the final sample consists of 32 banks. Table 3.1 depicts the sample selection techniques.

Data are manually extracted from the annual reports of the corresponding banks for the years 2012 through 2021. The study's dependent and independent variables each had 310 bank-year observations. Table 3.2 contains a list of the variables used in the study. The total Asset (TA) series is converted into a natural logarithm before estimating.

Table 3.1: Sample Selection Procedures

Description	Total No. of Banks	SOCBs	PCBs		FCBs
			Conventional	IBs	
Banks in All Categories	61	9	34	9	9
Banks Excluded as started operations after 2012	(13)	-	(11)	(2)	-
Banks Excluded for Data Incomplete	(8)	(5)	(3)	-	
Banks Excluded Due to Ownership Structure	(9)	-	-	-	(9)
Total Banks in the Study	31	4	20	7	0

Source: Author's Own Compilation

Note: SOCBs stand for State-Owned Commercial Banks, PCBs stand for Private Commercial Banks, FCBs stand for Foreign Commercial Banks, IBs stand for Islamic banks which are based on Islamic Shariah Based principles, and Conventional banks include the banks which are not Shariah-based principles.

Table 3.2: List of Variables

Variables	Descriptions	Unit	Source
ROA	Net Income to Total Assets	In Percentage	Audited Annual Reports
ROI	Net Income/Total Investment	In Percentage	Audited Annual Reports
ROE	Net Income/ Total Shareholders' Equity	In Percentage	Audited Annual Reports
PSL	Percent of Agriculture and CMSME Lending to Total Lending	In Percentage	Audited Annual Reports
TA	Total Assets of Audited Balance Sheet	In Natural Logarithm	Audited Annual Reports
CAR	Total Eligible Regulatory Capital to Total Risk-Weighted Assets	In Percentage	Audited Annual Reports
CIR	Total Operating Expense to Total Operating Income	In Percentage	Audited Annual Reports
NPL	Classified Loan as a percent of Loan Loans	In Percentage	Audited Annual Reports
ADR	Total Lending to Total Deposit	In Percentage	Audited Annual Reports
GDP	Annual Gross Domestic Product Rate	In Percentage	World Bank
INF	Annual Inflation	In Percentage	World Bank

Notes: Sample period: 2012 to 2021. The frequency of all the data is on a yearly basis.

ROA stands for Return on Assets. ROI stands for Return on Investment. ROE stands for Return on Equity. PSL stands for Priority Sector Lending. TA stands for Total Assets. CAR stands for Capital Adequacy Ratio. CIR stands for Cost to Income Ratio. NPL stands for Non-Performing Loans. ADR stands for Advance Deposit Ratio. GDP stands Gross Domestic Product. INF stands for Inflation.

3.2.2 Correlation Matrix

Before model estimation, the study finds correlation analysis to determine whether the explanatory variables are substantially correlated. The correlation matrix between the variables is explained in Table 3.3 For example, there is a

positive relationship between PSL and TA, PSL and CAR, and PSL and ADR. The relationship between PSL and NPL, on the other hand, is a negative one. PSL and CIR also have a negative correlation. NPL and TA also show a positive correlation. Table-3.3 shows that there is no strong correlation, either positive or negative, between the regressors.

Table 3.3: Correlation Matrix

	PSL	TA	CAR	NPL	CIR	ADR	GDP	INF
PSL	1.00							
TA	0.17	1.00						
CAR	0.17	-0.04	1.00					
NPL	-0.08	0.41	-0.51	1.00				
CIR	-0.04	0.33	-0.35	0.45	1.00			
ADR	0.14	-0.24	0.38	-0.61	-0.43	1.00		
GDP	0.02	0.01	-0.05	0.09	-0.03	0.12	1.00	
INF	-0.06	-0.43	-0.23	-0.05	-0.16	-0.17	-0.28	1.00

Notes: Sample period: 2012 to 2021. ROA stands for Return on Assets. PSL stands for Priority Sector Lending. TA stands for Total Assets. CAR stands for Capital Adequacy Ratio. CIR stands for Cost to Income Ratio. NPL stands for Non-Performing Loans. ADR stands for Advance Deposit Ratio.

3.3 Model Specification

The study proceeds by selecting an appropriate regression method for panel data in order to measure the relationship between bank profitability and priority sector lending. Initially, the study employs the Hausman test to comprehend the model's effects (Gujarati & Porter, 2009).

The Hausman test is used to determine whether the model is random or fixed effects, where H0 indicates that the model is random effects and H1 indicates that the model is fixed effects. According to the Hausman test analysis, the probability value ($p = 0.9279$) indicates that the chosen model will be random ($p > 0.05$). Based on the Hausman test, the random effects model is used in this study to determine the relationship between financial performance and priority sector lending for banks in Bangladesh. Table 4.4 shows the outcome of the Hausman test. Following the Hausman test analysis, the random effects model is used to evaluate the factors affecting the profitability of banks.

The study uses robust standards to adjust the standard errors in the regression results for better prediction to account for heteroskedasticity and autocorrelation. To account for the impact of the year on ROA and ROI, the study utilizes a time dummy in the estimate (Uddin et al., 2022).

Additionally, the study employs a primary survey based on empirical analysis findings. The primary survey's main goal is to identify some qualitative factors that may affect bank profitability as a result of PSL. In this context, a survey questionnaire for 100 mid-level officers working in PSL in various banks is being prepared. A semi-structured questionnaire is included in the study (Appendix-4). To obtain feedback from respondents, a purposive sampling technique was used.

4. Empirical Results

4.1 Descriptive Statistics

Table-4.1 displays descriptive data for the following variables: ROA, PSL, TA, CAR, NPL, CIR, ADR, GDP, and INF. Sample banks have an average ROA of 0.79 percent. The minimum and maximum ROA are -4.92 and 2.75 percent, respectively. Table 4.2 shows that 61.3 percent (19) of the sample banks' mean ROA is greater than the aggregate mean ROA (0.79).

The mean PSL percentage is only 19.35 percent, with a minimum and maximum of 1.40 percent and 56.05 percent, respectively. When compared to other lending sectors in Bangladesh, the average percentage of PSL is insignificant. Table 4.2 displays that the mean PSL of 61.3 percent of banks (19) is lower than the aggregate mean PSL (19.35)

The average CAR is 12.40 percent, with a low of 3.70 percent and a high of 17.93 percent. Table 4.2 shows that the mean ROA of 61.3 percent of banks (19) is higher than the aggregate mean ROA (0.79). The average LTA is 5.45 percent, with a low of 4.30 percent and a high of 6.28 percent. Table-4.2 shows that the mean LTA of 54.84 percent of banks (17) is less than the aggregate mean LTA (5.45).

The average NPL is 7.20 percent, with a low of 1.63 percent and a high of 35.28 percent. Table 4.2 shows that the mean NPL of 77.42 percent of banks (24) is less than the aggregate mean NPL (7.20). The average CIR is 53.56 percent, with low and high values of 20.63 and 104.11, respectively. Table 4 shows that the mean CIR of 67.74 percent of banks (21) is less than the aggregate mean CIR (53.56).

Table-4.2 exhibits 58.06 percent of banks' (18) mean ADR is more than the aggregate mean ADR (80.05). As shown by Table 4.1, among the variables, the least standard deviation is observed in TA (Total Asset) and the highest standard deviation is found in CIR (Cost-Income Ratio).

Table 4.1: Descriptive Statistics: Aggregate (All Banks in the Sample)

Variable	Obs.	Mean	Std. Dev.	Minimum	Maximum
ROA	310	0.79	0.65	-4.92	2.75
ROI	310	7.41	3.48	-0.59	22.35
PSL	310	19.35	10.37	1.40	56.05
LTA	310	5.45	0.27	4.30	6.28
CAR	310	12.40	1.97	3.70	17.93
NPL	310	7.20	6.11	1.63	35.28
CIR	309	53.56	16.98	20.63	104.11
ADR	310	80.05	10.87	37.28	108.20
GDP	310	6.60	1.26	3.40	8.200
INF	310	6.04	0.66	5.50	7.5

Notes: Sample period: December 2012 to December 2021. TA is transformed into the natural logarithm. Obs. stand for a number of observations and std. dev stands for standard deviation

Table 4.2: Descriptive Statistics: Bank Wise

Variables	Less than all banks' mean	% of Banks	More than all banks' Mean	% of Banks
ROA	12	38.7	19	61.3
PSL	19	61.3	12	38.7
LTA	17	54.84	14	45.16
CAR	14	45.16	17	54.84
NPL	24	77.42	7	22.58
CIR	21	67.74	10	32.26
ADR	13	41.94	18	58.06

4.2 Multicollinearity Test

The study investigates multicollinearity, as suggested by previous research (Belkaoui & Karpik, 1989). According to Wooldridge (2013), a multicollinearity problem exists when the mean Variance Inflation Factors (VIFs) are greater than 10. The Table-4.3 shows that the mean VIF is 1.62, indicating that there is no multicollinearity (mean VIF10). The highest VIF is found in NPL (2.31) and the lowest VIF is found in PSL (1.10). As a result, the data are free of the multicollinearity problem.

Table 4.3: Variance Inflation Factors

Variable	VIF	1/VIF
NPL	2.31	0.39
TA	1.68	0.51
ADR	1.89	0.52
INF	1.66	0.53
CIR	1.49	0.56
CAR	1.64	0.63
GDP	1.18	0.83
PSL	1.10	0.88
Mean VIF	1.62	

4.3 Interpretation of Regression Outputs

Table-4.4 shows the regression result without VCE (robust) and with VCE (robust) for ROA. The regression output in Table 4.4 shows that the overall multiple regression is statistically significant as the chi-squared value of 111.16 which is statistically significant at a 1 percent level of significance. R squared value shows that 34.91 percent of the variation in ROA has been explained by the PSL and other independent variables. The table 4.4 shows the insignificant relationship between PSL and ROA, which indicates that PSL does not affect the financial performance of banks (ROA, a measure of profitability, which is consistent with Sudin et al., (2022).

Table 4.4: Panel Estimation Results: without VCE (robust) and with VCE (Robust)

Equation 1	**Dependent Variable =ROA**	
	Without VCE robust	**With VCE robust**
PSL	.0042	.0042
	(0.246)	(0.159)
TA	-0.3077*	-.3077*
	(0.057)	(0.093)
CAR	0.0447**	.0447
	(0.032)	(0.311)
NPL	-0.0493***	-.0493**
	(0.000)	(0.018)
CIR	-.00036	-.003
	(0.205)	(0.372)
ADR	-0.0098**	-.0098*
	(0.023)	(0.081)
GDP	0.0563**	.0563***
	(0.027)	(0.010)
INF	0.1244**	.1244*
	(0.036)	(0.051)
constant	2.0494	2.0494*
	(0.110)	(0.094)
Model Selection Test		
BP-LM test: p-value	0.0072	0.0072
Hausman test: p-value	0.9279	0.9279
Poolability F test: p-value	0.0000	0.0000
No. of banks	31	31
Number of Observations	310	310
R-Squared	34.91%	34.91%
Chi-Squared	114.30	232.95
Probability	0.000	0.000
Time Dummy	Yes	Yes

Notes: The asterisk ***, ** and * denotes statistical significance at 1%, 5% and 10 % level respectively. Values in parentheses are p-values. Sample period: December 2012 to December 2021

The size of the banks (total asset), adequacy measure (CAR), and liquidity measure (ADR) are found to be statistically significant at a 5% level of significance. At the 5% level of significance, the size of the banks' assets (TA) and ADR show a negative relationship (-0.0377 percent and -0.0098 percent) with ROA, implying that as the size of the banks' assets increases, ROA decreases, which are consistent with Jeris (2021).

It also implies that banks will face diseconomies of scale as a result of management inefficiencies, lowering their performance. The same interpretation

holds true for ADR. Furthermore, GDP and INF have a significant positive relationship with ROA, which are consistent with Phan et al. (2020).

Because CAR has a positive significant relationship with ROA, it means that capital provides adequate protection against potential bank failure, which reduces risk, the finding is consistent with Akbar (2019). A high CAR also signals to the market that the bank's future prospects are promising. It sends a positive signal about market value and improves the bank's financial performance.

Table-4.4 shows a significant negative relationship between NPL (-0.0493) and ROA for the sample banks in the country, indicating that a higher level of NPL will cause lower bank profitability, the finding is consistent with Majumdar & Uddin (2017) . It also shows that a higher level of non-performing loans will deteriorate bank profitability for commercial banks in Bangladesh. The Cost to Income Ratio has a negligible impact on profitability for the sample banks in the country.

Table 4.5: Panel Estimation Results: without VCE (robust) and with VCE (Robust)

Equation 2	**Dependent Variable =ROI**	
	Without VCE robust	**With VCE robust**
PSL	0.0224	0.0224
	(0.364)	(0.379)
TA	-1.0966	-1.0966
	(0.300)	(0.279)
CAR	-0.15584	-0.15584
	(0.200)	(0.195)
NPL	-0.0411	-0.0411
	(0.383)	(0.194)
CIR	-.0098	-.0098
	(0.592)	(0.510)
ADR	-0.0245	-0.0245
	(0.356)	(0.351)
GDP	-.2397 *	-.2397
	(0.073)	(0.132)
INF	0.2928	0.2928
	(0.383)	(0.255)
constant	12.5252	12.5252 *
	(0.116)	(0.049)
Model Selection Test		
BP-LM test: p-value	0.0000	0.0000
Hausman test: p-value	0.1846	0.1846

Equation 2	Dependent Variable =ROI	
	Without VCE robust	**With VCE robust**
Poolability F test: p-value	0.0000	0.0000
No. of banks	31	31
Number of Observations	310	310
R-Squared	19.77%	19.77%
Probability	0.000	0.000
Time Dummy	Yes	Yes

Notes: The asterisk ***, ** and * denotes statistical significance at 1%, 5% and 10 % level respectively. Values in parentheses are p-values. Sample period: December 2012 to December 2021

4.4 Robustness Test

Table-4.6 below shows the regression outputs of panels corrected standard errors (PCSEs). The robustness also shows insignificant relationship between PSL and ROA, as is the original model. The coefficients of panel-corrected standard errors have nearly the same significance and sign. At the 5% level of significance, the robustness check indicates that PSL has no effect on bank financial performance.

Table 4.6: Regression Results: Dependent Variable: ROA

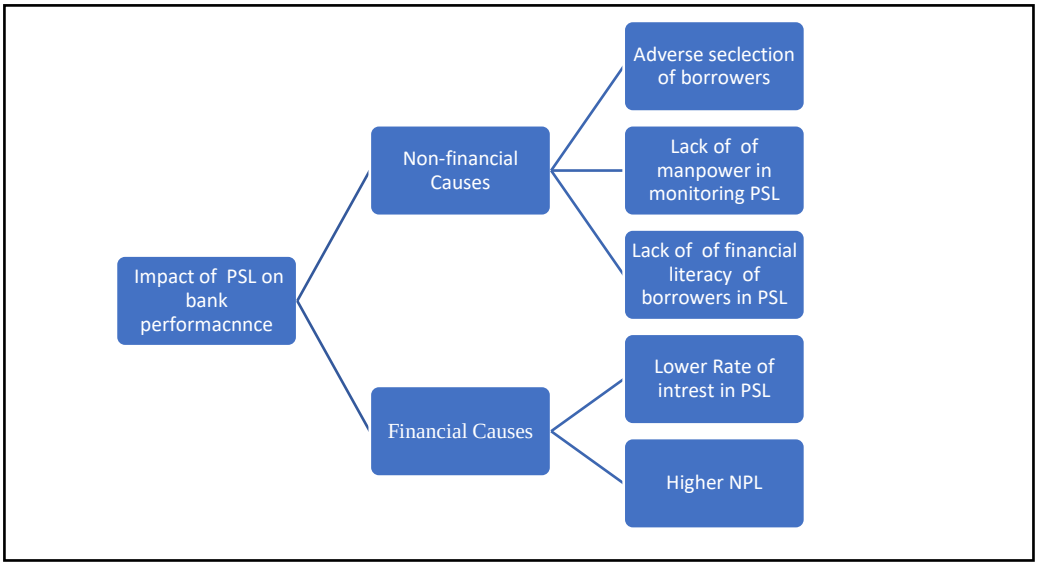
Specification	ROA
PSL	0.0036
	(0.103)
TA	-.3411 **
	(0.048)
CAR	.0519 **
	(0.011)
NPL	-.0464 ***
	(0.000)
CIR	-.0036
	(0.172)
ADR	-.0086
	(0.126)
GDP	.0550 *
	(0.066)
INF	0. .1267 **
	(0.038)
constant	2.0375 *
	(0.085)
Number of Observations	310
R-Squared	0.34
Wald Chi-Squared	66.66
Probability	0.000

Notes: The asterisk ***, ** and * denotes statistical significance at 1%, 5% and 10 % level respectively. Values in parentheses are p-values. Sample period: December 2012 to December 2021

4.5 Respondent's Opinions on the Empirical Findings for PSL and ROA

The study's primary goal is to determine the impact of PSL on the bank performance (ROA). The study found no statistically significant relationship between PSL and ROA. The study attempts to identify possible explanations for the insignificant relationship between PSL and ROA. As the goal of the primary survey is to find out reasons for insignificant relationship between PSL and ROA, the scope of the analysis is very limited. The respondents' feedback provided the most likely explanations for the study's findings. Financial and non-financial causes were identified by respondents (Figure-4.1).

Figure 4.1: Causes of Bank's Unwillingness for PSL



Source: Author's own compilation based on primary survey

4.5.1 Adverse Selection of Borrowers in PSL

Because PSL is mostly government-directed and the central bank sets a time limit for disbursing a certain amount of funds to the underprivileged sector (Priority Sector), banks usually try to follow central bank regulations when disbursing loans to priority sectors to avoid financial and non-financial penalties from the regulators. In many cases, banks lack an appropriate appraisal process for selecting the right borrowers during this process. According to respondents, many unscrupulous people use bank loans to divert funds.

4.5.2 Lack of Manpower to Monitor the Loans in PSL

Banks are required to disburse large sums of money to borrowers in small amounts under PSL. Banks must employ a large number of bank employees to monitor borrowers and fund utilization. However, banks lack sufficient manpower to supervise PSL loans.

4.5.3 Lack of Financial Literacy of Borrowers in PSL

Another reason for banks' reluctance to invest in PSL is a lack of financial literacy. Because borrowers in priority sectors are undereducated and lack financial literacy, they are hesitant to repay loans on time. Respondents claim that a larger proportion of borrowers believe that because the lending is government-directed, it will be waived by the government later, discouraging more PSL lending.

4.5.4 Lower Rate of Interest in PSL

PSL typically required a lower interest rate than other economic sectors such as the corporate sector and transportation, but monitoring costs are extremely high. As a result, it has an impact on bank profitability. Bangladesh Bank, the central bank of the country, has instructed banks to provide bank loans at the rate of 9 percent to all sectors, however, the maximum interest rate is 8 percent for the agricultural sector. Moreover, in some sectors of agriculture, banks will have to provide lending at a concessional interest rate. For instance, banks cannot charge more than 4 percent while lending to salt cultivation. Additionally, a number of refinance schemes are available for agriculture sectors, where lending banks earn a commission from the central bank.

4.5.5 Higher NPL in PSL

Because supervision and monitoring are difficult in PSL, the amount of non-performing loans increases in comparison to other economic sectors, affecting bank performance. According to the Financial Stability report of the central bank, the ratio of NPL in priority sectors is 18.88 percent at the end of 2021, which is much higher than the aggregate NPL of all sectors.

5. Conclusion

This chapter focuses on the summary of key findings and policy implications of the study. The study's limitations and recommendations for further research are also included in this chapter. According to the study's problem statement, even though GoB and BB require banks to lend to priority sectors, the proportion of PSLs in overall bank loans is quite small-around 20% on average. The purpose of this article is to experimentally investigate the effect of PSL on Bangladeshi banks' profitability. The dependent variable in the research is measured for profitability using ROA and ROI. Priority Sector Lending (PSL) Percentage is regarded as a critical independent variable.

According to the research study, in addition to PSL, macroeconomic variables and bank-specific variables also have an impact on ROA. The size of the asset, CAR, CIR, ADR, and NPL are among the independent variables included in the research that are special to banks. The list of independent variables also includes GDP, and INF. The research considered 310 observations from 31 banks with diverse ownership structures that operate in Bangladesh. In chapter two, the selection procedure for 31 banks is detailed. Panel data from 2012 to 2021 is used in the research. The yearly audited report of banks is where the study gets all the information, except GDP and INF. The World Bank data base is used to get information on GDP and INF.

5.1 Summary of Key Findings

As the key purpose of this research is to analyse the link between PSL and ROA for commercial banks in Bangladesh from 2012 to 2021. The study also tries to find out the regulatory framework of Priority Sector Lending (PSL). After going through regulatory framework for priority sectors, agricultural and CMSMEs, it has been found that PSL is mostly regulatory driven. In this context, BB, the central bank of Bangladesh has instructed all categories of banks to attain the target set.

According to the regulation governing the financing of CMSMEs by banks, banks must define their target for CMSME financing and must grow the total amount of CMME loans by 1% annually. Additionally, banks will be required to

provide 24 percent of their overall loans to CMSMEs by 2024. Each bank should devote to agricultural financing at least 2.5 percent of its total annual loans and advances annually. The descriptive statistics in this situation show a little upward trend in the percentage of PSL over time. The majority of the rise, nevertheless, may be attributed to legislative requirements.

Eight hypotheses are developed by the research for empirical examination. According to the literature assessment, every hypothesis claims that every independent variable—aside from NPLs—affects bank profitability. NPL, however, has a detrimental effect on banks' profitability, according to the theory. The Hausman test selects the Random Effect (RE) estimator to estimate the empirical framework of the investigation based on model selection tests.

As ROA is dependent on other bank-specific and macroeconomic parameters, LTA, CAR, ADR, NPL, CIR, GDP, and INF are used as independent variables in this analysis. The contribution of PSL to GDP has been about 20% throughout the years, which is negligible compared to the contributions of these other sectors.

According to panel estimation results in chapter 4, no significant relationship is found between PSL and ROA. While using ROI as the dependent variable, it also shows no significant relationship between PSL and ROI. The research used a primary survey to determine the causes for the negligible association between the variables (100 mid-level officers of banks). According to the feedback of respondents, the primary cause includes lower earnings from PSL as compared to other sectors, resulting in less amount of lending by banks in priorities sectors. The respondents also opine that bank lending in the priorities sector faces problems of a poor selection of PSL borrowers, a shortage of personnel at the bank level to supervise PSL loans, a lack of financial awareness among PSL borrowers, and an increase in NPL.

As the profitability of banks is influenced by other factors, the study reveals that the size of the banks (total asset), adequacy measure (CAR), and liquidity measure (ADR) are found to be statistically significant with ROA. The size of the banks' assets (TA) and ADR show a negative relationship with ROA,

implying that as the size of the banks' assets increases, ROA decreases. Additionally, if banks provide more advance to total deposits, the study shows that profitability decreases, which indicates inefficient management of funds by banks. GDP and INF have a significant positive relationship with ROA.

Because CAR has a positive significant relationship with ROA, it means that capital provides adequate protection against potential bank failure, which reduces risk. A high CAR also signals to the market that the bank's future prospects are promising. It sends a positive signal about market value and improves the bank's financial performance.

A significant negative relationship is found between NPL and ROA for the sample banks in the country, indicating that a higher level of NPL will cause lower bank profitability. The Cost to Income Ratio has a negligible impact on profitability for the sample banks in the country. Thus, there may be more factors that impact the profitability of a bank. Therefore, banks may see priority sector lending as a vital sector for Bangladesh's economic and social growth.

5.2 Policy Implications of the Study

Bangladesh's monetary and financial policy has relied heavily on PSL. As the data indicate no substantial correlation between PSL and the profitability of banks, policymakers should take the necessary steps to make efficient use of public funds. As banks demonstrate a reluctance to engage in PSL due to a lack of personnel and capacity development in selecting borrowers for PSL, regulators should address weaknesses in regulatory oversights and implement stringent monitoring mechanisms so that banks to increase significant involvement in PSL with adequate personnel and capacity development and borrowers' lack of financial literacy.

5.3 Limitations and Suggestions for Future Study

This study is not an exception to the rule that all studies contain limits and need for additional research; this study is no exception either. First, the study includes priority sectors only, by passing other economic sectors where banks' lending is almost 80 percent of total lending. Second, the study covers bank-level

data for 31 banks out of 61 banks for empirical analysis due to data unavailability and ownership structure. Third, the study uses a very short questionnaire (primary survey) to find out the probable causes of the insignificant relationship between PSL and ROA. Finally, the study is based on the supply side not on demand side, at borrowers 'side.

Overcoming the limitations of the study, further research can be conducted for more comprehensive and specific findings so that policymakers can take appropriate initiatives to widen the scope of Priority Sector Lending (PSL) and encourage lenders to provide more lending in PSL.

Reference

Abdel-Baki, & Monal A. (2012). The impact of Basel III on emerging economies. *Global Economy Journal* 12 (2). DOI: https://doi.org/10.1515/1524-5861.1798.

Ahmed, J. U. (2010). Priority Sector Lending By Commercial Banks in India: A Case of Barak Valley. *Asian Journal of Finance & Accounting*, *2*(1).

Ahmed, J.U., G.P. Bhandari, & R. Ahmed (2013), Profitability of Regional Rural Banks in India: An Empirical Analysis in Meghalaya Rural Bank, *Journal of Rural and Industrial Development*, 1(1), 1-15.

Akbaş, H. E. (2012). Determinants of bank profitability: An investigation on Turkish banking sector. Öneri Dergisi, 10(37), 103-110.

Akber, S. M. (2019). Influential Factors Responsible for Profitability: A Technical Study on Commercial Banks in Bangladesh. *International Journal of Accounting &Amp; Finance Review*, *4*(2), 22–28. https://doi.org/10.46281/ijafr.v4i2.418

Akter, H., & Barua, S. (2016).International trade financing: a comparative study on the performance of state-owned and private commercial banks of Bangladesh. *International Journal of Monetary Economics and Finance*, 9(2)

Alauddin, M., & Biswas, J. (2014). Agricultural Credit in Bangladesh: Present Trend, Problems and Recommendations. *Journal of Economics and Sustainable Development*, 5(27), 11-22.

Ali, M. R., Ahmed, R. A., Tisha, R. T., & Islam, M. A. (2021). Does SME financing perform well from both demand and supply sides? The case of a developing country. *International Journal of Financial Engineering*, *08*(04). https://doi.org/10.1142/s2424786321420020

Almaqtari, F. A., Al-Homaidi, E. A., Tabash, M. I., & Farhan, N. H. (2018). The determinants of profitability of Indian commercial banks: A panel data approach. *International Journal of Finance &Amp; Economics*, *24*(1), 168–185. https://doi.org/10.1002/ijfe.1655

Alrafadi. (2013). Evaluating the Performance of Libyan Banks Using Return On Investment. *American Journal of Economics and Business Administration*, *5*(2), 84–88. https://doi.org/10.3844/ajebasp.2013.84.88

Anand, S. C. (1992, October). Is Priority Sector Lending still a Drag on Profitability? *The Banker,* Vol. XXXIX (8), pp. 35-40.

Asia Focus. (2014). In *Priority Sector Lending in Asia*. [Country Analysis Unit]. Federal Reserve Bank of San Francisco. https://www.frbsf.org/banking/wp-content/uploads/sites/5/Asia-Focus-Priority-Sector-Lending-in-Asia-September-2014.pdf

Ayeomoni, I. O., & Aladejana, S. A. (2016). Agricultural Credit and Economic Growth Nexus.Evidence from Nigeria. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 6(2), 146-158.

Bag, S., & Islam, S. (2017). Non-performing assets a biggest challenge in banking sector— A Comparative Study between India and Bangladesh Banking Sector. DOI: 10.21917/ijms.2017.0084

Bag, S., Ray, N., & Roy, B. (2022). Does priority sector lending affect profitability? An empirical study on Indian public sector banks. In *Green Production Engineering and Management* (pp. 81-92). Woodhead Publishing.

Bangladesh Bank (2022), Bangladesh Bank Annual Report, Bangladesh. https://www.bb.org.bd

Bonomo, M. and Martins, B., 2016. The Impact of Government-Driven Loans in the Monetary Transmission Mechanism: what can we learn from firm-level data? *Banco Central Do Brasil Working Paper No. 419*, dated May 2016.

Brahmaiah, B., & Ranajee. (2018). Factors Influencing Profitability of Banks in India. *Theoretical Economics Letters*, *08*(14), 3046–3061. https://doi.org/10.4236/tel.2018.814189

Cetorelli, N., & Goldberg, L. S. (2012). Banking globalization and monetary transmission. *The Journal of Finance*, *67*(5), 1811-1843.

Chalermchatvichien, P., Jumreornvong, S., & Jiraporn, P. (2014). Basel III, capital stability, risk-taking, ownership: Evidence from Asia. Journal of Multinational Financial Management, 28, 28-46.

Dave, K. S. (2016). A Study of Priority Sector Lending for Selected Public Sector Banks of India. *International Journal of Research and Analytical Reviews,3(2)*

Farooq, M., Khan, S., Atique Siddiqui, A., Tariq Khan, M., & Kamran Khan, M. (2021). Determinants Of Profitability: A Case Of Commercial Banks In Pakistan. *Humanities & Amp; Social Sciences Reviews*, *9*(2), 01–13. https://doi.org/10.18510/hssr.2021.921

Flannery, M. J., & Rangan, K. P. (2007). What Caused the Bank Capital Build-up of the 1990s?. *Review of Finance*, *12*(2), 391–429. https://doi.org/10.1093/rof/rfm007

Ganesan, P. (2003). Impact of Priority sector advances on profitability of public sector banks in India. *Journal of Financial Management and Analysis*, 16(2), 14-24

Gaur, D., & Mahopatra, D.R. (2019). Non-performing assets in India: priority vs non- priority sector lending. *NMIMS Management Review*, 37(3),53-65.

Gaur, D., & Mohapatra, D. R. (2020). The nexus of economic growth, priority sector lending and non-performing assets: case of Indian banking sector. *South Asian Journal of Business Studies*, *10*(1), 70–90. https://doi.org/10.1108/sajbs-01-2020-0010

Gazi, M. A. I., Alam, M. S., Hossain, G. M. A., Islam, S. N., Rahman, M. K., Nahiduzzaman, M., & Hossain, A. I. (2021). Determinants of Profitability in Banking Sector: Empirical Evidence from Bangladesh. *Universal Journal of Accounting and Finance*, *9*(6), 1377–1386. https://doi.org/10.13189/ujaf.2021.090616

Gujarati, D.N. and Porter, D.C. (2009) Basic Econometrics. 5th Edition, McGraw Hill Inc., New York

Ho, P. H., Huang, C. W., Lin, C. Y., & Yen, J. F. (2016). CEO overconfidence and financial crisis: Evidence from bank lending and leverage. *Journal of Financial Economics, 120*(1), 194–209.https://doi.org/10.1016/j.jfineco . 2015.04.007

Hosen, M. Z. (2020). Internal Factors Influencing the Profitability of Commercial Banks in Bangladesh. *International Journal of Economics and Financial Research*, (67), 192–200. https://doi.org/10.32861/ijefr.67.192.200

Isalm, Q.B.T.(2021). Impact of Bank-specific Variables on Profitabilityan Empirical Study on the Banking Sector of Bangladesh. *Atlantic Review of Economics: Revista Atlántica de Economía, 4(1).*

Islam, M. S., & Nishiyama, S. I. (2016). The determinants of bank net interest margins: A panel evidence from South Asian countries. *Research in International Business and Finance*, 37(3), 501–514. https://doi.org/10.1016/j.ribaf.2016.01.024

Iskandar, A. S., Che-Yahya, N. ., & Ab Wahid, Z. (2021). Determinants of Commercial Banks' Profitability in Malaysia. *Journal of Entrepreneurship and Business*, 7(1), 27–39. Retrieved from http://journal.umk.edu.my/index.php/jeb/article/view/469

Islam, M. M. (2020). Agricultural credit and agricultural productivity in Bangladesh: an econometric approach. *International Journal of Food and Agricultural Economics* (IJFAEC), 8(1128-2020-1530).

Islam, M.M. (2020). Agricultural Credit and Agricultural Productivity in Bangladesh: An Econometric Approach**.** *International Journal of Food and Agricultural Economics*, 8(3), DOI. 10.22004/ag.econ.305327

Jeris, S. S. (2021). Factors Influencing Bank Profitability in a Developing Economy. *International Journal of Asian Business and Information Management*, *12*(3), 333–346. https://doi.org/10.4018/ijabim. 202107 01. oa20

Julia, T., & Kassim, S. (2016). Green Financing and Bank Profitability: Empirical Evidence From The Banking Sector In Bangladesh. Al-Shajarah: Journal of the International Institute of Islamic Thought and Civilization (ISTAC), 21(3). Retrieved from https://journals.iium.edu.my/shajarah/ index.php/ shaj/article/view/423

Kale, D.(2016).The Impact of Directed Lending Programs on the Credit Access of Small Businesses in India: A Firm-level Study. *MPRA Paper* No. 72510, Online at https://mpra.ub.uni-muenchen.de/72510/

Khaled Mahmud, Avijit Mallik, Md. Farhan Imtiaz, & Nazia Tabassum. (2016). The Bank-Specific Factors Affecting the Profitability of Commercial Banks in Bangladesh: A Panel Data Analysis. *International Journal of Managerial Studies and Research*, *4*(7). https://doi.org/10.20431/2349-0349.0407008

Khaled Mahmud, Avijit Mallik, Md. Farhan Imtiaz, & Nazia Tabassum. (2016). The Bank-Specific Factors Affecting the Profitability of Commercial Banks in Bangladesh: A Panel Data Analysis. *International Journal of Managerial Studies and Research*, *4*(7). https://doi.org/10.20431/2349-0349.0407008

Kishan, R. P., & Opiela, T. P. (2000). Bank Size, Bank Capital, and the Bank Lending Channel. *Journal of Money, Credit and Banking*, *32*(1), 121. https://doi.org/10.2307/2601095

Kohli, R. (1997). Directed credit and financial reform. *Economic and Political weekly, 32(42),* 2667- 2676.

Kosmidou, K. (2008). The determinants of banks' profits in Greece during the period of EU financial integration. Managerial finance.

Kumar, M., Batra, N., & Deisting, F. (2016). Determinants of Priority Sector Lending: Evidence from Bank Lending Patterns in India. *The International Journal of Business and Finance Research, 10(2),* 55-80.

MADPE, 2011. Management Accounting-divisional performance evaluation.

Majumder, M. T. H., & Uddin, M. J. (2017). The determinants of profitability of nationalised banks in Bangladesh. *International Journal of Economics and Business Research, 13*(4), 335. https://doi.org/10.1504/ijebr.2017.084380 Management Studies, 3(4), 620–625. https://doi.org/10.2 1917 /ijms.2017.0084.

Miah, M. D., Hasan, R., & Uddin, H. (2020). Agricultural Development and the Rural Economy: The Case of Bangladesh. *Bangladesh's Economic and Social Progress*, 237–266. https://doi.org/10.1007/978-981-15-1683-2_8

Mohammad Hedayet Ullah, M. H., & Rahman, S. M. M. (2022). Financial Performance Comparison between State-Owned Commercial Banks and Islamic Banks in Bangladesh. *Journal of International Business and Management*, *5*(3).

Narayanan, S. (2015). The Productivity of Agricultural Credit in India. Indira Gandhi Institute of Development Research, Working Papers 2015-001.

Niranjana, S., & Anbumani, V. (2002). Social Objectives and Priority Sector Lending, Banking and Financial Sector Reforms in India. Deep and Deep Publications. pp. 231–233..

Okosodo, L. A. (2016). Agricultural Credit on the Growth of the Nigerian Economy. International Journal of Education and Research, 4(12), 265-276.pp;--0o'/.gh68u6i56grvfgrvfrgefvtvg m,jer8u89ruyj34fnes

Okosodo, L. A. (2016). Agricultural Credit on the Growth of the Nigerian Economy. International Journal of Education and Research, 4(12), 265-276.

Oli, S. K. (2021). Deprived Sector Lending and Non-Performing Loans in Nepal. *Applied Economics and Finance*, *8*(4), 1. https://doi.org/10.111 14/ae f.v8i4.5261

Parida, T. K., & Jain, S. (2016). *Rethinking Priority Sector Lending by Banks in India*. LAP LAMBERT Academic Publishing.

Klein, P. O., & Weill, L. (2018). Bank Profitability and Economic Growth. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3207171

Phan, H. T., HOANG, T. N., DINH, L. V., & HOANG, D. N. (2020). The Determinants of Listed Commercial Banks' Profitability in Vietnam. *The Journal of Asian Finance, Economics and Business*, *7*(11), 219–229. https://doi.org/10.13106/jafeb.2020.vol7.no11.219

Qian, J. Q., Strahan, P. E., & Yang, Z. (2015). The Impact of Incentives and Communication Costs on Information Production and Use: Evidence from Bank Lending. *The Journal of Finance*, *70*(4), 1457–1493. https://doi.org/10.1111/jofi.12251

Rahaman, M. M., Hoque, M. S., & Roy, M. (2018). Green Financing and Its Impact on Profitability of the Banks: An Empirical Study on Banking Sector of Bangladesh. *Metropoliton University Journal,* 6(1), 42-56.

Rahman, S. U., Hussain, A., & Taqi, M. (2014). Impact of agricultural Credit on Agricultural Productivity in Pakistan: An Empirical Analysis. International Journal of Advanced Research in Management and Social Sciences, 3(4), 125-139

Rajeev, M., & Mahesh, H. P. (2010). Banking sector reforms and NPA: A study of Indian Commercial Banks. *Bengaluru: Institute for Social and Economic Change.*

Re-Prioritizing Priority Sector Lending, Economic Impact Analysis. (2013, December). *Nathan India*. Retrieved December 6, 2022, from https://www.nathaninc.com/wp-content/uploads/2017/10/Priority_Sector_Lending_India.pdf

ROI Vs ROS (2011). Performance Evaluation for HighTechnology Companies.

Rosengard, J. K., & Prasetyantoko, A. (2011). If the banks are doing so well, why can't I get a loan? Regulatory constraints to financial inclusion in Indonesia. *Asian Economic Policy Review*, *6*(2), 273-296.

Saleem, M. A., & Jan, F. A. (2011). The Impact of Agricultural Credit on Agricultural Productivity in Dera Ismail Khan (District) Khyber Pakhtonkhawa Pakistan. *European Journal of Business and Management*, 3(2).

Saleh, I., & Abu Afifa, M. (2020). The effect of credit risk, liquidity risk and bank capital on bank profitability: Evidence from an emerging market. *Cogent Economics &Amp; Finance*, *8*(1), 1814509. https://doi.org/10.1080/23322039.2020.1814509

Samad, A. (2015). Determinants Bank Profitability: Empirical Evidence from Bangladesh Commercial Banks. *International Journal of Financial Research*, 6(3). https://doi.org/10.5430/ijfr.v6n3p173

Sarker, M. N. (2018). Role of Banks on Agricultural Development in Bangladesh. International Journal of Ecology and Development Research, 1(1), 010-015.

Sufian, F., & Habibullah, M. S. (2009). Determinants of Bank Profitability In A Developing Economy: Empirical Evidence From Bangladesh. *Journal of Business Economics and Management*, *10*(3), 207–217. https://doi.org/10.3846/1611-1699.2009.10.207-217

Sumaira, & Bibi, R. (2022). Banking sector development and Economic growth in south Asian countries: Dynamic Panel data analysis. *Journal of Environmental Science and Economics*, *1*(1), 52–57. https://doi.org/10.56556/jescae.v1i1.10

Swami, V. (2012). Impact of macroeconomic and endogenous factors on non performing bank assets. *International Journal of Banking and Finance*, 9(1).

Thanh Cuong Dang, Thi Bat Nguyen, Thi Yen Nguyen, Thi Hang Trinh, & Thi Thao Banh. (2021). Factors affecting the profitability of listed commercial banks in Vietnam : does agriculture finance matter? *Harvested by MU Libraries From AgBioForum (Https://Agbioforum.Org/) on October 11, 2021. Original File Format Was Pdf. File Uploaded Without Modifications.*, *23*(1), 32–41.

Uddin, M. J., Majumder, M. T. H., Akter, A., & Zaman, R. (2021). Do the diversification of income and assets spur bank profitability in Bangladesh? A dynamic panel data analysis. *Vilakshan - XIMB Journal of Management*, *19*(2), 177–194. https://doi.org/10.1108/xjm-01-2021-0023

Uddin, M. M., Islam, M. T., & Al Farooque, O. (2022). Effects of politically controlled boards on bank loan performance: an emerging economy perspective. Journal of Accounting in Emerging Economies. https://doi.org/10.1108/jaee-11-2021-0353

Ullah, M.H, Kamruzzaman, A.S.M, Rahman, & S.M.M (2019). Performance Evaluation of Conventional and Islamic Banks in Bangladesh. *Journal of Business Studies*, 12(2), 16-29.

Uppal, R. K. (2009). Priority sector advances: Trends, issues and strategies.

Journal of Accounting and Taxation, 1(5), 79-89.

UN.ESCAP. (2021, June 28). Micro, small and medium-sized enterprises' access to finance in Bangladesh. Retrieved October 23, 2022, from https://reposit ory. unescap.org/handle/20.500.12870/3676

Yadav, P., & Sharma, A. K. (2015). Agriculture Credit in Developing Economies: A Review of Relevant Literature. *International Journal of Economics and Finance*, 7(12), 219-244.

Yesmine, S., & Mohammad, S.U.B. (2015). Determinants of Banks' Financial Performance: A Comparative Study between Nationalized and Local Private Commercial Banks of Bangladesh. *International Journal of Business and Management Invention, 9*(4), 33-39.

Yüksel, S., Mukhtarov, S., Mammadov, E., & Özsarı, M. (2018). Determinants of Profitability in the Banking Sector: An Analysis of Post-Soviet Countries. *Economies, 6*(3), 41. https://doi.org/10.3390/ econo mie s60 30041

Wooldridge, M. (2013). Introductory Econometrics: A Modern Approach. 5th Edition, South-Western, Mason.

Websites of Sampled Banks

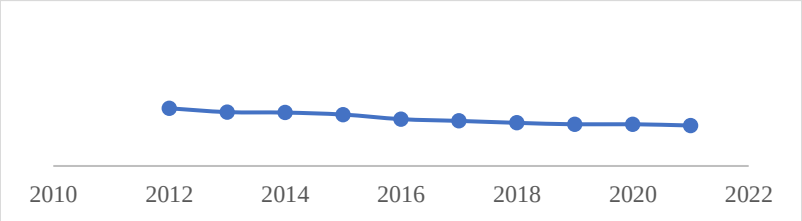
Appendixes

Appendix 1: Sector Wise Loans other than CMSME

	Large Industries	Commercial Loans	RMG, Textile and Ship Breaking Industry
2016	14.90	23.60	21.10
2017	14.70	23.10	21.00
2018	15.90	22.40	21.10
2019	14.70	21.90	21.00
2020	14.25	21.27	22.17
2021	12.29	21.00	22.08

Source: Bangladesh Bank, 2022

Appendix 2: Contribution of Agricultural Sector to GDP in Percent



Source: Bangladesh Bank, 2022

Appendix 3: Sector Wise Maximum Loan Limit for CMSME (BDT)

Sector	Manufacturing	Service	Trade
Cottage	15 lacs	-	-
Micro	1 crore	25 lacs	50 lacs
Small	20 crores	5 crores	5 crores
Medium	75 crores	50 crores	-

Source: Bangladesh Bank, 2022

Appendix 4: Short Questionnaire to Validate the Finding of Empirical Results about PSL and ROA

1. Do you agree that Priority Sector Lending does not affect the profitability of banks?

Yes	No

2. Do you believe that banks are just lending to the priority sector to fulfill the BB target?

Yes	No

3. What are the challenges you are facing while giving loans to priority sectors?

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The Effects of Capital Structure on the Performance and Sustainability of Microfinance Institutions: Empirical Evidence from South Asian Countries

- Mohd. Anisul Islam*

Abstract

In the wake of ongoing trend of commercialization in the microfinance sector for improving performance and sustainability, microfinance institutions (MFIs) nowadays tend to reduce their dependence on non-commercial funding. This study investigates the effects of this shift in capital structure on the performance and sustainability of these socially oriented financial intermediaries operating in South Asian countries. This study employs panel regression and two-stage least squares regression on data from 311 Microfinance Institutions (MFIs) spanning the years 2003 to 2016, demonstrating that increased reliance on grants is associated with both diminished performance and reduced sustainability of MFIs. Conversely, deposit funding improves MFI's performance and sustainability by curbing default rate and raising capability to serve high-income borrowers. The findings of the paper have implications for ongoing shift from concessional funding to commercial funding in the MFI industry and the choice of appropriate capital mix to enhance both performance and sustainability.

Keywords: Capital Structure, Social Performance, Microfinance Institutions, Grants, Default Rate.
JEL Classification: G32, G210

1. Introduction

The capital structure of lending institutions is an important issue nowadays because the advent of diverse and innovative forms of capital has made the capital structure decision complicated. Besides, the urge for the bailout funding or government donations by globally-leading lending institutions after the initiation of financial crisis in 2008 raises the question of appropriateness of their capital structure (Bogan, 2012). Furthermore, the lending institutions like Microfinance Institutions (MFIs), which were largely dependent on grants in the past, are now shifting their reliance to deposits and equity from concessional loans and grants (Farrington & Julie, 2002). If outperforming MFIs are more likely to use the commercial funding and less likely to use the concessional funding, the shift of

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their capital mix toward commercial funding can be justified. It is pivotal to seek the answer to the question –which form of financing out of debt, equity, and grant funding is mostly used by outperforming and highly sustainable MFIs?

Since the publication of seminal paper 'The cost of capital, corporate finance, and the theory of investment' in 1958 by Modigliani and Miller, several empirical studies have been conducted on optimum capital structure. Based on some restrictive conditions, they argue that changes in capital structure have no consequence on the value of firm. Though (Hamada, 1969; Stiglitz, 1974) support the conclusions drawn by Modigliani and Miller (1958), several studies document the linkage between change in capital structure and value of firm (Harris & Raviv, 1991; Jensen & Meckling, 1976; Masulis, 1983; Williams, 1987). These papers identify several factors such as: tax advantages (Masulis, 1983), agency cost (Jensen & Meckling, 1976; Williams, 1987), bankruptcy cost (Jensen & Meckling, 1976), and corporate control (Harris & Raviv, 1991; Kim & Stulz, 1988) etc. through which changes in capital structure cause the changes in value and performance of firm.

Though a number of theorems prove that choice of capital structure by a firm has consequences and effects on its performance and sustainability, most of these are not directly applicable to lending institutions because of the differences in fundamental operations and associated accounting differences (Cohen, 2003). Corporate firms and lending institutions including MFIs are markedly different in terms of their operations, revenue model, regulatory environment, systematic risk measurement, and risk management objectives etc. (Bogan, 2012). Moreover, the usage of noncommercial funding such as – grants, add up another layer of complications to the capital structure issue of microfinance institutions. For these distinctiveness of lending institutions, the idea of optimum capital structure is not as obvious for lending intuitions as it is for corporate institutions. Does the reduction of concessional lending and grants in capital structure reduce the propensity of moral hazard of MFI managers and result in superior performance of MFIs – has become a weighty question nowadays. This study attempts to shed light on these issues by examining the role of capital structure on the performance and sustainability of MFIs.

The issue of optimum capital structure and performance is one of the most visited research topics in corporate finance (Bogan, 2012; Nha et al., 2016). This study is distinctive from existing literature on capital structure of MFIs operating in South Asian countries for several reasons. First, it investigates the individual component of capital structure instead of solely relying on debt-to-equity ratio to measure capital structure. Second, existing literature commonly measure performance of MFIs in terms of financial performance indicators, though social performance indicators are more appropriate to measure the true performance of social objective-oriented MFIs. Outreach, operational self-sufficiency, return on assets, and default rate are commonly used measure of performance for MFIs (Kyereboah-Coleman, 2007; Bogan, 2012; Duguma & Han, 2018; Parvin et al., 2020; Dabi et al., 2023;). Outreach which is measured by number of active borrowers, is considered as social performance measure (Bassem, 2012). Third, average loan balance to GNI per capita, one of the key social performance variables for MFIs has not been used in capital structure and performance literature on MFIs. Probably this is the first attempt to recognize the average loan balance to GNI per capita as the social performance indicator in capital structure studies on MFIs. In this study, performance is measured in terms of both average loan balance to GNI per capita and outreach along with the conventional performance and sustainability indicators (Bassem, 2012).

The main purpose of the study is to examine the influence of varied forms of commercial and non-commercial capital on differences in performance and sustainability measures of microfinance institutions. Forms of capital which drive superior financial and social performance, bring self-sufficiency, and ensure more sustainability also to be assessed.

I use borrowings, deposits, grants, share capital relative to assets as capital structure measures. Besides, financial performance is measured using default rate, operational self-sufficiency, return on assets while social performance is measured using outreach and average loan balance/GDP per capita. This study shows that MFIs which relies more on concessional funding namely grants are likely to experience deteriorating financial performance and sustainability: higher default rate, lower operational self-sufficiency, and lower return on assets. In

contrary, MFIs which banks on deposits and share capital are more likely to earn superior financial performance: lower default rate and higher return on assets. In terms of social performance and sustainability measure, the results find evidence that reliance on deposits and share capital reduces the capability of MFIs to serve a greater number of borrowers. However, reliance on deposits enhances the capability of MFIs to serve borrowers with greater average loan balance which would fulfill the borrowing need of borrowers more prudently.

Though this paper attempts to provide an empirical analysis through studying MFIs operating in South Asian countries, the findings from this paper could be relevant for other financial institutions operating in different parts of the world. This study is based on MFIs, but the lessons learned from this study can be applied to the knowledge of optimal capital structure for other type of lending institutions (Booth et al., 2001; Bogan, 2012). Findings from this research would suggest whether modification of capital structure of MFIs by reducing dependence on noncommercial funding is a worth decision.

The remaining sections are structured as follows: Section-2 provides overview of microfinance sub-sector in South Asia and Section-3 surveys the literature on MFIs' capital structure and derives hypothesis regarding the linkage between type of capital and performance, respectively. Sections-4 and 5 describe the data and the econometric analysis, respectively. The study concludes with Section-6.

2. Microfinance Sub-sector in South Asia

Microfinance exemplifies as an evolving and dynamic system in the world that has shown its capability to adjust to various socio-cultural settings and respond to the changing and varied needs of the poor. South Asia can justifiably claim the intellectual property right of the idea of microfinance in its modern form. 'Microfinance revolution' has seriously challenged many traditional assumptions about poverty reduction strategies by developing innovative ways of reaching credit to the poor. Moreover, microfinance has added momentum in financial markets. Microfinance programs have rapidly increased their outreach

across the South Asian countries under various institutional arrangements over the last three decades.

Instead of its role in providing social security or safety nets to the poor, microfinance is often surrounded by subjects of intense public debates regarding - determination of interest rate in the microfinance market, establishment of financial viability of the microfinance programs, evaluation of microfinance programs by financial self-reliance and commercial viability, effectiveness of microfinance in helping the poor, and accessibility of MFIs to subsidized funds from the government and foreign donors etc. The two separate roles of microfinance recognized by policy makers are to channel funds to the poor as an innovative banking operation and to help poverty alleviation.

Microfinance started in South Asian countries at different points of time and pattern of evolution of microfinance has not been uniform. MFIs in this region have some common features and some differences with respect to models and approaches. South Asia leads the global outreach of MFIs, accounting for about two-thirds of global borrowers (60%) (Microfinance Barometer, 2018). Development in financial sector is expected to promote growth and reduce poverty by allowing the entrepreneur to have greater access to capital. As formal banking system is not adept in supporting very poor class of people, microfinance works in tandem with formal financial system to enhance the economic growth of this region. Even after growth of institutional loan facilities like MFIs, in many parts of South Asia, informal moneylenders persist as source of credits at the time of need. The failure of the commercial banking sector to reach the rural people as well as discouraging performance of commercial bankers in rural area encouraged MFIs to serve the unserved borrowers who have demand for microcredit.

Some MFIs are heavily leveraged while some MFIs are moderately leveraged. In South Asia region, on an average MFIs fund 57.53% of their assets from borrowings and 15.24% from the voluntary savings deposits kept by the members of MFIs.

3. MFI Performance and Capital Structure

MFIs provide financial services to the marginalized people in the society. The people, who are not usually eligible to take services from conventional banking system, are the target customers of MFIs. Microcredit, one financial product of MFIs, enables these poor people to initiate an income generating activity. Though MFIs initially began their operation just by disbursing microcredit, nowadays they provide services like small credit, savings, and insurance services etc. Microfinance industry is dominated by non-government organizations (NGOs) across the world; however, commercial banks, rural banks, nonbank financial intermediaries, and credit unions also operate in this financial sub-sector. No requirement of collateral from borrower – creates the main differentiating line between conventional banking and MFIs. But to protect itself from the loss arising from credit event, MFI's average lending rate is always higher than the average lending rate of conventional commercial bank, however, the rate is lower than the rate charged by usurious moneylenders in society. MFIs were introduced with a view to eradicating poverty from the society by providing collateral free tiny credit to extremely poor people for investment purposes, however, in later time some opportunistic entities started to enter this industry for making profitable lending business. These opportunistic lending institutions term their tiny credit as microcredit but charge interest rate which is significantly higher than the average rate of leading MFIs in this world. This kind of shift is recognized as the root of abuse and other problems in the microfinance sector. "Commercialization has been a terrible wrong turn for microfinance, and it indicates a worrying "mission drift" in the motivation of those lending to the poor. Poverty should be eradicated, not seen as a money-making opportunity" (Yunus, 2011).

It is estimated that globally 139 million low-income and underserved clients receive financial services from MFIs and loan portfolio is growing at 15.6% rate (Microfinance Barometer, 2018). Though MFIs have been able to reach to a significant number of unbanked people, still 2 billion adults lack access to the transaction account of formal financial system (Riley & Kulathunga, 2017). High operating cost and fund constraints are often cited as reasons for inability of MFIs

to serve the demand for microcredit. In addition, high interest rates on loans are likely to reduce the demand for financial services because rising interest rates erode the surpluses generated by the customers (Dehejia et al., 2012). Donor agencies, development partners, and local government often take initiatives to ensure the sustainability of MFIs by enabling them to have more outreach. However, due to institutional structural differences of MFIs from the conventional lending institutions, the funding structure issue of MFIs is also recognized as complex issue. Once dependent on funds provided by public development agencies and private foundations, MFIs nowadays look for alternative sources of funding which will not only enable them to mobilize funds efficiently but also to ensure the sustainability of their operations. In this regard, this paper seeks to examine the consequences of transformation of capital structure of MFIs on performance and sustainability of these semi-formal financial institutions.

Different theories describe what type of fund is used by an MFI in different stages. The propositions regarding funding structure can be discussed under two broad theories: life cycle theory and profit incentive theory.

A. Life Cycle Theory

The life cycle model, which is applied to explore growth and development of MFIs, is also used as a tool to compare financing patterns at various stages of an MFI's to that of 'typical' business predicted by the lifecycle model (Bogan, 2012). This theory describes the pattern of different capital instruments required in each stage of life of enterprises. According to this framework, MFIs begin their operation by taking non-commercial equity i.e., grants and subsidized loans from development agencies and donors with a social mission of eradicating poverty from societies.

Life cycle framework asserts the fact that when MFIs evolve one stage to another stage, funding pattern changes. This evolution of MFIs is also known as 'NGO transformation' as most of the MFIs initiate their primary operation in the form of NGO (Helms, 2006). Though donor grants, concessional loans, and equity from sponsors/owners enable MFIs to launch their operation, when MFIs

reach at maturity stage, commercial sources of funding from banks, development agencies, and government become available. Larger MFIs issue stocks or bonds in final stage to mobilize funding from financial markets.

Hoque, Chishty and Halloway (2011); Bogan (2012); Abrar and Javaid (2016) provide empirical evidence on life cycle theory of institutional framework. Bogan (2012) find significant relationship between life cycle stage variable- age and both operational self-sufficiency and financial stability of MFIs. However, this study argues that other economic and financial variables have more explanatory power compared to life cycle model to explain the variation of capital structure of MFIs. In contrary, expectation of life-cycle theory is reasoned by Hoque, Chishty and Halloway (2011) for decline of grants and concessional loans to matured MFIs. Besides, Farrington and Julie, 2002) note increase in competition, leverage, public deposits, and reliance on commercial funding in MFI industry.

Although life cycle model is often cited as dominant explanation for evolution of capital structure of MFIs, existing literature identified some other critical variables which are shaping this change in funding pattern. These factors include legal and regulatory factors. Mature regulatory environment is considered as one of the influencing factors which cause the variation in funding patterns of MFIs across different nationals and regions (Hoque et al., 2011). In Latin America, number of specialized and supervised MFIs is growing because it is easy for these types of MFIs to mobilize market funding easily. In contrary, MFIs in Middle East, North Africa, and Central Asia and Eastern Europe are heavily reliant on donated equity and borrowing because most of MFIs in these regions are operating as NGOs and these NGOs are not strictly regulated which are the core reasons for their inability to attract market funding (Bogan, 2012; Tchakoute Tchuigoua, 2015). However, to support future business expansion amid the robust economic growth, leading MFIs of India have raised sizeable equity funding recently.

B. Profit-Incentive Theory

Profit incentive theory encourages commercialization of MFIs by arguing that use of commercial funding sources enables MFIs to achieve both profitability and the mission of solving poverty problem in society (Bogan, 2012). Commercial funding is different from non-commercial funding because commercial fund providers expect positive return relative to the risk. In addition, commercial funding is more desirable than non-commercial funding from the perspective of ensuring good governance, more capital and better outreach in MFIs. Fund constraints of donors can limit the ability of MFIs to serve demand for financial services by unbanked people. Client-maximizing MFIs stresses the need for commercialization to mobilize more money to enhance outreach and to reduce reliance on donor's fund. In addition, commercially funded MFIs are found to be more sustainable compared to MFIs dependent on subsidized fund because these MFIs work in a way to enhance revenue and curtail expenses so that adequate operating profit can be generated to make up the cost of commercial funds. (Bogan, 2012) find meaningful empirical evidence that MFIs dependent on more grants are less self-sufficient and stress the fact that MFIs should rely less on non-commercial fund (e.g., grants, soft loans, and other type of donor funds).

Although grants consist of a major funding source for many MFIs in the world, the proportion of grants in capital structure has been declining over the years. In contrary, the proportion of commercial funding (e.g., commercial loans, private equity investment) in capital structure has been growing over time. Moreover, the external pressure on MFIs to reduce dependency on concessional funding has got momentum. Donors are nowadays advised to let their grant receiving MFIs to graduate to quasi-commercial investors like private investors by encouraging them to develop their own linkage with domestic capital market (Helms, 2006). MFIs which are transforming to regulated institutions nowadays get direct investment from leading investment companies in the world. In addition, these companies provide strategic support to MFIs to raise commercial funds from financial market. One of the prominent examples of such companies is the ACCION Gateway Fund, LLC. Eight MFIs operating in Latin America and

the Caribbean regions have received US$5.0 million funding from this leading investment firm. These types of companies work to bring independency to MFIs from dependency on donor's fund. However, commercialization of funding of MFIs is now cited as the reason which will endanger the whole mission of MFIs. If MFIs could take deposits by refurbishing the existing law, these would have adequate funding to meet the demand for loan by borrowers. Hence, we can summarize our hypotheses as follows:

Hypothesis 1: Capital structure has significant effects on performance and sustainability of microfinance institutions.

Hypothesis 2: Microfinance institutions which rely more on commercial sources of funding perform better in terms of performance and sustainability compared to the microfinance institutions which rely on noncommercial sources of funding.

4. Data

Microfinance Information Exchange (The Mix Market) is the main source of data of all variables used in this study. For this empirical study on capital structure of MFIs, I use unbalanced panel data of MFIs from the year of 2003 to year of 2016. Individual MFIs data are from the data stored in Mix Market database (www.themix.org/mixmarket.org). Besides, country macroeconomic variables (GDP growth and Inflation) are from the World Development Indicators compiled by World Bank. The sample MFIs have total assets value over $0.13 million and number of active borrowers more than 380. They have minimum disclosure index of 3 on Mix Market which indicates that MFIs disclose general information, outreach, impact and financial data. Based on the convenience sampling, total 311 MFIs are included in the sample. These MFIs collectively represent a major portion of the MFIs serving in South Asian countries. As sample is filtered based on the availability of the data, no bias is involved in selecting the MFIs. According to Mix Market data as of 2019, total 233 institutions fully or partially render microfinancing services in South Asia which include Bank, credit union, financial institutions, cooperatives, and NGOs.

This paper concentrates on performance in terms of outreach, default rate, efficiency, profitability, and average loan balance to GNI per capita. Table I in

appendix offers the definitions of variables. There is significant amount of variation in institutions type which provide micro financial services. I did not focus on either smallest or largest MFIs in selecting sample. Hence, a commendable amount of variation can be observed with respect to assets size and number of active borrowers. Table 1 provides descriptive statistics and Table 2 illustrates the summary statistics of the selected sample. These summary statistics have been broken down by the countries of the South Asian region and several facts can be identified from the country differences (see Figures-1 to 4).

Afghanistan has the highest percentage of unsustainable MFIs which is evidenced by lowest percentage of sustainable MFIs (22.62%), highest percentage of average default rate (2.69%), second highest percentage of portfolio at risk (8.47%), and lowest average return on assets (-16.21%) among the seven South Asian countries.

Table 1: Microfinance Institutions: Descriptive Statistics

	Percentage of Sample
Charter type	
Bank	10.65
Credit Union / Cooperative	4.79
NBFI	31.13
NGO	47.56
Other	2.73
Rural Bank	3.14
Country	
Afghanistan	6.94
Bangladesh	16.27
Bhutan	0.25
India	47.65
Nepal	8.92
Pakistan	15.94
Sri Lanka	4.05
Life cycle stage	
Mature	70.19
New	9.50
Young	20.31
Accepts deposits	50.12
Grants funding	53.76
Negative equity	4.62

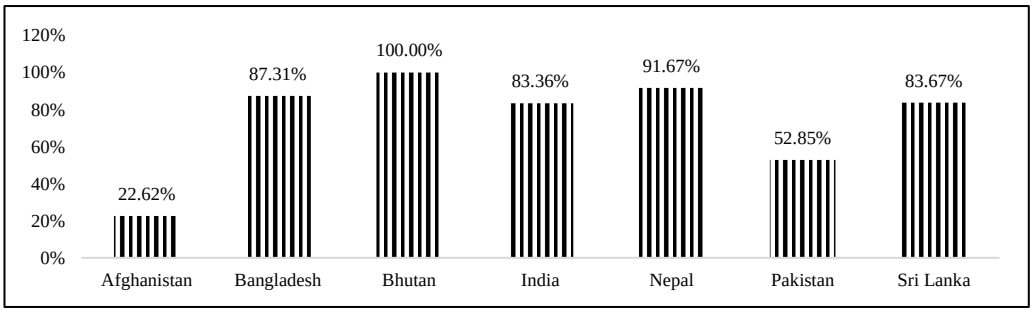
Table 2: Descriptive Statistics of Key Indicators of MFIs in the South Asian Countries

Variable	Observations	Mean Value	Median Value	St. Dev.	Minimum	Maximum
Borrowings relative to assets	1211	0.57	0.62	0.31	0.00	4.75
Deposits relative to assets	1211	0.14	0.00	0.20	0.00	0.93
Grants relative to assets	1211	0.10	0.00	0.36	0.00	8.96
Share capital relative to assets	1211	0.20	0.16	0.26	-4.31	1.00
Retained earnings relative to assets	1211	-0.06	0.03	1.43	-46.56	0.61
Portfolio at risk > 30 days	1211	0.06	0.02	0.26	0.00	7.11
Yield on gross loan portfolio	1211	0.24	0.23	0.10	-1.33	1.31
Active borrowers (000s)	1211	301	51	922	0	7,290
Assets (US$000)	1211	63,483	10,036	219,765	133	2,810,000
Default rate	1211	0.01	0.00	0.06	-0.04	1.33
Operational self sufficiency	1211	1.11	1.11	0.38	-0.12	6.67
Return on assets	1211	-0.01	0.02	0.12	-1.45	0.31
Average loan balance relative to GNI per capita	1211	0.26	0.15	0.37	0.00	3.56

Return on assets = (Net operating income, less taxes)/ (average assets).
Portfolio at risk ratio = (Portfolio at risk greater than 30 days)/ (gross loan portfolio). Represents the portion of loans greater than 30 days past due, including the value of all renegotiated loans (restructured, rescheduled, refinanced and any other revised loans) compared to gross loan portfolio.

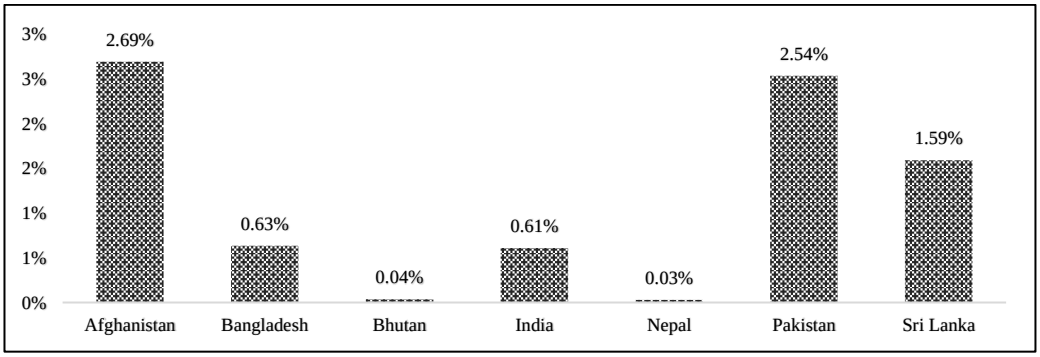
Though Bhutan has the highest percentage of sustainable MFIs and highest profitability (3.98%), the sample size represented by MFIs in Bhutan is only 0.25%. Except Bhutan, Nepal has the lowest percentage of unsustainable MFIs (8.33%), the lowest average default rate (0.03%), the lowest portfolio at risk (3.77%), and MFIs of Bangladesh have the highest return on assets (3.21%). With respect to capital structure, it can be observed that MFIs of Afghanistan have the highest dependency on borrowings and grants, MFIs of Nepal have the highest dependency on deposits and MFIs of Sri Lanka have the highest dependency on equity capital to finance the assets of MFIs.

Figure 1: Operationally Sustainable Microfinance Institutions (MFIs) in Percentage (%).



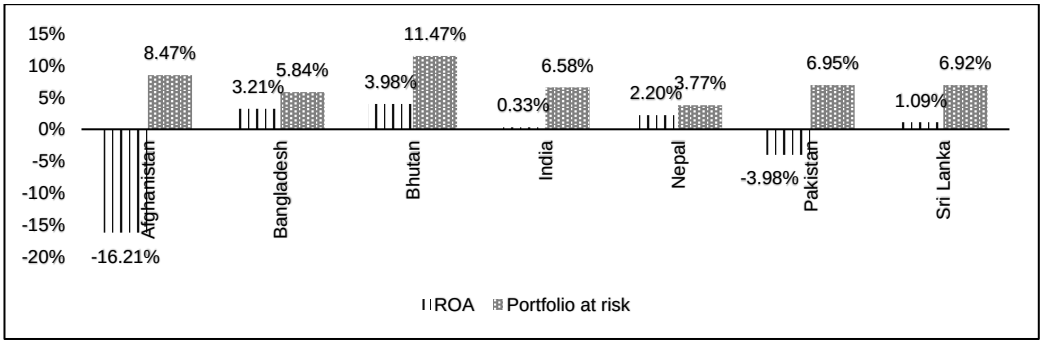
Country-wise proportion of operationally sustainable MFIs relative to total number of MFIs in operation in South Asian countries. Bhutan has the highest % of sustainable MFIs and Afghanistan has the lowest % of sustainable MFIs.

Figure 2: Average Default Ratio of Microfinance Institutions (MFIs) in Percentage (%).



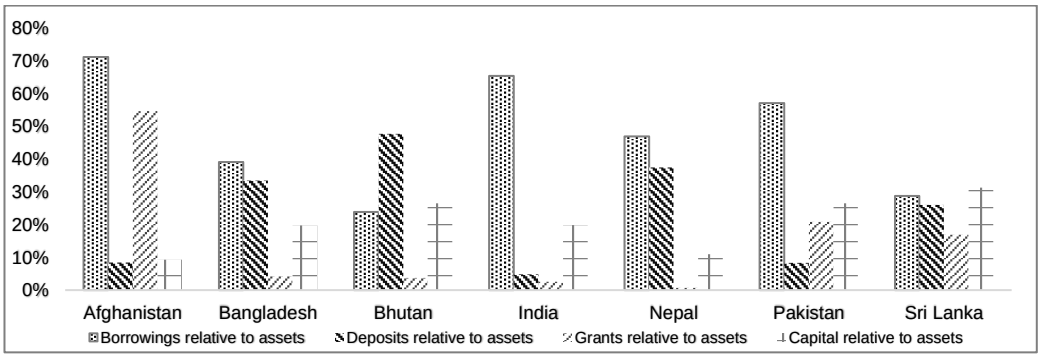
Country-wise proportion of written-off loans net of recoveries relative to average gross loan portfolio of MFIs of South Asian countries. MFIs of Bhutan have the lowest percentage of default loan ratio and MFIs of Afghanistan have the highest percentage of default loan ratio.

Figure 3: Profitability and Risk of Microfinance Institutions (MFIs) in Percentage (%).



Country-wise average profitability in terms of return on assets and average risk in terms of portfolio at risk for 30 days, of MFIs of South Asian countries. MFIs of Bhutan have the highest average profitability and highest average percentage of loan portfolio at risk. MFIs of Afghanistan perform poorly in terms of return on assets and portfolio at risk.

Figure 4: Funding Sources of Microfinance Institutions (MFIs) in Percentage (%).



Country-wise average funding from borrowings, deposits, grants, and equity capital relative to total assets of MFIs of South Asian countries. MFIs of Bhutan

have the lowest reliance on borrowings and MFIs of Afghanistan have the highest reliance on borrowings relative to assets. MFIs of Afghanistan also use the highest percentage of grants while MFIs of Nepal use the lowest percentage of grants relative to assets.

To analyze the relationship between life cycle and performance, I divide the sample into three groups: new, young, and mature stage. Stage in the life cycles is measured by the number of years for which MFI has been operating. This grouping helps to test the life cycle theory of MFI financing. For each of this group – life stage, dummy is created. I follow the standard definition for life stages of MFIs: new (0-4 years), young (5-8 years), and mature (over 8 years) - followed by mix market. With these definitions, 70.19% of the sample is mature, 20.31% of the sample is young, and 9.50% of the sample is new MFIs. From the regression results depicted in table 3, it can be observed that life cycle variables are related to performance variables: outreach, operational self-sufficiency and return on assets. However, performance variables: default rate and average loan balance relative to GDP per capita are not significantly related to life cycle variables. Nevertheless, the OLS models have limited explanatory power evidenced from the low R^2.

Table 3: Life Cycle Theory Models

Dependent Variable	Outreach	Default rate	Operational self sufficiency	Return on assets	Average loan balance/ GNI per capita
Young Stage Dummy	0.6884*** (0.1773)	0.0050 (0.0043)	0.1156** (0.0510)	0.0878 (0.0291)***	-0.0639 (0.0681)
Mature Stage Dummy	1.2820*** (0.2294)	0.0018 (0.0034)	0.2221 (0.0563)***	0.1107 (0.0308)***	-0.1036 (0.0850)
Intercept	9.8185*** (0.1754)	0.0082 (0.0024)***	0.9269 (0.0537)***	-0.1039 (0.0307)***	0.3410 (0.0940)***
R-squared	0.0518	0.0007	0.0352	0.0677	0.0074
Log likelihood	-2401.56	1762.37	-534.014	851.9304	-510.2552
Observations	1211	1211	1211	1211	1211
Test of probability	F(2,310) = 16 [0.0000]	F(2,310) = 0.66 [0.5185]	F(2,310) = 8.65 [0.0002]	F(2,310) = 7.46 [0.0007]	F(2,310) = 0.78 [0.4584]

Note: Standard errors in parentheses. P-values in square bracket; Significant at the ***1% level, **5% level, *10% level.

The results reflect that age is significantly associated with outreach, operational self-sufficiency and return on assets. However, when other independent variables are added to the simple regression model of outreach, the life cycle stage variables become insignificant. In other two cases, i.e., operational self-sufficiency and return on assets regression, life cycle stage variables are still significant after adding other independent variables.

5. Econometric Analysis

A. Capital Structure and Financial Performance

Default Rate, Operational Self-Sufficiency, and Return on Assets.

Default rate is one of the key financial metrics to measure the success and sustainability of MFIs. I analyze the effects of change in capital structure on the default rate of MFIs using equation (1). Though equation (1) is a Panel OLS regression model which are captured in both version A and B, version C and version D reflect the fixed effect regression and random effect regression, respectively. Fixed effect regression controls structural differences of MFIs that may influence the default rateoutreach and random effect regression controls the correlations between explanatory variables and unobservable individual MFI effect. Note that out of panel OLS regression models A and B, version A does not control for country and macroeconomic variables whereas version B included these variables.

$$Default\ rate_i = \beta_0 + \sum_{j=1}^{4} \beta_j X + \sum_{k=5}^{19} \beta_k Y + \sum_{t=20}^{24} \beta_l Z + \varepsilon_i \qquad (1)$$

where X specifies the MFI capital structure variables, Y captures the MFI characteristic variables, and Z indicates the country specific macroeconomic indicators. The results of equation (1) are summarized in Table-4.

Table 4: Key Coefficients of Default Rate Regression

Dependent Variable	A		B		C		D	
Default rate	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Borrowings to assets	-0.0272	0.0291	-0.0298	0.0289	-0.0302	0.0379	-0.0298	0.0271
Deposits to assets	-0.0489*	0.0278	-0.0498*	0.0287	-0.0328	0.0370	-0.0498	0.0310
Grants to assets	0.0246**	0.0123	0.0098	0.0117	-0.0087	0.0179	0.0098	0.0122
Share capital to assets	-0.0273	0.0281	-0.0373	0.0284	-0.0454	0.0490	-0.0373	0.0327
Log of assets	0.0014	0.0011	0.0009	0.0011	-0.0072	0.0050	0.0009	0.0011
Portfolio at risk > 30 days	0.0128	0.0117	0.0121	0.0108	0.0113	0.0138	0.0121	0.0122
Yield on gross loan portfolio	-0.1727	0.1383	-0.2086	0.1459	-0.3776**	0.1939	-0.2086	0.1465
Accept deposits	0.0044	0.0038	0.0053	0.0042	-0.0024	0.0114	0.0053	0.0039
Bank dummy	0.0012	0.0038	-0.0054	0.0035	0.0000		-0.0054	0.0044
NGO dummy	0.0024	0.0047	-0.0021	0.0037	0.0000		-0.0021	0.0046
Young Stage Dummy	-0.0015	0.0074	-0.0021	0.0069	0.0103	0.0086	-0.0021	0.0070
Mature Stage Dummy	-0.0069	0.0092	-0.0059	0.0080	0.0104	0.0108	-0.0059	0.0082
MFI country GDP growth			0.0290	0.1086	0.0648	0.1232	0.0290	0.0990
MFI country inflation			-0.0664*	0.0362	-0.0622	0.0385	-0.0664*	0.0348
Constant	0.0550	0.0437	0.0855	0.0547	0.2404*	0.1292	0.0855	0.0569
Country control variables	No		Yes		Yes		Yes	
Macroeconomic indicator control variables	No		Yes		Yes		Yes	
Observations	1,211		1,211		1,211		1,211	
R^2	0.1369		0.1820		0.0860		0.1820	

Note: Significant at the ***1% level, **5% level, and * 10% level

The results show that deposits to assets is negatively related to the default rate which implies that MFIs relying on deposits for funding are likely to curve down the default rate of borrowers. It can be inferred that management of MFIs are more prudent to disburse the loanable funds to borrowers because good credit management will enable them to make the interest payment to depositors promptly. Borrowings, the key component of leverage, also show the negative relationship with the default rate. Though this relationship supports the fact mentioned above, it is not statistically significant. MFIs with high leverage put essential measures to reduce the default rate for improving profitability and capability to honor debt obligations (Kyereboah-Coleman, 2007). However, high leverage increases the likelihood of MFI failure, if it cannot generate adequate cash flows to service the outstanding debt amount. The significance of negative relationship between deposits and default rate disappears when I consider the fixed effect regression and random effect regression in version C and D which are more robust relative to OLS regression.

Grants as a percentage of assets is positively associated with the default rate and this relationship is statistically significant in version A. From this result, it can be inferred that source of funding is important in determining default of MFI loans. Grants, which works as a donation, does not come with repayment obligation, and makes MFI management less concerned about prompt disbursement and management of loans. Hence, the default rate rises for the MFIs which rely mostly on in-kind donations. Probably this reason works as an impetus to reduce the dependency of MFIs on subsidized or grant funding in recent years. In addition, yield on gross loan portfolio, an indicator of lending interest rate of MFI, is negatively related to the default rate in version C, which indicates that MFIs with high lending rate are less likely to incur loan default. Often high lending rate of MFIs is justified with the argument of reducing the likelihood of loan default by the poorer borrowers. This negative relationship supports this argument. Moreover, the inflation is negatively related to the loan default of MFIs in version B and D and the relationship is significant. It can be asserted that high inflation reduces the real value of money which makes it convenient for borrower to clear the loan installment promptly and thereby reduces the default probability. Instead of the empirical relationship presented above, the overall explanatory

power of the equation to explain the performance of MFI in terms of default rate is not quite good.

Operational self-sufficiency, one of the key performance indicators of MFI, measures MFI's ability to make up the financial expense, impairment losses on loans and operating expenses by operating revenue. I analyze the effect of capital structure variables on MFI's ability to be operationally sustainable using equation (2). Like before equation (2) is a Panel OLS regression model of which results are presented in version A and B. In addition, fixed effect regression and random effect regression are covered in version C and D, respectively.

$$Operational\ self-sufficiency_i = \beta_0 + \sum_{j=1}^{4} \beta_j X + \sum_{k=5}^{19} \beta_k Y + \sum_{t=20}^{24} \beta_l Z + \varepsilon_i \qquad (2)$$

where X specifies the MFI capital structure variables, Y captures the MFI characteristic variables, and Z indicates the country specific macroeconomic indicators. Table 5 shows the regression results of equation (2). Log of assets is positively related to the operational self-sufficiency. It can be inferred that large MFIs, in terms of assets size, are likely to enhance their self-sufficiency be extending microfinance services to large number of clients. Large portfolio of borrowers enables MFIs to extract enough revenue to meet up the required expenses for operating and financial purposes. As MFIs are specialized for lending micro loan, the only way to increase the loan portfolio size is to disburse the micro loans to large number of eligible borrowers.

Table 5: Key Coefficients of Operational Self Sufficiency Regression

Dependent Variable	**A**		**B**		**C**		**D**	
Operational Self Sufficiency	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
Borrowings to assets	-0.1798*	0.1023	-0.1583	0.1025	-0.2147*	0.1214	-0.1836*	0.1106
Deposits to assets	0.0546	0.1216	0.0282	0.1217	-0.2085	0.1463	-0.0225	0.1304
Grants to assets	-0.2104**	0.1080	-0.1053	0.0966	-0.0436	0.0860	-0.0616	0.0900
Share capital to assets	0.0555	0.1256	0.1324	0.1169	-0.0205	0.1526	0.0683	0.1361
Log of assets	0.0363***	0.0060	0.0431***	0.0069	0.0731***	0.0150	0.0517***	0.0087
Portfolio at risk > 30 days	-0.1810*	0.1062	-0.1651*	0.0959	-0.1628	0.1027	-0.1602*	0.0977
Yield on gross loan portfolio	0.1573	0.1080	0.4697***	0.1589	0.5241**	0.2347	0.4670***	0.1768
Accept deposits	0.0276	0.0289	0.0400	0.0296	0.1051***	0.0306	0.0561*	0.0292
Bank dummy	-0.1115***	0.0304	-0.1002***	0.0315	0.0000		-0.1182**	0.0538
NGO dummy	0.0192	0.0204	0.0516**	0.0214	0.0000		0.0416	0.0336
Young Stage Dummy	0.1014**	0.1023	0.0832**	0.0388	0.0881**	0.0368	0.0943***	0.0370
Mature Stage Dummy	0.1584***	0.1216	0.1044***	0.0375	0.0898*	0.0552	0.0966**	0.0441
MFI country GDP growth			0.4596	0.4007	0.4841	0.4169	0.3982	0.3991
MFI country inflation			-0.6810***	0.2279	-0.4730**	0.2011	-0.5892***	0.2036
Constant	0.4535***	0.1479	0.2980*	0.1762	-0.1639	0.2744	0.2173	0.2207
Country control variables	No		Yes		Yes		Yes	
Macroeconomic indicator control variables	No		Yes		Yes		Yes	
Observations	1,211		1,211		1,211		1,211	
R^2	0.1975		0.2602		0.1232		0.2554	

Note: Significant at the ***1% level, **5% level, and * 10% level

Borrowings relative to assets is significant and negatively related to operational self-sufficiency in version A, C, and D. In addition, grants as percentage of assets is negatively related to the operational self-sufficiency. These findings affirm the hypothesis that source of funding does matter to the achievement of performance (Bogan, 2012). As MFIs work for marginalized people in the society, donors and international financial institutions often provide MFIs with significant amount of grants and concessional loans. However, MFIs reliant on grants funding are less likely to achieve operational self-sufficiency which can be inferred from the above findings. Portfolio at risk is significant and negatively related to the operational self-sufficiency in version A, B, and D. Yield on gross loan portfolio is significant and positively related to the operational self-sufficiency in version B, C, and D. The MFIs which accept deposits are more self-sufficient compared to the MFIs which do not accept deposits. This inference can be made based on the significant and positive relationship of deposits dummy and operational self-sufficiency. Furthermore, while the bank dummy variable is significant and negative with respect to the relationship with operational self-sufficiency, the NGO dummy variable is significant and positive with respect to the relationship with operational self-sufficiency. It indicates that bank-based MFIs are less likely to be self-sufficient relative to the NGO based MFI. Life cycle stage of the MFIs is also important in assessing the self-sufficiency of MFIs which is revealed from the significance of life cycle indicator. Though country GDP growth is not significant in any versions of the regression, inflation causes a major challenge to the self-sufficiency of MFIs for which these financial institutions should be adequately cautious during high inflationary environment.

I also analyze the effects of capital structures on the financial performance of MFI in terms of return on assets using equation (3). The regression results of equation (3) are presented in Table 6 where version A and B reflect the result of panel OLS regression, and version C and version D reflect the fixed effect regression and random effect regression.

$$Return\ on\ assets_i = \beta_0 + \sum_{j=1}^{4} \beta_j X + \sum_{k=5}^{19} \beta_k Y + \sum_{t=20}^{24} \beta_l Z + \varepsilon_i \qquad (3)$$

where X captures the MFI capital structure variables, Y includes the MFI characteristic variables, and Z covers the country specific macroeconomic indicators. It can be observed that borrowings as a percentage of assets and deposits as a percentage of assets are significant and negatively related to the return on assets in version C which indicates that dependence on leverage is associated with dilution of profitability. In contrary, share capital relative to assets is significant and positively related to return on assets in version A, B, and D which provides evidence that MFIs dependent on share capital are likely to achieve more profitability compared to highly levered MFIs. Moreover, grants are significantly related to the profitability and the relationship is negative which is affirms the existing literature (Bogan, 2012). This relationship can be considered as one of the reasons which discourage donors and international financial institutions to extend concessional funding and grants nowadays. Firm's size measured by log of assets is significantly related to the profitability which indicates that high profitability is associated with large size of MFIs. Portfolio at risk is significant and negatively related to the return on assets in version A and B.

MFIs which accept deposits from client are likely to generate more profits relative to those which do not accept deposits. In addition, the positive and significant NGO dummy variable stresses the fact that NGO led MFIs are more profitable compared to bank or NBFI or credit union led MFIs. Furthermore, life cycle dummy variable is significant with respect to relationship with profitability. Though GDP growth is not significant, inflation causes reduction of profitability of MFIs significantly.

Table 6: Key Coefficients of Return on Assets Regression

Dependent Variable	**A**		**B**		**C**		**D**	
Return on Assets	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
Borrowings to assets	-0.0024	0.0301	0.0098	0.0305	-0.0737**	0.0321	-0.0193	0.0327
Deposits to assets	0.0423	0.0294	0.0446	0.0313	-0.0868*	0.0494	0.0025	0.0358
Grants to assets	-0.0969**	0.0418	-0.0602	0.0397	0.0011	0.0389	-0.0292	0.0400
Share capital to assets	0.1074**	0.0533	0.1351***	0.0513	0.0899	0.0691	0.1253**	0.0619
Log of assets	0.0072***	0.0022	0.0092***	0.0023	0.0274***	0.0069	0.0144***	0.0037
Portfolio at risk > 30 days	-0.0469*	0.0286	-0.0431*	0.0249	-0.0278	0.0201	-0.0366	0.0227
Yield on gross loan portfolio	0.0416	0.1672	0.1408	0.1626	0.3489*	0.1914	0.1983	0.1868
Accept deposits	0.0062	0.0090	0.0119	0.0096	0.0463***	0.0163	0.0250**	0.0105
Bank dummy	-0.0027	0.0092	0.0060	0.0094	0.0000		-0.0048	0.0174
NGO dummy	0.0077	0.0072	0.0181***	0.0071	0.0000		0.0208*	0.0115
Young Stage Dummy	0.0885***	0.0216	0.0844***	0.0202	0.0807***	0.0263	0.0867***	0.0241
Mature Stage Dummy	0.0999***	0.0210	0.0853***	0.0190	0.0782***	0.0316	0.0855***	0.0253
MFI country GDP growth			0.1051	0.1998	0.0064	0.2454	0.0459	0.2112
MFI country inflation			-0.1548**	0.0793	-0.0537	0.0670	-0.1142*	0.0693
Constant	-0.2428***	0.0546	-0.2881***	0.0602	-0.5891***	0.1208	-0.3740***	0.0860
Country control variables	No		Yes		Yes		Yes	
Macroeconomic indicator control variables	No		Yes		Yes		Yes	
Observations	1,211		1,211		1,211		1,211	
R^2	0.2862		0.3474		0.1371		0.3359	

Note: Significant at the ***1% level, **5% level, and * 10% level

B. Capital Structure and Social Performance

Outreach and Average loan balance/GDP per capita.

To examine the association between performance and MFI characteristics, I use the equation (4) which is an OLS regression model. Panel OLS regression model is reflected in version A and B. Version C covers the MFI fixed effect regression and version D covers the random effect regression. The performance variable – outreach is considered in equation (4). The explanatory variables include capital structure (i.e. borrowings relative to assets, deposits relative to assets, grants relative to assets, and capital relative to assets, MFI characteristics variables (i.e. log of assets, portfolio at risk > 30 days, yield on gross loan portfolio, a dummy variable for whether the MFI accepts deposits or not, a dummy variable for whether the MFI is classified as a bank or NGO, a dummy variable for whether the MFI is classified as a new, young or mature, and country-level macroeconomic indicators (i.e. GDP growth and inflation).

$$Outreach_i = \beta_0 + \sum_{j=1}^{4} \beta_j X + \sum_{k=5}^{19} \beta_k Y + \sum_{t=20}^{24} \beta_l Z + \varepsilon_i \qquad (4)$$

where X indicates the MFI capital structure variables, Y indicates the MFI characteristic variables, and Z indicates the country specific macroeconomic indicators. The results of equation (4) are presented in table 9. In each version of the OLS regression: version A and B, we can observe that log of assets is highly significant and positively associated with outreach. This indicates that larger MFIs, as measured by assets, serve a greater number of active borrowers which is associated with distributing micro credit to a large group of borrowers. Alternatively, it can be said that MFIs asset size get bigger, when they can serve large number of borrowers with microcredit. Grants as a percentage of assets is significant and negatively associated with outreach in version A and C. It is negative and significant at 1% level and 5% level in versions A and C, respectively. From this output, we can understand that source of funding does matter in determining performance with respect to outreach. Grants have negative

effect on outreach though it enables young MFIs to continue their operation when commercial sources of funding are not available for them.

Share capital to assets is significant at 5% and 10% level in version C and D, respectively. Additionally, share capital is negatively related to the outreach. It reflects the fact that MFIs with large number of active borrowers use less of share capital to assets to fund their operation. Besides, deposits to assets is significant at 1% significance level in version A and B, and negatively related to outreach. It stresses the fact that MFIs with large number of active borrowers are not reliant on deposits for sourcing their capital.

Yield on gross loan portfolio, an indicator of lending interest rate charged by MFIs, is negatively related to outreach which reestablishes the fact that high lending rate deters the interested borrowers from taking loans. It leads to adding a smaller number of borrowers to client portfolio. Bank dummy variable is significant at 1% significance level in version A and B and negatively related to outreach. In contrary, NGO dummy variable is significant at 1% level and positively related to outreach. It indicates that NGO based MFIs are likely to serve greater number of borrowers compared to Bank based MFIs. However, the significance of NGO dummy variable disappears in other versions. Country level dummy variables are significant in version B and D. Country level macroeconomic variables – GDP growth and inflation are significant where GDP growth is negatively related to outreach and inflation is positively related to outreach, respectively. From the above discussion, it can be observed that number of borrowers served by MFI can be influenced by the form of sources of funding.

Table 7: Key Coefficients of Outreach Regression

Dependent Variable: Outreach	**A**		**B**		**C**		**D**	
	Coefficient	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
Borrowings to assets	0.0094	0.2084	0.1405	0.1632	0.0981	0.1142	0.1582	0.1059
Deposits to assets	-1.0380***	0.2887	-0.9862***	0.2435	0.2525	0.3397	-0.2398	0.2784
Grants to assets	-0.2237***	0.0859	0.1125	0.0833	-0.1055**	0.0491	-0.0490	0.0463
Share capital to assets	-0.3072	0.2344	-0.1724	0.1871	-0.3502**	0.1441	-0.2557*	0.1335
Log of assets	0.9656***	0.0233	0.9356***	0.0204	0.7511***	0.0332	0.8105***	0.0241
Portfolio at risk > 30 days	-0.0731	0.0608	-0.0831	0.0619	0.0152	0.0450	-0.0157	0.0521
Yield on gross loan portfolio	-0.9351***	0.3338	-0.2687	0.2012	-0.1425	0.1603	-0.1450	0.1528
Accept deposits	0.1179	0.0844	0.1158	0.0801	-0.0812	0.1009	-0.0159	0.0876
Bank dummy	-0.5096***	0.1788	-0.3036***	0.1183	0.0000		-0.1024	0.1482
NGO dummy	0.2115***	0.0735	0.0871	0.0708	0.0000		0.0884	0.0843
Young Stage Dummy	-0.0197	0.0864	0.0494	0.0816	0.0805	0.0829	0.0451	0.0789
Mature Stage Dummy	0.0072	0.1054	-0.0410	0.0890	0.1469	0.1033	0.0430	0.0922
MFI country GDP growth			0.2260	0.5719	-0.8571**	0.3871	-0.7570**	0.3803
MFI country inflation			0.8732***	0.3351	0.7902***	0.2945	0.7000**	0.2881
Constant	-4.4560***	0.4115	-5.3801***	0.4145	-1.3790***	0.5206	-2.5038***	0.4074
Country control variables	No		Yes		Yes		Yes	
Macroeconomic indicator control variables	No		Yes		Yes		Yes	
Observations	1,211		1,211		1,211		1,211	
R^2	0.8763		0.9120		0.8417		0.9045	

Note: Significant at the ***1% level, **5% level, and * 10% level

Though it is expected that funding from different sources enable MFIs to expand operation and serve more people, form of funding does matter to determine the performance of MFIs. MFIs which serve greater number of borrowers are not dominantly funded by deposits from depositors, grants from donors and equity from shareholders. Probably these fund providers are not very likely to be more vigilant than the lenders to make sure that loanable funds are disbursed to the more active borrowers. Borrowings, the principal form of debt, are positively related to outreach. However, this relationship is not statistically significant. From both fixed effect and random effect regression it can be observed that equity capital is negatively related to the number of active borrowers which is consistent with the findings of (Bogan, 2012). This significant negative relationship can raise the question of viability of MFI's interest for mobilizing equity funding from financial market in recent days.

Microfinance institutions are socially motivated financial institutions. In addition to analyzing its performance in terms of financial ratios, policymakers often look for indicators which measure the social performance of MFIs. In addition to outreach variable, which indicates the number of active borrowers served by MFIs, the average loan balance relative to GNI per capita measures the poverty level of the client of MFIs. The MicroBanking Bulletin which is bi-annual publication of Microfinance Information eXchange defines that if any MFI's average outstanding loan balance per borrower relative to GNI is less than 20%, that kind of MFI is classified as low end. As they are disbursing small loans, it is expected that they are reaching to poorer people of the society. To analyze the linkage between average loan balance per borrower and the sources of funding I used the equation (5). The regression results of equation (5) are summarized in Table 8 where version A and B demonstrate the result of panel OLS regression, and version C and version D show the fixed effect regression and random effect regression.

Table 8: Key Coefficients of Average Loan Balance/ GNI Per Capita Regression

Dependent Variable	**A**		**B**		**C**		**D**	
Average Loan Balance/ GNI Per Capita	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
Borrowings to assets	-0.0941	0.1337	-0.2132**	0.1011	-0.0843	0.0728	-0.1271	0.0897
Deposits to assets	0.4368**	0.2088	0.3461**	0.1621	-0.2881	0.2266	-0.0318	0.1932
Grants to assets	0.0985***	0.0327	-0.1334***	0.0480	-0.0211	0.0195	-0.0308	0.0203
Share capital to assets	-0.0920	0.1266	-0.1651*	0.0966	-0.0563	0.0757	-0.0855	0.0880
Log of assets	-0.0019	0.0048	0.0033	0.0035	0.0170***	0.0064	0.0132***	0.0050
Portfolio at risk > 30 days	-0.0370**	0.0165	-0.0322***	0.0122	-0.0145	0.0116	-0.0124	0.0102
Yield on gross loan portfolio	0.1631*	0.0993	-0.2592***	0.0694	0.0035	0.0664	-0.0511	0.0522
Accept deposits	0.0177	0.0342	-0.0652***	0.0257	0.0613**	0.0318	0.0364	0.0298
Bank dummy	0.1257**	0.0579	0.0862**	0.0438	0.0000		0.0421	0.0909
NGO dummy	-0.0825***	0.0210	-0.0143	0.0183	0.0000		-0.0618*	0.0326
Young Stage Dummy	-0.0289	0.0578	-0.0570	0.0411	-0.0118	0.0465	-0.0159	0.0467
Mature Stage Dummy	-0.0877*	0.0519	-0.0088	0.0320	-0.0330	0.0514	-0.0263	0.0474
MFI country GDP growth			0.3841	0.7014	0.5980	0.4776	0.6108	0.4879
MFI country inflation			0.0359	0.2823	-0.0523	0.1233	0.0065	0.1433
Constant	0.3350**	0.1569	0.2057	0.1311	0.0404	0.1005	-0.0302	0.0958
Country control variables	No		Yes		Yes		Yes	
Macroeconomic indicator control variables	No		Yes		Yes		Yes	
Observations	1,211		1,211		1,211		1,211	
R^2	0.1464		0.5550		0.0052		0.5035	

Note: Significant at the ***1% level, **5% level, and * 10% level

$$\text{Average loan balance per borrower}_i = \beta_0 + \sum_{j=1}^{4} \beta_j X + \sum_{k=5}^{19} \beta_k Y + \sum_{t=20}^{24} \beta_l Z + \varepsilon_i \qquad (5)$$

where X includes the MFI capital structure variables, Y covers the MFI characteristic variables, and Z incorporates the country specific macroeconomic indicators. In table 8, in both version A and B, we see deposits relative to assets is significant and positively related to the average loan balance per borrower as a percentage of GNI per capita. This indicates that source of funding is important to determine the average loan balance. It can be inferred that MFIs with reliance on deposits fund are more likely to have higher average loan balance per borrower compared to the counterparts who raise fund mostly from sources other than deposits. On the other hand, borrowings, grants, and share capital are significant and negatively related to the average loan balance per borrower in version B which shows the results of panel OLS regression model with both country and macroeconomic control variables. However, in version A, where country and macroeconomic control variables were not included, grants relative to assets is significant and positively related to the average loan balance per borrower as a percentage of GNI per capita. As version B is more robust compared to version A, we can infer that grants dependence of MFIs is inversely related to the average loan balance per borrower of MFI. As average loan balance per borrower relative to GNI per capita indicates the category of the borrowers, from the positive sign of grants in version A, we can infer that grants enhances the MFIs capability to serve more capable borrowers.

Log of assets is positive and significantly related to average loan balance per borrower in both version C and D. It can be understood that lower average loan balance per borrower is associated with small sized MFIs. In addition, portfolio at risk is significant and negatively related to average loan balance per borrower in version A and B which indicates that risky loan portfolio reduces the capability of MFIs to serve with higher loan balance to the borrower. Moreover, yield on gross loan portfolio is significant and negatively related to average loan balance per borrower in version B which can be interpreted as higher yield on gross loan portfolio, an indicator of high lending rate, reduces the likelihood of taking higher

amount of loan by borrower. Though version A is showing positive and significant relationship of yield on gross loan portfolio and average loan balance per borrower, the relationship is significant only at 10% and control variables for macro-economy and country were not included in that version. The bank dummy variable is significant and positive with respect to the relationship with average loan balance per borrower in version A and B while the NGO dummy variable is significant and negative with respect to the relationship with average loan balance per borrower in version A and D. It indicates that banks-based MFIs are likely to have higher capability to serve borrower with higher amount of loan which is desirable as the loanable fund available in bank-based MFIs is expected to be higher. Life cycle dummy variable, country dummy variable, and macroeconomic indicator variables are not significant with respect to the relationship with average loan balance per borrower.

C. MFI Charter Type

Differences in capital structure, portfolio at risk, yield on loan, average loan balance, and outreach etc. can be clearly observed by MFI charter type. Therefore, there is likelihood that endogenous problem can arise from the relationship between outreach, capital structure, and MFI charter type. (NGO, NBFI, Bank, Credit Union, Rural Bank, and other type). Though I control for charter type NGO and Bank in earlier equations with dummy variables, I further concentrate on this issue. Table 10 summarizes selected MFI statistics by charter type. Moreover, I classify the data based on charter type and conduct random effect panel regression with country control variables using each sample. From Table 10, it is observed that borrowings to assets is significant and positively related to the outreach with respect to sample of NGO and credit union type MFI. Share capital is significant and negatively related to outreach with respect to sample of NBFI. However, share capital is positively related to outreach with respect to credit union/cooperative type MFI.

Table 11: Summary Statistics of MFIs By Charter Type

	Average Value					
	NGO	**NBFI**	**Bank**	**Credit Union/ Cooperative**	**Rural Bank**	**Other**
Borrowings to assets	0.57	0.64	0.42	0.38	0.59	0.53
Deposits to assets	0.14	0.05	0.28	0.38	0.28	0.14
Grants to assets	0.12	0.07	0.02	0.06	0.00	0.46
Share capital to assets	0.19	0.22	0.21	0.17	0.09	0.23
Assets (US$000)	50,942.12	45,978.32	226,265.10	4,456.19	13,385.12	7,468.44
Portfolio at risk > 30 days	0.05	0.07	0.10	0.04	0.08	0.06
Yield on gross loan portfolio	0.24	0.24	0.25	0.19	0.20	0.30
Accept deposits (%)	54.34	26.26	71.32	89.66	100.00	39.39
Average loan balance per borrower/GNI per capita	0.19	0.18	0.49	0.62	0.42	0.42
Outreach	307.17	232.02	748.45	18.16	42.29	28.38

Though the relationship between grants and outreach is negative with respect to NGO and NBFI subsample, this relationship is not statistically significant. In addition, the relationship between portfolio at risk and outreach is positive with respect to NBFI subsample and negative with respect to bank subsample. Yield on gross loan portfolio impacts the outreach of credit union positively. Furthermore, while deposit accepting NGO and credit union-based MFIs can serve a greater number of borrowers, deposit accepting NBFI based MFIs are not reaching to a greater number of borrowers.

Table 12: Outreach Random Effect Regression by Charter Type

Dependent Variable Outreach	NGO		NBFI		Bank		Credit Union/ Cooperative	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Borrowings to assets	0.2538*	0.1506	-0.1325	0.1500	0.5459	0.3946	0.7045***	0.1934
Deposits to assets	0.4100	0.4885	-0.4127	0.4291	-0.3259	0.5191	0.1390	0.8436
Grants to assets	-0.0654	0.0743	-0.2259	0.1846	2.8756	2.0748	1.0182	0.7897
Share capital to assets	-0.1257	0.1795	-0.4696**	0.2284	-0.8299	0.6340	0.9788*	0.5240
Log of assets	0.7449***	0.0379	0.8243***	0.0294	0.9240***	0.0453	0.6706***	0.0729
Portfolio at risk > 30 days	-0.0599	0.2776	0.1308**	0.0553	-0.1940***	0.0413	-0.2709	1.1736
Yield on gross loan portfolio	-0.1610	0.1740	0.0662	0.3293	-0.2730	0.5001	0.1227*	0.0736
Accept deposits	0.1975*	0.1174	-0.2373**	0.1178	0.1201	0.1970	0.3831***	0.1446
Young Stage Dummy	-0.1142	0.0847	-0.0527	0.0713	0.2046	0.2020	0.1431	0.1355
Mature Stage Dummy	-0.0890	0.1082	-0.1054	0.0962	0.1728	0.2074	0.4119*	0.2444
MFI country GDP growth	-0.8794	0.6505	0.1089	0.5722	-1.5959*	0.9457	0.6781	1.1935
MFI country inflation	0.1861	0.3721	0.6888*	0.3758	2.3949**	1.0888	-0.8431	0.7070
Constant	-1.9536***	0.6300	-2.2560***	0.4723	0.0000		0.0000	
Country control variables	Yes		Yes		Yes		Yes	
Macroeconomic indicator control variables	Yes		Yes		Yes		Yes	
Observations	576		377		129		1,211	
R^2	0.9099		0.9139		0.9607		0.8421	

Note: Significant at the ***1% level, **5% level, and * 10% level

Instrumental variables two-stage least square regression.

From Table-7, it can be observed that grants relative to assets and outreach have a clear relationship. However, the causal relationship between these two variables is not analyzed. If grants to assets and outreach are jointly influences by any unobserved variables, instrumental variables (IV) two-stage least square regression can help us to decompose the simultaneity circle. With similar approach, the causality between share capital to assets and outreach can also be examined.

While correlation results demonstrate that macroeconomic indicators have very week or no relationship with outreach, the regression results between outreach and macroeconomic indicators also have very poor explanatory power. However, it can be inferred that macroeconomic indicators like GDP growth and inflation affect the investment flow as well as flows to the financial institutions in the form of deposits or grants or equity investments. Based on the previous study (Bogan, 2012) and my intuition, I find that GDP growth lagged variable and inflation lagged variable to be appropriate instruments for grants relative to assets and share capital relative to assets. Taking lagged GDP growth and lagged inflation as instruments for grants to assets and share capital to assets, I perform a two-stage least-square regression of which results are presented in appendix. From second stage, it can be observed that grants relative to assets is negative and associated p-value is 0.07 which indicate that greater percentage of grants relative to assets in capital structure of MFIs reduces the ability to server greater number of active borrowers – outreach.

6. Conclusion

This systematic study aims at analyzing the relationship between different forms of funding and overall financial and social performance of MFIs. This study is an attempt to explore the linkage between capital structure, and performance and sustainability measures of socially oriented financial institutions – Microfinance Institutions.

Life cycle model is one of the most popular models to establish the relationship between capital structure and performance measures. However, I

find that it has very little explanatory power when I tested with the data. In contrary, I find some other MFI characteristic and macroeconomic variables which are likely to be closely associated with MFI performance and sustainability. This study documents that capital structure components are significantly associated with both performance and sustainability measures. In addition to capital structure, some specific characteristic variables of MFIs also influence the attainment of good performance and achievement of sustainability. Assets size of MFIs has significant effect on both financial and social performance, but it does not influence the default rate of MFIs. However, grants as a percentage of assets is significant and positively associated with default rate and it is negatively associated with outreach. The instrumental variables analysis also confirms the inference that grants reduce the ability of MFIs to serve greater number of borrowers. However, the positive relationship between average loan balance per borrower and grants indicate the MFIs can serve high end category borrowers. These findings may explain the reasons why donors are putting pressures on MFI management to reduce dependency on donations and to increase dependency on more commercial source of funding. As grants do not come up with repayment obligation, it does not encourage MFIs to reduce default rate and increase profitability and outreach which causes degradation of operational sustainability of MFIs. Furthermore, MFIs with high reliance on share capital are likely to achieve higher return on assets.

Though it is particularly challenging for commercial fund led Microfinance Institutions to pursue dual goals of achieving financial sustainability and social development goals, it is not impossible if they can undertake following activities. Firstly, diversify income sources by providing wide array of financial services i.e., savings accounts, insurance, remittance, and digital payment services (Morduch, 1999). Secondly, implement a balanced interest rate structure by employing efficient operational practices and leveraging technology (Rosenberg et al., 2009). Third, maintain a strong client relationship which can enhance repayment rates and reduce default risk (Hermes & Lensink, 2011). Finally, establish strong risk management frameworks which will help in identifying, assessing, and mitigating risks associated with lending (Cull et al., 2009) .

The reliability and validity of the findings from this study could be enhanced if I could address following constraints of this study. First, it would be more appropriate to measure social performance of MFIs based on environmental, social, and governance (ESG) factors in addition to the measures i.e., outreach and average loan balance to GDP per capita. Second, since reporting to the MIX market is voluntary, there is a chance only successful MFIs are included, which might create concern for survivorship bias in sample. Third, inclusion of a country-wise analysis of performance and sustainability would provide a comparative scenario across South Asian countries. Finally, potentially endogenous relationship could be tested using the instrumental variables (IV) two-stage least square regression on all performance and sustainability indicators instead of only outreach.

The findings from the paper have specific policy implications for microfinance institutions which are exploring opportunities to increase reliance on commercial funding keeping the goal of social development intact. Donors, government, and monetary regulatory authority are likely to extend grants funding to MFIs in the form of bailout funding on regular basis or during financial crisis. However, they should be concerned of the potential negative effects of grants on performance and sustainability of these semi-formal financial institutions.

References

Abrar, A., & Javaid, A. Y. (2016). The impact of capital structure on the profitability of microfinance institutions. *South Asian Journal of Management Sciences, 10*(1), 21–37. https://doi.org/10.21621/sajms. 2016 101.03

Bassem, B. S. (2012). Social and financial performance of microfinance institutions: Is there a trade-off? *Journal of Economics and International Finance, 4*(4), 92–100. https://doi.org/10.5897/jeif11.129

Bogan, V. L. (2012). Capital Structure and Sustainability: An Empirical Study of Microfinance Institutions. *Review of Economics and Statistics*, *94*(4), 1045–1058. https://doi.org/10.1162/REST_a_00223

Booth, L., Aivazian, V., Demirguc-Kunt, A., & Maksimovic, V. (2001). Capital structures in developing countries. *Journal of Finance*, *56*(1), 87–130. https://doi.org/10.1111/0022-1082.00320

Cohen, R. D. (2003). The optimal capital structure of depository institutions. *Wilmott Magazine*, 38–49. https://doi.org/10.1002/wilm.42820040213

Cull, R., Demirgüç-Kunt, A., & Morduch, J. (2009). Microfinance meets the market. In *Journal of Economic Perspectives* (Vol. 23, Issue 1). https://doi.org/10.1257/jep.23.1.167

Dabi, R. S. K., Nugraha, Disman, & Sari, M. (2023). Capital structure, financial performance and sustainability of Microfinance Institutions (MFIs) in Ghana. *Cogent Economics and Finance*, *11*(2). https://doi.org/10.1080/23322039.2023.2230013

Dehejia, R., Montgomery, H., & Morduch, J. (2012). Do interest rates matter? Credit demand in the Dhaka slums. *Journal of Development Economics*, *97*(2), 437–449. https://doi.org/10.1016/j.jdeveco.2011.06.001

Duguma, G. J., & Han, J. (2018). Effect of deposit mobilization on the financial sustainability of rural saving and credit cooperatives: Evidence from Ethiopia. *Sustainability (Switzerland)*, *10*(10). https://doi.org/10.3390/su10103387

Farrington, T., & Julie, A. (2002). The Evolving Capital Structure of Microfinance Institutions. *Microenterprise Development Review*.

Hamada, R. S. (1969). Portfolio Analysis, Market Equilibrium and Corporation Finance. *The Journal of Finance*, *24*(1), 13–31. https://doi.org/10.2307/2326122

Harris, M., & Raviv, A. (1991). The Theory of Capital Structure. *The Journal of Finance*, *46*(1), 297–355. https://doi.org/10.1111/j.1540-6261.1991.tb 03753.x

Helms, B. (2006). Access for All: Building inclusive financial systems. In *Consultative Group to Assist the Poor*. https://doi.org/10.1596/978-0-8213-6360-7

Hermes, N., & Lensink, R. (2011). Microfinance: Its Impact, Outreach, and Sustainability. *World Development*, *39*(6). https://doi.org/10.1016/j.worlddev. 2009.10.021

Hoque, M., Chishty, M., & Halloway, R. (2011). Commercialization and changes in capital structure in microfinance institutions: An innovation or wrong turn? *Managerial Finance*. https://doi.org/10.1108/03074351111126906

Jensen, M. C., & Meckling, W. H. (1976). Theory of Firm:Managerial Behaviour, Agency cost, and Ownership Structure. *Journal of Financial Economics*, *3*(4), 305–360.

Kim, Y. C., & Stulz, R. M. (1988). The Eurobond market and corporate financial policy. A test of the clientele hypothesis. *Journal of Financial Economics*, *22*(2). https://doi.org/10.1016/0304-405X(88)90068-2

Kyereboah-Coleman, A. (2007). The Impact of Capital Structure on the Performance of Microfinance Institutions. *Journal of Risk Finance*, *8*(1), 56–71. https://doi.org/10.1108/15265940710721082

Masulis, R. W. (1983). The impact of capital structure change on firm value: Some estimates. *The Journal of Finance*, *38*(1), 107–126. https://doi.org/10.1111/j.1540-6261.1983.tb03629.x

Microfinance Barometer. (2018). Microfinance Barometer 2018: microfinance and profitabilities. In *Convergences World Forum*.

Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporate finance, and the theory of investment. *American Economic Review*, *48*(3), 261–297. https://doi.org/10.1257/aer.103.4.i

Morduch, J. (1999). The microfinance promise. *Journal of Economic Literature*, *37*(4). https://doi.org/10.1257/jel.37.4.1569

Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of Financial Economics*, *5*(2), 147–175. https://doi.org/10.1016/0304-405X(77)90015-0

Nha, B. D., Loan, N. T. B., & Nhung, N. T. T. (2016). Determinants of capital structure choice: Empirical evidence from Vietnamese listed companies. *Society and Economy*, *38*(1). https://doi.org/10.1556/204.2016.38.1.3

Parvin, S. S., Hossain, B., Mohiuddin, M., & Cao, Q. (2020). Capital structure, financial performance, and sustainability of micro-finance institutions (MFIs) in Bangladesh. *Sustainability (Switzerland)*, *12*(15). https://doi.org/10.3390/su12156222

Riley, T. A., & Kulathunga, A. (2017). Bringing E-money to the Poor: Successes and Failures. In *Bringing E-money to the Poor: Successes and Failures*. https://doi.org/10.1596/978-1-4648-0462-5

Rosenberg, R., Gonzalez, A., & Narain, S. (2009). The new moneylenders: Are the poor being exploited by high microcredit interest rates? *Contemporary Studies in Economic and Financial Analysis*, *92*. https://doi.org/10.1108/S1569-3759(2009)0000092008

Stiglitz, J. E. (1974). On the Irrelevance of Corporate Financial Policy. *American Economic Review*, *64*(6), 851–866. https://www.jstor.org/stable/1815238

Tchakoute Tchuigoua, H. (2015). Capital Structure of Microfinance Institutions. *Journal of Financial Services Research*, *47*(3), 313–340. https://doi.org/10.1007/s10693-013-0190-2

Williams, J. (1987). Perquisites, Risk, and Capital Structure. *The Journal of Finance*, *42*(1), 29–48. https://doi.org/10.1111/j.1540-6261.1987.tb02548.x

Yunus, M. (2011). Sacrificing Microcredit for Megaprofits -NYTimes Sacrificing Microcredit for Megaprofits. *The New York Times*.

Appendix

Table I: Description of the Variables

Objectives	Variable	Operational definition	Unit
Performance and sustainability of MFIs	Outreach	Number of active borrowers of MFI	ln (Number of people)
	Default rate	Total written off loans net of recoveries relative to the average gross loan portfolio	Percentage
	Operational Self-sufficiency	Operating incomes divided by total of financial expense, impairment losses on loans and operating expenses	Percentage
	Return on assets	Net operating income (less of taxes) compared to average assets	Percentage
	Average loan balance	Average loan balance per borrower compared to local GNI per capita	Percentage
Capital structure as well as financing pattern	Borrowings	Total borrowings divided total assets	Percentage
	Deposits	Total deposits divided total assets	Percentage
	Grants	Total accumulated donated equity divided total assets	Percentage
	Share capital	Total equity compared to assets.	Percentage
Other influencing factors	Firm size	Natural logarithm of total assets value	ln (USD)
	Risk level	Portion of loans greater than 30 days past due divided by gross loan portfolio	Percentage
	Gross yield	Total financial revenue divided by average gross loan portfolio	Percentage

Table II: Instrumental Variables Two-stage Least-Squares Regression

Dependent Variable Outreach	**First Stage**				**Second Stage**	
	Coefficient	**Std. Error**	**Coefficient**	**Std. Error**	**Coefficient**	**Std. Error**
Grants to assets					-2.6133*	1.4502
Share capital to assets					0.6842	10.3987
Borrowings to assets	0.5908***	0.0514	-0.8692***	0.0174	2.3690	9.5196
Deposits to assets	0.5998***	0.1226	-0.7651***	0.0416	1.4551	8.5182
Log of assets	-0.0463***	0.0092	-0.0036	0.0031	0.8321***	0.0655
Portfolio at risk > 30 days	0.4386***	0.1172	-0.0830**	0.0398	0.9224	1.3632
Yield on gross loan portfolio	0.0835	0.1354	-0.0230	0.0459	-0.5020	0.5419
Accept deposits	-0.1145***	0.0408	-0.0311**	0.0138	-0.1474	0.2885
Bank dummy	0.0812	0.0596	-0.0039	0.0202	-0.2694	0.2377
NGO dummy	0.0795**	0.0347	-0.0210*	0.0118	0.4064	0.3200
Young Stage Dummy	-0.0147	0.0571	0.0000	0.0194	-0.1018	0.2972
Mature Stage Dummy	-0.0282	0.0585	0.0210*	0.0199	-0.1592	0.5594
MFI country GDP growth	3.7274***	0.5024	0.0496***	0.1705	8.5917	8.5781
MFI country inflation	-0.0195	0.2917	-0.4278	0.0990	0.1911	1.1692
MFI country GDP growth-*lagged*	-0.2764	0.5184	0.0849	0.1759		
MFI country inflation-*lagged*	0.7369**	0.3129	0.0790	0.1061		
Constant	0.1309	0.1768	0.8622***	0.0600	-4.5722	9.0451
Observations	698		698		698	
Wald Chi Square	329		2910		1279.92	

Note: Significant at the ***1% level, **5% level, and * 10% level

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The Effect of E-Banking Services on Customer Satisfaction: A Study on Customers in Khulna

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Abstract

Nowadays E-Banking Services are getting increasingly popular because of their ease of use and other benefits. This study aims to determine the effect of E-Banking Services on customer satisfaction. The population of the study consists of customers of several banks in Khulna, with samples consisting of customers who use various forms of E-Banking Services. The primary information came from surveys filled out by 206 customers. For the study purpose, the respondents were asked close-ended questions using a structured questionnaire. The literature review suggests six factors influence customers' levels of satisfaction. The findings of the study indicate that there is a positive correlation between the independent and dependent variables. The result reveals that convenience, ease of use, personalization, customization, and cost are the most important variables, and their relationship to customer satisfaction is statistically significant. The findings also suggest that improvements can be made in the areas of security and privacy.

Keywords: E-Banking, E-Services, Online Banking, Internet Banking, Customer Satisfaction.
JEL Classification: M1-10

1. Introduction

1.1 Background of the Study

People living in our modern world rely heavily on various forms of digital technology and have digitized nearly every aspect of their lives. The banking industry is not exempt from digitalization. It has brought a revolution in the banking sector and changed the forms of financial services. The concept of "Electronic banking", in short, "E-Banking", is a type of financial service offered by banks to their customers that enables them to carry out banking transactions online. As a result, the customer does not have to go to the bank in person and perform the transaction while waiting in line. As a result of E-Banking customers are able to perform banking transactions at any time from any location (Fatima

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Khan, 2017). As a developing nation, E-Banking and E-Services are also being practiced in Bangladesh. From 2001, E-Services were available in Bangladesh. In 2007, out of 48 banks in Bangladesh, 29 banks offered online financial services (Kamil, 2010). E-Banking and E-Services were not widely deployed due to security difficulties, connectivity issues, lack of awareness, trust issues, and other considerations. In the previous year, the banks of Bangladesh conducted banking activities in traditional methods. Banks, especially the State-Owned Commercial Banks (SOCBs), were resistant to change and thus followed the traditional banking system. But as technology usage is increasing, this scenario is changing. Bangladesh Bank reported 20.49 lakh electronic banking customers in 2019 and 26.05 lakh in 2020. E-Banking transactions totaled Taka 63,000 million in February 2020 which rose to Taka 85,000 million in February 2021 and Taka 177,700 million in February 2022. The number of transactions rose with time. In 2018, Bangladesh had 9 lakhs of E-Banking transactions, rising to 16 lakhs in 2019, 23 lakhs in 2020, and 43 lakhs in 2021 (Modak, 2022). The banks are trying to make E-Banking and E-Services easier and more convenient for customers. Bangladesh Bank (BB) has extended its policies to support E-Banking practices in the banking sector of Bangladesh. Bangladeshi Foreign Commercial Banks (FCBs) have shaped E-Banking since the early 1990s. FCBs have been offering a variety of E-Services for a long time and are expanding E-Banking to meet customer requirements. In the typical banking system banking system it was very hard for customers to perform banking transactions. In order to reduce this siffering of the customers, the FCBs took necessary step[s and made it simple for customers by providing different E-Banking Services options like SWIFT service

1.2 Scope of the Study

The people of Bangladesh are now becoming increasingly involved with electronic banking and the use of various forms of electronic services is increasing. This is no different in Khulna. There are a lot of banks in Khulna, among them a lot are trying to offer different E-Banking services to customers. Banks are also trying to implement different forms of E-banking Services. The purpose of this study is to identify the effect that E-Banking and E-Services have had on the level of satisfaction experienced by customers at Khulna. The findings

of this study are advantageous to the banking sector since they demonstrate the relative significance of service quality criteria.

1.3 Objective of the Study

The broad objective of this study is to identify the effect of electronic banking services or E-Banking Services on customer satisfaction in Khulna. The following is a list of the specific goals of this research that will help in establishing the overarching purpose of the study:

1. Identify the current situation of E-Banking and E-Services
2. Determine how online banking and other electronic services have changed the financial industry
3. Determine the amount of satisfaction that customers have with E-Banking and other electronic services offered by the bank
4. Determine whether customers prefer bank E-Banking and E-Services.

1.4 Research Gap

Many research studies have been conducted based on the banking sector of Bangladesh to identify different perspectives by different researchers. Several researches on electronic banking in Bangladesh have been conducted within the past few years. The development of E-Banking or Electronic Banking was a theoretical study based in Bangladesh to determine the emergence and growth of E-Banking in Bangladesh (Shamsuddoha, 2008). Jannatul Mawa Nupur researched E-Banking and customer satisfaction which was based on customers all over Bangladesh to identify their satisfaction with E-Banking (Nupur, 2010). Several studies were conducted in Bangladesh to gain an understanding of the effects that electronic banking has had on the country's banking sector (Shamsus Sadekin, 2016). There were some major issues for which E-Banking is not being adopted in Bangladesh. These issues were addressed in research that identified the major barriers to implementing E-Banking practices in Bangladesh (Redwanuzzaman & Islam, 2013). Some factors affect Internet banking or E-Banking behavior. These factors were determined through some research conducted by several researchers in Bangladesh (Hoque, 2012). Some researchers

mainly focused on commercial banks (PCBs) E-Banking and E-Services. These studies identified the situation of E-Banking and E-Services in Bangladesh (Hossain et al., 2013). Most of these studies or research were conducted based on all over Bangladesh, and some of them were done from a different perspective or with different objectives. However, there has not yet been any research conducted on Khulna to determine how E-Banking and E-Services influence the level of satisfaction experienced by customers. Therefore, there is a substantial lack of study in this field. This study is expected to reflect or represent a major part of the banking industry of Bangladesh, which is very important in the upcoming time but yet overlooked.

1.5 Limitations of the Study

Required data were mainly collected from respondents who were based in Khulna because the study's primary focus was on this particular city. Samples were only collected from 206 respondents due to time restrictions, which directly resulted in a small sample size. The information that was gathered was only partially disclosed. As there was no list of respondents, random sampling would not have been feasible, hence non-probability sampling was used to obtain the samples.

2. Literature Review

2.1 An Overview of E-Banking and E-Services

The concept of “E-Banking” or “Electronic Banking” was conceptualized in the 1970s. Later on, in 1985, a few banks provided electronic services but soon it was interrupted due to connectivity issues and high costs (Batchelor, 2017). Electronic banking, sometimes known as "e-banking," refers to the usage of modern technology so that customers can perform baking services like financial activities. E-banking offers banking services instantly by using electronic channels. As a result, customers can access banking activities faster, and conveniently from any place at any time. Daniel defined “E-Banking”, as where the banking information and services provided by the banks can be accessed by the customers using different platforms such as mobile phones, PCs, or telephones (E. Daniel, 1999). Tero Pikkarainen argued that banking is now

completely flexible and not restricted by location or time. An account can be accessed by a customer anywhere in the world, at any time of day or night, seven days a week. The author also said that customers who used to stay in line in banks can now perform their banking transactions online with just one click from anywhere. He or she does not have to visit the bank in person. According to Shamsus Sadekin, the major benefit of E-Banking and E-Services from the customer perspective is that it saves valuable time for the customers and provides an easy maintenance tool for managing money (Sadekin & Shaikh, 2015). Many researchers were conducted to identify the major benefits of E-Banking from the customer's perspective. According to Luštšik these benefits include – low cost for assessing and performing banking activities, performing banking transactions at any time from anywhere, continuous access to information, managing funds (cash) in a better way, and paying bills online just with one click, an easy, fast, and convenient way of performing banking transactions, fund transfer at any time from bank to bank, the high-speed loan application process with better privacy and security (Luštšik, 2003).

2.2 Customer Satisfaction

Customers are the primary source of income for every business. If the customers are satisfied then the business will perform better. In the early 20th century, Harry Gordon Selfridge stated that "*customers are always right*" (SOCO, 2021). Customer satisfaction is always the main focus of any business. Satisfied customers recommend the products and services to others which eventually increases the sales of the business. Customer satisfaction is defined in different ways by different authors. Oliver states customer satisfaction as the evaluation of how much of a gap is seen to exist between initial anticipations and the product's actual capabilities (Oliver, 1999). Kotler defined customer satisfaction as the customer's satisfaction or disappointment which is the difference between the product's perceived performance and expectations. If the perceived performance is more than that of expectation, then the customer will be happy and it is more likely that the satisfied customer will make purchases in the future (Kotler, 1966). According to Kotler, it is six times more expensive to attract new customers and convert them to loyal customers compared to

maintaining a satisfied customer. Managing loyal and satisfied customers thus saves costs and increases profits. Customer satisfaction gives a competitive advantage to the business. It increases the number of sales because satisfied customers refer the products and services to others (Hasim et al., 2018). Keeping the customers satisfied is no different in the banking industry. To perform successfully, banks must satisfy the customers' needs and adapt to their changing demands.

2.3 Easy Use of E-Banking

The performance and quality of E-Service is very important in terms of E-Banking customer satisfaction. If the service quality is poor then it is more likely that the customer will move to other banks that provide better E-Service quality. E-Services should be easy to use for the customers while using it (Saha & Zhao, 2005). Using different forms of E-Banking services, customers can perform banking-related actions on their own, such as maintaining balance, applying for a loan, checking transaction history, fund transfer at ease, submitting papers or updating them, opening fixed deposit schemes, and many other banking-related activities (ISMAIL & OSMAN, 2012). The way banks design their website and the contents on them are very easy to understand by the customers. The website and application should have basic content such as account numbers or bank balances. E-Services should be designed in a manner so that anyone can use them while showing some of the basic but important information related to a customer's account like account numbers or balances (Ahmad & Al-Zu'bi, 2011).

2.4 Cost of E-Banking

E-Banking services are less costly. This is because the traditional banking system contained many hidden costs and traveling expenses were high as customers had to go to banks in person every time to perform bank transactions. But E-Services enable customers to perform their banking transactions from anywhere and it is much less costly with almost no hidden. Customers are required to pay full pricing in three different ways, in retail banking: the value, the preferences regarding technology, and the distance traveled to carry out a group activity. There are a few different ways retail banks might charge applicants for their services, but the most common one is known as indirect

expenses. Fees for a particular service, minimum bank deposits, monthly service charges, and service bundles are a few examples of the fees that customers of retail banks encounter. When examining a customer's banking relationship, it is safe to presume that they do not live within walking distance of a single retail spiral outlet because banks strategically position numerous sites throughout an area (Byers & Lederer, 2001).

2.5 Convenience of E-Banking

Studies have shown customers tend to be more satisfied if the E-Services are convenient, fast, user-friendly, and safe. Electronic banking has become popular in many countries due to its many benefits for individuals and financial organizations. Researches show that advanced countries are able to cope with new technologies at a far quicker rate compared to other countries. One example of this is the widespread adoption of E-Banking among customers (Adapa & Rindfleish, 2013). Kayabaşı identified the structural correlations between total satisfaction, total service quality, and electronic service quality in their study. It has been discovered that the degree of association between an individual's opinion of the complete service quality and their level of overall satisfaction is quite high. In terms of how satisfied and how highly customers rate the quality of an E-Service, customers are influenced by several different aspects, which involve user-friendliness, ease of use, the responsiveness of the service providers, safety of the transactions, and the variety of products offered (Kayabaşı et al., 2013).

2.6 Privacy Issues of E-Banking

Security and privacy are the primary determinants of customer satisfaction. The degree to which customers are willing to participate in transactions involving money and personally sensitive information online is significantly impacted by trust or e-trust (Y.-S. Wang et al., 2003). According to Bélanger and Crossler, the idea of information privacy refers to people's desires to exercise some degree of control or influence over data that pertains to them personally (Bélanger & Crossler, 2011). The subject of privacy concerns and the growing use of electronic banking is explored in other research as well. Some customers may be hesitant to use electronic banking because they are worried about the

confidentiality of their personal information. This demonstrates how significant privacy and security concerns are. Regarding the customers' concern about their privacy when using Internet banking, the essential gaps need to be solved.

2.7 Security of E-Banking

Customers not trusting the internet can be broken down into three categories: the dependability of online services, the security of the system itself, and mistrust of service providers. Reputation is also believed to be significant because mistrusting the service provider is a component that is tied to the situation. Avoiding using Internet banking or electronic banking is recommended for the best reason, which is the risk that is linked with using the service (Yousafzai et al., 2003). Research finds that the challenges associated with enticing customers of elderly age to use Internet banking. According to Grabner-Krauter and Faullant's research, there is a possibility that the gender of the customers is a crucial factor in determining the level of reluctance they have toward the usage of electronic banking. This is due to the perception that women, in comparison to men, are more concerned about maintaining their privacy and adhering to ethical norms (Grabner-Kräuter & Faullant, 2008).

2.8 Personalization and Customization

Customers get better flexibility because of E-Services. Because they can perform their banking transactions from anywhere at any time, edit or customize their information, and make recurring transactions such as paying bills, and others. According to Sundar and Marathe, customers gain significant benefits from the availability of a high level of customization. They can also have better control through the usage of the technology (Sundar & Marathe, 2010). E-banking services reduce traditional tasks like writing cheques or buying stamps. This is because customers can pay electronic bills using a computer or a mobile device online. Instead, once customers have created a standing list by entering their payment or account information, the website or application will forward them to their banking profile. From that point on, whenever a customer is ready to make their payment, all they have to do is go to the website or mobile application, type in the amount, and click the send option (M. Wang et al., 2017).

Customers may set up automatic withdrawals for fixed bills like insurance, mortgages, and car loans on a specified date of the month. Bank bill-paying systems' flexibility lets clients choose which invoices to pay and when.

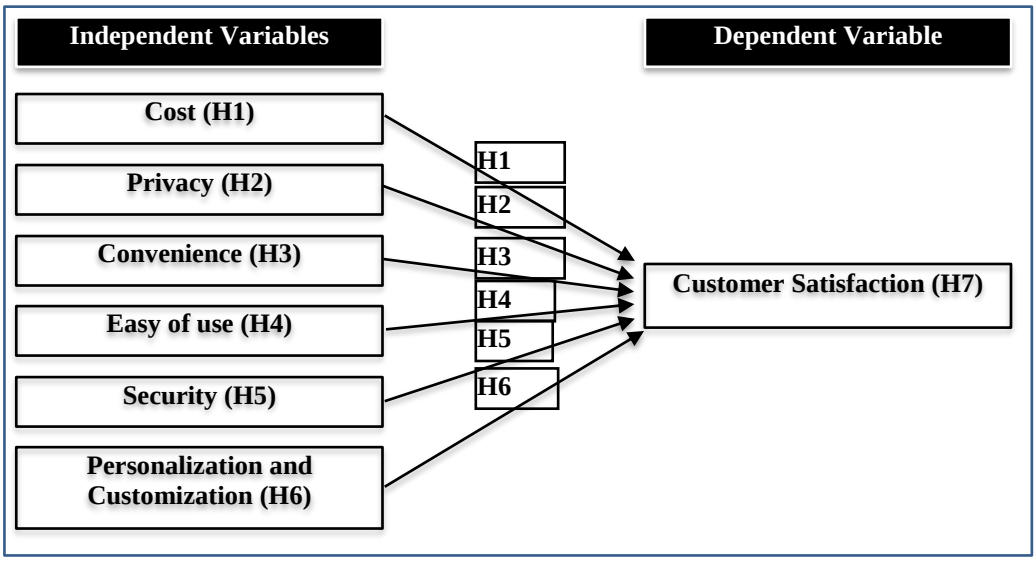
3. Conceptual Framework and Hypothesis

The independent variables for this research include:

1. Cost
2. Privacy issues
3. Convenience
4. Easy usage
5. Security issues
6. Personalization, and customization related to E-Banking and E-Services

The goal of this study was to identify the effect that E-Banking and E-Services have had on the level of satisfaction that customers in Khulna have experienced as a result of using different forms of E-Banking Services. The level of satisfaction experienced by customers as a result of using E-Banking and E-Services is a dependent variable that can be affected by the variables that are considered independent.

Figure 1: Conceptual Framework



Source: Adapted from (Altobishi et al., 2018)

Based on the conceptual framework, seven hypotheses have been constructed for the purpose of testing. These hypotheses include-

Table 1: List of Hypotheses

Hypothesis 1 (H1):	The lower cost of E-Banking and E-Services has a positive effect on customer satisfaction
H**ypothesis 2 (H2)**	Ensuring high privacy of E-Banking and E-Services has a positive effect on customer satisfaction
H**ypothesis 3 (H3)**	Convenience of E-Banking and E-Services has a positive effect on customer satisfaction
H**ypothesis 4 (H4)**	Easy usage of E-Banking and E-Services has a positive effect on customer satisfaction
Hypothesis 5 (H5)	Ensuring high security for E-Banking and E-Services has a positive effect on customer satisfaction
Hypothesis 6 (H6)	Personalization and Customization of E-Banking and E-Services have a positive effect on customer satisfaction
Hypothesis 7 (H7)	E-Banking and E-Services positively affect customer satisfaction

4. Methodology

4.1 Research Design

This research is deductive in nature. The quantitative method has been used to collect and analyze data. This is because the research is objected to testing the hypothesis based on existing theories. For collecting the primary information from the respondents, a structured questionnaire has been developed, which has been evaluated to test the hypothesis, and, and, finally, a decision has been made based on the results. The study used causal research. The purpose of this study is to determine how independent variables affect the dependent variable.

4.2 Data Source

The study uses both primary and secondary sources of data. The study involves a well-structured questionnaire that has been used to collect information from the respondents to measure customer satisfaction levels. This primary data has been collected using the questionnaire. The information has been collected from secondary data, that comes from a variety of sources, including different websites, books, journals, and articles.

4.3 Population, Sample Sample Size, and Sampling Technique

For this research, the population of the study (N) involves all of the banks that offer E-Banking and E-Services in Khulna and all of their customers. The study has a population size of unknown. For the purpose of the study, the samples (n) include customers using E-Banking Services provided by the banks in Khulna. A nonprobability sampling technique was used to conduct this study. Probability sampling has not been used as the number of banking customers is confidential information and has not been disclosed (unknown) by the banks. Convenience sampling was followed to collect the samples from the customers using E-Banking and E-Services located in Khulna. The size of the sample (189), denoted by n, has been determined by applying the following formula (W. Daniel, 1999). The explanation of the formal can be found in the appendix section of the study.

$$n = z^2 * p * (1 - p)/e^2$$

4.4 Data Collection Methods and Instruments

A structured questionnaire has been developed for the purpose of the study. It has been used to obtain information from respondents. Respondents were asked close-ended questions with limited options to respond. The target respondents were the E-Banking customers who use different forms of E-Banking Services provided by the banks. The questionnaire was broken down into its parts according to the information required. On a scale from 1 to 5, the Likert questionnaire asked respondents to rate the degree to which they agreed with statements on the dependent and independent variables.

4.5 Data Analysis Technique

The study used quantitative data, most of which came from a structured survey questionnaire. After collecting the right information from the respondents, the study focused on analyzing that information in the right and logical way. These data have been analyzed using descriptive reporting techniques. Google Forms has been created as the digital form of the questionnaire and thus used to conduct the survey and collect data online from respondents. These Google Forms were sent to the customers via email who were readily available to the

researcher while collecting samples using convenience sampling but due to their busy schedules, they could not have cooperated at that very moment. IBM SPSS 23 has been used to conduct tests such as descriptive statistics, reliability analysis, correlation analysis, multiple regression analysis, and others. The reliability of a survey can be determined by using Cronbach's alpha (α). For this study, the dependent variable in a multiple regression analysis includes customer satisfaction, while the independent variables include indications of E-Banking services. The model shows how E-Banking service elements contribute to customer satisfaction. This leads to the following equation, which serves as the basis of the mathematical model:

$$Customer\ satisfaction = \alpha + X1(X1) + X2(X2) + X3(X3) + X4(X4) + X5(X5) + X6(X6)$$

Here, X1 = Cost, X2 = Privacy, X3 = Convenience, X4 = Ease of use, X5 = Security, X6 = Personalization and Customization

5. Data Analysis

5.1 Reliability and Validity Analysis

Analyzing the consistency with which respondents respond to each component of a measure, or the extent to which an instrument yields consistent results when administered to the same individuals under controlled conditions is what is referred to as "reliability analysis." The instrument's validity in measuring what it is intended to measure improves in direct proportion to the coefficient's value. This research includes Cronbach's Alpha score to determine the degree to which the data exhibited internal consistency.

Table 2: Reliability and Validity Analysis

Variable Name	N		%		N of Items	Cronbach's Alpha
	Valid	Excluded	Valid	Excluded		
Cost Measurement	206	0	100	0	5	0.829
Privacy Measurement	206	0	100	0	5	0.793
Convenience Measurement	206	0	100	0	5	0.783
Ease of Use Measurement	206	0	100	0	5	0.786
Security Measurement	206	0	100	0	5	0.820
Personalization and Customization Measurement	206	0	100	0	5	0.820
Satisfaction Measurement	206	0	100	0	5	0.834

Scales with coefficients α (Cronbach's Alpha) between 0.80 and 0.95 are usually believed to be highly reliable. The reliability of a scale is regarded as having good reliability when its coefficient α is between 0.70 and 0.80, and fair reliability when it falls in the range of 0.60 to 0.70. If the coefficient α of reliability is less than 0.60, the scale has poor reliability (Zikmund et al., 2013). According to the outcome of the reliability analysis (Table-1), cost measurement, security measurement, personalization, and customization measurement, satisfaction measurement have a coefficient α between 0.80 and 0.95. This means that the data set is highly reliable. Again, privacy measurement, convenience measurement, and ease of use measurement have a coefficient α is between 0.70 and 0.80. Based on this, it is possible to conclude that the data that was used in this research is reliable based on the value that was displayed by Cronbach's Alpha.

5.2 Correlation Analysis

As was previously highlighted, there are six independent factors involved in this study, while there is only one dependent variable. Through the use of the SPSS program, the Spearman Correlation approach was carried out to determine whether or not the variables have a relationship (correlate) with one another. When the value is negative, the correlation between the variables is negative, and when it's positive, the correlation is positive. A correlation value of 0 shows that

the two variables do not have any form of relationship with one another. It means that there is no correlation between them (Artusi et al., 2002). According to experts, the strength of a link can be determined by looking at the value of the r (correlation coefficient). The value of r is between 0.10 to 0.29 suggests a weak relationship; the value of r is between 0.30 to 0.49, which suggests a moderate relationship; The value of r is between 0.50 to 1.00, which suggests a strong relationship (Hauke & Kossowski, 2011)

Table 3: Correlations between Cost and Satisfaction

Correlations				
			Cost Measurement	**Satisfaction Measurement**
Spearman's rho	Cost Measurement	Correlation Coefficient	1.000	0.379**
		Sig. (2-tailed)	.	0.000
		N	206	206
	Satisfaction Measurement	Correlation Coefficient	0.379**	1.000
		Sig. (2-tailed)	0.000	.
		N	206	206
****.** Correlation is Significant at the 0.01 Level (2-Tailed).				

The above analysis shows the connections between cost measurement and customer satisfaction measurement. The findings demonstrated a relatively moderate positive connection (r = 0.379) between costs and levels of customer contentment. As a result, both variables have a certain degree of positive relationship with one another.

Table 4: Correlations between Privacy and Satisfaction

Correlations				
			Privacy Measurement	**Satisfaction Measurement**
Spearman's rho	Privacy Measurement	Correlation Coefficient	1.000	0.457**
		Sig. (2-tailed)	.	0.000
		N	206	206
	Satisfaction Measurement	Correlation Coefficient	0.457**	1.000
		Sig. (2-tailed)	0.000	.
		N	206	206
****.** Correlation is Significant at the 0.01 Level (2-Tailed).				

Table-4 illustrates the relationships that exist between the measurements of privacy and satisfaction. The correlation between the two variables is 0.457, which indicates a moderately positive relationship between the two. This finding is confirmed by the fact that the relationship is positive. Therefore, there exists a positive correlation between the two variables.

Table 5: Correlations between Convenience and Satisfaction

Correlations				
			Convenience Measurement	**Satisfaction Measurement**
Spearman's rho	Convenience Measurement	Correlation Coefficient	1.000	0.621**
		Sig. (2-tailed)	.	0.000
		N	206	206
	Satisfaction Measurement	Correlation Coefficient	0.621**	1.000
		Sig. (2-tailed)	0.000	.
		N	206	206
****.** Correlation is Significant at the 0.01 Level (2-Tailed).				

Table-5 portrays the relationships between convenience and satisfaction measurement. According to the data, customer satisfaction is strongly positively correlated with convenience (r = 0.621). It is reasonable to conclude that the relationship between the two variables is strong and positive since the independent variable provides good predictions of the dependent variable.

Table 6: Correlations between Ease of Use and Satisfaction

Correlations				
			Ease of Use Measurement	**Satisfaction Measurement**
Spearman's rho	Ease of Use Measurement	Correlation Coefficient	1.000	0.601**
		Sig. (2-tailed)	.	0.000
		N	206	206
	Satisfaction Measurement	Correlation Coefficient	0.601**	1.000
		Sig. (2-tailed)	0.000	.
		N	206	206
****.** Correlation is Significant at the 0.01 Level (2-Tailed).				

The correlations between the ease of use measurement and the satisfaction measurement have been placed in Table-6. According to the findings, there is a strong correlation (r = 0.601), in the positive direction, between the ease with which a service can be used and the degree to which a customer is satisfied with the service. As a direct consequence of this, there is a positive correlation that exists between the two variables.

Table 7: Correlations between Security and Satisfaction

Correlations				
			Security Measurement	**Satisfaction Measurement**
Spearman's rho	Security Measurement	Correlation Coefficient	1.000	0.328**
		Sig. (2-tailed)	.	.000
		N	206	206
	Satisfaction Measurement	Correlation Coefficient	0.328**	1.000
		Sig. (2-tailed)	0.000	.
		N	206	206
****.** Correlation is significant at the 0.01 level (2-tailed).				

The relationships between security measurements and satisfaction measurements are detailed in Table-7. It shows that there is a moderate positive relationship between the two variables. This is because r = 0.328 as discovered in the above table. Therefore, there is a moderately positive relationship between the two variables.

Table 8: Correlations between Personalization and Customization and Satisfaction

Correlations				
			Personalization and Customization Measurement	**Satisfaction Measurement**
Spearman's rho	Personalization and Customization Measurement	Correlation Coefficient	1.000	0.592**
		Sig. (2-tailed)	.	.000
		N	206	206
	Satisfaction Measurement	Correlation Coefficient	0.592**	1.000
		Sig. (2-tailed)	0.000	.
		N	206	206
****.** Correlation is significant at the 0.01 level (2-tailed).				

The correlations between personalization-customization and satisfaction are displayed in the table 8. According to the findings, there is a strong relationship (r = 0.592) between the two variables. Thus, the independent variable strongly positively correlates with the dependent variable. As a result, it can be concluded that the dependent variable has a positive correlation with the other six independent variables, with some of the correlations being rather high and others being moderate.

5.3 Regression Analysis and Hypothesis Testing

The statistical method known as multiple regression is used in order to gain an understanding of the nature of the association that exists between the several variables. It takes into account one dependent variable and several independent variables at the same time. This type of statistical investigation may be carried out to conclude the nature of the connection. (Moore et al., 2006).

Table 9: ANOVA - Cost and Customer Satisfaction

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	17.158	1	17.158	65.885	0.000[b]
	Residual	53.126	204	0.260		
	Total	70.284	205			
a. Dependent Variable: Satisfaction Measurement						
b. Predictors: (Constant), Cost Measurement						

Table 10: Coefficients - Cost and Customer Satisfaction

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	2.230	0.256		8.693	0.000
	CostMeasurement	0.493	0.061	0.494	8.117	0.000
a. Dependent Variable: Satisfaction Measurement						

The first hypothesis for this research is between the cost of using E-Banking Services and customer satisfaction. The ANOVA table tells whether or not the regression model describes a significant amount of the variance. As the p-value (Sig. value) is below 0.05, it can be concluded that the relationship between the

two variables used in the analysis is statistically significant. It is to be mentioned that, the p-value in regression explains the importance of a variable, that is independent variable, in explaining the changes in the outcome, that is dependent variable. Here, the F-value is 65.885. The t-test from the coefficients table portrays that the value is 8.117, which is greater than 2, and the sig value is lower than 0.05. As the p-value (Sig. value) is lower than 0.05, thus the null hypothesis is not accepted (rejected) and this leads to the acceptance of the alternative hypothesis of the study. So, based on the findings of the study, it is possible to conclude that the first hypothesis of this research can be accepted.

Thus, Hypothesis 1 (H1): Accept.

Table 11: ANOVA - Privacy and Customer Satisfaction

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	20.975	1	20.975	86.777	0.000[b]
	Residual	49.309	204	0.242		
	Total	70.284	205			
a. Dependent Variable: Satisfaction Measurement						
b. Predictors: (Constant), Privacy Measurement						

Table 12: Coefficients - Privacy and Customer Satisfaction

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	2.083	0.240		8.693	0.000
	PrivacyMeasurement	0.546	0.059	0.546	9.315	0.000
a. Dependent Variable: SatisfactionMeasurement						

The second hypothesis that was tested for this research was on the relationship between maintaining one's privacy when using E-Banking Services and customer satisfaction. As the p-value in the ANOVA table is less than 0.05, it may be concluded that there is a relationship between the two variables that can be considered statistically significant. Here, the F-value is 86.777. From the coefficients table, the t-test reveals that the value is 9.315, which is larger than 2,

and the sig is less than 0.05. Thus, the second hypothesis of this study can be accepted based on the analysis.

Thus, Hypothesis 2 (H2): Accept.

Table 13: ANOVA - Convenience and Customer Satisfaction

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	36.522	1	36.522	220.676	0.000[b]
	Residual	33.762	204	0.166		
	Total	70.284	205			
a. Dependent Variable: Satisfaction Measurement						
b. Predictors: (Constant), Convenience Measurement						

Table 14: Coefficients- Convenience and Customer Satisfaction

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.061	0.219		4.837	0.000
	ConvenienceMeasurement	0.750	0.051	0.721	14.855	0.000
a. Dependent Variable: Satisfaction Measurement						

The third hypothesis that has been investigated for this study involved the connection between the convenience of utilizing E-Banking Services and the level of satisfaction experienced by the customer. It is possible to conclude that there is a relationship between the two variables that can be regarded as statistically significant. This is because the p-value in the ANOVA table is less than 0.05. Here, the F-value is 220.676. The t-test result is portrayed in the table of coefficients, and it indicates that the value is 14.855, which is greater than 2. Additionally, the sig value is less than 0.05. According to the findings, the third hypothesis for this study can be accepted.

Thus, Hypothesis 3 (H3): Accept.

Table 15: ANOVA - Ease of use and Customer Satisfaction

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	30.668	1	30.668	157.925	0.000[b]
	Residual	39.616	204	0.194		
	Total	70.284	205			
a. Dependent Variable: Satisfaction Measurement						
b. Predictors: (Constant), Ease of Use Measurement						

Table 16: Coefficients- Ease of use and Customer satisfaction

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.611	0.216		7.473	0.000
	EaseofUseMeasurement	0.638	0.051	0.661	12.567	0.000
a. Dependent Variable: SatisfactionMeasurement						

The fourth hypothesis has been tested in this study is one that examines how ease of use of electronic banking services can predict overall customer satisfaction. Since the p-value in the ANOVA table is lower than 0.05, it is reasonable to conclude that a statistically significant correlation exists between the two variables. Here, the F-value is 157.925. The table of coefficients presents the t-test results, which show that the value is 12.567, which is more than 2, and the sig value is also below 0.05. The results of the study provide support for the potential that the fourth hypothesis that has been offered for this investigation can be accepted.

Thus, Hypothesis 4 (H4): Accept.

Table 17: ANOVA – Security and Customer Satisfaction

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	11.944	1	11.944	41.765	0.000[b]
	Residual	58.340	204	0.286		
	Total	70.284	205			
a. Dependent Variable: Satisfaction Measurement						
b. Predictors: (Constant), Security Measurement						

Table 18: Coefficients - Security and Customer Satisfaction

Coefficients[a]						
		Unstandardized Coefficients		**Standardized Coefficients**		
Model		**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	2.752	0.241		11.414	0.000
	SecurityMeasurement	0.398	0.062	0.412	6.463	0.000
a. Dependent Variable: Satisfaction Measurement						

The fifth hypothesis that will be examined in this research focuses on the relationship between the safety concerns of E-Banking Services and customer satisfaction. Since the p-value for the ANOVA table is lower than 0.05, it may be concluded that there is a significant relationship between the two variables used in the analysis. Here, the F-value is 41.765. According to the t-test results on the coefficients table, the value is 6.463, which is more than 2, and the sig value is lower than 0.05. The analysis of the study led to the conclusion that the fifth hypothesis of this study can be accepted, and the findings provide evidence to back up this conclusion.

Thus, Hypothesis 5 (H5): Accept.

Table 19: ANOVA - Personalization and Customization and Customer Satisfaction

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	27.833	1	27.833	133.751	0.000[b]
	Residual	42.451	204	0.208		
	Total	70.284	205			
a. Dependent Variable: Satisfaction Measurement						
b. Predictors: (Constant), Personalization and Customization Measurement						

Table 20: Coefficients - Personalization and Customization and Customer Satisfaction

Coefficients[a]						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	1.820	0.216		8.427	0.000
	Personalization and Customization Measurement	0.602	0.052	0.629	11.565	0.000
a. Dependent Variable: Satisfaction Measurement						

The sixth hypothesis that was investigated for this study is the connection between the degree of personalization and customization of E-Banking Services and customer satisfaction. Since the p-value in the ANOVA table is below 0.05, it is reasonable to conclude that there is a relationship between the two variables and that this relationship satisfies the criteria for being called statistically significant. Here, the F-value is 133.751. The t-test result has been given in the table of coefficients, and it suggests that the value is 11.565, which is higher than 2. In addition to this, the level of significance is below 0.05. Based on the result, it is possible to conclude that the sixth hypothesis that is posed for this study can be accepted.

Thus, Hypothesis 6 (H6): Accept.

At this point of analysis, all of the independent variables have a significant relationship with customer satisfaction, and each of the independent variables influences customer satisfaction independently. The following are the summaries of the overall ANOVA and coefficient tables, as well as the regression model summary (considering all the variables simultaneously).

Table 21: Overall Model Summary of Regression Analysis

Model Summary[b]									
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Change Statistics**				
					R Square Change	**F Change**	**df1**	**df2**	**Sig. F Change**
1	0.786[a]	0.618	0.606	0.36737	0.618	53.631	6	199	0.000
a. Predictors: (Constant), Personalization and Customization Measurement, Security Measurement, Cost Measurement, Convenience Measurement, Privacy Measurement, Ease of Use Measurement									
b. Dependent Variable: Satisfaction Measurement									

The model summary is depicted in the table that can be found above when all independent variables and one dependent variable are taken into consideration (simultaneously). Here the value of R provides insight into the type and strength of the correlation that exists between variables. When the value of R is close to 0, the relationship is weak or has no relationship; when it is closer to 0.5, then the relationship is moderate; and when it is closer to 1.00, then the relationship is very strong. Similarly, If the value is positive, then the relationship is positive; if the value is not positive, then the relationship is negative (Eberly, 2007). From the above table, the value of R is .786 and it shows a positive sign. Which means that the relationship is moderately high. Again, the "R Square" value is .618. It indicates that 61.80% of the variance in the dependent variable (customer satisfaction) can be explained by the change or variance in the independent variables. In addition, this indicates that the effect of the independent variables is responsible for 61.80% of the change that occurred in the dependent variable. Based on the result, It is possible to draw the conclusion that there is a strong connection between all of the independent factors and the dependent variable.

Table 22: Overall ANOVA

ANOVA[a]						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	43.428	6	7.238	53.631	0.000[b]
	Residual	26.857	199	0.135		
	Total	70.284	205			
a. Dependent Variable: Satisfaction Measurement						
b. Predictors: (Constant), Personalization and Customization Measurement, Security Measurement, Cost Measurement, Convenience Measurement, Privacy Measurement, Ease of Use Measurement						

The outcome of the regression model is presented in the table above. It shows that the dependent variable can be projected with a high level of precision when each of the independent factors is taken into account simultaneously. The result of the ANOVA is presented in a table, which shows that the p-value (Sig Value) is 0.00. Since this is a value that is below 0.05, it indicates that there is a significant relationship between all of the variables. One conclusion that may be drawn from this is that the model has sufficient statistical support to be generalized to the target population. In addition, the F-value in the table is significant at 53.631, which indicates that the model and the data are a strong fit for one another when it comes to explaining the levels of satisfaction that customers have with E-Banking.

Table 23: Overall Coefficient of Regression Analysis

Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	0.207	0.240		0.861	0.391
	Cost Measurement	0.113	0.055	0.113	2.063	0.040
	Privacy Measurement	0.060	0.060	0.060	1.012	0.313
	Convenience Measurement	0.400	0.070	0.385	5.760	0.000
	Ease of Use Measurement	0.194	0.067	0.200	2.890	0.004
	Security Measurement	0.072	0.053	0.075	1.378	0.170
	Personalization and Customization Measurement	0.135	0.063	0.141	2.131	0.034

The above table represents the coefficient analysis between all variables (considering all the variables simultaneously). Based on the outcome of the p-value (Sig Value), cost, convenience, ease of use, personalization, and customization have a significant relationship with customer satisfaction. This is because the p-value (sig value) is below 0.05 for these four variables. Here, the convenience variable has the highest t-value of 5.760 and it indicates that convenience has resulted in the most significant result in customer satisfaction. However, the p-value of privacy and security is above 0.05 which is more than a significant level. The t-test results also portray the same result for these two variables because both variables have a t-value below 2. With all factors taken into account, the analysis suggests that privacy and security have not produced statistically significant findings in demonstrating a significant relationship with customer satisfaction. This is because in multiple regression analysis, the beta value, p-value (sig value), and t-value of each independent variable are all subject to change as the number of variables in the study changes (Aiken et al., 2003). According to the value of the VIF derived from the table of the coefficient of regression analysis, it is clear that none of the values are higher than 10. It would appear that there is no multicollinearity in the variables that are considered independent in the research.

However, statistical analysis revealed that each of the independent variables had a substantial effect on customers' satisfaction when they were tested individually.

The beta value gives an indication of the degree to which the independent factors can explain the dependent variable. So, based on the "coefficient of regression analysis", the following regression equation has been developed-

Customer satisfaction = .207 + .113*(X1) + .060*(X2) + .400*(X3) + .194*(X4) + .072*(X5) + .135*(X6)

- X1 = Cost changes affect customer satisfaction by .113 units in the same direction

- X2 = Privacy changes affect customer satisfaction by .060 units in the same direction
- X3 = Convenience changes affect customer satisfaction by .400 units in the same direction
- X4 = Ease of use changes affect customer satisfaction by .194 units in the same direction
- X5 = Security changes affect customer satisfaction by .072 units in the same direction
- X6 = Personalization and customization changes affect customer satisfaction by 0.135 units in the same direction

Based on this outcome, it can be concluded that all the independent variables have a significant effect on customer satisfaction related to E-Banking Services. So the last hypothesis can also be accepted.

Thus, Hypothesis 7 (H7): Accept.

So, based on the above analysis, all the hypotheses subject to tests can be accepted. The purpose of this study was to evaluate whether or not there is a relationship that exists between E-Banking Services and customer satisfaction when using a wide range of E-Banking Services. The research found that there is a positive correlation between the variables and that this connection is a significant one.

6. Result and Discussion

The study aimed to evaluate the impact of E-Banking Services on the customers that use them. For the purpose of the study, six different independent variables as been used related to E-Banking Services, with one dependent variable. The study focused on testing the seven hypotheses, that were developed based on the literature review. Reliabilty test has been conducted to check the accutray of the data and sample adequacy test was perofmed to justy the approproiteness of the sample size. Based on the descriptive analysis of this research, the customers are satisfied with the E-Banking Services provided by the

different banks located in Khulna. The findings of the study indicate that when the independent variable is investigated individually, then each independent variable and the dependent variable have a significant relationship with one another. However, when all of the variables that affect customer satisfaction are taken into account, the convenience of the service has been found to yield the most significant result, followed by ease of use, personalization and customization, and cost. Compared to other factors, however, privacy and security in E-Banking have not been able to predict significant results in E-Banking. The research also indicates that the customers of E-Banking Services evaluate its service quality based on four factors. It is essential to underline that the other two components, privacy, and security, are not as well developed in Bangladesh as they are in developed countries and that is one of the many reasons why these two variables have relatively less significance in determining customer satisfaction. So there is room for further development in terms of privacy and security. Positive correlations were found between the variables, with some of the correlations being strong and others being modest.

The banks located in Khulna can use this information to update the security system and privacy issues for the customers to increase customer satisfaction as well and they need to also focus on the other four factors as well. It is possible to draw the following conclusion based on the findings of the study: because each of the factors that make up an independent variable has its impact on the level of customer satisfaction, financial institutions (banks) need to pay attention to all of the variables. In addition to this, financial institutions additionally need to place more emphasis on the factors of privacy and security so that both of these factors can be improved. As a result, the banks will able to modify and update their service quality to enhance customer satisfaction.

7. Conclusion and Future Research

7.1 Conclusion

In today's competitive global landscape, banks must understand and anticipate what their customers need. As more people embrace technology, financial institutions have an increasing responsibility to keep their services

modern and responsive to evolving expectations. To stay ahead, banks must not only meet but exceed customer expectations by offering high-quality services.This study aimed to examine the impact of e-banking services on customer satisfaction, focusing on six key factors: cost, privacy, convenience, ease of use, security, and personalization/customization. The findings reveal a statistically significant positive relationship between e-banking services and customer satisfaction. Each of these factors contributes to enhancing satisfaction, with convenience emerging as the most influential, followed by ease of use, personalization/customization, and cost. Although security and privacy were found to be significant, they lag behind the other factors, suggesting that there is considerable room for improvement in these areas.The study indicates that while customers are generally satisfied, there is still potential for banks to further enhance their e-banking services. Particularly in regions like Khulna, where security and privacy measures may not be as robust as in more developed markets, banks should prioritize updates and improvements in these areas. By addressing all these factors, banks can make informed changes that not only meet customer expectations but also boost overall satisfaction.

7.2 Managerial Implications

The results of this study demonstrate how E-Banking services affect the level of satisfaction experienced by customers. Even though Khulna is not considered a major financial hub, it is believed that users, as well as other researchers, will benefit from this study by obtaining a better knowledge of how the offering of E-Banking Services influences the degree of satisfaction experienced by customers. Banks located in other major financial hubs can use the outcome of this research and work on improving their services, because most of the E-Banking customers tend to behave in a similar way. This investigation takes into account six independent factors of electronic banking services. As a result of the increasingly intense competition, financial institutions are striving to gain a competitive advantage over their rivals. As a consequence of this study, they will be in a better position to understand how to raise the quality of the electronic banking services that they provide as a result of this study.

7.3 Recommendation

According to the findings of the research, financial institutions need to focus their efforts on all six of the independent factors that are considered in this study. The reason for this is that the data demonstrates a significant positive correlation between the variables that are considered independent, and these variables all play a significant role in determining customer satisfaction. According to the findings of multiple regression, banks should place the majority of their effort on convenience because one unit of change in convenience will have the greatest potential for positively affecting customer satisfaction. Besides that, banks need to focus on privacy and security, along with other variables to enhance customer satisfaction.

7.4 Future Scope of Research

As technology advances, people depend on it in every aspect of their life. These services have improved and evolved due to current banking industry technical advances. Research suggests there is area for research because financial organizations are still adopting new technologies. Bangladeshi government banks lag behind private commercial and foreign banks. Government banks offer few E-Banking services, however, this may change as new technologies become available. That gives researchers plenty to study in the future. Again, the other variable has great potential for further study. The study was conducted only on the population of Khulna. Therefore, future studies could include more responders for more reliable results. A future study can add other E-Banking Services characteristics to ascertain its exact impact on customer satisfaction.

References

Adapa, S., & Rindfleish, J. (2013). Internet Banking Non-Users: Thematic Matrix Display Analysis. *The International Journal of Business and Information*. https://doi.org/10.6702/IJBI.2013.8.2.1

Ahmad, Dr. A. M. K., & Al-Zu'bi, Dr. H. A. (2011). E-banking Functionality and Outcomes of Customer Satisfaction: An Empirical Investigation. *International Journal of Marketing Studies*, *3*(1). www.ccsenet.org/ijms

Aiken, L. S., West, S. G., & Pitts, S. C. (2003). Multiple Linear Regression. In *Handbook of Psychology*. John Wiley & Sons, Ltd. https://doi.org/10.1002/0471264385.WEI0219

Altobishi, T., Erboz, G., & Podruzsik, S. (2018). E-Banking Effects on Customer Satisfaction: The Survey on Clients in Jordan Banking Sector. *International Journal of Marketing Studies*, *10*(2), 151. https://doi.org/10.5539/ijms.v10n2p151

Artusi, R., Verderio, P., & Marubini, E. (2002). Bravais-Pearson and Spearman correlation coefficients: meaning, test of hypothesis and confidence interval. *The International Journal of Biological Markers*, *17*, 148–151. https://journals. sagepub.com/doi/pdf/10.1177/172460080201700213

Batchelor, B. (2017). *The History of E-Banking*. Biz Fluent. https://bizfluent.com/ about-5109945-history-ebanking.html

Bélanger, F., & Crossler, R. E. (2011). Privacy in the digital age: A review of information privacy research in information systems. *MIS Quarterly: Management Information Systems*, *35*(4), 1017–1041. https://doi.org/10.2307/41409971

Byers, R. E., & Lederer, P. J. (2001). Retail bank services strategy: A model of traditional, electronic, and mixed distribution choices. *Journal of Management Information Systems*, *18*(2), 133–156. https://doi.org/10.1080/07421222.2001.11045686

Daniel, E. (1999). Provision of electronic banking in the UK and the Republic of Ireland. *International Journal of Bank Marketing*, *17*(2), 72–83. https://doi.org/10.1108/02652329910258934/FULL/XML

Daniel, W. (1999). Biostatistics: A Foundation for Analysis in the Health Sciences. In *John Wiley & Sons.: Vol. 7th edition New York*. https://goodcalculators.com/sample-size-calculator/

Eberly, L. E. (2007). Multiple linear regression. In *Methods in molecular biology (Clifton, N.J.)* (Vol. 404). Humana Press. https://doi.org/10.1007/978-1-59745-530-5_9/COVER

Fatima Khan, H. (2017). E-Banking: Benefits and Issues. In *Int ernat ional Journal of Managing Informat ion Technology*. www.arjonline.org

Grabner-Kräuter, S., & Faullant, R. (2008). Consumer acceptance of internet banking: The influence of internet trust. *International Journal of Bank Marketing*, *26*(7), 483–504. https://doi.org/10.1108/02652320810913855

Hasim, M. A., Shamsudin, M. F., Ali, A. M., & Shabi, S. (2018). The relationship between sales promotions and online impulse buying in Malaysia. *Año*, *34*(16), 516–525.

Hauke, J., & Kossowski, T. (2011). Comparison of Values of Pearson's And Spearman's Correlation Coefficients on the Same Sets of Data. *QUAESTIONES GEOGRAPHICAE*, *30*(2), 87–93. https://doi.org/ 10.2478/v10117-011-0021-1

Hoque, S. M. S. (2012). *Factors Affecting Internet Banking Behavior in Bangladesh: An Analysis on the Perspective of Gender and Educational Background*. https://ssrn.com/abstract=2286039

Hossain, M. M., Irin, D., Islam, S., & Saha, S. (2013). Electronic-Banking Services: A Study on Selected Commercial Banks in Bangladesh. *Asian Business Review*, *3*(3).

ISMAIL, M. A., & OSMAN, M. A. Y. (2012). Factors Influencing the Adoption of E-banking in Sudan: Perceptions of Retail Banking Clients. *The Journal of Internet Banking and Commerce*, *17*(3), 1–12. https://www.icommerce central.com/ open-access/factors-influencing-the-adoption-of-ebanking-in-sudan-perceptions-of-retail-banking-clients.php?aid=38126

Kamil, A. A. (2010). *E-Banking of Economical Prospects in Bangladesh*. http://www.arraydev.com/commerce/jibc/

Kayabaşı, A., çelik, B., & Büyükarslan, A. (2013). The analysis of the relationship among perceived electronic service quality, total service quality and total satisfaction in Banking sector. *Journal of Human Sciences , 10*(2), 304–325. https://www.researchgate.net/publication/259893940_The_analysis_of_the_relationship_among_perceived_electronic_service_quality_total_service_quality_and_total_satisfaction_in_Banking_sector

Kotler, P. (1966). A design for the Firm's marketing nerve center. *Business Horizons*, *9*(3), 63–74. https://doi.org/10.1016/0007-6813(66)90007-3

Luštšik, O. (2003). *E-banking in Estonia : reasons and benefits of the rapid growth*. Tartu University Press.

McLeod, Dr. S. (2019). *Independent And Dependent Variables In Resear4ch*. Simply Psychology. https://www.simplypsychology.org/variables.html

Modak, T. (2022). *Internet banking users double, transactions triple in two years*. The Business Standard. https://www.tbsnews.net/economy/banking/internet-banking-users-double-transactions-triple-two-years-410194

Moore, A. W., Anderson, B., Das, K., & Wong, W.-K. (2006). *Handbook of biosurveillance*. Academic Press.

Nupur, J. M. (2010). *E-Banking and Customers' Satisfaction in Bangladesh: An Analysis*.

Oliver, R. L. (1999). Whence consumer loyalty? *Journal of Marketing*, *63*(SUPPL.), 33–44. https://doi.org/10.2307/1252099

Redwanuzzaman, M., & Islam, M. A. (2013). Problematic Issues of E-Banking Management in Bangladesh. *Asian Business Review*, *3*(1).

Sadekin, M. S., & Shaikh, M. A. H. (2015). Current Status of E-Banking Practices in Bangladesh. In *Scholar Journal of Business and Social Science* (Vol. 1, Issue 1). https://ssrn.com/abstract=2724338

Saha, P., & Zhao, Y. (2005). Relationship between Online Service Quality and Customer Satisfaction A Study in Internet Banking. *Master Thesis, Luleå University of Technology, Sweden*. https://www.scirp.org/(S(i43dyn45teexjx455qlt3d2q))/reference/ReferencesPapers.aspx?ReferenceID=2119647

Shamsuddoha, M. (2008). *Development of Electronic Banking in Bangladesh*. http://ssrn.com/abstract=1302296Electroniccopyavailableat:http://ssrn.com/abstract=1302296

Shamsus Sadekin, M. (2016). Effect of E-Banking on Banking Sector of Bangladesh. *International Journal of Economics, Finance and Management Sciences*, *4*(3), 93. https://doi.org/10.11648/j.ijefm.20160403.11

SOCO. (2021). *5 Powerful Reasons Why The Customer Is Always Right*. https://www.socoselling.com/5-powerful-reasons-why-the-customer-is-always-right/

Sundar, S. S., & Marathe, S. S. (2010). Personalization versus Customization: The Importance of Agency, Privacy, and Power Usage. *Human Communication Research*, *36*(3), 298–322. https://doi.org/10.1111/J.1468-2958.2010.01377.X

Wang, M., Cho, S., & Denton, T. (2017). The impact of personalization and compatibility with past experience on e-banking usage. *International Journal of Bank Marketing*, *35*(1), 45–55. https://doi.org/10.1108/IJBM-04-2015-0046

Wang, Y.-S., Wang, Y.-M., Lin, H.-H., & Tang, T.-I. (2003). Determinants of user acceptance of Internet banking: an empirical study. *International Journal of Service Industry Management*, *14*(5), 501–519. https://doi.org/10.1108/09564230310500192

Yousafzai, S. Y., Pallister, J. G., & Foxall, G. R. (2003). A proposed model of e-trust for electronic banking. *Technovation*, *23*(11), 847–860. https://doi.org/10.1016/S0166-4972(03)00130-5

Zikmund, W. G., Babin, B. J., Carr, J. C., & Griffin, M. (2013). *Business Research Methods* (8th ed.). South-Western Cengage Learning.

Appendix

- Sample Sample Size

$$n = z^2 * p * (1 - p)/e^2$$

Here, n = *Size of the sample*; z = *z-score associated with a level of confidence (for a confidence level of 95%, the critical value or z-score is 1.96)* = 1.96; e = *The margin of error* = 6.8% (at 95% confidence level); p = *The sample proportion or percentage picking a response* = 65%.

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The Impact of Bank Stability Metrics on Distance-from-Default

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Abstract

The study aims to determine whether bank stability metrics can predict the default risk of listed banks in Bangladesh. To achieve this, a sample of 29 banks (7 Shariah-based banks and 22 conventional banks) from 2010 to 2023 is used. As a proxy for default risk, ROA based Altman's Z score and Merton's distance to default (DTD) were used. For bank stability ratios, Non-performing Loan to Equity (NPLE), Return on Equity (ROE), Liquidity Coverage Ratio (LCR), and Capital Adequacy Ratio (CRAR) were taken. Age, GDP growth, and a dummy for COVID were taken as control variables. Random effect model was tested to interpret the results across all models. The impact of stability metrics differs depending on the proxies taken in the study, as evidenced by the endogeneity and robustness test; however, it was found that capital adequacy, asset quality and profitability significantly impact bank's default risk for all models, respectively. Additionally, shariah-based banks are more sensitive to asset quality and profitability, where changes in these factors have a heightened effect on default risk. Conventional banks tend to be more sensitive to capital adequacy suggesting that capital adequacy management is critical for these banks' default risk.

Keywords: Z-score, Metron's Distance to Default, Default Risk, Random Effect Model, Conventional Banks, Shariah-based Banks, Endogeneity Test
JEL Classification: C23, C36, G21, G32, G33, G41

1. Introduction

Following the devastating effects of the global financial crisis on financial systems around the world, maintaining financial stability has emerged as a key priority of central banks' regulatory responsibilities globally. Bangladesh is not an exception. The "Financial Stability Assessment Report (FSAR)" published by the central bank of Bangladesh raise the concern as well that reveals a mixed landscape with both positive trends and concerning issues. The June 2024 quarterly issue of FASR shows that profitability has shown a slight improvement. Total assets grew to approximately BDT 25,462 billion. However, there has been a decline in asset quality, with the Non-performing Loan (NPL) ratio increasing

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significantly. The provision maintenance ratio also dropped, indicating potential weaknesses in the bank's ability to absorb losses. Capital adequacy has weakened slightly, with the Capital to Risk-Weighted Assets Ratio (CRAR) falling to 10.64 percent and the Tier-1 capital ratio to 7.61 percent. While most banks still meet the regulatory capital requirements, these reductions highlight diminishing buffers against losses. Liquidity measures remain compliant with regulatory benchmarks, and stress tests indicate moderate resilience to economic shocks, though credit risk is a notable concern. An increase in NPLs and defaults from key borrowers may threaten to push the CRAR below the minimum regulatory threshold of 10 percent, reflecting the sector's vulnerability to credit risks. Total defaulted loans in Bangladesh's banking sector stood at around Tk 1.45 lakh crore by the end of 2023, up from the previous year (Bangladesh Bank, 2023). NPLs have risen due to weak corporate governance, political interference, and poor risk management practices, making the sector more vulnerable to financial instability and default risk (The Business Standard, 2023).

In South Asia, the banking sector is under stress. In India, NPLs as a percentage of total loans went up from 7.5 percent in 2019 to 8.3 percent in 2022 (Reuters, 2022). Pakistan has seen similar trends, inflation rose to 24.5 percent in 2022, which added to the economic pressure on borrowers (Dawn, 2024). At the close of 2023, Pakistan's banking sector experienced a notable increase in Non-performing Loans (NPLs). The total NPLs rose by approximately 7.6 percent, escalating from PKR 924.04 billion in December 2022 to PKR 994.82 billion by December 2023. These are compounded by structural issues like high unemployment and fiscal deficits, leading to tighter credit conditions and slower economic growth (Dawn, 2023).

Recent evaluations have also pointed out persistent difficulties within the banking sector of Bangladesh. An analysis by S&P Global Ratings in August 2024 noted that the volatile political climate in Bangladesh has intensified the banking industry's weaknesses, including insufficient liquidity, limited capital buffers, and declining asset quality (S&P Global Ratings, 2024, August 14). Moreover, Fitch Ratings downgraded Bangladesh's Long-Term Foreign-Currency Issuer Default Rating to 'B+' from 'BB-' in May 2024, citing worries

about the nation's financial stability (Fitch Ratings, 2024). These events highlight the need for close observation of financial stability indicators like NPL ratios and capital adequacy ratios to understand their influence on banks' default risks.

Given these conditions, it is crucial to analyze how various financial stability metrics affect the default risk of banks in Bangladesh. Gaining insights into the relationships among profitability, asset quality, capital adequacy, and liquidity can inform efforts to enhance the sector's resilience and ensure a stable financial environment.

The overall objective of this study is to understand the effects of the financial stability indicators on the default risk of listed banks of Bangladesh, either partially or entirely and to provide suggestions to policymakers on ensuring financial stability in the banking sector.

To the best of our knowledge, there exists a research gap in this area. Firstly, while previous studies have explored the relationship between financial stability indicators and the profitability of the banking industry, no research has specifically examined the impact of these ratios on the default risk of banks. Secondly, no studies have differentiated the impact of stability indicators on the default risk between conventional banks and shariah-based banks. No studies have used multiple definitions of default risk to make the relationship between the predictor variables on default risks.

Additionally, this study employs a panel data approach, which has been absent in similar previous research (Anwarul et al., 2012; Rafiq, 2016). It also covers a more extensive time frame, analyzing data from 29 listed conventional and sharia-based banks from 2010 to 2023. This study aims to fill the existing literature gap by determining whether the stability ratios of the banks' financial conditions have any impact on the default probability of these banks using the Distance to Default (DTD) and Distance from Default (DFD) models. This aspect is notably absent in other studies conducted on the banking sector of Bangladesh.

2. Literature Review

2.1 Predicting Default Probability of Banks

One of the most important metrics for evaluating default risk in banks is the probability of credit default, which gauges the possibility that a borrower will not fulfill their loan commitments. The likelihood of credit default has demonstrated significant patterns in industrialized economies such as the United States. According to a study by Altman and Kishore (1995), regulatory changes, better risk management, and a rebounding economy all contributed to the chance of decline after the 2008 financial crisis. For instance, the probability of a credit default for US investment-grade corporate bonds was roughly 2.5 percent in 2010 and dropped to about 0.5 percent by 2017, indicating a more stable market. Similarly, Japan has seen a decline in the likelihood of credit default, which Ohashi et al. (2004) attribute to a low-interest rate environment and decisive government intervention.

Altman and Saunders (1997), the first seminal paper, contended subjective analysis where various characteristics of borrowers, known as 4 "Cs", are used to judge the credit granting decisions. With the move towards more objective-based assessment of default risk, credit scoring model and multivariate model like the linear model, logit model, probit model, and the discriminant model were being used. Altman and Saunders (1997) used the logit model, akin to the components of the extant CAMEL model used by bank examiners to assess the strength of banks. They also introduced a separate class of models that impute the implied probabilities of default using the yield spread of term structure of interest rate of corporate risky securities.

Coats & Fant, (1993) and Trippi & Turban (1992) used the neural network approach that identified hidden correlations between predicted variables as additional explanatory variables in predicting the non-linear function of bankruptcy.

The mostly used model of prediction of bankruptcy is the option pricing models that were proposed by Black and Scholes (1973), Merton (1974), and Hull and White (1995). According to the model, the likelihood of a default depends on

the initial value of assets relative to its total interest-bearing liabilities and the company's volatility in the value of assets. The model assumes that the equity holders' value is a call option on the company's book value of assets, where the company's debt represents the strike price. The input of these models - specifically the value of assets and the volatility of the value of assets- are easily estimable for publicly traded firms with adequate data on stock return. The option pricing model expresses that defaults occur when the market value of a company's asset falls below its outstanding short-term debt obligations. This model used by Merton (1974) denoted that the model value expresses how many standard deviations asset values (A) are above debt (B) and the percentage of units that went bankrupt in a one-year time with that many standard deviations of asset values above B. He named the value as Distance to Default (DTD). Bharat and Shumway (2008) tested the model accuracy of Merton (1974) and argued that the DTD model can be a good predictor of forecasting bankruptcy.

A recent study by Giordana & Schumacher (2017) conducted a study on the impact of Basel-III standards on a bank's default risk using the Z score as the indicator of default risk where the Z score represents the distance from default (DFD). A higher DFD reflects a lower probability of default and greater financial stability. Sagatbekovich et al. (2021) also used the Z score model to explore the effect of regulatory norms on the performance of the banking industry. They argued that the Z score could be a better measure of DFD than Merton's DTD when market data used in DTD is not suitable for its unavailability or unreliability. They also pointed out that since banks are highly regulated and accounting data is standardized and publicly available, the Z score can be a good measure of default risk.

2.2 Default risk and firm stability studies conducted on the banking industry

Sundararajan et al. (2002) described the indicators of financial soundness, including capital adequacy, asset quality, profitability, and banks' liquidity. Indicators of Financial Soundness (FSIs) are measurements used to evaluate the stability and resilience of markets, financial institutions, and associated corporate and household units. FSIs include aggregated information about financial institutions and indicators of the marketplaces in which they operate.

Using quarterly data from 2005 to 2019, Maulana et al. (2023) examined 80 Indonesian banks, concentrating on variables that affect default probability, such as the Common Equity Tier-1 (CET-1) ratio, the inefficiency ratio, and the deposit ratio. The study uses the copula approach to investigate the impact of macro-financial indicators on default likelihood, including policy rate, real exchange rate, economic growth, and unemployment. The findings show that macroeconomic factors similarly lower default likelihood, but the CET1 ratio, inefficiency ratio, and deposit ratio have a negative impact. The report emphasizes how crucial deposit and capital management practices are in reducing banks' propensity for taking on unnecessary risk.

Nicolas et al. (2021) analyzes European banks' default risk determinants, examining the impact of bank-specific and macroeconomic variables over 2004-2013. Key findings indicate that bank size, profitability, asset quality, liquidity, and macroeconomic conditions significantly influence default risk.

Jabra et al. (2017) focused on institutional variables like statutory liquidity ratio (SLR), macroeconomic variables like GDP, and stability indicators like capital adequacy, asset quality, management quality, earnings, and liquidity. It also analyzed data from 280 European commercial banks between 2000 and 2019. The study divided the data into pre- and during-crisis eras to evaluate the impact of the financial crisis. It looked at the factors that lead to bank default using panel data and the binomial Logit model. The results showed that institutional, macroeconomic, and stability variables all impacted bank default, underscoring the important roles that these variables play in predicting bank default. This thorough approach shed light on the intricate interactions between institutional, macroeconomic, and financial issues that affect bank failure in the European banking system.

Several studies have investigated the relationship between the Capital Adequacy Ratio (CAR) and bank default probability. Sood (2016) examined US bank holding firms during the years 2003–2009 and found that a Tier 1 capital ratio of less than 6 percent was associated with meaningful bank failure. Karugu et al. (2018) studied Kenyan commercial banks and concluded that CAR is a highly consistent indicator of financial difficulty. Fiordelisi and Mare (2013)

found that adequate capital lowers the likelihood of default, suggesting that larger capital buffers offer more absorbency for losses. Additionally, Sang (2021) found that the banks' default probability of Vietnamese commercial banks is negatively correlated with CAR. Obadire (2022) analyzed the effect of banking regulation, Basel III, on the stability of African banks. The results demonstrated that, contrary to the general consensus surrounding the Basel III Accord, the minimum capital requirement, CAR, and capital buffer premium had a negligible and negative relationship with the stability of banks in the African context. At the same time, the LCR stood out as having a substantial positive relationship with the stability of the banks.

Buchdadi et al. (2020) discovered that both bad loans and capital adequacy significantly impact the financial distress of rural banks. Meanwhile, Saputra et al. (2020) found that capital adequacy has a positive effect on bank stability in Indonesia, while credit risk and liquidity have a negative effect. Hossain et al. (2017) studied the resilience of banks in the BRICS economies and found that CAR is strong in boosting banks' resilience. Finally, Aroghene (2023) studied Nigerian banks and found a positive but insignificant effect of CAR on bank stability. Another study by Aroghene and Ikeora (2022) yielded similar results, showing an insignificant effect of CAR on bank stability as measured by the z-score.

A study conducted by Ejoh et al. (2014) examined how asset quality and liquidity impact the default risk of Nigerian banks. Their findings revealed a negative correlation between asset quality and liquidity. This suggests that as the credit risk, or the occurrence of bad loans, increases, the bank's loan portfolio (asset) is negatively affected, leading to a rise in bank illiquidity. Furthermore, the likelihood of a bank default is influenced by both asset quality and liquidity risk.

Amollo (2015) studied the relationship between earning quality and profitability of commercial banks in Kenya. The study found that at a 95 percent confidence level, the study discovered that profit rates significantly improve the financial performance of Kenyan commercial banks. It was also discovered that

there was a linear link between the profit rates and the profitability of default, with better profitability resulting from higher profit rates.

The relationship between the probability of default and the effectiveness of bank management has been the subject of numerous studies. Cost-effectiveness and problem loans have been linked by Berger and DeYoung (1997), suggesting that banks with higher levels of efficiency had a lower likelihood of experiencing financial difficulties. In a similar vein, Altunbas et al. (2007) found that lower risk and a lower likelihood of default are linked to increased managerial efficiency in European banks. Mester (1996) provided evidence in support of this by highlighting how risk preferences affect management effectiveness and the probability of bank failure. Goddard et al. (2004) discovered that efficient management practices contribute to lower default risk. Fiordelisi and Marques-Ibanez (2013) highlighted the role of management efficiency in mitigating systemic bank default risk, while Wheelock and Wilson (2000) underscored the critical role of management efficiency in reducing the likelihood of default in their study of U.S. bank failures and acquisitions. Finally, Said and Tumin (2011) demonstrated the significance of financial ratios reflecting management efficiency for bank performance and stability in their comparative analysis of banks in Malaysia and China. These studies collectively affirm the significant role of higher management efficiency in lowering the probability of bank defaults and ensuring financial stability.

To the best of authors' knowledge, no study has been conducted on all banks (conventional and shariah) in Bangladesh that examines the impact of Capital adequacy, liquidity, profitability, and asset quality on the distance from default (DFD) and differentiate the results between conventional and shariah-based banks. Therefore, this study has addressed this gap and employed the necessary techniques to obtain the objective of the research. Additionally, the study aims to incorporate measures of the DTD to check the robustness of the hypotheses.

3. Hypothesis

Based on the above literature, the study aims to determine the relationship between DFD and bank stability metrics. Bank stability metrics are identified as the *capital adequacy, liquidity, profitability, and asset quality* of the banks based on the study of Sundararajan et al (2002). The hypotheses are developed based on the study of Podpiera & Ötker (2010). The alternate hypotheses for this study are as follows:

H_1: There is a significant relationship between Capital adequacy and DFD of banks

H_2: There is a significant relationship between Asset quality and DFD of banks

H_3: There is a significant relationship between Liquidity and DFD of banks

H_4: There is a significant relationship between Profitability and DFD of banks

4. Methodology

4.1 Data

In the study, secondary data has been utilized to carry out a panel data analysis to delve into the relationship between bank stability metrics and the DFD of banks. Data on banking attributes and stability indicating information were retrieved from the Dhaka Stock Exchange (DSE) website, published annual reports, and company websites. The DSE had 32 banks listed as of 2023. This study thus only looks at 29 of these institutions for a balanced panel; including other three banks would have disturbed the estimation process parameter and eligibility criteria (Baltagi, 2005). Among them, twenty-two banks were scheduled commercial banks, and seven banks were shariah-compliant banks. The time frame when data are collected was extended from 2010 through July to 2023, excluding the period between 1994 and 2009 because of significant date fragmentation.

4.2 Variables

The study incorporates one dependent variable and four independent variables, including a few control variables. The definition of dependent and independent variables is as follows:

4.2.1 Dependent variable: The study's key dependent variable is Altman's z-score, a gauge of the bank's distance from default (DFD). According to Altman (1968), a higher Z score means a bank has more equity relative to its assets and earnings volatility, reflecting a better distance from default. A lower Z score thus means a proximity to default. Bandyopadhyay (2005), Giordana & Schumacher (2017) and Kaliyev & Nurmakhanova (2020) use the following estimation for the z-score:

$$\text{Z-score} = \frac{(\frac{Equity}{Total\ assets})+ROA}{sd(ROA)}$$

Whereas Return on Assets (ROA) is determined by dividing net profit after taxes by the entire amount of assets. The standard deviation of return on assets serves as the equation's denominator. Equity serves as a safety net against financial loss. The bank's ability to make a profit on its whole asset base is shown by its Return on Assets (ROA). According to the equation, banks with higher profitability and equity-to-asset ratios will have higher z scores, eventually showing that they are more resilient and have a lower default risk.

Merton (1974) formulated the Distance to Default (DTD) formula that measures how far the firm's assets is away from the threshold default value of debt in terms of standard deviations. The formula was also tested for the robustness of the hypotheses. The formula can be written as follows:

$$\text{DTD}=\frac{ln(MVE)+[E\ (ROA)-Var\frac{(A)}{2}]}{Std\ (A)}$$

Whereas MVE is the market value of equity calculated by deducting the market value of assets from the company's total debt. E(ROA) is the expected average return on assets. Var (A) is the variance of assets of the company over

the sample period. Std (A) is the standard deviation of assets of the company over the sample period.

4.2.2 Independent variables: *Capital Adequacy* is the first factor. The term "capital adequacy" describes the level of capital that is anticipated to be maintained in proportion to the risks to protect the financial institution's debt holders and absorb any potential losses. Following the papers of Altan et al. (2014), Wanke et al. (2016), and Karim et al. (2018), the Capital Adequacy Ratio has been employed as a proxy variable for the analysis.

The second factor to consider is the bank's asset quality. The quality of an asset is determined by whether it is uncollectable or whether its true value is less than what the bank reports on its balance sheet. In line with the research of Sahut and Mili (2011), Altan et al. (2014), Lahrech et al. (2014), and Alqahtani et al. (2017), NPLs to Equity were used for the study.

Return on equity (ROE) has been used to measure profitability, according to the works of Wanke et al. (2016), Alqahtani et al. (2017), and Karim et al. (2018).

Liquidity is the last thing to be tested. LCR is used to determine liquidity in accordance with the Basel-III requirements and assess a bank’s ability to meet its short-term obligations. It estimates the ratio of a bank's highly liquid asset holdings to its anticipated net cash withdrawals over a given time frame, usually 30 days.

Three control variables were included in the analysis. The age of the bank's history from its founding was the first control variable following the study of Berger et al. (2012). A dummy variable that represented COVID-19 was also employed as a control variable because of theorized connections between it and the bank's performance (Imran, 2023). Finally, GDP, a macroeconomic component, was also incorporated into the analysis as a control variable.

Table 1: Operational Definition of Variables

Measures	Operational Variables	Concepts	Formula	Expected sign	References
Dependent	Z score	Distance from Default (DFD)	[(Equity/Assets)]/sd(ROA)		(Kaliyev & Nurmakhanova, 2020)
Independent variables	Capital Adequacy (CA)	Capital Adequacy Ratio (CRAR)	Total Regulatory Capital/ Risk weighted Asset	(+)	Altan et al., (2014); Wanke et al., (2016) and Karim et al., (2018)
	Asset Quality (AQ)	NPLs to Total Equity (NPLE)	NPLs/Total Equity	(-)	Sahut and Mili (2011); Altan et al., (2014); Lahrech et al., (2014) and Alqahtani et al., (2017)
	Profitability (P)	Return on Assets (ROE)	Net Profit/Total Equity	(+)	Wanke et al., (2016); Alqahtani et al. (2017) and Karim et al., (2018)
	Liquidity (L)	Liquidity Coverage Ratio (LCR)	(High-Quality Liquid Assets)/(Net Cash Outflows)	(+)	(Amara & Mabrouki 2019)
Control variable	COVID	Binary variable having 1 for COVID years otherwise 0 (COVID)		(-)	Elnahass et al. (2021)
	AGE	Years of operation since its inception (AGE)		(+)	DeYoung & Hasan (1998)
	GDP	GDP Growth Rate of Respective Year (GDPGR)		(+/-)	Demirguc et al (1998)

4.3 Model of the Study

To develop the baseline model of the study, the study followed the methodology of Sundararajan et al (2002) and Podpiera & Ötker (2010). Accordingly, the model equation of the study is:

$$\text{Z-score}_{it} = \alpha + \sum_{j=1}^{4} Bj\ Stability\ Indicators_{ijt} + \sum_{k=1}^{3} \delta_k Control_{ikt} + \epsilon_{it}$$

Where;

Z-score$_{it}$ is the Z-score of bank i at time t, representing the distance from default, α is the intercept, βj are the coefficients for the Stability Indicators parameters, δ_k are the coefficients for the control variables, Stability Indicators $_{ijt}$ represents the four parameters: CA, AQ, P, L for bank i at time t. Control$_{ikt}$ represents the three control variables for bank i at time t: CV1$_{it}$, CV2$_{it}$, and CV3$_{it}$ (GDP growth, age, COVID 19), ϵ_{it} is the error term for bank i at time t.

5. Empirical Results

5.1 Descriptive Statistics

The dataset comprises 406 observations from 29 scheduled banks in Bangladesh. Table-2 shows the mean, standard deviation, minimum and maximum values as part of the descriptive statistics. The analysis of descriptive analysis gives us the guidelines for testing the dataset against the assumptions of normal distributions and getting the optimum regression model.

Table 2: Descriptive Statistics

Variable	Observation	Mean	Std. Dev.	Min	Max
CRAR	406	0.13	0.02	0.03	0.19
LCR	406	1.68	1.18	0.42	1.90
NPLE	406	0.56	0.69	0.03	7.37
ROE	406	0.11	0.08	-0.78	0.36
AGE	406	24	8.53	9.00	47.00
GDPGR	406	0.06	0.01	0.03	0.08
COVID	406	0.14	0.35	0.00	1.00
DFD (z score)	406	18.20	8.64	0.64	48.40
Merton's DTD	406	23.61	0.84	20.61	26.90

Source: Author's calculation

Table-2 shows that the banks overall have a Z-score (average of 18.2 and SD = 8.64), indicating a lower probability of default and a greater distance to default in the banking industry. The non-performing loan ratio (mean of 0.56, SD of 0.69) ranged considerably in terms of problems with asset quality. The financial profitability of lending activities is steady with a net interest margin. The liquidity of the banking sector, with an average liquidity coverage ratio of 168 percent, shows a stable 30-day safety margin for the banks in difficult times. The average

bank age was 23 years with a mix of mature and somewhat newer banks. CRAR suggests sufficient capital buffers with a mean of 13 percent. Finally, 75 percent of banks are conventional, and the rest of the banks are shariah-based.

5.2 Diagnostic Test

The study conducted several tests and ultimately determined that the most appropriate model was being used in order to satisfy the assumptions of the underlying panel data analysis.

Normality test: The study included the Shapiro-Wilk Test for Normality to determine whether the selected variables had a normal distribution. P-value, which is less than 5 percent, shows that the test results show that none of the study's variables have a normal distribution. However, the study uses appropriate model which is robust to violations of normality assumptions.

Table 3: Shapiro Wilk Normality Test

Variable	Observation	z	Prob>z
DFD (zscore)	406	4.45	0.000
DTD	406	6.55	0.000
NPLE	406	11.93	0.000
CRAR	406	4.54	0.000
LCR	406	11.43	0.000
ROE	406	10.72	0.000
AGE	406	5.44	0.000
COVID	406	4.75	0.000
GDPGR	406	9.08	0.000

Multicollinearity Test: Since none of the explanatory variables have a correlation coefficient higher than 0.80, the Pearson Correlation Coefficient finding clearly shows that none exhibit multicollinearity problems. The Variance Inflation Factor (VIF) was another tool utilized in the study to verify multicollinearity. The test indicates that the mean VIF is 1.41. Its value of less than 10 suggests that multicollinearity is not present.

Table 4: Pearson Correlation Matrix

VAR_COVAR	CRAR	LCR	NPLE	ROA	GDPGR	AGE	COVID
CRAR	1						
LCR	-0.0713	1					
NPLE	-0.4111	0.1538	1				
ROA	0.1698	-0.0011	-0.4916	1			
GDPGR	0.0343	-0.076	0.0635	-0.0445	1		
AGE	0.096	0.1898	0.2687	-0.2477	0.0426	1	
COVID	0.2635	0.0928	0.0459	-0.0713	-0.4794	0.1928	1

Table 5: Variance Inflation Factor (VIF) Test

Variable	VIF	1/VIF
NPLE	1.72	0.581341
COVID	1.59	0.629622
CRAR	1.47	0.680215
GDPGR	1.42	0.70233
ROA	1.36	0.73321
AGE	1.22	0.817985
LCR	1.08	0.930129
Mean VIF	1.41	

Heteroskedasticity Test: Utilizing the Breusch-Pagan/Cook-Weisberg test, the study verified the heteroskedasticity. The Chi-square value is 28.78.13 and p-value is close to 0.000. Therefore, the data exhibits the presence of heteroskedasticity.

Table 6: Breusch-Pagan/Cook-Weisberg Test for Heteroskedasticity

Model	chi2	Prob>chi2	Presence of Heteroscedasticity
DFD	28.78	0.0000	Yes

Autocorrelation Test: The Wooldridge test has been performed to check autocorrelation for this model. The F-value is 0.437, and the p-value is 0.52. Considering a 10 percent significance level, the test suggests that there is no first-order autocorrelation in the dataset.

Table 7: Wooldridge Test for Autocorrelation in Panel Data

Model	F value	Prob>F	Presence of Autocorrelation
DFD	0.437	0.5203	No first order autocorrelation

Cross-sectional Dependency: The study performed Friedman's methods to check the cross-sectional dependence among the panel data set. The Friedman's Value is 11.708, and P-value is 0.55 which suggests no presence of cross-sectional dependence at 5 percent significance level.

Table 8: Pesaran's Test of Cross-Sectional Independence

Model	Friedman's Value	P-Value	Presence of Cross-Sectional Dependence
DFD	11.708	0.5517	No

Hausman Test: The study explored the Hausman test while deciding between the Fixed Effects Model and the Random Effect Model. Based on the Hausman test, where the P-value is close to 0.000, the study used the Random Effect Model.

Table 9: Hausman Test

Model	chi^2	Prob > chi^2	Decision
DFD	74.86	0.000	Random Effect Model (RE)

Since the data exhibits heteroskedasticity but no first-order autocorrelation and cross-sectional dependence, the Random Effects (RE) model can be an effective decision. Additionally, the Hausman test confirmed that RE is preferable to Fixed Effects (FE), suggesting that individual-specific effects are uncorrelated with explanatory variables. Since heterogeneity was present, RE accommodates variation across banks while allowing for generalizable insights into the banking sector's default risk.

5.3 Baseline Model and Sub-Sample Analysis: Conventional vs. Shariah Banks

The study conducted the baseline model, whereby all the listed banks were regressed against the DFD (z score). Sub-sample analysis helps to identify potential heterogeneity in regression and the overall generalization of the results (Angrist & Pischke, 2009). Gujarati and Porter (2009) expressed that sub-sample

analysis helps detect patterns and biases hidden in the full sample to check the external validity of the dataset. To check for the robustness of the study and whether the result of baseline regression holds among the conventional and shariah-based banks, the study also covers the result of the two sub-sample models.

Table 10: Result of Baseline and Sub-Sample Models

	Model 1: All Banks	**Model 2: Conventional Banks**	**Model 3: Shariah-based Banks**
Variables	**Coef**	**Coef.**	**Coef.**
CRAR	55.14*** (12.71)	63.77*** (15.14)	85.27*** (24.84)
NPLE	-2.52*** (0.54)	-0.87 (0.60)	-5.81*** (1.62)
ROE	5.06** (2.51)	7.35*** (2.16)	25.47*** (7.98)
LCR	-0.12 (0.25)	0.05 (0.32)	-1.40*** (0.38)
Control Variables			
Age	-0.09 (0.33)	-0.84*** (0.14)	-0.51*** (0.18)
GDP	-1744.65* (980.76)	-28.96 (25.54)	-4.38 (33.19)
COVID	15.86 (10.18)	0.03 (1.24)	-0.29 (1.37)
Constant	20.50*** (5.70)	33.76*** (6.32)	27.95*** (6.45)
Firm Effect	YES	YES	YES
Year Effect	YES	YES	YES
Overall R-Square	88.01%	88.79%	92.78%
Prob>Chi2	0.00	0.00	0.00
Total Observation	406	308	98

Source: Author's Analysis Using STATA (Version 14.2)
Note: Here *** Means Significant at 1% Level; ** Means Significant at 5% level; *Means Significant at 10% Level; Values in () are Standard Errors

From Table-10, it was found that for all banks, higher Capital Adequacy (CA) was associated with a higher DFD (Z score), as indicated by a positive and significant coefficient of CRAR. Asset Quality (AQ) exhibits a significant negative relationship with the Z score, indicating that higher NPLE increases

default risk by reducing the distance from default. The Profitability (P) of the banks, as expressed by ROE, has a significant positive impact on the Z score, implying that higher profitability decreases default risk. Liquidity (L) of the banks, as expressed by LCR, is found to have an insignificant relationship with the Z score. The study also revealed a negative coefficient for the age of banks, indicating that newer banks have lower default risk, whereas older banks are prone to high default risk, as evidenced by lower DFD.

For conventional banks, CRAR maintains a positive and significant relationship with the Z score, reinforcing that higher CAR lowers default risk. NPLE remains insignificantly negative, indicating increased default risk with higher NPLE. The profitability of the commercial banks has a significant positive impact on the Z score, implying that higher profitability decreases default risk. Age continues to show significant effects, with older banks having higher default risk and higher market valuation reducing default risk.

In the case of Shariah-based banks, the study found a positive and highly significant relationship between default risk and both CAR and ROE, along with the age of banks having a negative and highly significant impact on default risk. The result also reinforces a negative relationship between distance from default and LCR and NPLE.

Moreover, the model displayed high explanatory power, with R-squared values of 88.01 percent for all banks, 88.79 percent for conventional banks, and 92.78 percent for Shariah-based banks. Overall, shariah-based banks are more sensitive to asset quality and profitability, where changes in these factors have a heightened effect on default risk. Conventional banks tend to be more sensitive to capital adequacy suggesting that capital adequacy management is critical for these banks' default risk.

5.4 Endogeneity Tests

Regression analysis can lead to inconsistent estimation of coefficients if endogeneity is present in the dataset. Three primary sources of endogeneity- omitted variable bias, measurement error, and reverse causality- can be a critical concern (Gujarati & Porter, 2009; Angrist & Pischke, 2009). To show that the

result of the study holds water in the issue of endogeneity, an omitted variable bias test and measurement error test have been conducted.

5.4.1 Omitted Variable Bias Test

According to Wooldridge (2010), when a relevant variable that has a significant influence on the dependent variable is left out of the model, it can cause biased coefficients capturing the effect of the missing variables. In the banking literature, Norden and Weber (2010) argued that excessive credit growth may lower the lending quality, thereby heightening default risk. Conversely, Laeven and Levine (2009) postulated that well-managed asset growth can reduce default risk by invoking economies of scale. According to Lipton and Lorsch (1992), a larger board size may cause incoordination and diluted accountability potentially elevating higher default risk. Following these arguments, the study included asset growth and board size as omitted variables to test the baseline model.

Table 11: Result of Baseline and Omitted Variable Bias based Models

VARIABLES	(1)	(2)	(3)	(4)
	Baseline	**Asset Growth**	**Board Size**	**Combined**
CRAR	55.14***	69.52***	69.97***	69.58***
	(12.707)	(4.537)	(4.581)	(4.538)
NPLE	-2.52***	-0.598	-0.657	-0.647*
	(0.543)	(-1.351)	(-1.474)	(-1.447)
ROE	5.06**	1.295	1.411	1.287
	(2.514)	(0.485)	(0.534)	(0.482)
LCR	-0.13	-0.184	-0.199	-0.199
	(0.250)	(-0.713)	(-0.770)	(-0.768)
COVID	15.86	-9.502**	-9.155**	-9.301**
	(10.184)	(-2.055)	(-1.985)	(-2.007)
AGE	-0.09	-0.0832	-0.104	-0.0932
	(0.334)	(-0.238)	(-0.298)	(-0.266)
GDPGR	-1744.65*	-64.55	-66.57	-64.89
	(980.75)	(-0.730)	(-0.754)	(-0.733)
ASSETGROWTH		-0.813		-1.088
		(-0.277)		(-0.368)
BSIZE			0.0726	0.0766
			(0.776)	(0.813)
CONSTANT	119.63***	23.37*	22.45*	22.18*
	(45.844)	(1.901)	(1.818)	(1.790)

VARIABLES	(1)	(2)	(3)	(4)
	Baseline	**Asset Growth**	**Board Size**	**Combined**
Observations	406	406	406	406
Firm RE	Yes	Yes	Yes	Yes
Firm Cluster	No	No	No	No
seasonal adjustment	No	No	No	No
R2 within	0.868	0.860	0.860	0.860
R2 overall	0.880	0.872	0.872	0.872
Wald chi2	2626.73	2433	2437	2431
Prob > chi2	0.00	0.00	0.00	0.00
z-statistics in parentheses and *** p<0.01, ** p<0.05, * p<0.1				

Source: Author's analysis using STATA

From Table-11, it can be observed that the inclusion of asset growth and board size in the baseline model has a notable shift in the significance and directional impact of financial stability metrics (CRAR, NPLE, ROE, and LCR). For CRAR, the positive and significant relationship observed in the baseline model becomes even stronger when asset growth and board size are included, with the combined model maintaining this upward trend. For Asset quality (NPLE), the negative and significant impact in the baseline model loses its impact in terms of lower coefficient value, though the directional relationship holds. Regarding profitability (ROE), its positive and moderately significant association in the baseline becomes insignificant across the asset growth, board size, and combined models. It suggests that the baseline relationship may have been partially driven by these omitted factors. Finally, liquidity (LCR) remains statistically insignificant across all models, suggesting neither of these two omitted factors affects its relationship within the model framework. Overall, the result shows that even after accounting for these two omitted variables, the result of the baseline model still holds its significance and direction arguing that the model does not suffer from endogeneity up to a level.

5.4.2 Measurement Error Test

Where the explanatory variables are measured inaccurately or the variables are defined inaccurately, it will lead to measurement error and can cause the coefficients to be biased (Angrist & Pischke, 2009). This measurement error is a common source of endogeneity in regression analysis. To tackle this problem, alternative definitions of the stability indicators are used in the study.

The alternate predictor variables used to test measurement error are given in Table-12.

Table 12: Operational Definition of Alternate Variables

Name of Predictor	Baseline Variable Used	Alternate Variable Used	Measurement of Alternate Variable	References
Capital Adequacy (CA)	Capital to Risk-Weighted Assets Ratio (CRAR)	Equity to Total Assets (ETA)	Total Equity / Total Assets	Berger & Bouwman (2013)
Asset Quality (AQ)	Non-Performing Loans to Equity (NPL/Equity)	Non-Performing Loans to Total Loans (NPLL)	Non-Performing Loans / Total Loans	Ghosh (2015); Louzis et al. (2012)
Profitability (P)	Return on Equity (ROE)	Net Interest Over Equity (INOE)	(Interest Income - Interest Expense) / Average Equity	Demirgüç-Kunt & Huizinga (2010); Imran (2023)
Liquidity (L)	Liquidity Coverage Ratio (LCR)	Loan to Deposit Ratio (LTD)	Total Loans / Total Deposits	Altan et al. (2014); Vodová (2011).

To determine whether the outcome of the baseline predictor factors also aligns with alternate variables, the study performs a panel regression for each of these alternate variables. The results are shown in Table-13.

Table 13: Result of Alternate Variables based Models

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5
	ETA	NPLL	INOE	LTD	Combined
ETA	1.078				0.847
	(0.397)				(0.313)
NPLE	-0.433		0.624	0.615	
	(-1.115)		(1.471)	(1.403)	
ROE	0.222	-2.429		-1.138	
	(0.0822)	(-0.953)		(-0.433)	
LCR	-0.127	-0.159	-0.0495		
	(-0.480)	(-0.615)	(-0.183)		
CRAR		59.57***	67.55***	69.14***	
		(4.526)	(4.471)	(4.555)	
NPLL		-0.884			-0.338

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5
	ETA	NPLL	INOE	LTD	Combined
		(-0.476)			(-0.177)
INOE			-1.510		-1.666*
			(-1.557)		(-1.763)
LTD				-0.674**	-0.698**
				(-1.962)	(-1.964)
COVID	12.32	18.25*	19.21*	18.79*	13.30
	(1.145)	(1.730)	(1.831)	(1.785)	(1.252)
AGE	-0.0884	-0.0848	-0.0908	-0.0937	-0.0703
	(-0.247)	(-0.243)	(-0.262)	(-0.271)	(-0.198)
GDPGR	-1,373	-1,980*	-2,075**	-2,045**	-1,481
	(-1.328)	(-1.949)	(-2.055)	(-2.019)	(-1.450)
Constant	103.2**	131.0***	135.2***	133.8***	109.1**
	(2.132)	(2.760)	(2.871)	(2.827)	(2.290)
Observations	406	406	406	406	406
Number of groups	29	29	29	29	29
Firm Effect	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes
R2 within	0.392	0.423	0.429	0.431	0.401
R2 overall	0.864	0.871	0.872	0.873	0.866
Wald chi2	2286	2426	2456	2465	2323
Prob > chi2	0.00	0.00	0.00	0.00	0.00
z-statistics in parentheses & *** p<0.01, ** p<0.05, * p<0.1					

Source: Author's analysis using STATA

From Table-13, it can be seen that key variables, namely CRAR, NPLE, ROE, and LCR, exhibit significant changes in their significance and directional impact when alternative variable definitions are incorporated into the baseline model. With coefficients of 59.57 in the NPLL model, 67.55 in the INOE model, and 69.14 in the LTD model, the CRAR variable continually shows a substantial positive association with DFD and is still highly significant and positive across all models in which it is included. This implies that Capital Adequacy (CA) has a positive impact on default risk regardless of model specifications.

For Asset Quality (AQ), NPLE in the baseline model has a significant negative effect, which diminishes as it becomes statistically insignificant across the alternate models: the ETA model and the combined model. However, the

directional impact holds across all the significant models, implying that Asset Quality (AQ) has a negative impact on default risk regardless of model specifications.

Regarding Profitability (P), ROE loses its significance when replaced by INOE, though not consistently significant. Interestingly, INOE itself approaches significance in the combined model, suggesting a potential negative relationship. This makes the predictor less robust in terms of model selection.

In terms of Liquidity (L), though insignificant, LCR remains negatively related to default risk across all models, showing minimal sensitivity to alternate liquidity definitions. However, when LTD is taken, it becomes significantly negative in the LTD model and in the combined model, highlighting a stronger inverse relationship with default risk than observed with LCR. This indicates that LTD may better capture liquidity-related risks compared to LCR.

Overall, these results suggest that Capital Adequacy (CA), Asset Quality (AQ) and Liquidity (L) measures are well defined and their directional impact hold along with different alternative models. However, profitability measures are not significant across different models.

5.5 Robustness Check

The robustness test checks whether the baseline regression model remains stable and reliable under different model specifications and data conditions. Leamer (1983) expressed that for a model to be robust its coefficient values must remain consistent when alternate definitions of dependent variables are taken. It will test the reliability of the model, thereby minimizing the risk of specification bias. Huber (1981) addresses outliers can influence the coefficient estimates and introduces a process called winsorizing to limit the extreme values in the dataset. According to Huber (1981), if regression results remain stable after winsorizing the data, it will indicate a robust generalizable underlying pattern in the baseline regression. For this study, we have conducted the baseline regression analysis by introducing an alternate definition of default risk called Merton's (1974) Distance to Default (DTD) and after performing winsorizing at 1 percent level on the dataset.

5.5.1 Distance to Default (DTD) and Model Specification

DTD was calculated using the methodology of Merton (1974). The DTD is a similar index like DFD that captures default risk. DFD measures how far a bank is from reaching the point of default. The study conducted the same panel methodology and used random effect model to interpret the impact of financial stability proxies on the DTD. The findings are shown in Table-14.

Table 14: Result of DTD and Baseline (DFD) Models

VARIABLES	(1)	(2)
	DTD	**Baseline (DFD)**
CRAR	3.942*	55.14***
	(1.777)	(12.71)
NPLE	-0.176*	-2.52***
	(-1.960)	(0.54)
ROE	5.694***	5.06**
	(10.48)	(2.51)
LCR	0.128***	-0.12
	(2.984)	(0.25)
COVID	-1.693	15.86
	(-1.172)	(10.18)
AGE	-0.0314	-0.09
	(-0.663)	(0.33)
GDPGR	171.8	-1744.65*
	(1.234)	(980.76)
CONSTANT	14.95**	137.4***
	(2.292)	(2.886)
Observations	406	406
Number of Code	29	29
Firm RE Effect	Yes	Yes
Year effect	Yes	Yes
R^2 within	0.500	0.426
R^2 overall	0.746	0.872
Wald chi^2	1054	2439
Prob > chi^2	0	0
z-statistics in parentheses; *** p<0.01, ** p<0.05, * p<0.1		

Source: Author's Analysis using STATA

From Table-14, it can be interpreted that when comparing the DTD model with the Baseline model using DFD, CRAR shows a strong positive and highly significant relationship with default risk (55.14, p<0.01), indicating that higher capital adequacy reduces default risk for both DFD and baseline model though the magnitude of coefficient has gone down. For NPLE, both DFD and DTD

models indicate a negative relationship with default risk, reflecting that a low asset quality increases default risk. For ROA, a highly significant and positive association with default risk can be found in the DTD model, showing a stronger effect than in the baseline model. For LCR, the DTD model shows a significant positive relationship, while it is insignificant and negative in the baseline model.

5.5.2 Winsorizing and Model Specification

Winsorizing is the process of eliminating the extreme values in the coefficients of the baseline regression model. For the study, winsorizing has been done on the four financial stability indicators on 1 percent level on both end of the dataset. The result of the winsorized model is given in Table-15.

Table 15: Result of Winsorized and Baseline Models

VARIABLES	(1) Winsorized (DFD)	(2) Baseline (DFD)
CRAR1	43.09***	55.14***
	(2.79)	(12.71)
NPLE1	-1.878***	-2.52***
	(-2.86)	(0.54)
ROE1	4.29	5.06**
	(1.180)	(2.51)
LCR1	-0.0332	-0.12
	(-0.109)	(0.25)
COVID	-6.154	15.86
	(-1.338)	(10.18)
AGE	-0.144	-0.09
	(-0.417)	(0.33)
GDPGR	-82.46	-1744.65*
	(-0.945)	(980.76)
CONSTANT	27.66**	137.4***
	(2.274)	(2.886)
Observations	406	406
Number of groups	29	29
Firm Effect	Yes	Yes
Year Effect	Yes	Yes
R^2 within	0.438	0.426
R^2 overall	0.874	0.872

VARIABLES	(1) Winsorized (DFD)	(2) Baseline (DFD)
Wald chi^2	2505	2439
Prob > chi^2	0.00	0.00
z-statistics in parentheses & *** p<0.01, ** p<0.05, * p<0.1		

Source: Author's Analysis Using STATA

From Table-15, CRAR remains positively significant in both models, but its magnitude decreases slightly in the winsorized model. For NPLE, both models show a significant negative relationship with default risk reflecting that lower asset quality in terms of higher non-performing loans increase default risk. For ROE, though the positive sign persists, it is significant in the baseline model, it becomes insignificant in the winsorized model. Lastly, LCR remains insignificant in both models.

6. Findings and Discussion

The study presents the model's findings in this section and discusses each of the variables in great detail. According to Table-16, the result of each of the variables is discussed below:

Table 16: Variable-wise summary findings of the study

Stability Indicators of Banks	Variables	Expected Sign with Default Risk	Merton's DTD Model	Altman's DFD Model
			Actual Sign	Actual Sign
Capital Adequacy (CA)	CAR	+	(+)*	(+)***
Asset Quality (AQ)	NPLE	-	(-)*	(-)***
Profitability (P)	ROE	+	(+)***	(+)**
Liquidity (L)	LCR	+	(+)***	(-)

Source: Author's Analysis
Note: Comprises the sign of the variables with the dependent variables; *** means significant at 1% level; ** means significant at 5% level; *Means significant at 10% level; Underline represents a match with expected sign

Capital Adequacy (CA)

CAR was taken as the proxy for capital adequacy. It was found that a positive and significant relationship across all the models tested indicating that a higher capital adequacy ratios are associated with a higher Z-scores (DFD) and DTD and a greater stability. It implies that well capitalized banks tend to be more resilient to financial distress.

Asset Quality (AQ)

Non-performing Loan to Equity (NPLE) was taken as a proxy for measuring asset quality where negative association between NPLE and default risk is expected. The negative and significant relationship for both Z score (DFD) and DTD found in our study that aligns with the expectation. It indicates that poor asset quality is associated lower Z score and thereby a higher default risk.

Profitability (P)

In the study, profitability, as measured by ROE, is found to have a significant positive relationship with default risk for both DTD and DFD model as expected. However, for winsorizing model and after endogeneity test, the profitability significance does not hold much though the positive relationship holds across the models. Conventional and shariah-based banks also show a positive and significant relationship as expected.

Liquidity (L)

Table-16 indicates that LCR, a proxy for bank liquidity, has a positive correlation with some models and a negative correlation with others. However, this association was negligible across all models, indicating that the influence of liquidity as a measure of financial stability on default risk is not that substantial. However, when LTD is taken, it becomes significantly negative in the LTD model and in the combined model highlighting a stronger inverse relationship with default risk than observed with LCR. This indicates that LTD may better capture liquidity-related risks compared to LCR.

7. Conclusion and Limitation

Default risk in the banking industry has been an unprecedented event in the last decades. To determine which factors influence the default probability most, financial stability indicators can be tested to understand the dynamics. To exercise that theory, this study incorporates a sample of 29 banks from 2010 to 2023 with 406 observations to analyze the predictive power of capital adequacy, asset quality, liquidity and profitability on the default probability listed banks. The study exhumes that Capital Adequacy (CA), Asset Quality (AQ) and Profitability (P) are consistently significant across all models, highlighting their crucial role in determining default risk. CAR's positive association, ROE's positive association, and NPLE's negative association with Altman's Z-score and Merton's DTD having an exact sign match with expected theory assigns that regulatory body should peruse over these ratios to understand the overall financial stability of the banks. The study also unwraps that shariah-based banks are more sensitive to asset quality and profitability where changes in these factors have a heightened effect on default risk, but conventional banks tend to be more sensitive to capital adequacy, suggesting that capital adequacy management is critical for these banks' default risk.

Finally, the study has several limitations that future research should address. The dataset covers only 2010-2023, potentially missing long-term trends. Future studies should extend the dataset, include the Sensitivity component, or conduct a comparative analysis with other countries can reveal potential variations and inform policy adjustments where necessary.

References

Abou-El-Sood, H. (2016). Are regulatory capital adequacy ratios good indicators of bank failure? Evidence from US banks. *International Review of Financial Analysis*, *48*, 292–302. https://doi.org/10.1016/j.irfa.2015.11.011

Alqahtani, F., Mayes, D. G., & Brown, K. (2017). Reprint of Economic turmoil and Islamic banking: Evidence from the Gulf Cooperation Council. *Pacific-Basin Finance Journal*, *42*, 113–125. https://doi.org/10.1016/ j.pacfin. 2016.06.013

Altan, D. M., Yusufazari, H., & Bedük, A. (2014). Performance Analysis of Banks in Turkey Using CAMEL Approach. *Proceedings of International Academic Conferences*, Article 0902916. https://ideas.repec.org//p/sek/ iacpro/0902916.html

Altman, E. I. (1968). Financial Ratios, Discriminant Analysis and The Prediction Of Corporate Bankruptcy. *The Journal of Finance*, *23*(4), 589–609. https://doi.org/10.1111/j.1540-6261.1968.tb00843.x

Altman, E. I., & Kishore, V. (1995). *Defaults and Returns on High Yield Bonds: Analysis Through 1995* (SSRN Scholarly Paper No. 1298310). Social Science Research Network. https://papers.ssrn.com/abstract=1298310

Altman, E. I., & Saunders, A. (1997). Credit risk measurement: Developments over the last 20 years. *Journal of Banking & Finance*, *21*(11–12), Article 11–12. https://doi.org/10.1016/S0378-4266(97)00036-8

Altunbas, Y., Carbo, S., Gardener, E. P. M., & Molyneux, P. (2007). Examining the Relationships between Capital, Risk and Efficiency in European Banking. *European Financial Management*, *13*(1), Article 1. https://doi.org/10.1111/j.1468-036X.2006.00285.x

Amollo, M. O. (2015). *The relationship between lending interest rate and profitability of commercial banks in Kenya* [PhD Thesis]. University of Nairobi.

Angrist, J., & Pischke, J.-S. (2009). Mostly Harmless Econometrics: An Empiricist's Companion. In *Mostly Harmless Econometrics: An Empiricist's Companion*.

Aroghene, K. G. (2022). Effect of Capital Adequacy, Bank Size and Liquidity on the Stability of FUGAZ Bank in Nigeria. *International Journal of Engineering and Information Systems (IJEAIS)*, *6*(12), Article 12.

At least 10 banks to be forced to merge by next January | The Business Standard. (2025, February 22). https://www.tbsnews.net/economy/banking/least-10-banks-be-forced-merge-next-january-803386

Baker, M., & Wurgler, J. (2002). Market Timing and Capital Structure. *The Journal of Finance*, *57*(1), Article 1.

Bandyopadhyay, A. (2006). Predicting probability of default of Indian corporate bonds: Logistic and *Z* -score model approaches. *The Journal of Risk Finance*, *7*(3), 255–272. https://doi.org/10.1108/15265940610664942

Bangladesh Bank. (n.d.). *Financial Stability Assessment Report* (2024q2) [Quarterly]. https://www.bb.org.bd//pub/quaterly/finstab/ qfsar%20 2024 q2.pdf

Berger, A. N., & Bouwman, C. H. S. (2013). How does capital affect bank performance during financial crises? *Journal of Financial Economics*, *109*(1), Article 1. https://doi.org/10.1016/j.jfineco.2013.02.008

Berger, A. N., & DeYoung, R. (1997). Problem loans and cost efficiency in commercial banks. *Journal of Banking & Finance*, *21*(6), Article 6. https://doi.org/10.1016/S0378-4266(97)00003-4

Bharath, S. T., & Shumway, T. (2008). Forecasting Default with the Merton Distance to Default Model. *Review of Financial Studies*, *21*(3), Article 3. https://doi.org/10.1093/rfs/hhn044

Black, F., & Scholes, M. (1973). The Pricing of Options and Corporate Liabilities. *Journal of Political Economy*, *81*(3), Article 3. https://doi.org/10.1086/260062

Bourkhis, K., & Nabi, M. (2013). Islamic and conventional banks' soundness during the 2007–2008 financial crisis. *Review of Financial Economics*, *22*(2), Article 2.

Buchdadi, A. D., Nguyen, X. T., Putra, F. R., & Dalimunthe, S. (2020). The effect of credit risk and capital adequacy on financial distress in rural banks. *Accounting*, 967–974. https://doi.org/10.5267/j.ac.2020.7.023

Coats, P. K., & Fant, L. F. (1993). Recognizing Financial Distress Patterns Using a Neural Network Tool. *Financial Management*, *22*(3), Article 3. https://doi.org/10.2307/3665934

Editorial. (07:10:24+05:00). *Rising inflation*. DAWN.COM. https://www.dawn.com/news/1802819

Ejoh, N., Okpa, I., & Inyang, E. (2014). The relationship and effect of credit and liquidity risk on bank default risk among deposit money banks in Nigeria. *Research Journal of Finance and Accounting*, *5*(16), 142–150.

Enoch, C., Hilbers, P., Krueger, R., Moretti, M., Jose, A., Slack, G., & Sundararajan, V. (2002). Financial Soundness Indicators: Analytical Aspects and Country Practices. *International Monetary Fund, IMF Occasional Papers*.

Fiordelisi, F., & Mare, D. S. (2013). Probability of default and efficiency in cooperative banking. *Journal of International Financial Markets, Institutions and Money*, *26*, 30–45. https://doi.org/10.1016/ j.intfin.2013.03.003

Giordana, G. A., & Schumacher, I. (2017). An Empirical Study on the Impact of Basel III Standards on Banks' Default Risk: The Case of Luxembourg. *Journal of Risk and Financial Management*, *10*(2), Article 2. https://doi.org/10.3390/jrfm10020008

Goddard, J., Molyneux, P., & John O. S. Wilson. (2004). Dynamics of Growth and Profitability in Banking. *Journal of Money, Credit and Banking*, *36*(6), 1069–1090. JSTOR.

Gujarati, D. N. (2009). *Basic econometrics*. McGraw-Hill.

Hossain, M. Z., Khan, M. A. R., & Sadique, M. S. (2018). Basel III and perceived resilience of banks in the BRICS economies. *Applied Economics*, *50*(19), 2133–2146. https://doi.org/10.1080/00036846.2017.1391999

Huber, P. (1981). Robust statistics. New york: John wiley and sons. *HuberRobust Statistics1981*.

Hull, J. C., & White, A. D. (1995). A Note on the Models of Hull and White for Pricing Options on the Term Structure: Response. *The Journal of Fixed Income*, *5*(2), Article 2. https://doi.org/10.3905/jfi.1995.408139

International Monetary Fund. (2023). *World Economic Outlook*. International Monetary Fund. https://www.imf.org/en/Publications/WEO

Jabra, W. B., Mighri, Z., & Mansouri, F. (2017). Determinants of European bank risk during financial crisis. *Cogent Economics & Finance*, *5*(1), Article 1.

Kabir, M. A., & Dey, S. (n.d.). *Kabir, M. A., & Dey, S. (2012). Performance analysis through CAMEL rating: A comparative study of selected private commercial banks in Bangladesh. Journal of Politics & Governance, 1(2–3), 16–25.*

Kaliyev, K., & Nurmakhanova, M. (2020). Bank risk evaluation through Z-score measure and its effect on financial health of the industry of transitional economy of Kazakhstan. *Journal of Economic Research & Business Administration*, *133*(3), 40–50.

Karim, N. A., Alhabshi, S. M. S. J., Kassim, S., & Haron, R. (2018). Measuring bank stability: A comparative analysis between Islamic and conventional banks in Malaysia. *Proceedings of the 2nd Advances in Business Research International Conference: ABRIC2016*, 169–177.

Karugu, C., Achoki, G., & Kiriri, P. (2018). Capital Adequacy Ratios as Predictors of Financial Distress in Kenyan Commercial Banks. *Journal of Financial Risk Management*, *07*(03), 278–289. https://doi.org/10.4236/jfrm.2018.73018

Kparobo Gloria Aroghene & Ikeora, J.J.E. (2022). Effect of Non-Performing Loans (Npls), Capital Adequacy (CA) and Corporate Governance (CG) on Bank Stability in Nigeria. *Finance & Accounting Research Journal*, *4*(4), Article 4. https://doi.org/10.51594/farj.v4i4.400

Laeven, L., & Levine, R. (2009). Bank governance, regulation and risk taking. *Journal of Financial Economics*, *93*(2), 259–275.

Lahrech, N., Lahrech, A., & Boulaksil, Y. (2014). Transparency and performance in Islamic banking: Implications on profit distribution. *International Journal of Islamic and Middle Eastern Finance and Management*, *7*(1), 61–88. https://doi.org/10.1108/IMEFM-06-2012-0047

Leamer, E. E. (1983). Let's Take the Con Out of Econometrics. *The American Economic Review*, *73*(1), 31–43.

Lipton, M., & Lorsch, J. W. (1992). A modest proposal for improved corporate governance. *The Business Lawyer*, 59–77.

Mahmud, I. (2023). CAMEL Ratios and Market Profitability: A study on Banking Sector in Bangladesh. *Journal of Financial Markets and Governance*, *2*(1), Article 1. https://doi.org/10.54728/JFMG-202209-00062

Merton, R. C. (1974). On the Pricing of Corporate Debt: The Risk Structure of Interest Rates. *The Journal of Finance*, *29*(2), Article 2. https://doi.org/10.2307/2978814

Mester, L. J. (1996). A study of bank efficiency taking into account risk-preferences. *Journal of Banking & Finance*, *20*(6), 1025–1045. https://doi.org/10.1016/0378-4266(95)00047-X

Minh Sang, N. (2021). Capital adequacy ratio and a bank's financial stability in Vietnam. *Banks and Bank Systems*, *16*(4), 61–71. https://doi.org/10.21511/bbs.16(4).2021.06

Muhajir, M. H., Six, P., & Ahn, J.-H. (2023). Macro-Financial Determinants of Default Probability Using Copula: A Case Study of Indonesian Banks. *Buletin Ekonomi Moneter Dan Perbankan*, *25*(4), Article 4. https://doi.org/10.21098/bemp.v25i4.1748

Norden, L., & Weber, M. (2010). Credit line usage, checking account activity, and default risk of bank borrowers. *The Review of Financial Studies*, *23*(10), 3665–3699.

Obadire, A. M. (2022). Banking Regulation Effects on African Banks' Stability. *Journal of Financial Risk Management*, *11*(04), 707–726. https://doi.org/10.4236/jfrm.2022.114034

Ohashi, K., & Singh, M., (2004). Japan's Distressed Debt Market. *IMF Working Papers*, *04*(86), 1. https://doi.org/10.5089/9781451850918.001

Podpiera, J., & Ötker, M. I. (2010). *The fundamental determinants of credit default risk for European large complex financial institutions*. International Monetary Fund.

Rafiq, Md. R. I. (2016). Determining Bank performance using CAMEL rating: A comparative study on selected Islamic and Conventional Banks in Bangladesh. *Asian Business Review*, *6*(3), Article 3. https://doi.org/10.18034/abr.v6i3.40

Resolving banking sector's distressed portfolio problem | The Business Standard. (2025, February 22). https://www.tbsnews.net/economy/banking/resolving-banking-sectors-distressed-portfolio-problem-800718

Sagatbekovich, K. K., & Nurmakhanova, M. (2021). Bank Regulation in the Economies in Transition. *Sage Open*, *11*(4), Article 4. https://doi.org/10.1177/21582440211061537

Sahut, J.-M., & Mili, M. (2011). Banking distress in MENA countries and the role of mergers as a strategic policy to resolve distress. *Economic Modelling*, *28*(1–2), 138–146.

Said, R. M., & Tumin, M. H. (2011). Performance and financial ratios of commercial banks in Malaysia and China. *International Review of Business Research Papers*, *7*(2), 157–169.

Saputra, A. A., & Shaferi, I. (2020). *THE EFFECT OF CREDIT RISK, LIQUIDITY RISK AND CAPITAL ADEQUACY ON BANK STABILITY*.

Soenen, N., & Vander Vennet, R. (2022). Determinants of European banks' default risk. *Finance Research Letters*, *47*, 102557. https://doi.org/10.1016/j.frl.2021.102557

Sundararajan, V., Enoch, C., San Jose, A., Hilbers, P., Krueger, R., Moretti, M., & Slack, G. (2002). *Financial soundness indicators: Analytical aspects and country practices* (Vol. 212). International Monetary Fund Washington, DC.

Trippi, R. R., & Turban, E. (1992). *Neural Networks in Finance and Investing: Using Artificial Intelligence to Improve Real World Performance*. McGraw-Hill, Inc.

Wanke, P., Azad, M. A. K., & Barros, C. P. (2016). Financial distress and the Malaysian dual baking system: A dynamic slacks approach. *Journal of Banking & Finance*, *66*, 1–18.

Wheelock, D. C., & Wilson, P. W. (2000). Why do Banks Disappear? The Determinants of U.S. Bank Failures and Acquisitions. *Review of Economics and Statistics*, *82*(1), 127–138. https://doi.org/10.1162/003465300558560

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT press.

Appendix

Appendix 1: List of Conventional Banks and Shariah based Banks

No.	Name of the Conventional Banks	No.	Name of the Shariah-based Banks
1	AB Bank PLC.	1	Al-Arafah Islami Bank PLC.
2	Bank Asia PLC.	2	Exim Bank PLC.
3	BRAC Bank PLC.	3	First Security Islami Bank PLC.
4	Dhaka Bank PLC.	4	Islami Bank Bangladesh PLC.
5	Dutch-Bangla Bank PLC.	5	Shahjalal Islami Bank PLC.
6	Eastern Bank PLC.	6	Social Islami Bank PLC.
7	IFIC Bank PLC.	7	Standard Bank PLC.
8	Jamuna Bank PLC.		
9	Mercantile Bank PLC.		
10	Mutual Trust Bank PLC.		
11	NCC Bank PLC.		
12	National Bank PLC.		
13	ONE Bank PLC.		
14	The City Bank PLC.		
15	The Premier Bank PLC.		
16	Prime Bank PLC.		
17	Pubali Bank PLC.		
18	Rupali Bank PLC.		
19	Southeast Bank PLC.		
20	Trust Bank PLC.		
21	United Commercial Bank PLC.		
22	Uttara Bank PLC.		

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Testing the Nexus between Imported Capital Goods and Manufacturing Output in Bangladesh

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Abstract

Considering the increasing importance of imported capital goods in the developing economy's manufacturing sector, our empirical study explores the relationship between imported capital goods, inflation, financial development, trade openness, and manufacturing output in Bangladesh using data from 1991 to 2022. The econometric analyses utilize the augmented ARDL (Auto-regressive Distributed Lag) model, frequency domain causality, and counterfactual analysis. The results suggest a significant connection between the import of capital goods and manufacturing output in Bangladesh in the near and long term. Specifically, a favorable long-term association exists between imported capital goods and manufacturing output. Furthermore, short-term adjustments are consistently made to uphold this association. The frequency domain causality analysis and counterfactual analysis also support the findings of the augmented ARDL approach. In addition, this study also emphasizes that inflation and trade openness adversely impact manufacturing output, while financial development positively influences manufacturing output in the economy.

Keywords: Augmented ARDL, Bangladesh, Imported Capital Goods, Manufacturing Output, Trade Openness
JEL Classification: C32, F14, F41, O14

1. Introduction

Insufficient technological advancement is widely acknowledged as the main obstacle to long-term economic development in developing countries. Technologically backward countries can experience rapid growth like industrialized nations by adopting and implementing foreign innovations in domestic manufacturing (Mohamed et al., 2022). Importing capital goods, which often contain embedded knowledge in machinery and equipment, can be viewed as a systematic way of acquiring foreign technologies. The import of capital goods that incorporate advanced technologies is essential for the development process because it significantly affects manufacturing output (Habiyaremye,

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2013; Usman & Bashar, 2022). Developing countries often lack the resources and specialized skills to generate technological knowledge. Acquiring this expertise domestically can be exceedingly costly for these nations (Sarker & Khan, 2020). Therefore, importing these technologies is a logical choice to acquire the necessary technological capital, given the limitations of the domestic technological gap (Ayeni & Akeju, 2023; Mustafin et al., 2022).

Due to inadequate technological advancement, capital goods imports can significantly contribute to manufacturing performance in developing countries like Bangladesh (Chowdhury et al., 2023; Rahman et al., 2023). The manufacturing sector in the country started to grow in the 1990s following the introduction of trade and financial liberalization policies. As a result, the manufacturing industry heavily depends on imported raw materials and capital goods (Swazan & Das, 2022). Although from the beginning of manufacturing expansion, the economy has benefited from cheap labor due to its comparative advantage of having an excessive labor supply (Ahmed et al., 2014). However, the country's heavy reliance on low-cost labor could restrict production growth. On the other hand, imports of capital machinery and technological equipment from abroad are required for higher manufacturing growth through increased labor productivity (Liao et al., 2023). Therefore, imported capital goods are crucial for the country's manufacturing growth because they bring technology and advanced manufacturing processes (Wahab et al., 2016).

Bangladesh's economy has shown a prospective growth rate of around 6 percent annually in recent years. The manufacturing industry has been pivotal in this expansion, especially through the advancement of the ready-made garment (RMG) sectors (Gu et al., 2021). Relying on RMG manufacturing, the country has experienced export-oriented growth, with the RMG industry contributing to more than 80 percent of the total exports (Islam & Halim, 2022). Agriculture dominated the economy in the past, but in recent years, manufacturing has become the driving force behind economic growth by enabling exports. The contribution of manufacturing value added to GDP was around 22 percent in 2022, compared to approximately 14 percent in 1991 (The World Bank, 2024).

In the era of industrialization, economic growth was driven by increased manufacturing performance. Simultaneously, the importation of capital goods also fostered manufacturing contribution by facilitating the transfer of technological capital and technical know-how. Transferring technology by importing capital goods is a prerequisite because the economy has a comparative disadvantage in producing technological capital (Hossain & Alauddin, 2005). Trade openness and financial development have helped boost the country's manufacturing exports, and importing capital goods has facilitated these exports (Sarker, 2024). Although the country used to rely heavily on imports for consumer products and food after gaining independence, it has steadily shifted towards importing capital goods to promote manufacturing growth (Hosen, 2023). In 2022, the volume of imported capital goods to the GDP was more than 6 percent; in 1991, it was only 1.64 percent (Bangladesh Bank, 2024). The swift rise in imports of capital goods, along with the growing proportion of manufacturing value added to GDP, serves as proof of a strong link between the import of capital goods and the manufacturing performance within the economy.

In addition, economic theory suggests that imported capital goods have considerable merit in increasing manufacturing growth in technologically backward countries in light of proper international trade mechanisms (Sankaran, et al., 2021). The increasing imports of capital goods in Bangladesh can also contribute to manufacturing growth as Bangladesh's manufacturing highly relies on imports of technological capital, which could be observed since the period of economic liberalization (Hoque & Yusop, 2010).

Meanwhile, no previous empirical research has been identified regarding the long-term relationship between imported capital goods and the growth of manufacturing. The labor-intensive manufacturing sector in Bangladesh increasingly depends on imported capital goods for technology transfer. Effectively implementing technological advancements is crucial for achieving competitive and sustainable growth in manufacturing. Thus, it is important to understand how imported capital goods affect the manufacturing growth of the country by exploring both the long-term and short-term relationships between capital goods imports and manufacturing performance in Bangladesh.

This study seeks to explore the causal relationship between the importation of capital goods and the growth of manufacturing in Bangladesh, based on the hypothesis that imported capital goods have a positive impact on manufacturing expansion. To understand the connection between imported capital goods and manufacturing growth, we take into account control factors such as inflation rates, financial development, and trade openness. By employing the augmented Auto-regressive Distributed Lag (ARDL) model, this research investigates the cointegrating relationships among capital goods, inflation, financial development, trade openness, and manufacturing output in Bangladesh. Additionally, this study utilizes frequency-domain causality to discern the short-term, medium-term, and long-term causal relationships among the variables. Lastly, we implement the innovative dynamic ARDL simulation method to analyze the effects of hypothetical shocks in independent variables on the dependent variable of this study.

This research is organized in the following manner: Section-2 reviews the current literature to comprehend the connections among the variables. Section-3 provides an overview of the methodology and the data used. Section-4 presents the empirical results along with a discussion of the findings. Lastly, Section-5 wraps up the study with policy implications.

2. Literature Review

2.1 Theoretical Underpinnings

Theories suggest that countries with a comparative disadvantage in capital goods primarily import technological capital from developed nations with a comparative advantage in capital technologies (Thangavelu & Rajaguru, 2004). The endogenous growth hypothesis posits that such imports contribute to long-term growth by providing essential technological capital and intermediate goods for manufacturing (Coe et al., 2009). Additionally, imports of capital goods facilitate the transfer of technology and know-how from developed to developing countries (Lawrence & Weinstein, 1999; Mazumder, 2001; Sharma et al., 2023). The import-led growth hypothesis further indicates that imports drive growth through advanced technology (Krishna et al., 2003; Li et al., 2021). In developing

countries, imports are crucial for exports, and both processes promote economic development, highlighting a reciprocal relationship (Awokuse, 2007, 2008).

The relationship between imported capital goods and manufacturing output can be explained by the import-led economic growth hypothesis, particularly in countries reliant on imports for production (Kim et al., 2022). Importing capital goods promotes technological advancement and enhances competitiveness and economic prospects (Liao et al., 2023; Panta et al., 2022). Thus, trade openness and foreign capital inputs are vital for output growth, while reducing such imports in developing countries may negatively impact their economies (Nguyen et al., 2023; Singh, 2010). Our research examines how imported capital goods influence manufacturing output in Bangladesh.

2.2 Empirical Evidence from the Global Perspective

Many scholars have examined the relationship between imports and economic growth, particularly focusing on imported capital goods and manufacturing output. Aluko and Obalade (2020) studied 26 African countries and found no causal link between imports and growth in over half of them. Conversely, Aluko and Adeyeye (2020) reported a two-way causal linkage in most of the 41 sampled African countries. Hye et al. (2013) found that imported capital goods significantly boost economic development in South Asia, while Usman and Bashir (2022) identified a significant association between imports and economic growth in the short and long term in China, India, and G7 countries.

Islam et al. (2012) found that in high-income countries, imports significantly drive economic growth, whereas low-income countries exhibit a bidirectional relationship between imports and growth. Veeramani (2009) highlighted that the import of intermediate and capital goods boosts output and economic development in both income groups. Zang and Baimbridge (2012) noted a positive long-term correlation between imports and economic growth in Japan and Korea, with bidirectional causality. Raghutla and Chittedi (2020) revealed that imports significantly contribute to economic growth in Russia within the BRICS countries.

Herrerias and Orts (2013) examined the impact of imported capital goods on China's economic growth and per capita income, finding that they boost domestic production and economic development. In Jordan, Istaiteyeh et al. (2023) noted a short-run causal link between imports and economic growth, while the long-run correlation is less significant. Maitra (2020) analyzed India's post-1990s economy and found that imports positively affect growth in both the short and long term. Similarly, Ugur (2008) identified a bidirectional causal relationship between imported capital goods and GDP growth in Turkey.

2.3 Empirical Evidence from Bangladesh Context

In Bangladesh, while the export-growth relationship has been widely studied, research on the import-growth relationship, particularly regarding capital goods and manufacturing output, is limited. Ahmed and Uddin (2009) analyzed data from 1976 to 2005 and found a short-run positive association between imports and economic growth, but no significant long-run relationship. Conversely, Dawson (2006) investigated the link between exports, imports, and GDP from 1973 to 2003, identifying a negative correlation between imports and GDP.

Hossain et al. (2009) found that while imports do not significantly affect economic growth, exports are highly positively correlated with it. They noted that exports are positively associated with imports both in the short and long run. Paul (2011) analyzed data from 1979 to 2010, confirming that exports positively influence long-term economic growth, with imports having no substantial impact. Most studies in the Bangladesh context examined a mix of pre- and post-reform eras. In contrast, Wahab et al. (2016) focused on the liberalized period from 1985 to 2014, finding that imports of capital goods significantly contribute to long-term manufacturing growth, but showed no short-run correlation with manufacturing output.

2.4 Research Gap

The review of the literature indicates a mixed relationship between imports and economic growth in developing countries. While some studies suggest that imports fuel growth, others do not support this view. Notably, there is a lack of empirical studies examining the impact of imported capital goods on

manufacturing output using advanced econometric techniques in a developing country context. In Bangladesh, the relationship remains inconclusive, and there has been no comprehensive study on imported capital goods and manufacturing output. Given that the manufacturing sector heavily relies on imported technological capital, it is crucial to investigate this relationship using recent data and sophisticated methods.

Therefore, this study explores how imported capital goods affect manufacturing growth in technology-constrained, import-dependent developing countries like Bangladesh. It aims to provide insights for policymakers to enhance manufacturing output and support economic development through the import of embodied technologies.

3. Methodology and Data

3.1 Model Specification

To examine the connection between imported capital goods and manufacturing output, our research develops a model based on the import-led growth hypothesis, which posits that in a country reliant on imports, the growth in manufacturing output is significantly influenced by the imported capital goods, in addition to factors such as inflation rate, financial development, and trade openness. This relationship can be articulated in the following manner.

$$MO = f(ICG, INF\ FD, TO) \quad \text{.....(1)}$$

In the relationship discussed, MO refers to the value added by manufacturing, ICG stands for the volume of imported capital goods, INF signifies the rate of inflation, FD indicates the level of financial development, and TO denotes the degree of trade openness. When analyzing how imported capital goods affect manufacturing output, we take into account exogenous factors such as inflation, financial development, and trade openness. The incorporation of inflation as a variable for explanation is essential since domestic prices can influence manufacturing output. An increase in prices may raise production costs, which can restrict manufacturing output; therefore, inflation can have a detrimental effect on manufacturing output. Financial development is considered

an explanatory factor as private sector development is ensured by regular credit flow through proper financial development, which could positively influence manufacturing output. In addition, trade openness ensures the rapid trade mechanism that facilitates exports and imports; as an import-dependent economy, trade openness could negatively influence manufacturing growth if more consumer goods import can limit the country's manufacturing performance. The econometric relationship between imported capital goods and manufacturing output can be written as follows.

$$MO_t = \alpha_0 + \alpha_1 ICG_t + \alpha_2 INF_t + \alpha_3 FD_t + \alpha_4 TO_t + \varepsilon_t \quad \text{.....(2)}$$

In the econometric model, MO represents manufacturing value added as a percentage of GDP, ICG refers to imported capital goods as a percentage of GDP, INF denotes the inflation rate based on the consumer price index, FD indicates credit to the private sector as a percentage of GDP to measure financial development, and TO represents trade as a percentage of GDP for trade openness. The percentage format helps mitigate issues of heterogeneity or outliers.

3.2 Methods

In econometric analysis, we first conduct stationarity tests to assess the integration order of variables. Our study employs the augmented ARDL model to explore the relationship between imported capital goods and manufacturing output, requiring mixed orders of integration (I(0) and I(1)) but not I(2). We use the ARDL bounds test to check for long-run relationships, followed by an error correction method to analyze short-run dynamics. Various diagnostic tests validate the ARDL findings, and frequency domain causality analysis determines causality direction. Finally, we apply the dynamic ARDL simulation technique to explore counterfactual shocks.

3.2.1 Unit Root Tests

To assess the stationarity of the variables included in the research, we utilize several tests: the augmented Dickey-Fuller (ADF) test, the Dickey-Fuller generalized least squares (DF-GLS) test, the Phillips-Perron (PP) test, the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test, and the Zivot and Andrews

test. The ADF test is performed by enhancing the unit root test with the addition of a lagged difference of the dependent variable to address any serial correlation. The DF-GLS test proceeds after trend removal of the series through generalized least squares and subsequently applies the ADF test to identify the unit root. This approach is useful for de-meaning the data to account for any trends. In contrast, the PP test evaluates the unit root while considering robust standard errors to manage serial correlation. The KPSS test is employed to examine stationarity by adopting an alternative unit root hypothesis instead of the null hypothesis, allowing that the absence of a unit root may not unequivocally demonstrate stationarity. In some cases, the time series could be trend stationary. To identify any structural breaks within the variables, the Zivot and Andrews test is utilized, which checks for a unit root in the context of potential structural breaks and serial correlations in the time series data.

3.2.2 Augmented ARDL Bounds Test Approach

Our research utilizes the augmented ARDL bounds test method to investigate the presence of cointegration among the variables identified by McNown et al. (2018). One key benefit of the ARDL model in analyzing cointegration is its capability to accommodate mixed orders of integration in the series data, specifically I(0) or I(1), without the necessity for uniformity in their order of integration. Nonetheless, this model is not suitable if any series data is integrated of the second order, I(2). Additionally, the advantage of the ARDL model is its ability to provide more reliable results, even with a limited number of observations (Haug, 2002). As there is no level relationship between the independent and dependent variables, this model avoids facing any endogeneity issues. Moreover, the optimal lag selection for the variables under study is derived from the best combination of lag orders produced by simulation techniques that can effectively deal with the endogeneity in the relationships among the variables (McNown et al., 2018). The ARDL model introduced by Pesaran et al. (2001) has been enhanced by McNown et al. (2018), which necessitates an additional t-test or F-test to assess the coefficients of the lagged independent variables. The model below has been defined to explore the cointegration between the variables in this study.

$$\Delta MO_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta MO_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta ICG_{t-i} + \sum_{i=0}^{r} \alpha_{3i} \Delta INF_{t-i} + \sum_{i=0}^{l} \alpha_{4i} \Delta FD_{t-i} + \sum_{i=0}^{k} \alpha_{5i} TO_{t-i} + \beta_1 MO_{t-1} + \beta_2 ICG_{t-1} + \beta_3 INF_{t-1} + \beta_4 FD_{t-1} + \beta_5 TO_{t-1} + \varepsilon_t \quad \text{..... (3)}$$

In Equation (3), the difference operator is denoted by Δ, and ε_t represents the white noise error term. The coefficients for short-term dynamics are represented by α_{1i}, α_{2i}, α_{3i}, α_{4i}, α_{5i}, while β_1, β_2, β_3, β_4, β_5 signify the parameters of the long-run relationship. To assess cointegration, the bounds test approach examines the null hypothesis of no cointegration in the coefficients of the level relationship among variables, such as $H_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$. According to Pesaran et al. (2001), the F-test checks the significance of the long-run relationship, while the t-test evaluates the significance of the lagged dependent variable's coefficients. Both tests assume the dependent variable is integrated of the first order, I(1), and follow a non-standard distribution under the null hypothesis of no relationship among I(0) or I(1) variables. The F-test and t-test may not adequately confirm the cointegrating relationship due to degenerate cases. To address this, McNown et al. (2018) introduced an additional t-test or F-test for the lagged independent variables to aid in identifying the cointegrating relationship within the ARDL approach suggested by Pesaran et al. (2001). The augmented ARDL approach requires these three tests to confirm cointegration and resolve degenerate cases. The critical bounds for the tests are provided by Pesaran et al. (2001) and Sam et al. (2019), and the null hypothesis of no cointegration can be rejected if the F and t-test values exceed their upper critical bounds.

After confirming cointegration, we implement the error correction model to evaluate the short-term dynamics. The error correction model can be expressed in the following way.

$$\Delta MO_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta MO_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta ICG_{t-i} + \sum_{i=0}^{r} \alpha_{3i} \Delta INF_{t-i} + \sum_{i=0}^{l} \alpha_{4i} \Delta FD_{t-i} + \sum_{i=0}^{k} \alpha_{5i} TO_{t-i} + \gamma ECT_{t-1} + \varepsilon_t \quad \text{.....(4)}$$

In the error correction model outlined in Equation (4), the error correction term coefficient γ reflects the adjustment from short-term imbalances to long-term equilibrium, ranging from -1 to 0. A statistically significant ECT coefficient

of 0 indicates no adjustment in the following year due to current shocks, while a value of -1 signifies complete adjustment within that year.

3.2.3 Diagnostic Checks

Additionally, our research utilizes various diagnostic tests to assess the stability of the model. The Breusch-Godfrey LM test is used to address the issue of serial correlation, while the Breusch-Pagan-Godfrey test and ARCH test are employed to investigate the problem of heteroscedasticity. We apply the Ramsey RESET test to evaluate whether the model is appropriately specified, and we conduct the Jarque-Bera test to assess the normality of the residuals. This analysis includes the CUSUM test and CUSUM squares test to evaluate the structural stability of the model.

3.2.4 Frequency Domain Causality Analysis

We employ frequency-domain causality analysis instead of time-domain causality analysis to establish the causal link between the variables. The spectral causality test, created by Breitung and Candelon in 2006, builds on the earlier work of Geweke (1982) and Hosoya (1991). The primary distinction between the time-domain and frequency-domain methods is that the time domain reveals when a particular change takes place in the time series. Conversely, the frequency domain evaluates the size of a specific change within the time series. In brief analyses, serial patterns can be crucial factors, and the frequency domain allows for the exclusion of these fluctuations. Additionally, the frequency domain causality method permits the exploration of nonlinear and causal cycles, including causal relationships at both high and low frequencies (Gokmenoglu et al., 2019).

3.2.5 Novel Dynamic ARDL Simulation Technique

Alongside the augmented ARDL model, this study employs the dynamic ARDL simulation technique to explore the connection between imported capital goods and manufacturing output. Implementing simulation in the ARDL methodology necessitates that the dependent variable is strictly stationary at the first difference, indicating that the dependent variable is I(1) rather than I(0). The

model can include explanatory variables of mixed order of integration, either I(0) or I(1). Nevertheless, these variables should not exhibit any structural breaks and should not have issues with autocorrelation and heteroscedasticity.

The novel dynamic ARDL simulation model can be written for our analysis according to Jordan and Philips (2018) and by following Udeagha and Ngepah (2022) as follows.

$$\Delta MO_t = \alpha_0 + \beta_0 MO_{t-1} + \beta_1 \Delta ICG_{t-1} + \delta_1 ICG_{t-1} + \beta_2 \Delta INF_{t-1} + \delta_2 INF_{t-1} + \beta_3 \Delta FD_{t-1} + \delta_3 FD_{t-1} + \beta_4 \Delta TO_{t-1} + \delta_4 TO_{t-1} + \varepsilon_t \quad \text{.....(5)}$$

The short-term behavior and the long-term relationship involving the error correction term are analyzed using 5000 simulations in the dynamic ARDL framework via an error correction method, with parameter vectors adhering to a multivariate normal distribution. The error correction coefficient is estimated to range from -1 to 0, indicating that the innovative simulation technique has identified the long-term equilibrium resulting from short-term dynamic adjustments. The dynamic ARDL simulation generates a graphical representation of counterfactual analysis by illustrating the effects of positive and negative shocks or variations of the independent variables on the dependent variable's behavior. More specifically, the response of the dependent variable to the explanatory variables is quantified and displayed through a graphical illustration, showing how alterations (both positive and negative) in the independent variables influence the response of the dependent variable.

3.3 Data and Variables

This research employs historical data from the period of 1991 to 2022 to explore the relationship between imported capital goods and manufacturing output in Bangladesh. The analysis begins in 1991, as this marks the onset of significant financial and trade liberalization in Bangladesh during the 1990s. The study identifies the manufacturing value added to GDP ratio (MO) as the dependent variable and the imported capital goods to GDP ratio (ICG) as the primary explanatory variable. In addition to these, our study incorporates other control variables such as inflation (INF), financial development (FD), measured by the credit to the private sector to GDP ratio, and trade openness, assessed

through the trade to GDP ratio. The empirical analysis data for MO, INF, FD, and TO were sourced from the World Bank database, while data on ICG was obtained from the Bangladesh Bank database. A summary of the variables is provided in Appendix Table-1.

In examining the connection between the study variables, our research evaluates all indicators in terms of their ratios or rates. This approach has contributed to reducing the impact of outliers and the variability within the data series. The graphical representation of the variables is illustrated in Appendix Figure 1, which presents the time plots. This visual depiction indicates that the variables being investigated do not exhibit significant structural breaks. Table 1 provides the descriptive statistics for the study variables. The descriptive characteristics reveal that the mean and median of each variable are relatively close, and their skewness and kurtosis values generally fall between -2 and +2. The normality assumption, tested through the Jarque-Bera test for each variable, indicates that the observations originate from a normal distribution, as the probability value does not reject the null hypothesis of normality.

Table 1: Descriptive Statistics

	MO	**ICG**	**INF**	**FD**	**TO**
Mean	16.4548	4.5090	6.1437	30.7211	32.5372
Median	15.9071	4.3261	5.9043	31.6042	30.6669
Maximum	21.7648	8.4495	11.3951	44.4069	48.1109
Minimum	13.9871	1.6115	2.00717	14.5455	18.8898
Std. Dev.	2.5315	1.9299	2.2243	9.9650	7.9944
Skewness	1.0047	0.2041	0.11126	-0.1964	0.4270
Kurtosis	2.5664	1.9533	2.9702	1.5492	2.2488
Jarque-Bera	5.6351	1.6827	0.0672	3.0119	1.7248
Probability	0.0597	0.4311	0.9669	0.2218	0.4221
Observations	32	32	32	32	32

Source: Author's Estimation using E-views 10.

4. Empirical Results

4.1 Results of Unit Root Tests

We assess the order of integration of study variables using various unit root tests. For the augmented ARDL approach, a mixed order of integration is necessary, and no variables are integrated second order. Results from ADF, DF-GLS, PP, KPSS (without breaks), and Zivot & Andrews (with breaks) tests are shown in Table 2. All series are integrated at their first difference, except the INF series, which is stationary at the level under the KPSS test. The Zivot and Andrews test indicates the series is stationary with structural breaks late in the period, suggesting no endogeneity issues in the relationship between the variables. Consequently, we can investigate the link between imported capital goods and manufacturing output using the augmented ARDL bounds test as indicated by McNown et al. (2018).

Table 2: Results of Unit Root Tests

Variables	ADF test		DF-GLS test		PP test		KPSS test	
	Level	First Difference	Level	First Differ-ence	Level	First Differ-ence	Level	First Difference
MO	0.1269	-5.5864***	0.2891	-5.6372***	0.9678	-5.5870***	0.6061**	0.2142
ICG	-1.5309	-4.3953***	-1.0431	-4.4517***	-1.5302	-3.8112***	0.4755**	0.1270
INF	-4.0194***	-7.4497***	-4.0721***	-6.4537***	-4.0491***	-10.6475***	0.2416	0.5000
FD	-1.2684	-5.9156***	-0.4104	-5.2180***	-1.2844	-5.8904***	0.5850**	0.2430
TO	-1.9434	-4.5186***	-1.3589	-4.5209***	-1.9434	-4.4643***	0.3708**	0.1708

Zivot & Andrews test

Variables	Level		First Difference	
	t-statistic	Break Point	t-statistic	Break Point
MO	-4.9215***	2016	-3.5973**	2016
ICG	-4.4020***	2015	-5.2556**	2013
INF	-5.2770***	2004	-3.3132**	2003
FD	-4.0440***	2016	-7.6798***	2013
TO	-4.7091***	2016	-5.0397**	2014

Source: Author's Estimation Using E-views 10.
Note: '***', '**', and '*' Denote Significance at the 1%, 5%, and 10% Levels, Respectively.

4.2 Augmented ARDL Model Estimation

4.2.1 Augmented Bounds Test Analysis

Prior to conducting the augmented bounds test for cointegration, the ideal lag lengths for the ARDL model were determined using the Akaike Information Criterion (AIC). The optimal lag orders were identified from 2500 different regression combinations of the variable lag lengths, with the combination yielding the lowest AIC value indicating the best lag lengths for the ARDL model. The least favorable 20 combinations of the variable lags are displayed in Appendix Figure 2, while the lowest AIC value signifies that the optimal lag orders are ARDL (3,4,2,4,4).

The anticipated outcomes of the augmented bounds test are shown in Table 3; it is evident that the computed F statistic for evaluating the joint hypothesis and the t-statistic for the lagged dependent variables under the null hypothesis of no long-run cointegration surpass the upper bound of the critical value recommended by Pesaran et al. (2001) at both 1% and 10% significance levels. Since the calculated values of the F and t statistics reject the null hypothesis of no level relationship, this supports the presence of long-run cointegration among the variables. While the overall F-test and t-test on lagged dependent variables confirm long-run cointegration, there is a possibility that certain degenerated cases of the long-run relationship may occur in practice, as identified by Pesaran et al. (2001). To address the issue of degenerated cases, an additional t-test on lagged independent variables has been conducted under the null hypothesis of no cointegration, as suggested by McNown et al. (2018). The calculated t statistic for the lagged independent variables surpasses the critical upper bound established by Narayan (2005) and Sam et al. (2019) at a 5% significance level, which further confirms the existence of long-run cointegration and mitigates any concerns regarding degenerated cases in the relationship among the study variables.

Table 3: Results of Augmented ARDL Bounds Test

Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	7.949***	10%	2.25	3.52
(joint hypothesis testing)		5%	2.86	4.01
		1%	3.74	5.06
Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-3.743*	10%	-2.57	-3.66
(on lagged dependent variables)		5%	-2.86	-3.99
		1%	-3.43	-4.60
Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-4.384**	10%	-2.57	-3.66
(on lagged independent variables)		5%	-2.86	-3.99
		1%	-3.43	-4.60

Source: Author's Estimation Using E-views 10.
Note: '***', '**', and '*' Denote Significance at the 1%, 5%, and 10% Levels, respectively.

4.2.2 The Long-run Cointegration Analysis

Once the augmented bounds test verifies the presence of a long-run relationship, we proceed to estimate the long-run cointegration among the variables. The coefficients estimated for the long-run relationship are presented in Table 4. These findings indicate that imported capital goods have a significant (at the 5% level) positive relationship with manufacturing output, while trade openness shows a significant (at the 1% level) negative correlation with manufacturing output. Conversely, inflation and financial development demonstrate insignificant negative and positive connections with manufacturing output. In the long run, the link between imported capital goods and manufacturing output suggests that a 1 percent increase in the ratio of imported capital goods to GDP is associated with an over 2 percent increase in the manufacturing value added to GDP ratio. Similarly, in the long run, a 1 percent rise in the trade to GDP ratio leads to a 0.45 percent decrease in manufacturing value added to GDP ratio. Although the relationships between inflation and financial development with manufacturing output are not statistically significant, the anticipated signs of these two factors indicate a positive economic effect on manufacturing output in the long-term relationship.

Table 4: Results of Long-run Relationship

Dependent Variable	Regressors	Coefficient	Std. Error	t-Statistic	Prob.
	ICG(-1)	2.1932**	0.6784	3.2329	0.0178
Δ(MO)	INF(-1)	-0.0740	0.2435	-0.3042	0.7712
	FD(-1)	0.0110	0.1029	0.1078	0.9176
	TO(-1)	-0.4581***	0.1122	-4.0814	0.0065

Source: Author's Estimation Using E-views 10.
Note: '***', '**', and '*' Denote Significance at the 1%, 5%, and 10% Levels, Respectively.

4.2.3 Short-run Dynamics and Error Correction Analysis

The short-run dynamics of the augmented ARDL model are now estimated through the error correction method, with the estimated coefficients for short-run relationships and the error correction presented in Table 5. The results indicate that the coefficient of the error correction term (ECT) is negative and significant at the 1% level. This suggests that there is a consistent adjustment from short-run disequilibrium towards long-run stability. Specifically, the ECT coefficient highlights that 57 percent of the shocks or imbalances are corrected within a year, signifying that shocks from prior years have significantly converged to the subsequent year. In the short term, the influences of imported capital goods, inflation, and financial development adversely affect manufacturing output, whereas trade openness positively contributes to manufacturing output. The significant coefficients of the short-run dynamics underscore that an appropriate short-run linkage in the augmented ARDL framework aligns with the long-term cointegration among the variables.

Table 5: Results of Short-run Dynamics and Error Correction Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Δ(MO(-1))	-0.1725	0.1218	-1.4159	0.2066
Δ(ICG)	0.3796*	0.1838	2.0645	0.0845
Δ(ICG(-1))	-1.4279***	0.2315	-6.1678	0.0008
Δ(ICG(-2))	-1.3341***	0.2332	-5.7199	0.0012
Δ(ICG(-3))	-1.3349***	0.2135	-6.2518	0.0008
Δ(INF)	0.0692	0.0395	1.7523	0.1303
Δ(INF(-1))	0.0794	0.0421	1.8827	0.1087
Δ(INF(-2))	-0.0496**	0.0355	-1.3991	0.0113
Δ(FD)	-0.1889***	0.0421	-4.4798	0.0042
Δ(FD(-1))	-0.3119***	0.0562	-5.5419	0.0015
Δ(FD(-2))	-0.2526***	0.0549	-4.5979	0.0037
Δ(FD(-3))	-0.2018***	0.0465	-4.3339	0.0049
Δ(TO)	-0.1306**	0.0399	-3.2713	0.0170

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Δ(TO(-1))	0.2740***	0.0487	5.6265	0.0013
Δ(TO(-2))	0.2477***	0.0572	4.3251	0.0050
Δ(TO(-3))	0.1739***	0.0406	4.2783	0.0052
ECT/CointEq(-1)*	-0.5784***	0.0613	-9.4302	0.0001

Source: Author's Estimation Using E-views 10.
Note: '***', '**', and '*' Denote Significance at the 1%, 5%, and 10% Levels, Respectively.

4.3 Diagnostic Tests of the Augmented ARDL Model

The robustness of the ARDL model has been affirmed through various diagnostic tests, including autocorrelation, normality, heteroscedasticity, model specification, and structural stability tests. Results shown in Appendix Table 2 indicate that the Breusch-Godfrey test reveals no autocorrelation in the residuals. The Breusch-Pagan-Godfrey and ARCH tests confirm the absence of heteroscedasticity. The Jarque-Bera test shows the residuals are normally distributed. The Ramsey RESET test indicates no specification error. The structural stability tests, depicted in Appendix Figure 3, confirm that the recursive residuals remain within the 5% significance level boundaries, indicating structural stability without breaks in the long-term relationship. Overall, these diagnostic checks confirm the robustness and consistency of the augmented ARDL model in both long-run and short-run coefficients throughout the study period.

4.5 Results of Frequency Domain Causality

The relationship between the variables is analyzed using frequency domain causality analysis (Breitung & Candelon, 2006), with the findings presented in Table 6. The causative link between imported capital goods and manufacturing output is statistically significant in both the short and long term. Conversely, the relationship between financial development, trade openness, and manufacturing output also shows statistical significance in the long run. This causality assessment indicates that imported capital goods exert a strong causal impact on manufacturing output within the frequency domain, highlighting the robust causality that flows from imported capital goods to manufacturing output both in the short run and the long run.

Table 6: Results of Frequency Domain Causality

Variable	Long-term	Medium-term	Short-term
	Frequency, ω = 0.05	Frequency, ω = 1.5	Frequency, ω = 2.5
	Wald test statistic	Wald test statistic	Wald test statistic
ICG causes MO	6.9694**	2.2295	4.6799*
INF causes MO	0.5396	0.4266	0.3249
FD causes MO	16.1020***	0.9313	1.0120
TO causes MO	5.7590*	0.6019	0.4559

Source: Author's Estimation Using Stata 17.
Note: '***', '**', and '*' Denote Significance at the 1%, 5%, and 10% Levels, Respectively.

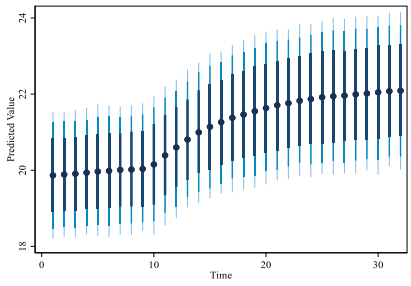
4.6 Results of Counterfactual Analysis

The counterfactual analysis utilizes a new dynamic ARDL simulation method to examine both the positive and negative impacts of the independent variable on the dependent variable while maintaining the effect of other control factors on the dependent variable unchanged. This analysis primarily centers on how the dependent variable responds to the positive and negative shocks of the independent variables.

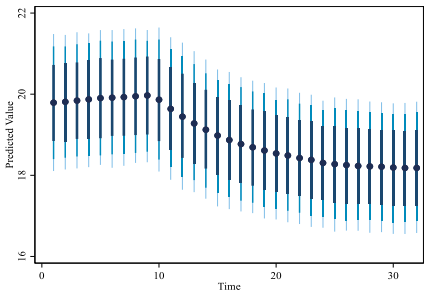
Figure-1 depicts the effects of changes in imported capital goods on manufacturing output. Graph (a) shows that a positive change in imported capital goods enhances manufacturing output over time, particularly in the long run. In contrast, graph (b) illustrates that a decrease in imported capital goods leads to a decline in manufacturing output. Therefore, the long-term benefits of imported capital goods on manufacturing output are evident in Bangladesh. The dot in the graphs indicates the predicted value, while the dark to light blue lines represent confidence intervals of 75%, 90%, and 95%.

Figure 1: Response of Manufacturing Output to Imported Capital Goods

(a) Positive shocks of ICG to MO



(b) Negative shocks of ICG to MO

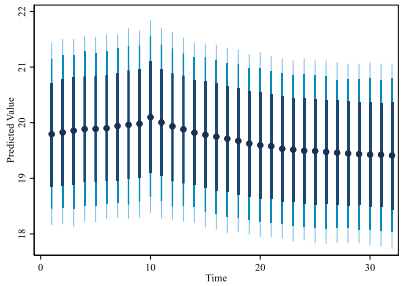


Source: Author's Estimation Using Stata 17.

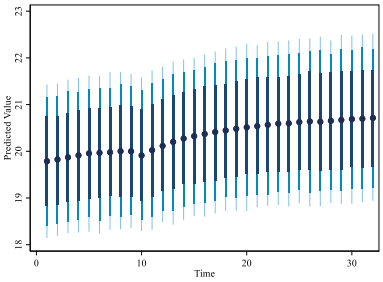
Figure-2 illustrates the impact of counterfactual inflation shocks on manufacturing output. Graph (a) shows that a 1% positive inflation shock increases manufacturing output in the short term but decreases it in the long term. Conversely, graph (b) reveals that negative inflation shocks adversely impact manufacturing output, while positive shocks boost it over the study period. Thus, inflation, whether positive or negative, has both short- and long-term effects on manufacturing output. The dot in the graphs indicates the predicted value, with the dark to light blue lines representing 75%, 90%, and 95% confidence intervals.

Figure 2: Response of Manufacturing Output to Inflation

(a) Positive shocks of INF to MO



(b) Negative shocks of INF to MO



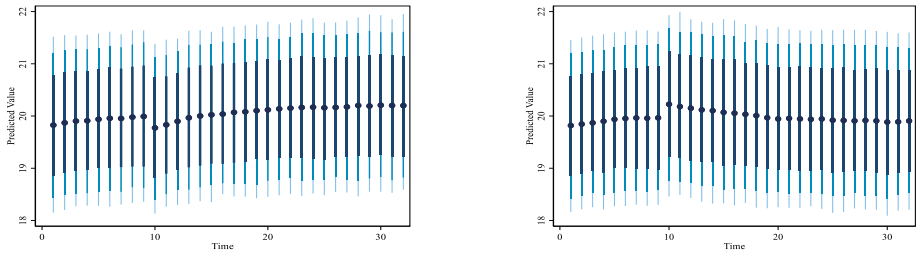
Source: Author's Estimation Using Stata 17.

Figure-3 illustrates the impact of financial development, measured by the credit to private sector to GDP ratio, on manufacturing output through counterfactual shocks. The graphs show that both positive and negative changes in financial development affect manufacturing output. An increase in financial

development boosts manufacturing output in both the short and long run, while adverse shocks have a negative effect. Specifically, a 1 percent increase in the credit to GDP ratio raises manufacturing output, while a decrease lowers it. The dots represent predicted values, and the lines indicate confidence intervals of 75%, 90%, and 95%.

Figure 3: Response of Manufacturing Output to Financial Development

(a) Positive shocks of FD to MO (b) Negative shocks of FD to MO

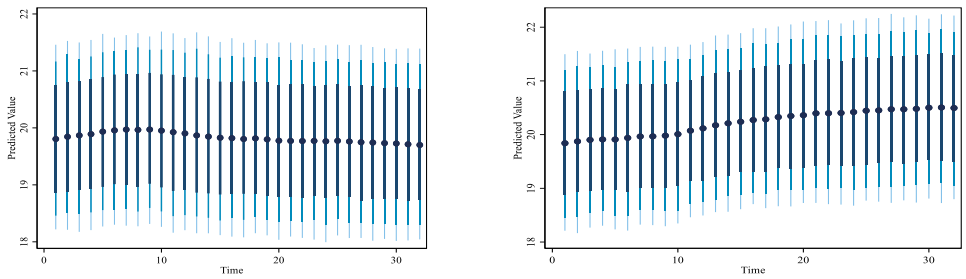


Source: Author's Estimation Using Stata 17.

The effects of changes in trade openness on manufacturing output are illustrated in Figure-4 from counterfactual analysis. The first graph (a) shows that a 1% increase in trade openness reduces manufacturing output in both the short and long run. Conversely, a decrease in trade openness positively impacts manufacturing output in the short and long run. This suggests that while higher trade openness may lower manufacturing output in Bangladesh, lower trade openness could enhance it. The dots represent predicted values, while the dark blue to light blue line indicates confidence intervals of 75%, 90%, and 95%.

Figure 4: Response of Manufacturing Output to Trade Openness

(a) Positive shocks of TO to MO (b) Negative shocks of TO to MO



Source: Author's Estimation Using Stata 17.

The results of the econometric analysis, including the augmented ARDL analysis, indicate that there is a positive relationship between imported capital goods and manufacturing output over the long term. Conversely, in the short term, imported capital goods produce varying effects on manufacturing output. The frequency domain causality analysis shows that there is a significant causal relationship between imported capital goods and manufacturing output in both the short and long run. The counterfactual analysis demonstrates that imported capital goods positively impact manufacturing output in the long term. However, in the short term, the effect of imported capital goods on manufacturing output is moderate but on an upward trend. Our research findings align with previous studies that highlight a positive connection between imported capital goods and manufacturing output (Herrerias & Orts, 2011; Hye et al., 2013; Maitra, 2020; Wahab et al., 2016). Nonetheless, regarding the lack of a significant relationship between imports and economic growth, our study's results differ from those found in earlier research (Hossain et al., 2009; Paul, 2011).

5. Conclusion and Policy Recommendations

This study examines the relationship between imported capital goods and manufacturing output in Bangladesh. The augmented ARDL bounds testing approach shows a long-run positive association between the two factors. The error correction mechanism indicates a short-run convergence toward long-run cointegration, confirming the short-term relationship. Additionally, frequency domain causality analysis reveals a causal linkage in both short and long-term periods. Counterfactual analysis using the dynamic ARDL simulation approach further supports that imported capital goods positively impact manufacturing output in the long run.

Moreover, our study explores the relationship between imported capital goods and manufacturing output in Bangladesh, including factors like inflation, private sector credit to GDP, and trade to GDP ratio. The results indicate that inflation negatively affects manufacturing output both in the long and short run, while financial development positively influences output in the long run. Conversely, trade openness has a long-term negative impact on manufacturing output in Bangladesh.

The analysis indicates that in a technology-constrained economy, imported capital goods boost long-term manufacturing output by providing essential technology and know-how, supporting the import-led growth hypothesis (Li et al., 2021; Liao et al., 2023; Panta et al., 2022; Sharma et al., 2023). Conversely, inflation negatively impacts manufacturing output by raising production costs. Furthermore, financial development positively correlates with manufacturing output, as consistent credit flow to the private sector can enhance production in Bangladesh. However, increasing imports of consumer goods, rather than capital goods, can reduce demand for domestically produced goods, contributing to a long-term negative relationship between trade openness and manufacturing output in the country.

Our research recommends key policy enhancements to boost manufacturing output via imported capital goods. Policymakers should establish effective import policies and best practices to support manufacturing growth and economic development. It's essential to invest in training the labor force to utilize imported capital effectively. Additionally, implementing price stability measures can help control inflation and support long-term manufacturing growth. Finally, reducing import dependency through domestically produced goods will strengthen the manufacturing sector and contribute to overall economic growth.

Nonetheless, our research has certain limitations. Due to the lack of a comprehensive data span, we rely on a limited dataset to explore the connection between imported capital goods and manufacturing output in Bangladesh. Utilizing various data sets along with additional explanatory variables could yield more accurate and relevant results. Consequently, further investigations are recommended using alternative methodologies and other control variables with diverse data collections, which may help address the gaps in the current research.

References

Ahmed, F. Z., Greenleaf, A., & Sacks, A. (2014). The paradox of export growth in areas of weak governance: The case of the ready-made garment sector in Bangladesh. *World Development*, *56*, 258-271. https://doi.org/10.1016/j.worlddev.2013.11.001

Ahmed, H. A., & Uddin, M. G. S. (2009). Export, imports, remittance and growth in Bangladesh: An empirical analysis. *Trade and Development Review*, *2*(2), 79-92.

Aluko, O. A., & Adeyeye, P. O. (2020). Imports and economic growth in Africa: Testing for granger causality in the frequency domain. *The Journal of International Trade & Economic Development*, *29*(7), 850-864. https://doi.org/10.1080/09638199.2020.1751870

Aluko, O. A., & Obalade, A. A. (2020). Import-economic growth nexus in selected African countries: An application of the Toda-Yamamoto Granger non-causality test. *Zagreb International Review of Economics & Business*, *23*(2), 117-128. https://doi.org/10.2478/zireb-2020-0016

Awokuse, T. O. (2007). Causality between exports, imports, and economic growth: Evidence from transition economies. *Economics Letters*, *94*(3), 389-395. https://doi.org/10.1016/j.econlet.2006.08.025

Awokuse, T. O. (2008). Trade openness and economic growth: is growth export-led or import-led?. *Applied Economics*, *40*(2), 161-173. https://doi.org/10.1080/00036840600749490

Ayeni, R. K., & Akeju, K. F. (2023). Human capital, capital goods import and economic growth in West Africa. *Cogent Economics & Finance*, *11*(2), 2268440. https://doi.org/10.1080/23322039.2023.2268440

Bashir, M. A., Sheng, B., Doğan, B., Sarwar, S., & Shahzad, U. (2020). Export product diversification and energy efficiency: Empirical evidence from OECD countries. *Structural Change and Economic Dynamics*, *55*, 232-243. https://doi.org/10.1016/j.strueco.2020.09.002

Breitung, J., & Candelon, B. (2006). Testing for short-and long-run causality: A frequency-domain approach. *Journal of Econometrics*, *132*(2), 363-378. https://doi.org/10.1016/j.jeconom.2005.02.004

Chowdhury, T. S., Rahman, M. H., Majumder, S. C., & Esquivias, M. A. (2023). Significance of technological progress and capital formation to expand foreign direct investment in Bangladesh: Does money circulation matter?. *Cogent Economics & Finance*, *11*(2), 2279351. https://doi.org/10.1080/23322039.2023.2279351

Coe, D. T., Helpman, E., & Hoffmaister, A. W. (2009). International R&D spillovers and institutions. *European Economic Review*, *53*(7), 723-741. https://doi.org/10.1016/j.euroecorev.2009.02.005

Dawson, P. J. (2006). The export–income relationship and trade liberalization in Bangladesh. Journal of Policy Modeling, 28(8), 889-896. https://doi.org/10.1016/j.jpolmod.2006.04.005

Geweke, J. (1982). Measurement of linear dependence and feedback between multiple time series. *Journal of the American Statistical Association*, *77*(378), 304-313.

Gokmenoglu, K., Kirikkaleli, D., & Eren, B. M. (2019). Time and frequency domain causality testing: the causal linkage between FDI and economic risk for the case of Turkey. *The Journal of International Trade & Economic Development*, *28*(6), 649-667. https://doi.org/10.1080/09638 199.2018.1561745

Gu, Y., Nayyar, G., & Sharma, S. (2021). *Gearing up for the future of manufacturing in Bangladesh*. World Bank Publications. http://hdl.handle.net/10986/35879

Habiyaremye, A. (2013). Imported capital goods and manufacturing productivity: Evidence from Botswana's manufacturing sector. *South African Journal of Economics*, *81*(4), 581-604. https://doi.org/10.1111/saje.12015

Haug, A. A. (2002). Testing linear restrictions on cointegrating vectors: Sizes and powers of Wald and likelihood ratio tests in finite samples. *Econometric Theory*, *18*(2), 505-524. https://doi.org/10.1017/S0266466602182119

Herrerias, M. J., & Orts, V. (2013). Capital goods imports and long-run growth: Is the Chinese experience relevant to developing countries?. *Journal of Policy Modeling*, *35*(5), 781-797. https://doi.org/10.1016/j.jpolmod.2013.02.006

Hoque, M. M., & Yusop, Z. (2010). Impacts of trade liberalisation on aggregate import in Bangladesh: An ARDL Bounds test approach. *Journal of Asian Economics*, *21*(1), 37-52. https://doi.org/10.1016/j.asieco.2009.09.004

Hosen, M. Z. (2023). Aggregated imports and expenditure components in Bangladesh: A cointegration and equilibrium correction analysis. *Heliyon*, *9*(6). https://doi.org/10.1016/j.heliyon.2023.e17417

Hosoya, Y. (1991). The decomposition and measurement of the interdependency between second-order stationary processes. *Probability theory and related fields*, *88*(4), 429-444.

Hossain, M. A., & Alauddin, M. (2005). Trade liberalization in Bangladesh: the process and its impact on macro variables particularly export expansion. *The Journal of Developing Areas*, 127-150. https://doi.org/10.1353/jda.2005.0035

Hossain, M. A., Haseen, L., & Jabin, N. (2009). Dynamics and causality among exports, imports and income in Bangladesh. The Bangladesh Development Studies, 32(2), 101-113.

Hye, Q. M. A., Wizarat, S., & Lau, W. Y. (2013). Trade-led growth hypothesis: An empirical analysis of South Asian countries. *Economic Modelling*, *35*, 654-660. https://doi.org/10.1016/j.econmod.2013.07.040

Islam, F., Muhammad Adnan Hye, Q., & Shahbaz, M. (2012). Import-economic growth nexus: ARDL approach to cointegration. *Journal of Chinese Economic and Foreign Trade Studies*, *5*(3), 194-214. https://doi.org/10.1108/17544401211263964

Islam, T., & Halim, M. A. (2022). Impact of ready-made garments (RMG) industries and sustainability: Perspective of the pandemic period in developing country. *Cleaner Engineering and Technology*, *11*, 100567. https://doi.org/10.1016/j.clet.2022.100567

Istaiteyeh, R., Najem, F., & Saqfalhait, N. (2023). Exports-and imports-led growth: Evidence from a time series analysis, case of Jordan. *Economies*, *11*(5), 135. https://doi.org/10.3390/economies11050135

Kim, B., Kyophilavong, P., Nozaki, K., & Charoenrat, T. (2022). Does the export-led growth hypothesis hold for Myanmar?. *Global Business Review*, *23*(1), 48-60. https://doi.org/10.1177/0972150919863929

Lawrence, R. Z., & Weinstein, D. (1999). Trade and growth: import-led or export-led? Evidence from Japan and Korea. *NEBR Working Paper 7264*. https://doi.org/10.3386/w7264

Li, M., Ahmad, M., Fareed, Z., Hassan, T., & Kirikkaleli, D. (2021). Role of trade openness, export diversification, and renewable electricity output in realizing carbon neutrality dream of China. *Journal of Environmental Management*, *297*, 113419. https://doi.org/10.1016/j.jenvman.2021.113419

Liao, H., Wang, D., Van Assche, A., & Du, J. (2023). Do capital goods imports improve the quality of regional development? Evidence from Chinese cities. *Journal of Innovation & Knowledge*, *8*(4), 100435. https://doi.org/10.1016/j.jik.2023.100435

Mazumdar, J. (2001). Imported machinery and growth in LDCs. *Journal of Development Economics*, *65*(1), 209-224. https://doi.org/10.1016/S0304-3878(01)00134-1

McNown, R., Sam, C. Y., & Goh, S. K. (2018). Bootstrapping the autoregressive distributed lag test for cointegration. Applied Economics, 50(13), 1509-1521. https://doi.org/10.1080/00036846.2017.1366643

Mohamed, M. M. A., Liu, P., & Nie, G. (2022). Causality between technological innovation and economic growth: Evidence from the economies of developing countries. *Sustainability, 14*(6), 3586. https://doi.org/10.3390/su14063586

Mustafin, A. N., Kotenkova, S. N., Kravčáková Vozárová, I., & Kotulič, R. (2022). Impact of Import Substitution Policy on Economic Growth. *Economies*, *10*(12), 324. https://doi.org/10.3390/economies10120324

Narayan, P. K. (2005). The saving and investment nexus for China: evidence from cointegration tests. *Applied Economics*, *37*(17), 1979-1990. https://doi.org/10.1080/00036840500278103

Nguyen, V. M. H., Ho, T. H., Nguyen, L. H., & Pham, A. T. H. (2023). The Impact of Trade Openness on Economic Stability in Asian Countries. *Sustainability*, *15*(15), 11736. https://doi.org/10.3390/su151511736

Panta, H., Devkota, M. L., & Banjade, D. (2022). Exports and imports-led growth: Evidence from a small developing economy. *Journal of Risk and Financial Management*, *15*(1), 11. https://doi.org/10.3390/jrfm15010011

Paul, B. P. (2011). Revisiting export-led growth for Bangladesh: A synthesis of cointegration and innovation accounting. International Journal of Economics and Finance, 3(6), 3-15. http://dx.doi.org/10.5539/ijef.v3n6p3

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3), 289-326. https://doi.org/10.1002/jae.616

Raghutla, C., & Chittedi, K. R. (2020). Is there an export-or import-led growth in emerging countries? A case of BRICS countries. *Journal of Public Affairs*, *20*(3), e2074. https://doi.org/10.1002/pa.2074

Rahman, P., Zhang, Z., & Musa, M. (2023). Do technological innovation, foreign investment, trade and human capital have a symmetric effect on economic growth? Novel dynamic ARDL simulation study on Bangladesh. *Economic Change and Restructuring*, *56*(2), 1327-1366. https://doi.org/10.1007/s10644-022-09478-1

Sam, C. Y., McNown, R., & Goh, S. K. (2019). An augmented autoregressive distributed lag bounds test for cointegration. *Economic Modelling*, *80*, 130-141. https://doi.org/10.1016/j.econmod.2018.11.001

Sankaran, A., Krishna, A., & Vadivel, A. (2021). How does manufacturing output affect export behaviors in emerging market economies? Evidence from a dynamic panel ARDL for ten biggest emerging market economies. *Future Business Journal*, *7*(1), 26. https://doi.org/10.1186/s43093-021-00072-x

Sarker, B. (2024). FDI-growth and trade-growth relationships during crises: evidence from Bangladesh. *Financial Innovation*, *10*(1), 55. https://doi.org/10.1186/s40854-023-00571-6

Sarker, B., & Khan, F. (2020). Nexus between foreign direct investment and economic growth in Bangladesh: an augmented autoregressive distributed lag bounds testing approach. *Financial Innovation*, *6*(1), 10. https://doi.org/10.1186/s40854-019-0164-y

Sharma, R., Shahbaz, M., Kautish, P., & Vo, X. V. (2023). Diversified imports as catalysts for ecological footprint: examining the BRICS experience. *Environment, Development and Sustainability*, *25*(4), 3153-3181. https://doi.org/10.1007/s10668-022-02177-x

Singh, T. (2010). Does international trade cause economic growth? A survey. *The World Economy*, *33*(11), 1517-1564. https://doi.org/10.1111/j.1467-9701.2010.01243.x

Swazan, I. S., & Das, D. (2022). Bangladesh's emergence as a ready-made garment export leader: an examination of the competitive advantages of the garment industry. *International Journal of Global Business and Competitiveness*, *17*(2), 162-174. https://doi.org/10.1007/s42943-022-00049-9

Thangavelu, S. M., & Rajaguru, G. (2004). Is there an export or import-led productivity growth in rapidly developing Asian countries? A multivariate VAR analysis. *Applied Economics*, *36*(10), 1083-1093. https://doi.org/10.1080/0003684042000246795

Usman, K., & Bashir, U. (2022). The causal nexus between imports and economic growth in China, India and G7 countries: granger causality analysis in the frequency domain. *Heliyon*, *8*(8). https://doi.org/10.1016/j.heliyon. 2022.e10180

Veeramani, C. (2009). Trade barriers, multinational involvement and intra-industry trade: panel data evidence from India. *Applied Economics*, *41*(20), 2541-2553. https://doi.org/10.1080/00036840701235688

Wahab, M. A., Sultana, N. N., & Hoque, M. R. (2016). *Does the import of capital goods spur manufacturing output growth in Bangladesh?* [Dhaka]: Research Department, Bangladesh Bank.

Zang, W., & Baimbridge, M. (2012). Exports, imports and economic growth in South Korea and Japan: a tale of two economies. *Applied Economics*, *44*(3), 361-372. https://doi.org/10.1080/00036846.2010.508722

Appendices

Appendix Table 1: Variables and Data Source

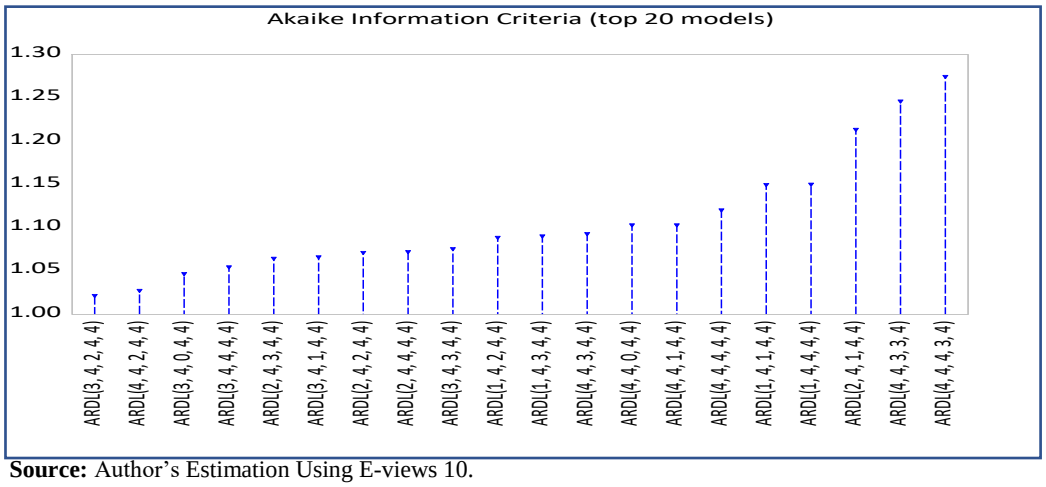
Variable	Name	Explanation	Data Source
MO	Manufacturing output	Manufacturing value added as a percentage of GDP	World Bank
ICG	Imported capital goods	Imported capital goods as a percentage of GDP	Bangladesh Bank
INF	Inflation	Annual inflation rate measured by the change in consumer price index	World Bank
FD	Financial development	Domestic credit to the private sector as a percentage of GDP	World Bank
TO	Trade openness	Trade as a percentage of GDP	World Bank

Source: Author's Compilation.

Appendix Figure 1: Time Plot of Different Study Variables, (a)-(e)

Source: Author's estimation using E-views 10.

Appendix Figure 2: Optimal Lag Length Selection



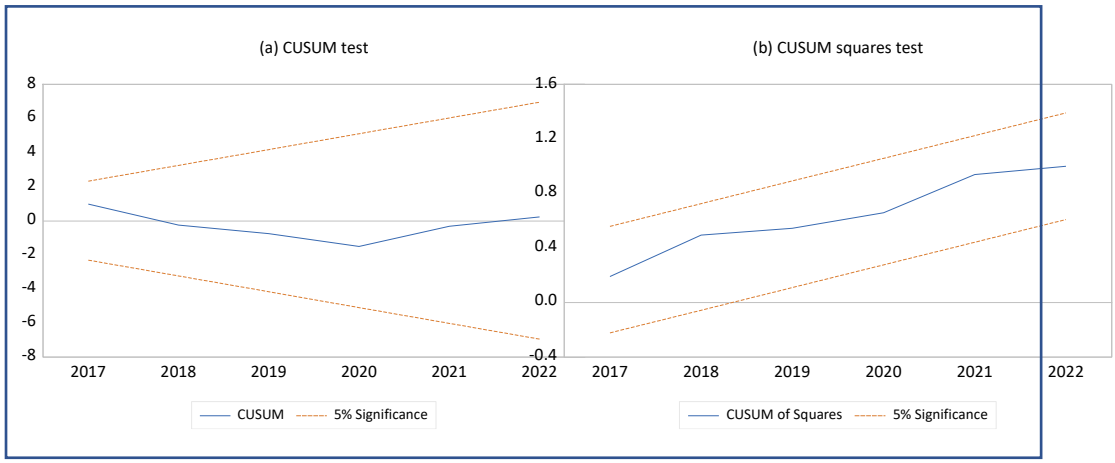
Source: Author's Estimation Using E-views 10.

Appendix Table 2: Results of Diagnostic Tests of the Augmented ARDL Model

Test	Test Statistic	Prob.
Breusch-Godfrey Serial Correlation LM Test	F-statistic = 0.0811	0.9224
Jarque-Bera Normality Test	J-B = 0.0429	0.9787
Breusch-Pegan-Godfrey for Heteroscedasticity	F-statistic = 1.7076	0.1552
ARCH Test for Heteroscedasticity	F-statistic = 0.7926	0.3812
Ramsey RESET Test	F-statistic = 0.0785	0.7821

Source: Author's Estimation Using E-views 10.

Appendix Figure 3: (a) CUSUM Test, (b) CUSUM Squares Test



Source: Author's Estimation Using E-views 10.

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Trends of Mobile Financial Services and the Impact of Using Electronic Modes of Transaction on Cash-Based Transactions in Bangladesh

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Abstract

Despite a pervasive lack of financial literacy, Bangladesh has made remarkable progress in financial inclusion through the rapid increase of Mobile Financial Service (MFS) accounts. MFS accounts per hundred people are found to have increased more than six times within eight years, accelerating the country's financial inclusion. Although a rapid penetration of MFS is observed, the pace of adopting electronic modes of MFS transactions as a substitute for cash-based modes of MFS transactions lags compared to the overall usage of MFS in the country. Time series data analysis, applying the Autoregressive Distributed Lag (ARDL) model, demonstrates that electronic modes of MFS usage are causing a significant reduction in the share of traditional cash-based MFS usages as a long-term impact. The findings of the study serve as a basis for strategic decision-making for policymakers and allow industry players to explore innovative approaches in response to the changing dynamics of the market.

Keywords: Electronic Transaction, MFS Penetration, Financial Literacy, Financial Inclusion.
JEL Classification: G210, C320, O310.

1. Introduction

Mobile Financial Service (MFS) offers financial services with mobile wireless networks and enables users to perform banking transactions (Bangladesh Bank, 2012). Through MFS, users can get financial services, even in remote locations. MFS users need not visit a physical bank branch to make any transactions. They do not even require a bank account in a commercial bank. MFS allows users to utilize an alternative channel beyond the periphery of commercial banking, operated primarily by branch and ATM networks. Compared to commercial banks, it enables customers easier access to the formal banking system. As a large portion of Bangladesh's people are unbanked and have poor financial literacy, MFS is an easy tool to access financial services for those

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unbanked people at affordable rates. MFS effectively enhances financial inclusion and promotes a country towards development (Mowla & Tani, 2020).

In Bangladesh, the number of MFS customers and transactions is increasing continuously, which manifests in gradual financial inclusion. At the end of July 2023, MFS's registered customers increased to 209.57 million compared to 181.14 million one year ago. During FY2022-23, MFS transactions were around 5.54 billion valuing BDT 12,174 billion. It showed an increase of 16.13% and 22.97% in number and value, respectively, compared to FY2021-22. The gradual increase of MFS transactions in the country manifests the people's inclination towards electronic payments (Bangladesh Bank, 2022). Easy accessibility and wide acceptability of MFS have catalyzed the increasing usage of the service all over the country.

Different payment platforms facilitate customers' different types of payment needs. Usually, MFS caters to the need for small ticket-size retail payments. It is a great advantage that only identity proof is required to open an MFS account. So, for people who do not have an account in a commercial bank, an MFS account is an easy tool for them to access formal financial services without any trouble. MFS transactions can be done with a feature phone and a mobile network, even without a smartphone and an internet connection.

Bangladesh Bank, the country's central bank, allows scheduled commercial banks, financial institutions, and government entity-led MFS providers to operate. As of September 2023, nine banks, three subsidiaries of three banks, and one govt. entity (Bangladesh Post Office) have been delivering mobile financial services in the country (Bangladesh Bank, 2023). The limited financial services of MFS include cash-in to and cash-out; Person-to-Business (P2B) payments, such as educational institutional fees, and merchant payments; Business-to-Person (B2P) payments, such as salary disbursements; Person-to-Person (P2P) payments, such as a person's MFS account to another person's MFS or bank account; Business-to-Business (B2B) payments, such as vendor payments; Government-to-person (G2P) payments, such as pension; person to government (P2G) payments, such as tax (Bangladesh MFS Regulations, 2022).

Among different types of usages of MFS, the cash-in and cash-out are related to cash transactions, whereas others are platform-based electronic transfers that do not require any cash involvement. In this paper, cash-in and cash-out have been considered cash-based modes of MFS usage, whereas other methods, such as P2P, P2B, B2P, B2B, G2P, and P2G transactions, have been considered electronic modes of MFS usage.

In comparison to cash-based (cash in and out) usage of MFS, electronic payment gateways, such as P2P, P2B, B2B, B2P, P2G, and G2P, have some advantageous features, like hassle-free transfer of money directly to the beneficiary from any time at any place that are influencing the consumers in the adoption of electronic payment gateways in MFS. Moreover, the demand for electronic transactions is growing globally (Kapoor et al., 2024).

For this study on MFS, Bangladesh was chosen because it has a lot of underprivileged people who lack proper financial literacy and have no bank account (Parvez & Woodard, 2015). These financially excluded people have been brought under the umbrella of MFS successfully, which can be an imitable example for the countries where many people are excluded from the formal financial arena.

The objectives of this paper are as follows:

i) To explore the trend of MFS in Bangladesh with respect to its adoption over the period.

ii) To find out the pattern of usage of MFS, especially focusing on whether the usages of MFS as a means of electronic payment gateways, such as P2P, P2B, B2P, B2B, G2P, and P2G transactions, are replacing traditional means of cash-based MFS transactions, such as cash-in or cash-out.

Analyzing the secondary data on MFS adoption, the rapid penetration of MFS is observed over time, accelerating the country's financial inclusion. The MFS accounts per hundred people are found to have increased more than six times within eight years (2015-2023). The analysis of the time series data applying the Autoregressive Distributed Lag (ARDL) model (Pesaran & Shin,

1995) explored that electronic modes of MFS usage negatively and significantly impact cash-based MFS usage in Bangladesh.

The paper seeks to contribute to the literature on MFS by offering empirical evidence on the evolution of MFS usage in Bangladesh over time, using objective measures instead of relying solely on users' opinions. The study will be valuable for policymakers, regulatory authorities, industry players, MFS providers, and consumers. Policymakers and regulatory authorities can leverage the paper's findings to assess the evolving landscape of technology usage among users in Bangladesh. By understanding the changes in user behavior and preferences, MFS providers can identify new business opportunities and tailor their services to better concentrate on customers' need. The empirical evidence presented in the paper can serve as a basis for strategic decision-making, allowing MFS providers to adapt their offerings and explore innovative approaches in response to the changing dynamics of the market.

Section-2 of this paper contains an overview of MFS in Bangladesh. Section 3 reviews related literature and develops research issues. Section 4 describes the data and methodology of this study. Section 5 presents the results, analysis and discussion. Section 6 provides conclusions, limitations, and areas of further research.

2. Overview of MFS in Bangladesh

In 2011, Bangladesh Bank introduced MFS, opening a new horizon of digital payment systems. At the initial stage, the usage of MFS was mostly confined to cash-in and cash-out transactions. However, it is now used as a medium for various payment gateways, like P2P, P2B, B2P, B2B, G2P, and P2G transactions.

The government of Bangladesh has taken steps to ensure the advancement in power connectivity nationwide, the availability of mobile phones at lower cost, the digitization of payment systems, and the availability of country-wide mobile network coverage and internet at an affordable price. Moreover, the recent implementation of interoperability among all financial service providers, including MFS has amplified the scope of MFS usage in the country. All these have widened the prospects of mobile financial services throughout the country.

As of July 2023, the country's mobile phone and mobile internet connections reached 187.48 million and 118.79 million, respectively (BTRC, 2023). With an easy account opening process and user-friendly, cost-effective features, MFS has extended the avenues for accessing financial services to the unbanked population. This infrastructure facilitation has expanded the scope of MFS penetration massively in the country. These favorable facilities encourage the MFS providers to reach customers easily (Pazarbasioglu et al., 2020). The exponential growth in mobile phone subscribers and the introduction of e-KYC accelerated MFS penetration in the country (ADB, 2022).

Despite the huge MFS penetration in the country, there are challenges. There is limited accessibility to digital financial services for a large segment of the people living mainly in the rural parts of Bangladesh. A critical challenge MFS faces in Bangladesh is the lack of digital financial literacy among a large portion of its population. A survey (BIGD, 2020) found that more than 60% of the MFS users in Bangladesh operates their accounts by others as they have not adequate digital financial literacy. It disrupts data confidentiality and violates security.

MFS fraud is widespread in the country. It reduces the credibility of the MFS platforms, and people are compelled to adopt traditional payment methods. According to a survey (2022) conducted by the *Policy Research Institute of Bangladesh (PRI)*, ten percent of MFS users in the country faced financial fraud. The main reasons for fraud, as they pointed out, are the lack of digital financial literacy, sharing Personal Identification Numbers (PINs) with relatives and agents, and sharing PINs with someone fraudulently personifying as officials of the MFS provider. The highest (56%) form of fraud happened in the form of PINs and scams involving impersonation, as they found (Azad & Rahman, 2022).

3. Literature Review

Existing literature on MFS primarily deals with the impact of MFS on financial inclusion (e.g., Sultana & Khan, 2016; Kanobe et al., 2017) and economic development (e.g., Ouma et al., 2017; Akhter & Khalily, 2020) of a country. Some papers have dealt with the driving force behind using MFS (e.g.,

Abdinoor & Mbamba, 2017; Ehsan et al., 2019; Mowla & Tani, 2020; Adjei et al., 2020) from users' perspectives.

Akhtaruzzaman et al. (2017) reported that in the household context, family members mostly transfer money among themselves, mainly to purchase family groceries and meet educational expenses in Bangladesh. They also surveyed small and medium business firms and found they use MFS to enhance their business activities, primarily revenue collection and suppliers' payment.

Kabir et al. (2020) studied the scenario of MFS, its regulatory framework, prospects, and challenges in Bangladesh. They examined MFS in Bangladesh and presented its growth of accounts from 2014 to 2019. From their collected data set, they also compared Bangladesh's MFS scenario.

Fernandes et al. (2021) analyzed the impact of the electronic modes of financial services on the financial inclusion based on the ARDL model. They found the crucial role of electronic modes of financial services on financial inclusion as the former extends access to the underserved people in Mozambique.

The review of prior literature clearly shows a gap in the existing research on the analysis of the trends of MFS in a country context and the examination of whether there are any changes in MFS usage over the period based on historical data, not on users' opinions, especially in the context of Bangladesh. The analysis of the overall trend of MFS with respect to the number of MFS accounts, MFS customer-to-MFS agent ratio, and MFS transactions provides insight into the penetration speed of MFS in a country. Moreover, observing the trend of MFS regarding the adoption rate with respect to the total population provides a clear picture of the financially included portion of a country due to the adoption of MFS over the period.

Though Bangladesh has been experiencing MFS for over a decade, the changing pattern of MFS usage with respect to the focus on whether the electronic payment gateways of MFS, such as P2P, P2B, B2P, B2B, G2P, P2G transactions are replacing the cash-based MFS usage, such as cash-in and cash-out, have not been analyzed in contemporary papers. Even the changing pattern of MFS usage

in the mentioned area has not been observed in available literature in the context of other countries.

4. Data and Methodology

4.1 Variables

For analyzing the trends of MFS in Bangladesh, the considered variables and their definitions are mentioned in Table-1.

Table 1: Variable (MFS trends) description

Variable	Definition
MFSCustomer	Number of MFS customers (in million).
MFSAgent	Number of MFS agents (in million).
MFSTranNo	Number of MFS transactions (in million).
MFSTranAmt	Amount (in billion BDT) of MFS transactions.

Source: Author's Compilation

For analyzing different categories of usages of MFS over time in Bangladesh, the considered variables and their definitions are mentioned in Table-2.

Table 2: Variable (MFS usage) Description

Variable	Definition
CashInAmt	MFS usage (in amount) of cash-in (as % of total MFS usage) in the country.
CashOutAmt	MFS usage (in amount) of cash-out (as % of total MFS usage) in the country.
P2PAmt	MFS usage (in amount) of P2P (as % of total MFS usage) in the country.
MerPayAmt	MFS usage (in amount) of merchant payment (as % of total MFS usage) in the country. It can be B2B and P2B.
G2PAmt	MFS usage (in amount) of G2P (as % of total MFS usage) in the country.
SalDisbAmt	MFS usage (in amount) of salary disbursement (as % of total MFS usage) in the country. It can be B2P and G2P.
UtiBillPayAmt	MFS usage (in amount) of utility bill payment (as % of total MFS usage) in the country. It can be P2G, P2B, B2G, and B2B.
CashInNo	MFS usage (in number) of cash-in (as % of total MFS usage) in the country.
CashOutNo	MFS usage (in number) of cash-out (as % of total MFS usage) in the country.
P2PNo	MFS usage (in number) of P2P (as % of total MFS usage) in the country.
MerPayNo	MFS usage (in number) of merchant payments (as % of total MFS usage) in the country. It can be B2B and P2B.
G2PNo	MFS usage (in number) of G2P (as % of total MFS usage) in the country.

Variable	Definition
SalDisbNo	MFS usage (in number) of salary disbursement (as % of total MFS usage) in the country. It can be B2P and G2P.
UtiBillPayNo	MFS usage (in number) of utility bill payments (as % of total MFS usage) in the country. It can be P2G, P2B, B2G, and B2B.

Source: Author's Calculation

4.2 Data

The secondary data for 97 months (July 2015-July 2023) on MFS registered customers, agents, transaction numbers, and transaction amounts have been collected from the annual reports (2015-2023) and the website of Bangladesh Bank to study the MFS trends.

For studying different categories of usages of MFS over time, secondary data for 56 months (Dec 2018-July 2023) has been collected from the Bangladesh Bank website. The study sample represents the entire MFS industry in the country.

4.3 Hypothesis

Traditional cash-based MFS usage (cash-in and cash-out) is negatively associated with the electronic modes of MFS usage (P2P, P2B, B2P, B2B, G2P, and P2G transactions).

4.4 Research Method

The ARDL model (Pesaran & Shin, 1995) has been applied to examine the hypothesis. The reason for applying the ARDL model is to explore the long-run cointegrating relationship between the variables of interest and estimate both the long-run and short-run relationships. Besides, enough lags in the model can handle serial correlation and endogeneity, and it permits using different optimal lags for different variables in the same model (Duasa, 2007).

In ARDL, the dependent variable is a function of its past lagged values and other explanatory variables' current and past values. It focuses on the exogenous variables and selecting the correct lag structure from the dependent and independent variables. An ARDL model assumes that the independent variables

are independent in the sense that it is not necessary to include the dependent variable as a predictor of the independent variables.

An ARDL model contains independent variables and their lagged values. Simultaneously it contains the lagged values of the dependent variable.

In general form, with p lags of y and q lags of x, an $ARDL\ (p, q)$ model can be expressed as –

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \cdots\cdots + \beta_p Y_{t-p} + \propto_0 X_t + \propto_1 X_{t-1} + \propto_2 X_{t-2} + \cdots\cdots + \propto_q X_{t-q} + \varepsilon_t \cdots\cdots (1)$$

where ε_t is a random disturbance term. The model is autoregressive in the sense that Y_t is explained partly by its lagged values. It also has a distributed lag component in the form of successive lags of the 'X' explanatory variable.

To avoid the nonlinearity in variables, natural logs for all the variables on both sides of the econometric specification (log-log model) have been used to generate the desired linearity.

For testing the hypothesis, 4 (four) separate models have been tested. Based on equation (1), the mathematical equations for Models-I to IV stand as follows:

Model-I

$$\begin{aligned} LnCashInNo_t = {} & \beta_0 + \beta_1 LnCashInNo_{t-1} + \beta_2 LnCashInNo_{t-2} + \cdots\cdots \\ & + \beta_p LnCashInNo_{t-p} + \alpha_0 LnP2PNo_t + \alpha_1 LnP2PNo_{t-1} \\ & + \alpha_2 LnP2PNo_{t-2} + \cdots\cdots + \alpha_p LnP2PNo_{t-p} + \gamma_0 LnSalDisbNo_t \\ & + \gamma_1 LnSalDisbNo_{t-1} + \gamma_2 LnSalDisbNo_{t-2} + \cdots\cdots \\ & + \gamma_p LnSalDisbNo_{t-p} + \delta_0 LnG2PNo_t + \delta_1 LnG2PNo_{t-1} \\ & + \delta_2 LnG2PNo_{t-2} + \cdots\cdots + \delta_p LnG2PNo_{t-p} + \varepsilon_t \end{aligned}$$

Model-II

$$LnCashInAmt_t = \beta_0 + \beta_1 LnCashInAmt_{t-1} + \beta_2 LnCashInAmt_{t-2} + \cdots\cdots + \beta_p LnLnCashInAmt_{t-p} + \alpha_0 LnP2PAmt_t + \alpha_1 LnP2PAmt_{t-1} + \alpha_2 LnP2PAmt_{t-2} + \cdots\cdots + \alpha_p LnP2PAmt_{t-p} + \gamma_0 LnSalDisbAmt_t + \gamma_1 LnSalDisbAmt_{t-1} + \gamma_2 LnSalDisbAmt_{t-2} + \cdots\cdots + \gamma_p LnSalDisbAmt_{t-p} + \delta_0 LnG2PAmt_t + \delta_1 LnG2PAmt_{t-1} + \delta_2 LnG2PAmt_{t-2} + \cdots\cdots + \delta_p LnG2PAmt_{t-p} + \varepsilon_t$$

Model-III

$$LnCashOutNo_t = \beta_0 + \beta_1 LnCashOutNo_{t-1} + \beta_2 LnCashOutNo_{t-2} + \cdots\cdots + \beta_p LnCashOutNo_{t-p} + \alpha_0 LnP2PNo_t + \alpha_1 LnP2PNo_{t-1} + \alpha_2 LnP2PNo_{t-2} + \cdots\cdots + \alpha_p LnP2PNo_{t-p} + \gamma_0 LnMerPayNo_t + \gamma_1 LnMerPayNo_{t-1} + \gamma_2 LnMerPayNo_{t-2} + \cdots\cdots + \gamma_p LnMerPayNo_{t-p} + \delta_0 LnUtiBillPayNo_t + \delta_1 LnUtiBillPayNo_{t-1} + \delta_2 LnUtiBillPayNo_{t-2} + \cdots\cdots + \delta_p LnUtiBillPayNo_{t-p} + \varepsilon_t$$

Model-IV

$$LnCashOutAmt_t = \beta_0 + \beta_1 LnCashOutAmt_{t-1} + \beta_2 LnCashOutAmt_{t-2} + \cdots\cdots + \beta_p LnCashOutAmt_{t-p} + \alpha_0 LnP2PAmt_t + \alpha_1 LnP2PAmt_{t-1} + \alpha_2 LnP2PAmt_{t-2} + \cdots\cdots + \alpha_p LnP2PAmt_{t-p} + \gamma_0 LnMerPayAmt_t + \gamma_1 LnMerPayAmt_{t-1} + \gamma_2 LnMerPayAmt_{t-2} + \cdots\cdots + \gamma_p LnMerPayAmt_{t-p} + \delta_0 LnUtiBillPayAmt_t + \delta_1 LnUtiBillPayAmt_{t-1} + \delta_2 LnUtiBillPayAmt_{t-2} + \cdots\cdots + \delta_p LnUtiBillPayAmt_{t-p} + \varepsilon_t$$

Considering different types of MFS usage and respective utility in Bangladesh, it is assumed that cash-in, a traditional cash-based MFS transaction, is supposed to be reduced by alternative electronic modes of injecting money into the MFS wallet or account. Among different types of MFS transactions allowed by the regulatory authorities of Bangladesh, as elaborated in the earlier part of this paper, Person-to-Person (P2P) transactions, salary disbursement to the employees by the employers (B2P transactions), and Government-to-Person

(G2P) payments are electronic modes that inject money into the MFS wallet or account. These types of injection of money in electronic modes are supposed to reduce or appear as a substitute for cash-based MFS usage like cash-in from an MFS agent point. Based on the assumption that MFS transactions in electronic modes grab traditional cash-based modes, for models I and II, the expected relationships between the dependent variables and the selected independent variables considered for the models are shown in Table-3.

Table 3: Independent Variables and Expected Relation (Models-I and II)

Model	Independent Variables	Expected Relation
I	P2PNo	-
I	SalDisbNo	-
I	G2PNo	-
II	P2PAmt	-
II	SalDisbAmt	-
II	G2PAmt	-

Source: Author'

Again, considering different types of MFS usages in Bangladesh, it is assumed that cash-out, another traditional cash-based MFS transaction, is supposed to be reduced by the alternative electronic modes of spending money from the MFS wallet or account. Among different types of MFS transactions allowed by the regulatory authorities of Bangladesh, as elaborated in the introduction part of this paper, P2P transactions, Merchant payment (P2B and B2B transactions), and utility bill payments (P2B, P2G, B2G, and B2B) are electronic modes that are used to spend money from the MFS wallet or account. These types of spending money in electronic modes are supposed to reduce or appear as substitutes for cash-based MFS usage, such as cash-out from an MFS agent point. Based on the assumption that MFS transactions in electronic modes grab traditional cash-based modes, for models III and IV, the expected relationships between the dependent variables and the selected independent variables considered for the models are shown in Table-4.

Table 4: Independent Variables and Expected Relation (Models-III and IV)

Model	Independent Variables	Expected Relation
III	P2PNo	-
III	MerPayNo	-
III	UtiBillPayNo	-
IV	P2PAmt	-
IV	MerPayAmt	-
IV	UtiBillPayAmt	-

Source: Author's Calculation

Time series data was processed and analyzed with the help of Stata 14.2. In Stata, the data set was declared as a time series. The skewness and kurtosis tests were run to check normality for each variable included in the models, and it was found to be normally distributed. The variables used in a regression model must be stationary. A unit root test was conducted to find out whether the data set was stationary at the level or stationary at the first difference. To determine whether the data set is stationary at which level, the Augmented Dickey-Fuller test (Dickey & Fuller, 1979) was run, and the results were cross-checked with the Phillips Perron test (Phillips & Perron, 1988).

Before conducting the cointegration test (Engle & Granger, 1987), it is required to find out the optimum lag of the variables for the model because it is assumed that in the time series, present month data are to some extent influenced by their previous data. According to all selection order criteria, considering the maximum and smaller lag criteria, the optimum lags were selected.

Then, the cointegration test was conducted to find out whether the variables had a long-run relationship. The Bound test from ARDL (Pesaran et al., 2001) was conducted to estimate the cointegration for each of the models.

Several diagnostic tests were conducted to find out the validity of each of the models. With the Variance Inflation Factor (VIF), all the models were checked to determine whether there was any multicollinearity in them. With the Durbin-Watson test (Durbin & Watson, 1971) and the Breusch-Godfrey test (Breusch, 1978; Godfrey, 1978), the models were checked whether there was autocorrelation. With White's test (White, 1980), models were tested to determine whether there were any heteroscedastic errors in the models. Lastly,

with the CUSUM test (Brown et al., 1975), the stability of the estimated coefficients in the models was checked.

5. Results, Analysis, and Discussion

5.1 Trends of MFS Adoption in Bangladesh

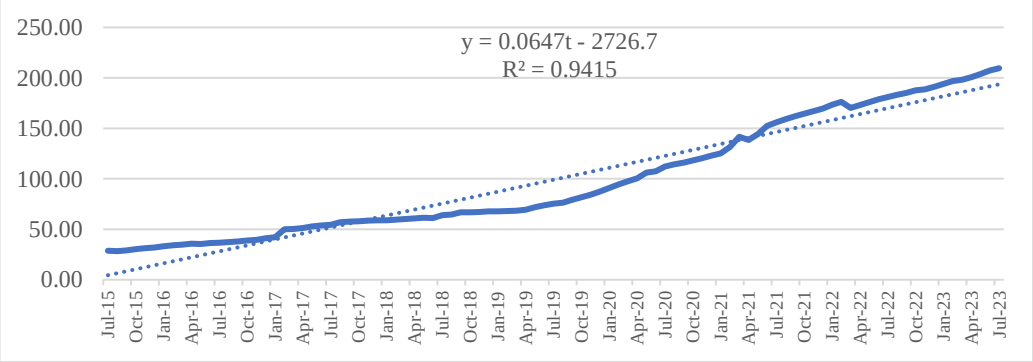
The descriptive statistics of the variables related to MFS trends in the country are shown in Table-5.

Table 5: Descriptive Statistics (MFS trends)

Variable	Obs	Mean	Std. Dev.	Min	Max
MFSCustomer	97	99.11	57.15	28.30	209.57
MFSAgent	97	1.05	0.34	0.53	1.60
MFSTranNo	97	258.44	123.32	97.70	572.62
MFSTranAmt	97	492.80	299.82	128.40	1321.75

Source: Bangladesh Bank; Author's Compilation & Calculation

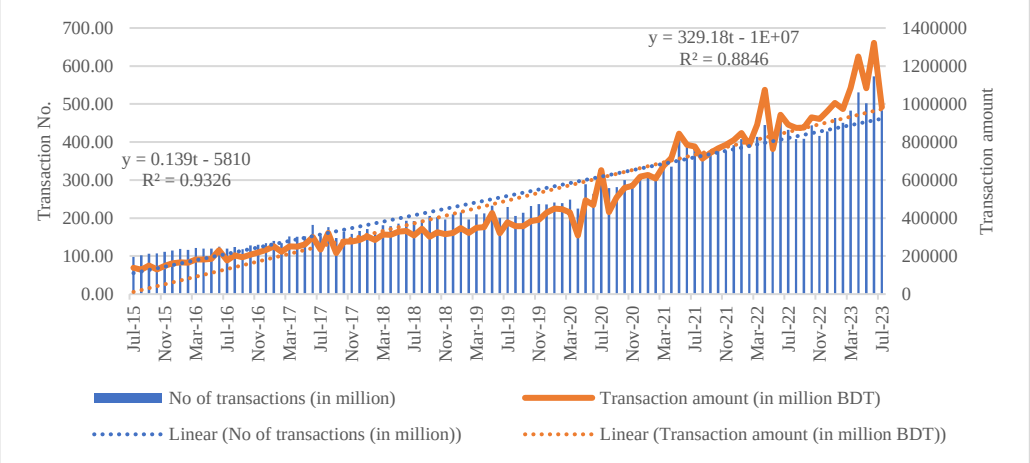
Figure 1: MFS Adoption (Number of Registered MFS Customers in a Million)



Source: Bangladesh Bank; Author's Compilation and Calculation

Figure-1 shows the increasing trends of MFS customers. Within 97 months of the study period, from July 2015 to July 2023, MFS registered customers grew 630% with a cumulative average growth rate (CAGR) of 28%.

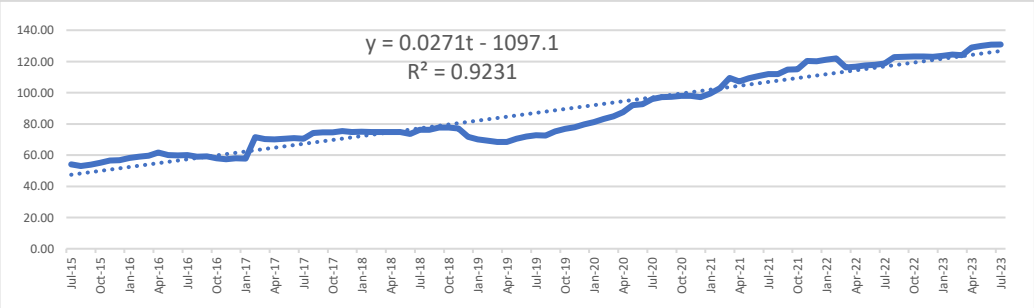
Figure 2: MFS adoption (Number and amount of MFS transactions in a million)



Source: Bangladesh Bank; Author's Compilation and Calculation

Significant growth in MFS transactions occurred over the period (Figure 2). Within 97 months of the study period from July 2015 to July 2023, MFS transactions grew 395% and 612%, with a CAGR of 22% and 27% in number and amount, respectively.

Figure 3: MFS customers to MFS agents' ratio



Source: Bangladesh Bank; Author's Compilation and Calculation

Figure-3 exhibits that the ratio of registered MFS customers to MFS agents during the study period reached 130.89 in July 2023 from 53.98 in December 2018, which shows that the rate of increase for MFS customers is consistently getting higher than that of agents. The increasing trend of electronic mode of MFS

transactions may be a reason for the sharply consistent rate of increase in MFS customers with respect to that of agents. Because, unlike cash-in and cash-out, the transactions made in electronic mode on the MFS platform do not require any support or involvement from the MFS agents. The necessity of agents with respect to total customers will gradually decrease with the pace of adopting the MFS customers' electronic mode of MFS transactions.

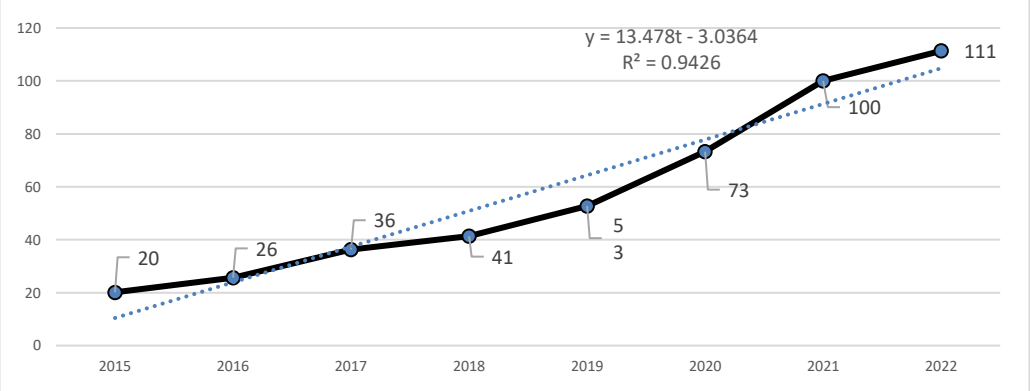
Table 6: Male/Female and Urban/Rural MFS Customers as % of Total MFS Customers

	Male Account	Female Account	Urban Account	Rural Account	Urban Male Account	Urban Female Account	Rural Male Account	Rural Female Account
At Starting month (Dec 18)	53%	47%	35%	65%	22%	13%	31%	34%
At Ending month (July 23)	58%	42%	44%	56%	26%	18%	32%	24%
Minimum	51%	41%	35%	55%	22%	13%	28%	23%
Maximum	59%	49%	45%	65%	28%	18%	33%	35%
Average	55%	45%	40%	60%	24%	16%	31%	29%
Standard Deviation	3%	3%	3%	3%	2%	2%	2%	4%

Source: Statistics Department, Bangladesh Bank; Author's Compilation and Calculation

It is observed (Table-6) that MFS accounts are more in rural parts than in urban parts, and male accounts are higher than female accounts, on average, both in urban and rural areas, during the study period. The financial literacy rate in urban parts is usually higher than in rural parts. There are different types of financial services available in urban areas. People living in urban areas and having adequate levels of financial literacy mostly like transactions through commercial banks because of the nature and variety of the services. So, as an option, MFS is mostly preferable in rural areas among low-income people to make small value transfers.

Figure 4: MFS Accounts per 100 People



Source: MFS account data from Bangladesh Bank and population data from Macro trends, 2023; calculation by author.

MFS accounts per 100 people (other than institutional accounts) in Bangladesh reached 111 in 2022 from 20 in 2015 (Figure-4). It is worth mentioning that a person cannot open more than one account on a particular MFS platform as it is linked with a National Identity Document (NID). However, some people have more than one MFS account on different MFS platforms based on their needs. So, the number of MFS accounts has reached more than the country's total population. The gradual increase in MFS accounts per 100 people proves increasing access to a formal financial system.

5.2 Hypothesis Test

The descriptive statistics of the variables related to MFS usage are shown in Table-7.

Table 7: Descriptive Statistics (MFS Usage)

Variable	Obs	Mean	Std. Dev.	Min	Max
CashInAmt	56	0.33	0.04	0.27	0.40
CashOutAmt	56	0.31	0.04	0.25	0.40
P2PAmt	56	0.26	0.04	0.16	0.31
MerPayAmt	56	0.03	0.02	0.01	0.06
G2PAmt	56	0.01	0.01	0.00	0.05
SalDisbAmt	56	0.03	0.01	0.02	0.07
UtiBillPayAmt	56	0.02	0.01	0.01	0.03
CashInNo	56	0.30	0.04	0.23	0.41

Variable	Obs	Mean	Std. Dev.	Min	Max
CashOutNo	56	0.30	0.03	0.24	0.37
P2PNo	56	0.25	0.04	0.15	0.32
MerPayNo	56	0.05	0.01	0.03	0.08
G2PNo	56	0.03	0.03	0.00	0.13
SalDisbNo	56	0.02	0.01	0.01	0.04
UtiBillPayNo	56	0.05	0.02	0.01	0.07

Source: Bangladesh Bank; Author's Compilation & calculation.

The results of the unit root test conducted to find out whether the time series data set is stationary at level or stationary at first difference have been shown in Table 8. Augmented Dickey-Fuller test (ADF) and Phillips-Perron Test (PP) have been used at the level and first difference under the assumption of constant and constant & trend.

Table 8: Results of ADF and PP Tests for Stationarity

Variable	Level				First Difference			
	Intercept		Intercept and Trend		Intercept		Intercept and Trend	
	ADF	PP	ADF	PP	ADF	PP	ADF	PP
CashInNo	0.19	-0.01	-3.06	-19.95*	-5.18***	-58.53***	-5.13***	-58.43***
CashOutNo	0.81	0.15	-1.57	-6.15	-8.44***	-64.48***	-9.61***	-65.74***
P2PNo	-1.34	-0.56	-2.31	-10.34	-7.71***	-67.87***	-8.55***	-70.19***
MerPayNo	-1.70*	-0.37	-2.86	-20.34*	-6.55***	-74.00***	-6.70***	-75.06***
G2PNo	-1.13	-3.96	-5.50	-40.92***	-8.47***	-62.50***	-8.29***	-62.50***
SalDisbNo	-0.13	0.01	-2.51	-33.74***	-6.36***	-90.43***	-6.29***	-90.30***
UtiBillPayNo	-2.21**	-0.53	-2.24	-13.36	-6.63***	-74.08***	-7.69***	-75.02***
CashInAmt	0.52	0.12	-2.07	-8.94	-4.32***	-60.01***	-4.38***	-61.01***
CashOutAmt	1.15	0.20	-1.39	-5.74	-5.47***	-70.63***	-6.16***	-72.73***
P2PAmt	-1.62*	-0.54	-2.45	-7.51	-5.46***	-55.16***	-6.10***	-59.16***
MerPayAmt	-1.59	-0.36	-1.308	-6.29	-4.98***	-77.43***	-5.08***	-78.24***
G2PAmt	-0.80	-1.88	-5.41	-40.74	-7.66***	-62.52***	-7.48***	-62.49***
SalDisbAmt	-0.28	-0.04	-2.56	-40.69***	-8.43***	-90.35***	-8.45***	-90.29***
UtiBillPayAmt	-1.36	-0.32	-3.06	-26.32***	-5.64***	-76.10***	-5.74***	-76.56***

Note: Logarithmic transformations of the series are applied to the test.
Null Hypothesis: Series contain unit root; significance at 1% ***, 5% **, and 10% *.
Source: Author's Calculation with Stata 14.2.

The results in Table-8 show that all of the variables under study are non-stationary at level as no variable complies with both ADF and PP simultaneously. However, at first differences, both ADF and PP tests reject the null in the cases of all variables and in both cases of 'constant' and 'constant and trend'. This signifies that all variables are stationary at first difference. The ADF and PP test

results confirm that the variables are integrated in order 1. This satisfies the condition of running the cointegration test.

Table-9 shows optimal lag length results. Akaike Information Criterion, Schwarz Bayesian Criterion, Hannan-Quinn, and Log Likelihood are the most common measures to determine the number of lags. Based on these criteria, the optimal lag length for all models has been found.

Table 9: Optimal Lag Length Results

Model I				
Variable	**CashInNo**	**P2PNo**	**SalDisbNo**	**G2PNo**
Optimal lag length	1	1	0	0
Model II				
Variable	**CashInAmt**	**P2PAmt**	**SalDisbAmt**	**G2PAmt**
Optimal lag length	1	1	3	4
Model III				
Variable	**CashOutNo**	**P2PNo**	**MerPayNo**	**UtiBillPayNo**
Optimal lag length	1	1	1	1
Model IV				
Variable	**CashOutAmt**	**P2PAmt**	**MerPayAmt**	**UtiBillPayAmt**
Optimal lag length	1	1	1	0

Source: Author's Calculation with STATA 14.2.

Then, we proceed with ARDL cointegration tests (F-bounds test). It becomes evident that for each of the models, there is a long-run relationship among the variables (Table-10).

Table 10: ARDL Cointegration Tests (F Bounds Test) Results

Model	**F-statistic**	**F-critical value**	**t-statistic**	**t-critical value**
Model I	52.604	2.720	-8.903	-2.570
Model II	19.424	2.720	-8.508	-2.570
Model III	35.869	2.720	-10.702	-2.570
Model IV	54.115	2.720	-14.275	-2.570

Source: Author's Calculation with STATA 14.2.

As F-statistics are greater than F-critical value and t-statistics are less than t-critical value in for all models, the null of no cointegration can be rejected at a 1% level. This confirms the long-run relationship among the variables in all models.

After being confirmed of a long-run relationship, the full ARDL estimation has been conducted using the optimal lag length to explore the impact of the electronic mode of MFS usages on traditional cash-based MFS usages.

The values of the models' Coefficient of Determination (R square and Adjusted R square) are 0.8560 and 0.8410 respectively for Model-I (Table-11a); 0.8499 and 0.8025, respectively for Model-II (Table-11b); 0.8555 and 0.8335 respectively for Model-III (Table-11c); and 0.8599 and 0.8420, respectively for Model-IV (Table-11d). These values show that the independent variables under reference correlate highly with the dependent variable in all four models. The variation caused by independent variables on the dependent variable is significant and cannot be left to chance factors.

Table 11a: ARDL Estimation Results (Significant Regression Coefficients) of the Long-run and Short-run Impacts: Model-I

Variable	Coefficient	Standard errors	P-values
CashInNo (L1)	-0.807***	0.091	0.000
Long Run			
P2PNo	-0.340*	0.184	0.071
SalDisbNo	-0.155***	0.040	0.000
G2PNo	-0.027***	0.006	0.000
Short Run			
P2PNo	0.256***	0.081	0.003

Table 11b: ARDL Estimation Results (Significant Regression Coefficients) of the Long-run and Short-run Impacts: Model-II

Variable	Coefficient	Standard errors	P-values
CashInAmt (L1)	-1.271***	0.149	0.000
Long Run			
P2PAmt	-0.382***	0.084	0.000
SalDisbAmt	-0.181***	0.055	0.002
G2PAmt	-0.037***	0.008	0.000
Short Run			
SalDisbAmt (D1)	0.171***	0.063	0.010

Variable	Coefficient	Standard errors	P-values
SalDisbAmt (LD)	0.084*	0.043	0.059
G2PAmt (D1)	0.028***	0.009	0.004
G2PAmt (LD)	0.020***	0.007	0.006
G2PAmt (L2D)	0.010***	0.005	0.037
G2PAmt (L3D)	0.006***	0.003	0.030

Table 11c: ARDL Estimation Results (Significant Regression Coefficients) of the Long-run and Short-run impacts: Model-III

Variable	Coefficient	Standard errors	P-values
CashOutNo (L1)	-1.294***	0.121	0.000
Long Run			
P2PNo	-0.367***	0.058	0.000
MerPayNo	-0.144***	0.042	0.001
Short Run			
P2PNo (D1)	0.207***	0.054	0.000

Table 11d: ARDL Estimation Results (Significant Regression Coefficients) of the Long-run and Short-run impacts: Model-IV

Variable	Coefficient	Standard errors	P-values
CashOutAmt (L1)	-1.522***	0.107	0.000
Long Run			
P2PAmt	-0.429***	0.057	0.000
MerPayAmt	-0.118***	0.025	0.000
Short Run			
P2PAmt (D1)	0.377***	0.065	0.000
MerPayAmt (D1)	0.066***	0.024	0.008

Source: Author's Calculation with STATA 14.2.
Note: Significance at 1%=***; 5%=**; and 10%=*; In time series ARDL estimation, L1 indicates the lagged value of a variable based on its value in the previous period; D1 indicates level or zero lag, LD indicates lag difference; L2D indicates one-period lag, and so on.

It is observed that in all four models, almost all the independent variables have a significant influence on the dependent variables in the long run. As hypothesized, in the case of cash-in transactions with respect to both number and amount, a negative and statistically significant (at 1% level) relationship with all independent variables is found in the long run. It is found that P2P transactions, salary disbursement (B2P), and G2P transactions have negative coefficients and are statistically significant at a 1% level in most cases. This means that all these independent variables negatively influence cash-in transactions in the long run.

The inclination of customers to use electronic modes of MFS transactions is causing a significant reduction in cash-in during the study period.

As expected, in the case of Cash-out transactions, with respect to both number and amount, a negative and statistically significant (at 1% level) relationship with all the independent variables, except utility bill payment, is found in the long run. With respect to both number and amount, it is found that P2P transactions and merchant payments (P2B, B2B, and P2G) have negative coefficients and are statistically significant at a 1% level in all cases in the long run. The inclination of electronic modes of MFS transactions among the customers is causing a significant reduction in cash-out during the study period in the long run.

In the short run, most variables are not statistically significant, and few have positive coefficients, contrary to our expectations. So, the impact of the variables is not found to be immediate. Only long-term impacts are found. This means all these independent variables negatively influence cash-out transactions only in the long run, not in the short run.

Table 12: Diagnostic Test Results

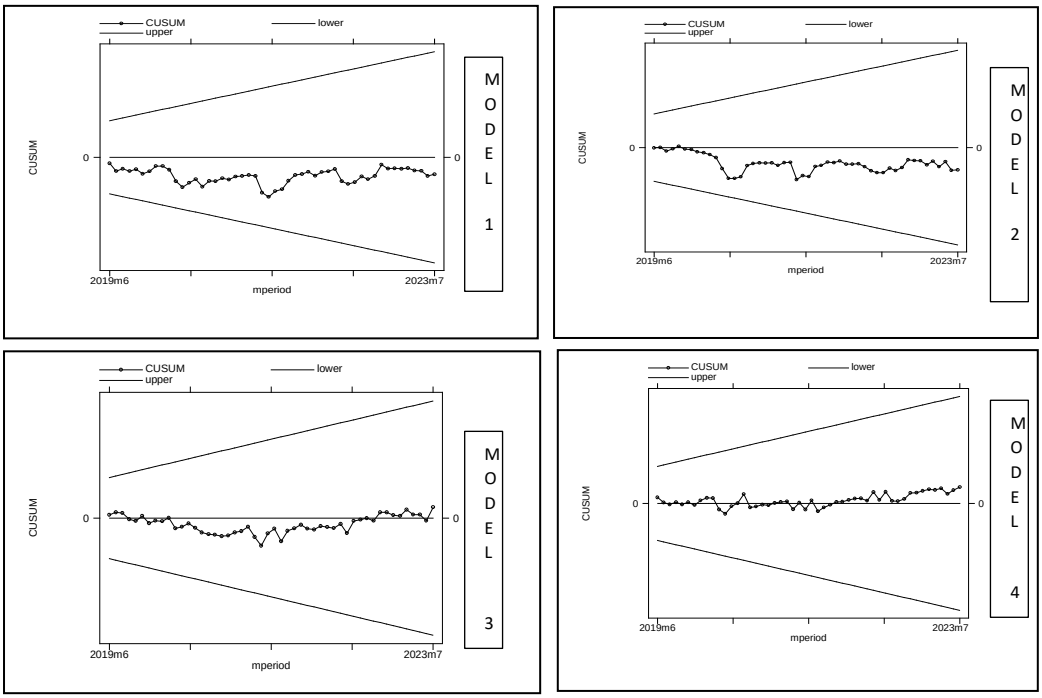
Model	Mean VIF	Durbin-Watson test	Breusch-Godfrey LM test (Prob>Chi2)	White's test (Prob > chi2)
Model I	2.25	d-statistic (6, 54) = 2.101003	0.628	0.542
Model II	3.99	d-statistic (13, 51) = 2.171245	0.179	0.434
Model III	3.99	d-statistic (8, 54) = 2.017113	0.328	0.306
Model IV	2.66	d-statistic (7, 54) = 2.016111	0.820	0.220

Source: Author's Calculation with STATA 14.2.

The results in Table-12 show that there is no multicollinearity, autocorrelation, or heteroscedasticity in any of the models. This validated the reliability of the models.

Moreover, the CUSUM tests validate the stability of the models' estimated coefficients (Figure-5).

Figure 5: Cumulative Sum (CUSUM) Charts of All Models



Source: Author's Developed by STATA.

Figure-5 exhibits the CUSUM charts from the CUSUM test, which uses the sum of recursive residuals to determine random movements in the estimated parameters (Brown et al., 1975). As the plots of all the models in Figure 5 lie within the upper and lower control limits in the case of all four models, they confirm the stability of the estimated coefficients.

Based on the above findings and analysis, there seems to be a significant reduction in the share of cash-based usage of MFS transactions that is substituted by electronic modes of MFS transactions, such as P2P, P2B, B2P, B2B, G2P, and P2G transactions. However, the share of cash-based MFS transactions is still dominating. There is a necessity to increase the scopes of both getting and spending money in electronic modes in the MFS platform and increasing these scopes will accelerate MFS penetration in such a way that may reduce the cash-based mode of MFS transactions at a faster speed and electronic modes of MFS transactions will be a potential substitute for cash-based modes.

6. Conclusion, Limitations, and Areas of Further Research

With the global pace, in recent times, the financial landscape in Bangladesh is transforming from traditional to electronic. Consumer behavior and demand have also changed toward contactless and cashless transactions.

Usually, MFS transactions are made for a small amount of value transfer. It is observed that MFS customers and MFS transactions are increasing consistently. The ratio of the number of MFS customers to MFS agents is gradually becoming steeper, which shows that the rate of increase for MFS customers is consistently getting higher than that of agents. The necessity of agents with respect to total customers decreases gradually with the pace of the MFS customers' usage of electronic mode of MFS transactions.

MFS accounts in respect of the total population have reached such a height that it can be inferred that in Bangladesh, most adult people with the least financial literacy have at least one MFS account. It is an instance-creating phenomenon globally that Bangladesh, a country with many people lacking adequate financial literacy, has increased MFS accounts per hundred people more than five times within seven years (2015-2022), covering almost all eligible people. Favorable government policies, central bank initiatives, efforts of industry players, and people's inclinations have helped accelerate MFS penetration in the country. Regarding the rate of MFS penetration, Bangladesh may be a role model for countries where many people are unbanked.

Though the major portion of MFS usage still comprises traditional cash-based methods, like cash in and out, cash usage is significantly being replaced by other means of usage that do not require cash handling to make a transaction. It has been found that regarding different types of usages of MFS, traditional cash in and out methods are being reduced by modern electronic payment usages like P2P, B2B, B2P, P2B, P2G, and G2P transactions. Though the impact is not immediate, there is empirical evidence of significant long-run impact. P2P transactions are found to be the cause of the reduction of both cash-in and cash-out. Merchant payments (P2B and B2B) are found to be the cause of the decrease in cash-out, whereas G2P and salary disbursement (B2P) for cash-in.

Initiatives are required to create more scopes regarding MFS usage through electronic gateways in the country so that the transfer of funds can be initiated through the MFS electronic gateways, reducing the dependency on cash in and out.

This study has several limitations. Data for 56 months have been studied to analyze MFS usage patterns. If the data for more months can be studied, the analysis might be more convincing. The country-level aggregate data has been used to study usage patterns empirically. It expresses the country-level phenomenon at an aggregate level. In Bangladesh, most of the people live in rural areas. If the usage pattern of MFS can be investigated separately for rural and urban areas, the findings might be more robust.

In this study, MFS penetration and transaction level as a whole has been considered. Individual MFS provider-level impact analysis can be an area of further research to get more specific results related to the penetration of MFS regarding the particular MFS providers. Geographical area-wise analysis of MFS penetration may be another area of further research as it may provide another stream of specific findings based on the socio-geographical scenario.

Endnote:

In this paper, the local currency, the Bangladeshi Taka (BDT), has been used. For the convenience of comparing BDT to USD, the applicable conversion rate of BDT and USD was BDT 110 = USD 1 as of 31 July 2023.

References

ADB. (2022). Gender equality and social inclusion diagnostic for the finance sector of Bangladesh. A report published by the *Asian Development Bank (ADB)*. Retrieved from https://www.adb.org/sites/default/files/ publication/849161/gender-equality-social-inclusion-finance-bangladesh.pdf (Accessed 3 March 2023).

Abdinoor, A., & Mbamba, U. O. (2017). Factors influencing consumers' adoption of mobile financial services in Tanzania. *Cogent Business & Management*, *4*(1), 1392273. https://doi.org/10.1080/23311975.201 7.13 9 2273.

Adjei, J. K., Odei-Appiah, S., & Tobbin, P. E. (2020). Explaining the determinants of continual use of mobile financial services. *Digital Policy, Regulation and Governance*, *22*(1), 15-31. https://doi.org/10.1108/DPRG-09-2019-0074.

Akhtaruzzaman, M., Islam, M. E., Islam, M. S., Islam, S. R., Bhuiyan, M. R. U., Tareq, M., & Palas, M. J. U. (2017). An Impact Study on Mobile Financial Services (MFSs) in Bangladesh. *Bangladesh Bank.* Retrieved from https://www.bb.org.bd/pub/special/ impact_mfs_27092018.pdf.

Akhter, N., & Khalily, M. B. (2020). An analysis of mobile financial services and financial inclusion in Bangladesh. *Indian Journal of Human Development*, *14*(2), 213–233. https://doi.org/10.1177 /0973703020 946706.

Azad, A., & Rahman, A. (2022). The state of DFS consumer protection in Bangladesh. *Policy Research Institute Bangladesh.* Retrieved from http://www.pri-bd.org/economy/the-state-of-dfs-consumer-protection-in-bangladesh/ (accessed on 27 February 23).

Bangladesh Bank. (2012). Mobile financial services in Bangladesh: An overview of market development. *Bangladesh Bank Policy Paper*. Retrieved from https://www.bb. org.bd/ pub/research/policypaper/pp072012.pdf.

Bangladesh Bank. (2022). Bangladesh Bank Annual Report 2021-22. *Bangladesh Bank*. Retrieved from https://www.bb.org.bd/en/index.php/ publication/ publictn/0/2 (Accessed 30 November 2023).

Bangladesh Bank. (2023). Bangladesh Bank Annual Report 2022-23. *Bangladesh Bank*. Retrieved from https://www.bb.org.bd/pub/ annual/anreport/ ar2022-2023.pdf (Accessed 28 May 2023).

Bangladesh MFS Regulations. (2022). Bangladesh Mobile Financial Services (MFS) Regulations. *Payment Systems Department, Bangladesh Bank*. Retrieved from https://www.bb.org.bd/ mediaroom/ circulars/ psd/feb152022psd04e.pdf (Accessed 3 November 2023).

BIGD. (2020). Last Mile Experience of Mobile Financial Services during Covid-19. An webinar arranged by the *BRAC Institute of Governance and Development (BIGD)*. Retrieved from https://bigd.bracu.ac.bd/wp-content/uploads/2021/08/ Webinar-Deck-Last-Mile-Experience-of-MFS-during-COVID-19.pdf (accessed 30 October 2023).

Breusch, T. S. (1978). Testing for autocorrelation in dynamic linear models. *Australian Economic Papers*, *17*(31), 334-355. https://doi.org/ 10.1111/j.1467-8454.1978.tb006 35.x.

Brown, R. L., Durbin, J., & Evans, J. M. (1975). Techniques for testing the constancy of regression relationships over time. *Journal of the Royal Statistical Society Series B: Statistical Methodology*, *37*(2), 149–163. http://www.jstor.org/stable/2984889.

BTRC. (2023). Bangladesh Telecommunication Regulatory Commission website. *Bangladesh Telecommunication Regulatory Commission*. Retrieved from http://www.btrc.gov. bd/site/page/347df7fe-409f-451e-a415-65b109a207f5/ (accessed 20 September 2023).

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, *74*(366a), 427–431. https://doi.org/ 10.2307 /2286348.

Duasa, J. (2007). Determinants of Malaysian trade balance: An ARDL bound testing approach. *Global economic review*, *36*(1), 89–102. https://doi.org/10.1080/12265080701217405.

Durbin, J., & Watson, G. S. (1971). Testing for serial correlation in least squares regression III. *Biometrika,* 58, 1-19.

Ehsan, Z. A., Musleh, N., Gomes, V., Ahmed, W., & Ferdous, M. D. (2019). The usage of mobile financial services in Bangladesh. *Munich Personal RePEc Archive (MPRA)*. Paper No. 109974. Retrieved from https://mpra.ub.uni-muenchen.de/109974.

Engle, R. F. & Granger, C. W. (1987). Cointegration and error correction: representation, estimation, and testing. *Econometrica: Journal of the Econometric Society*, 55(2), 251–276. https://doi.org/10.2307/1913236.

Fernandes, C., Borges, M. R., & Caiado, J. (2021). The contribution of digital financial services to financial inclusion in Mozambique: an ARDL model approach. *Applied Economics*, *53*(3), 400-409.

Godfrey, L. G. (1978). Testing against general autoregressive and moving average error models when the regressors include lagged dependent variables. *Econometrica: Journal of the Econometric Society*, 1293–1301. https://doi.org/10.2307/1913829.

Kabir, M. H., Huda, S. S., & Faruq, O. (2020). Mobile financial services in the context of Bangladesh. *Copernican Journal of Finance & Accounting*, *9*(3), 83-98. https://doi.org/10.12775/CJFA.2020.013.

Kanobe, F., Alexander, P. M., & Bwalya, K. J. (2017). Policies, regulations, and procedures and their effects on mobile money systems in Uganda. *The Electronic Journal of Information Systems in Developing Countries*, *83*(1), 1-15.

Kapoor, A., Sindwani, R., & Goel, M. (2024). Mobile wallets: Theoretical and empirical analysis. *Global Business Review*, 25(2_suppl), S211-S228.

Macrotrends. (2023). Retrieved from https://www.macrotrends.net/countries/BGD/ Bangladesh (accessed 21 September 2023).

Mowla, K. G. R., & Tani S. S. (2020). Mobile Financial Services in Bangladesh: Trends and Driving Forces. *Journal of Banking & Financial Services*, *71*.

Ouma, S. A., Odongo, T. M., & Were, M. (2017). Mobile financial services and financial inclusion: Is it a boon for savings mobilization? *Review of development finance*, *7*(1), 29–35. http://dx.doi.org/10.1016 /j.rdf.2017.01.001.

Parvez, J., Islam, A., & Woodard, J. (2015). Mobile financial services in Bangladesh. *USAID, mSTAR and fhi360*. Retrieved from https://www.marketlinks.org/sites/default/files/ resource/files/ MFSin Bangladesh_April2015.pdf.

Pazarbasioglu, C., Mora, A. G., Uttamchandani, M., Natarajan, H., Feyen, E., & Saal, M. (2020). Digital financial services. *World Bank*, *54*.

Pesaran, M. H., & Shin, Y. (1995). An autoregressive distributed lag modeling approach to cointegration analysis. *Cambridge (Vol. 9514), UK: Department of Applied Economics, University of Cambridge*. http://dx.doi.org/10.1017/CCOL0521633230.011.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, *16*(3), 289-326. http://dx.doi.org/10.1002/jae.616.

Phillips, P. C., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika*, *75*(2), 335-346. https://doi.org/10.2307/2336182.

Sultana, B., & Khan, M. R. (2016). Are mobile financial services promoting financial inclusion in Bangladesh? An assessment study (No. id: 11914). *Bangladesh Bank*. Retrieved from https://www.bb.org.bd/ pub/research/ workingpaper/wp1623.pdf.

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica: Journal of the Econometric Society*, 48(4), 817–838. https://doi.org/10.2307/1912934.

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Note

Past, Present and Future of Bangladesh Institute of Bank Management (BIBM)

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1. Introduction

A. The importance of training has been felt since the very early stage of human civilization. Training refers to the systematic development of knowledge, skills, and attitudes required by employees to perform adequately on a given task or job. Hence, training plays a predominant role in transforming the workforce into value-added resources. It facilitates keeping staff updated with the latest systems, improving performance, self-assessment, retaining staff and attracting new talent. As a whole, it is conclusive that there is a positive relationship between training and employee motivation.

B. Banks across the globe are always aware that there are continuous changes and innovations in the financial sector and these are not set to slow down anytime. Banks perform the act of financial intermediation by offering a wide range of product-market mix to customers. Further, to survive in the competitive market environment and to extend value-added services to different groups of customers, banks need to strengthen their organizational capacity with well trained and skilled manpower. As such, training has gained profound importance and attention to the banking fraternity in Bangladesh like any other countries in the world.

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2. Birth of the BIBM

A. Immediately after the glorious victory in the Liberation War, Bangladesh inherited a war-ravaged economy and a shattered banking sector due to the exodus of massive bank deposits, capital transfers, and outmigration of the then Pakistani bank owners during the War of Liberation. To revive the banking sector, the then State Bank of Pakistan in the East wing was changed to the Bangladesh Bank with all statutory authority and functions of a central bank. All private banks, owned by erstwhile Pakistani entrepreneurs except foreign banks at that time had to be subsequently nationalized.

B. As a part of a reorganization of the banking sector, the then Government started work for producing efficient banking professionals. The government recruited 1,000 fresh bank officers through a Bankers' Recruitment Committee. But the absence of any institute to train bank professionals was felt seriously lacking in developing professionals suited for the banking sector. This prompted to form an 11-member Task Force with the assignment of addressing the problem. Members of the Task Force were sent to the 'National Institute of Bank Management (NIBM)', Pune, India where they received training. After their return, they recommended for setting up a training institute for bankers in Bangladesh.

C. Accordingly, the Bangladesh Institute of Bank Management (BIBM) was established and began its nascent journey in Bangladesh Bank's office, Sadarghat on March 28, 1974, before its registration which was completed later on 31st December dated in the same year under The Societies Registration Act, 1860. Afterwards, it was moved from Sadarghat to the rented space of Lalmatia and Siddheswari, respectively and finally grounded its activities in its current premises at Mirpur in 1984.

3. Past and Present of BIBM: 1974 -2023

The initial objective of the BIBM was to develop professionally qualified and competent bankers primarily through a process of training and continuing professional development programs for mid-level bank executives, conducting research and offering consultancy in the areas of banking and finance which are

all complementary with each other. Subsequently, BIBM introduced post-graduation programs with launching Masters in Bank Management (MBM) and MBM-Evening program in 1997 and 2006, respectively. This section has picturized the past and present activities of BIBM based on the data set maintained by the BIBM's archive. Both tabular form and graphical approaches along with simple calculation techniques like Compound Annual Growth Rate (CAGR) have been utilized in portraying BIBM activities.

3.1. Training Courses, Workshops and Certification Programs

After its establishment in 1974, BIBM witnessed several turns and tides in the banking sector like bank nationalization, licensing new private banks, spreading branch network across the country, undertaking Financial Sector Reforms, initiating market-based exchange and interest rates, reducing the soaring NPL during the last five decades and positioned itself well to meet the changing demands of the skilled human resources of the banking sector. With the advent of aforesaid changes, and consequent transformation of the banking scenario in the country, the Institute continues its journey towards blossoming as a center of excellence. In this process, BIBM has come out from its initial focus and extended its activities multiple times through tailoring to the emerging needs of the banking system. Training which always occupied the centre stage of BIBM operation is now contemplated as very effective in capacity building of bank executives as all training programs of the Institute are need-based, cover contemporary issues and contents in line with the global and local banking phenomena, provide face-to-face knowledge with state-of-the-art classroom facilities and methods, and online training with utilizing modern technologies.

3.1.1. Overview of Training Courses and Workshops

A. Training Courses and Workshops: Executives Participated During 1974-2023

The number of training participants was low during the initial period as erstwhile BIBM was able to conduct only a few training courses. With the passage of time, the capacity of BIBM as well as the number of training courses and workshops have increased manifolds, and hence the number of trainees as well. The total number of trainees who participated in all training programs conducted

in 1974 was only 258, while in 2023 the number of participants of all courses and workshops was increased to as high as around 5000 registering a CAGR of 6.10 per cent (Table-3.1). Introducing more new courses and workshops by BIBM, increasing the number of banks along with their focus on creating a strong pool of manpower, nominating and accommodating more participants in the programs have contributed to the increased number of trainees in recent years.

Table 3.1. Executives Participated in Training Courses and Training Workshops: 1974-2023

Year	Participants	Year	Participants	Year	Participants	Year	Participants	Year	Participants	Year	Participants
		1981	1030	1991	2067	2001	1938	2011	2636	2021	3503
		1982	915	1992	2077	2002	2124	2012	2789	2022	4117
		1983	817	1993	1902	2003	2781	2013	3296	2023	4975
1974	258	1984	1170	1994	1499	2004	2705	2014	3560		
1975	517	1985	1259	1995	1482	2005	2433	2015	3752		
1976	520	1986	1234	1996	1514	2006	3651	2016	4093		
1977	580	1987	892	1997	1464	2007	3989	2017	4022		
1978	620	1988	757	1998	1340	2008	3632	2018	3905		
1979	712	1989	1241	1999	1604	2009	4250	2019	3373		
1980	1198	1990	1407	2000	2176	2010	2632	2020	4556		
CAGR	23.98		3.17		0.52		3.11		5.62		-0.93
CAGR (1974-2023)	6.10										

Source: BIBM's Archieve, BIBM Academic Calender 2023 and Researchers' Calculations

B. Training Courses and Workshops: In-house and Outreach Programs During 2015 - 2024

BIBM used to offer training courses and workshops on its campus only, subsequently, it initiated Outreach Training Programs in 1997 in divisional towns at the Bangladesh Bank regional office. The objective of this program is to facilitate the capacity building of banking professionals at the regional level. However, conducting training courses and workshops is still overly concentrated

in the 'In-house' arrangement (Table-3.2). Further, with respect to distribution of courses and workshops, it is revealed that the number of training workshops has shown an increasing trend whereas the number of training courses remains almost the same during the period. This is happened as banks prefer to send more officers to workshops having relatively less duration as compared to training courses. Another reason for such preferences is to get more practical knowledge from case- studies which is the primary content of training workshops. Hence in line with banks' demand, BIBM also offers more training workshops than courses.

Table 3.2: Distribution of In-house and Outreach Training Course and Workshop Programs: 2015 – 2024

Year	In-house Programs				Outreach Programs		Ratio between In-house and Outreach Training Programs	
	Training Courses	Training Workshops	Total Courses & Workshops	Total Participants	Total Courses & Workshops	Total Participants	Total Courses & Workshops	Participants of In-house and Outreach Training Programs
2015	52	46	98	3409	6	343	16.33	9.94
-	-	-	-	-	-	-	-	-
2020	46	49	95	4261	7	295	13.57	14.44
2021	47	53	100	3084	8	419	12.5	7.36
2022	45	55	100	3688	8	429	12.5	8.6
2023	44	63	107	4601	8	374	13.38	12.3
2024	46	63	109	3375	8	269	13.63	12.55
CAGR (2015-2020)	-2.02	1.06	-0.52	3.79	2.6	-2.48		
CAGR (2020-2024)	0	13.39	7.12	-11	6.9	-4.51		
CAGR (2015-2024)	-1.22	3.19	1.07	-0.1	2.92	-2.4		

Source: BIBM's Archieve, BIBM Academic Calender 2024 and Researchers' Calculations

C. Group-wise Distribution of Training Programs Conducted in 2024

A wide range of courses and workshops have been offered by BIBM under different disciplines/ areas considering the existing demand for training in the banking sector. In response to the new changes in regulations, policies, and operation systems, BIBM also quickly responds to the demand of banks by undertaking new courses and workshops on the new and changed areas of banking. Among the offered training courses and workshop programs, human resources, credit management, international banking, and IT/computer related training courses are the most repeated programs indicating higher demand for these courses among the participants. This is evidenced by the total number of courses and workshops arranged by the Institute in 2024 (Table-3.3).

Table 3.3.: Group-wise Distribution of Training Programs Conducted in 2024

Category of Training	Training Courses		Training Workshops		Total	
	Number	Participants	Number	Participants	Number	Participants
Human Resource Management and Bank Marketing	6	164	10	267	16	431
Bank and Branch Management Including General Banking	4	113	1	31	5	144
Regulatory and Supervisory Issues in Bank Management including ICC, AML & CFT	6	155	7	279	13	434
Credit Management Including Investment & Merchant Banking	5	191	9	221	14	412
CMSME, Rural Financing and Inclusive Banking	4	115	7	225	11	340
Risk Management	4	114	4	150	8	264
International Banking Including Foreign Trade and Foreign Exchange Operations	7	244	7	246	14	490
ICT, E-Banking, Financial Technology, Cyber Crime and Security	6	224	8	266	14	490
Islamic Banking and Finance	3	142	5	200	8	342
Total	**45**	**1462**	**58**	**58**	**58**	**58**

Source: BIBM's Archieve, Academic Calender 2024 and Researchers' Calculations

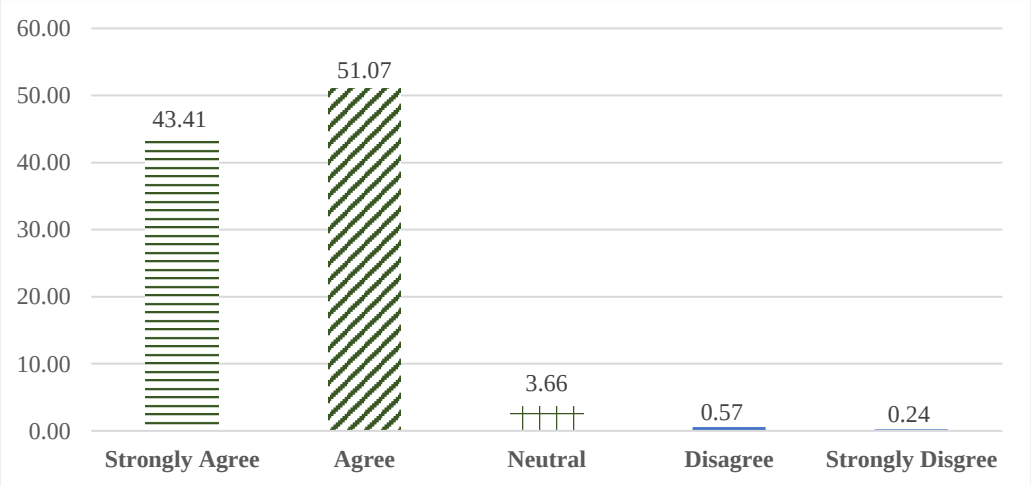
3.1.2. Effectiveness of Training Courses and Workshops

This section assesses the effectiveness of training courses and workshops in the light of indicators suggested by Donald Kirkpatrick in 2006. Responses of the participants have been collected from all course and workshop evaluation forms completed by trainees in 2024.

A. Improvement of Banking Knowledge and Skill at the Personal Level

With regard to the improvement of personal knowledge and skill, the maximum number of respondents (51.07) agreed that training programs are effective in enhancing their knowledge as well as skill level (Figure-3.1.). This is followed by 43.41 per cent of trainees who expressed their strong agreement about the effectiveness of BIBM's courses and workshops in upgrading their knowledge and skills. This can be concluded that training programs offered by BIBM contribute positively to the capacity building of trainees.

Figure 3.1: Improvement of Banking Knowledge and Skill at the Personal Level



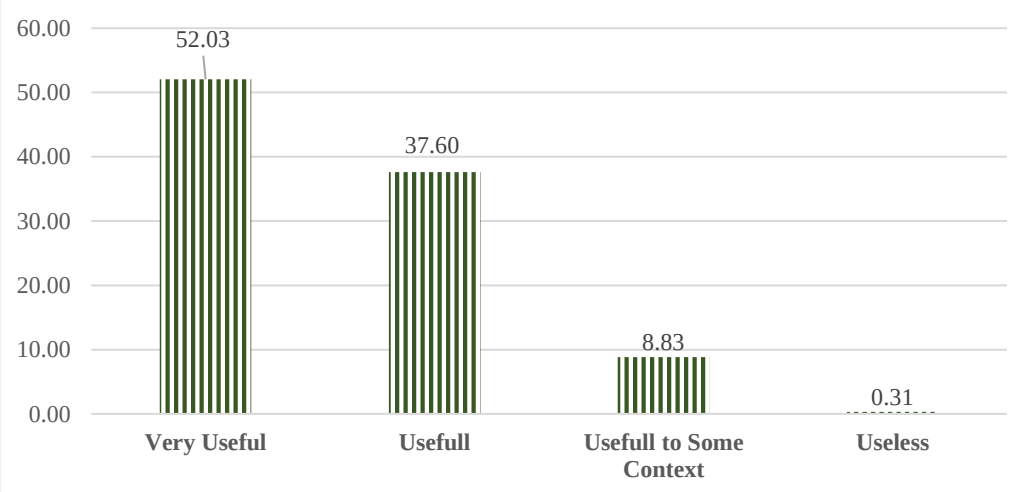
Source: BIBM's Archieve and Researchers' Calculations

B. Usefulness for Banks as well as the Banking Sector

In response to the question about the usefulness of training programs for banks as well as the banking sector as a whole, the opinions of the respondents clearly envisaged that training programs of BIBM are very useful for the

individual bank as well as the banking sector. Around 52 per cent of respondents clearly opined that courses and workshops offered by BIBM are very useful not only for banks but also for the entire banking sector (Figure 3.2). The second highest respondents i.e. 37.60 per cent visualized that these programs are useful for both banks and the banking sector as a whole. BIBMs' programs have, therefore, very clear and positive impact so far on the betterment of the banking sector.

Figure 3.2: Usefulness for Banks as well as Banking Sector



Source: BIBM's Archieve and Researchers' Calculations

C. Benefits of BIBM Training Programs[1]

Figure-3.3 shows the average score for various benefits "before" and "after" the training received. Respondents remained neutral in terms of 'increment in salary' as a result of training received. Except this, in all other cases, a clear incremental positive effect is observed due to training.

[1] The respondents were asked to rank the benefits of training, on a scale of 1 to 5, with 5 standing for 'outstanding', 4 for 'very good', 3 for 'good' 2 for 'fair' and 1 for 'poor'.

Figure 3.3: Benefits of BIBM Training Programs

Source: BIBM's Archieve and Researchers' Calculations

3.1.3. Certification Programs of BIBM

As part of broadening BIBM activities commensuration with the necessity of the banking sector, BIBM initiated 'Certification Programs' in January 2015 to groom banks' executives as experts in a particular field that is important for running the banking and financial services industry efficiently. As of today, BIBM offers a total number of 75 (seventy-five) intakes under 7 (seven) certification programs and till today 2030 students have earned the prestigious certified expert certification from BIBM. This indicates an overwhelming acceptability of certification programs among the banking fraternity of the country.

Table 3.4: Intakes and Certified Experts under Different Certification Programs* of BIBM: 2015-2024

Program	Total Intakes	Number of Certified Experts	Year of Initiation
CECM	13	504	January 2018
CETS	13	470	January 2018
CERM	17	421	January 2015
CEAF	9	275	January 2020
CIBFP	6	169	July 2021
CEEB	7	86	January 2021
CICC	7	78	January 2019
CiSMEC	3	27	January 2019
Total	**75**	**2030**	

Source: BIBM's Archieve

Note: *CECM=Certified Expert in Credit Management; CETS= Certified Expert in Trade Services; CERM=Certified Expert in Risk Management; CEAF= Certified Expert in Anti-Money Laundering and Financial Crime; CIBFP= Certified Islamic Banking and Finance Professional; CEEB= Certified Expert in E-Banking; CICC= Certificate in Commercial Credit; CiSMEC= Certificate in SME Credit.

3. 2. Research, Consultancy, Memorial Lectures, Conferences and Publications

A. Research: Research has been one of the important wings of BIBM, especially in response to the new challenges in the banking and financial sector. The present BIBM research programs follow four broad streams relating to research projects cum seminars, research workshops, review workshops and round table discussions. The research areas or titles are being finalized in two ways, one is proposals submitted by faculty members of BIBM, and the other is research areas suggested by the Governing Board of BIBM. BIBM has completed 3 research projects, 3 seminars, 3 review workshops, 2 research workshops and 5 roundtable discussions totaling 16 research initiatives in 2024.

Table 3.5: Research Projects, Seminars, Review Workshops, Research Workshops and Roundtable Discussion in 2024

Types of the Research	Title of the Research
Research Project	1. Related Parties Lending and Loan Quality in Bangladesh: Strategies
	2. Assessing Effectiveness of the On- the-Job Training in the Banking Sector of Bangladesh
	3. Digital Loans for Financial Inclusion: Affordability and Challenges for Bangladesh
Seminar	1. Sustainable Agriculture Value Chain Development: Implications for Bank Financing

Types of the Research	Title of the Research
	2. Stakeholders' Readiness for AI-Driven Banking Business in Bangladesh
	3. Institutional Sustainability of the Fourth-Generation Banks in Bangladesh: An Analysis from the Socio-Psychological Perspective
Review Workshop	1. Trade Services Operations of Banks
	2. Sustainable Banking Activities in Bangladesh
	3. Islamic Banking Operations in Bangladesh
Research Workshop	1. Pricing of Islamic Banking Products in a Dual Banking Environment of Bangladesh
	2. Renewable Energy Financing in Bangladesh: Alignment with the National Policies
Roundtable Discussion	1. Lending CMSEs through Agent Banking in Bangladesh: Issues and Challenges
	2. Service Rules Uniformity in Banks of Bangladesh: Issues and Challenges
	3. Remittance Inflow in Bangladesh: Pre-Migration Financial and Non-Financial Initiatives
	4. Price Verification in International Trade: Regulator's Expectation and Commercial Reality
	5. Development of Trade Ecosystem to Bring Efficiency in International Trade

Source: BIBM's Academic Calendar 2024

B. Consultancy: The BIBM usually undertakes three types of consultancies: (i) recruitment and promotion consultancy; (ii) training consultancy; and (iii) research consultancy. A common instance of providing recruitment and training consultancy is arranging recruitment tests and conducting foundation/special training courses. For example, BIBM has conducted 33 (19 for Bangladesh Bank and 14 for commercial banks) written examinations in 2024 for recruitment and promotion of Bangladesh Bank, State Owned and Private Commercial Banks, and offered training consultancy through arranging 24 Foundation/ Special Training courses for 9 banks and 2 Non-Bank Financial Institutions. Providing research consultancy in the area of banking and finance has all along been one of the key strengths of the Institute. BIBM conducted a good number of research consultancies for organizations/ ministries like the Ministry of Finance (MOF), Ministry of Expatriates' Welfare and Overseas Employment (MOEW&OE), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Centre for Research and Development (CRD), Green

Climate Funds (GCF), United Nations Development Programme (UNDP), International Finance Corporation (IFC), World Bank Group, The International Organization for Migration (IOM), etc. It is noteworthy to mention that, BIBM provided consultancy services to the Central Bank of Afghanistan, Da Afghanistan Bank (DAB) in 2010 to set up a banking training institute in Kabul as per the agreement between BIBM and the Central Bank of Afghanistan.

C. Memorial Lectures and Conferences: As a think tank in the banking sector**,** BIBM organizes Memorial Lectures, Conferences, and Dialogues. At present, three Memorial Lectures are scheduled to be held each year (Table 3.6.A). An annual conference titled "Annual Banking Conference (ABC)' is also organized by BIBM which brought together a huge number of practicing bankers, professionals, academics, and colleagues from home and abroad to focus on themes important for the banking and financial sector (3.6.B). Additionally, two conferences, one is at international level and the other at regional level were arranged by BIBM.

Table: 3.6. A: Memorial Lectures

Sl. No.	Title of the Memorial Lectures	Launching Year	Total No. of Lectures So Far
1.	Nurul Matin Memorial Lecture on Ethics in Banking	1998	21
2.	A.K.N. Ahmed Memorial Lecture on Central Banking	2018	03
3.	MAM Kazemi Memorial Lecture on Monetary Policy	2022	01

Source: BIBM Archive

Table: 3.6. B: Conference

Sl. No.	Titles of the Conferences	Launching Year	Total No. of Conferences So Far
1.	Annual Banking Conference	2012	09
2.	International Conference for Bankers and Academicians	2016	01
3.	Regional Banking Conference	2018	01

Source: BIBM Archive

D. Publications

In disseminating knowledge through publications, BIBM set a noticeable instance by publishing almost 104 publications between 1974-2024 in the form of journals, bulletins, books, monographs, reports, mimeographs, and working papers in tandem with its research activities. Among these publications, "Bank Parikrama", a quarterly double-blind peer-reviewed scholarly journal is a flagship publication of BIBM. After a long journey with continuing tireless efforts, this is now regionally if not globally acclaimed as one of the high-quality journals in banking and finance. As evidence, the journal is currently listed in the Directory of Excellence in Research for Australia (ERA), Australian Business Dean Council (ABDC), Journal of Quality List; Elton B. Stephens Co. (EBSCO) Database; and Europe World Year Book. Along with, a total of 75 monographs, printing forms of research projects after the presentation in the seminar, are a huge treasure-chest of knowledge for economists, financial experts, practicing bankers, researchers, and financial historians. The banking community as a whole would greatly be benefitted from the aforesaid repository of research efforts and findings in the areas of banking. Apart from these, it is worth mentioning that a number of articles authored by BIBM's Faculty Members have been published in reputed international journals with high Impact factors.

Table 3.7: Publications: 1974-2024

Sl. No	Types of Publications	Name of the Publication	Frequency of Publications
1.	Quarterly Journal	Bank Parikrama - A Journal of Banking & Finance	4 (Four) volumes
2.	Quarterly Magazine	BIBM Bulletin	DO
3.	Reports of the Research Projects	Research Monograph	75 (Seventy-Five)
4.	Compilation of Presented Papers in Round Table Discussions, Review Workshops and Research Workshops	Roundtable Discussion Series; Banking Review Series and Banking Research Series	3 (Three) Per Year
5.	Yearly Review of the Banks and NBFIs	Review of Banks, and Review of Non-Bank Financial Institutions	2 (Two) Per Year (Not Continued now)

Sl. No	Types of Publications	Name of the Publication	Frequency of Publications
6.	Yearly Memorial Lectures	Nurul Matin Memorial Lecture on Ethics in Banking; A.K.N. Ahmed Memorial Lecture on Central Banking; and MAM Kazemi Memorial Lecture on Monetary Policy	3 (Three) Per year
7.	Compilation of Conference Papers	Conference Proceedings of Annual Banking Conference	1(one) Per Year
8.	Inputs for Policy Formation	Policy Brief	1(one) Per Year
9.	Compilation of Case Studies	Case Studies in Credit Operation and Management in Banks	1 (one)
10.	Books	Green and Sustainable Banking in Bangladesh; A Review of the Supervisory Initiatives by Bangladesh Bank; An Unconventional Genius- Selected Writings of A.K.N. Ahmed; Bangladesh Vision 2030; Dimensions and New Horizons of Credit Operations in Banks; Examining Probable Effects of COVID-19 on Selected Areas of the Banking Sector in Bangladesh; Inclusive Finance and Sustainable Development; Financing Public-Private Partnership in Bangladesh; Trade Services of Banks in Bangladesh; and স্বাধীনতা পরবর্তী ব্যাংক খাতের অগ্রযাত্রা	10(Ten) Books
11.	Learning Materials	Learning Guide: Trade Service Operations of Banks; Learning Guide: Credit Operations and Management of Banks; Learning Guide: General Banking; Learning Guide: Certified Expert in Anti-Money Laundering; and Reference Guide: Sukuk	4 (Four)

Source: BIBM Archive

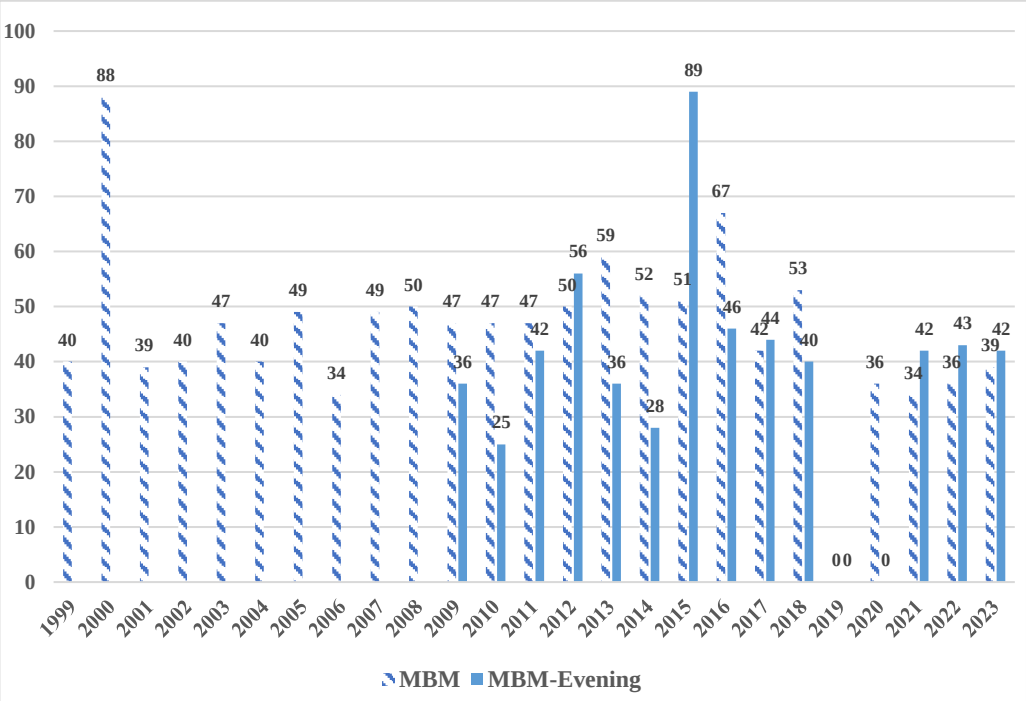
3.3. Academic Programs of BIBM

A. MBM and MBM-Evening Programs

BIBM launched MBM and MBM-Evening programs, professional post graduate programs, in 1997 and 2006, respectively for fresh university graduates, bank officers and other professionals who want to build and upgrade their career mostly in the banking and financial sectors. The program started with the affiliation with the National University and is managed by the then Center for Post Graduate Studies (CPGS) of BIBM. With the expectation of greater

acceptability of post-graduation degrees, both programs restarted a new journey with the affiliation of Dhaka University and managed by Dhaka School of Bank Management (DSBM) instead of CPGS in 2012 (MBM Brochure, 2025). Programs are aimed at developing capabilities among the graduates to make informed, creative and innovative decisions regarding management of banks and related policies and ensure their efficient and effective operation and execution in banks and financial institutions. As of today, a total number of 1755 students have graduated from these programs (Figure-3.4). Most of them are absorbed in the banking and financial sector and a small number of them are now working in the leading position of their banks. A few graduates are also working in the Cadre service of the Government sector.

Figure 3.4: Students Graduated Under MBM and MBM- Evening Programs



Source: Dhaka School of Bank Management (DSBM)

Notes: 1. The first batch of MBM-Evening students graduated in 2009.
2.Due to COVID-19 pandemic, no MBM and MBM-Evening graduates passed out in 2019 whereas no MBM-Evening graduates passed out in 2020.

B. Male and Female Graduates

Table-3.7 shows that number of female students is gradually increasing in both post-graduation programs. The ratio between male and female students was 4.14 in MBM programs in 2020 which came down to 1.08 indicating increasing participation of female students in this program. In MBM Evening programs, the same trend is also observed.

Table 3.7: Male and Female MBM Graduates: 2020-2024

	MBM			EMBM			MBM (Total)	EMBM (Total)	MBM/ EMBM
	Male	Female	Ratio	Male	Female	Ratio			
2020	29	07	4.14	-	-	-	36	-	-
2021	28	06	4.67	37	05	7.40	34	42	0.81
2022	25	11	2.27	32	11	2.91	36	43	0.84
2023	23	16	1.44	33	09	3.67	39	42	0.93
2024	13	12	1.08	37	13	2.85	25	50	0.50

Source: BIBM's Archieve

4. BIBM's Future: A Few Agenda Towards Making BIBM as a Thinktank

With the advent of Fintech, the growing pressure of risks in banking with respect to Geo-banking and finance, and a significant change in the local banking scenario, a fast-paced restructure of the banking sector is expected to take place in our country. This development will provide new opportunities to the Institute for reshaping its activities for contribution to navigate the banking sector of the future. In the backdrop of the above scenario, it is imperative for the Institute to adopt new strategies, new missions, and extended activities. It is therefore proposed that authority may undertake the following to take the Institute to a new height in the years to come.

i. Training Programs

A. Cluster Training: Lacking of quality manpower is seriously noticed currently in the banking sector. To create quality manpower, BIBM may design a cluster of training courses that may be offered to the same set of trainees during a year. This could be more effective in creating a set of very strong manpower for the entire banking sector. Each bank can send the same participant for at least 5-6 training programs that will cover training on core areas of banking. It might be

more effective if a few modules of this training program can be arranged in collaboration with one reputed regional training academy.

B. Case Study Method: In the pedagogic approach of training and teaching, the use of case studies is an integral part. BIBM has already published a book on "Case Studies in Credit Operation and Management in Banks"**.** Apart from this, several case studies linked to banking and finance have been developed by Faculty Members on their initiative. In this regard, a Case Study Development Centre is required to be established at BIBM to facilitate faculty members in developing cases. Bankers and financial experts can also be associated with this initiative.

C. The Regional Cooperation: Cooperation with the training academies/ institutes/ associations of the regional banking fraternity to exchange knowledge and ideas is highly important for designing innovative training modules to be commensurate with the dynamics of the global banking and financial sector. BIBM may go ahead with creating strategic relationship with Renowned Banking Training Academies like the Asia Pacific Association of Banking Institutes (APABI) and European Banking Training Network (EBTN) and can undertake an initiative to conduct a few flagship training programs for bankers of some selected Asian and African countries where the quality of banking training is not up to the mark. These initiatives will give BIBM additional uplift for changing the Institute to a think tank beyond the border of the country.

D. Outreach Programs: Although BIBM is currently offering a good number of courses in divisional towns at the Bangladesh Bank office, still training courses and workshops are overly concentrated on its own campus. The absence of infrastructure in local areas particularly at the district level, and the overburden of the faculty members with in-house activities like training, research, and education are the main barriers to conduct more outreach programs even though outreach courses have huge demand. BIBM may emphasize to offer more outreach programs to fulfill the training needs of the local banks' executives. Increasing the number of current online training courses as well as creating an online training platform/ portal with training materials, lectures, and case studies can be helpful in this respect.

ii. Research

Research, education, and training have complementary roles with each other. BIBM has placed the highest priority on research since its beginning. To sharpen research activities further, BIBM may now prioritize quality over quantity of research by stipulating that every faculty member must complete one research per year which has to be published in a journal with a high impact factor. Faculty members might be encouraged to undertake joint research with universities and relevant research organizations both at home and abroad to develop capacity and expand the scope of research. Introducing a reward system for publication in quality journals and permitting Faculty Members to participate in more seminars, and conferences at home and abroad are required to upskill the research capacity of them.

iii. Library

BIBM's Library with about 24,000 books and 200 local and foreign journals has been built up to cater to the requirements of bankers, financial experts, and researchers. It has also exchange programs with several libraries under which it can bring different books as per the demand of the readers. BIBM would like to reshape BIBM's Library as the best repository of knowledge relating to banking and finance. In this respect, a preliminary initiative is underway to make an archive of all Ph.D. and M.Phil. theses in banking and finance areas completed at different universities at home and abroad. Further, the ongoing process for the availability of electronic journals, technology integration, and initiating more exchange programs with other relevant libraries will make this library an ideal place for readers. The Institute may try to obtain copyrights for several foreign books and republish the same and make them available at affordable costs to the Bangladeshi banker.

iv. Education Programs: MBM and MBM-Evening

A. In the MBM day program, mostly fresh entrants except for officers of Bangladesh Bank are being enrolled. But commercial banks do not sponsor any of their officers to pursue these MBM programs like BB. Admission of fresh graduates along with young officers of banks having some experience in the day

MBM program, if banks nominate, could have increased desirable interactions among the students.

B. Both MBM and EMBM programs produce Graduates who are filling up the gap of necessity of skilled manpower in the banking sector. However, as it is not accredited by any ranking body, the program is not well known abroad. In this respect, accreditation can be helpful for Dhaka School of Bank Management (DSBM) to inform local and international students and professionals that the school is committed to constantly innovating in the development of future banking practices and is equally committed to developing them as banking leaders. DSBM may plan to be accredited by organizations like the Association to Advance Collegiate Schools of Business (AACSB) or others for its further value addition.

C. BIBM is trying to promote the brand image of its post-graduation programs by highlighting its infrastructure, green campus, faculty strength, and career prospects. This effort is required to speed up to attract the best graduates for admission in aforesaid programs. MBM Alumni Society (MAS) can contribute to this respect also.

v. Ph.D. program

Many bankers have shown their keen interest in pursuing a Ph.D. degree in banking and finance at BIBM; there is no such opportunity. A good number of Faculty Members of the Institute having Ph.D. degrees are quite capable of supervising M.Phil. and Ph.D. researchers. Further, the academic infrastructure we have is conducive for introducing Ph.D. and M. Phil programs. BIBM may therefore step up for launching the Ph.D. program with affiliation of the University of Dhaka.

vi. Faculty Strength and Development

The activities of BIBM have been increased manifolds on multiple fronts. But the number of Faculty Members has not increased at the same pace as expansion of its activities. Hence, number of Faculty members are required to be increased substantially. BIBM has a fund for Faculty Development Program for

providing short-term training at home and abroad. But it does not have any collaboration with any reputed institute/ university to send Faculty Members to pursue higher degrees like MBA, Masters, and Ph.D. Collaboration with a reputed university/institute can assist BIBM in capacity building of its faculty members in one way, on the other it will be helpful to retain its faculty members. It is encouraging to note that in November 2024, a team of BIBM faculty headed by its Director General (DG) signed an MOU with INCEIF University and International Islamic University of Malaysia (IIUM) while visiting the country.

vii. IT in Banks

The banking sector in Bangladesh has made significant strides in IT investment; however, it still faces challenges such as weak IT Governance, cybersecurity threats, a lack of skilled manpower, and inadequate training. A separate wing can be opened at BIBM to train the bank's manpower on IT as well as to provide policy inputs to the authority to redesign the IT infrastructure of banks.

viii. Faculty Participation in Executive Committee or Board

BIBM is run by the two highest decision and policy-making organs, the Governing Board and Executive Committee headed by the honorable Governor and the Senior most Deputy Governor of Bangladesh Bank, respectively. The Director General of BIBM acts as the member-secretary of the board/committee. Faculty members of BIBM do not have any scope to participate in these decision-making bodies. Participation of a Faculty Member in the rank of Professor (Selection Grade) on a rotation basis either in the Board or executive committee might ensure the voice of all faculty members in the decision-making bodies.

A conducive culture aiming the excellence is required to evolve for shaping BIBM fitting to the needs of banking of the ongoing century. Excellence is the sense of doing everything exceptionally and assuring that everyone coming into contact with the BIBM will be able to achieve distinction in their profession. Implementation of aforesaid initiatives is the foremost important to reshape BIBM as a regionally known think tank in the banking and financial sector in the immediate future.

References

Bangladesh Institute of Bank Management (BIBM) (2024). *Academic Calendar 2024*, Bangladesh Institute of Bank Management.

Bangladesh Institute of Bank Management (BIBM) (2023). *Academic Calendar 2023*, Bangladesh Institute of Bank Management.

Dhaka School of Bank Management (DSBM) (2025). *MBM Brochure*. Bangladesh Institute of Bank Management. Accessed April 24, 2025, from https://bibm.org.bd/pdf_files/About%20-DSBM.pdf

Kirkpatrick, D., & Kirkpatrick, J. (2006). *Evaluating training programs: The four levels*. Berrett-Koehler Publishers.

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I. *Bank Parikrama*, a professional refereed journal dedicated to banking and finance, is the semi-annualy publication of the Bangladesh Institute of Bank Management (BIBM). Usually, two issues are published in June and December each year.

II. *Bank Parikrama* is listed in Cabell's Jarnalytics, Directory of Excellence in Research for Australia (ERA), Australian Business Deans Council (ABDC) Journal Quality List, Elton B. Stephens Co. (EBSCO) Database and Europa World Year Book.

III. The main objective of the journal is to publish articles, notes, comments, review, etc. on relevant topics in the fields of banking, finance, economics and allied subjects which may contribute to the development of academic, professional and administrative expertise in the banking sector. **The similarity index after checking plagiarism with a software like Turnitin should not be exceeded 20%.**

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IX. The cover page of the paper should include the Title, Name, Designation, institutional Address, Phone/ Mobile Number and Email Address of each author. Authors should not identify themselves either directly or indirectly in the first page of the article.

X. The author has to submit the softcopy of the article in MS Word format at: **bibmresearch@bibm.org.bd** addressing to the Executive Editor of Bank Parikrama.

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3. Objectives and Hypotheses
4. Methodological Issues Involved
5. Findings and Analysis
6. Policy Implications
7. Conclusion

References (Use the American Psychological Association (APA) Referencing Style for referencing and ensure all the references should be both in the text of the paper and reference section as well)

Appendix/ Appendices

Acknowledgement (If Required)

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- Paper size: A4 Size (wide 8.5" and long 11")
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