BANK PARIKRAMA

A Journal of Banking & Finance

BANGLADESH INSTITUTE OF BANK MANAGEMENT

Contents

Measuring the Efficiency of Private Commercial Banks using Financial Ratios and Slack-based DEA Approach: Empirical Evidence from Bangladesh

- Nobinkhor Kundu[*]
- Sutapa Chowdhury[**]
- Salena Parven[***]

Abstract

The research of this study is to examine the experience of Private Commercial Banks' (PCBs') performance efficiency based on the financial ratios in their pursuit of financial efficiency. The research empirically explores efficient private commercial banks based on financial ratios employed in slack-based data envelopment analysis in Bangladesh. The secondary data was gathered from the annual report of thirty-four PCBs, including twenty-eight conventional PCBs and six islami shariah-based PCBs, in Bangladesh for the year 2019. The best financial ratios of PCBs were determined using cross-section data for Data Envelopment Analysis (DEA). The findings indicate that the financial ratio efficiency score achieved by 19 PCBs is 100 percent, with 12 PCBs scoring above 90 percent and the remaining three scoring around 90 percent, 89 percent, and 87 percent. This study's analysis indicates that inefficient DMUs can move towards the efficient frontier in order to become efficient, and those DMUs with the most efficient financial ratios have the highest financial performance.

Keywords: Bank Performance, Efficiency, Financial Ratios, Data Envelopment Analysis
JEL Classifications: C14, G32, N25

1. Introduction

1.1 Background of the Study

Bangladesh is a developing country with an impoverished banking system following its liberation, notably in terms of financial ratios (Kamarudin et al., 2016). In recent years, private commercial banks (PCBs) have attempted to emulate the banking structures and government regulations implemented by

---

[*]Nobinkhor Kundu is an Associate Professor, Department of Economics, Comilla University, Bangladesh and Ph.D. Fellow in Economics, Massey University, New Zealand, Email: kundunobin@gmail.com; [**]Sutapa Chowdhury is an Assistant Professor, Department of Finance, Comilla University, Bangladesh, Email: sutapachowdhury.cu@gmail.com and [***]Salena Parven is an Executive, Mercantile Bank Ltd., Bangladesh, Email: salenaparven32@gmail.com. The views expressed in this paper are the authors' own. The authors are thankful to the anonymous referees who considered the manuscript as well as BIBM.

Bangladesh Bank, the country's central bank. Bangladesh's PCBs' cost efficiency is critical for financial reform in the country's financial industry. Consider that costs, efficiency, and non-performing loans are the primary factors. The reasons for the lower performance are increased non-performing loans and increased costs, which are indirect indicators of poor corporate governance in Bangladesh (Mahbub et al., 2019). As a result of financial deregulation, bank costs have gone down, but having people with political connections on bank board member hurts efficiency. This means that not all Bangladeshi PCBs are operating at the desired level of efficiency (Robin et al., 2019).

International banking transactions have been affected in the globalisation age as a result of the 2008 global financial crisis (GFC). In this regard, it should be noted that the PCBs of Bangladesh appear to be challenging the bank's financial ratios. Following the GFC, the banking industry experienced drastic changes but remained a financial intermediary for bank operations. Conventional and Islamic banks are still suffering due to the failure of the market, particularly in developing countries (Alexakis et al., 2019). Islamic banking outperforms conventional commercial banks in Bangladesh, and they also exhibit variances in inefficiency due to a variety of circumstances (Asmild et al., 2019). Indeed, we investigate PCBs' actual financial ratio positions and financial intermediaries' net positions, which indicate stability and risk-averse behavior post-GFC.

The GFC demonstrated the critical role of regulation and supervision in maintaining a healthy banking sector capable of efficiently channeling financial resources into investment. International regulatory efforts have been concentrated on promoting the implementation of international capital norms and the Basel Core Principles (BCP)[1] for effective bank supervision in order to improve bank operational efficiency (Ayadi et al., 2016). The Basel-III reforms are aimed at strengthening bank regulation, supervision, and risk management (Vazquez and

---

[1] According to the Basel Committee (1997, 1998, 2006, & 2012), "Basel-I was effective from 1988 to 2006, and the Basel banking regulatory committee established a new variable market risk in 1998. Following the global financial crisis of 2008, the majority of banks implemented Basel-II between 2007 and 2012, which included a new operational risk variable. Beyond that, between 2013 and 2019, Basel-III was implemented, introducing new variables such as liquidity risk, leverage, additional tier-1 capital, capital conservation buffer, and countercyclical buffer".

Federico, 2015). We considered Basel's implementation in the banking sector and the impact of financial ratio risk on PCBs in Bangladesh. Furthermore, we want to emphasize that bank failure depends on the most critical financial ratio, non-performing loans. Most crucially, the influence of Basel III is on the banking sector's performance in Bangladesh.

In the case of Bangladesh's PCBs, conventional DEA does not use input-output ratios to determine the efficiency of a collection of decision-making units (DMUs). The fact that each DMU's efficiency distribution is represented by stochastic variables leads to efficiency scores that deviate from the mean efficiencies of the apparently real efficiency distributions calculated through simulation. DEA was discovered to be one of the most adaptable techniques employed in the financial sector. It allows each DMU to appear as favorable to its peers as feasible by letting each DMU select its variable weights or multipliers. DEA evaluated decision-making units' efficiency as well as simulation. The majority of DEA banking studies have concentrated on banks as institutions rather than on individual branches (Halkos and Salamouris, 2004). Moreover, DEA may recognize mention units for each DMU, which is a very important managerial tool because it assists in identifying potential reasons and curing inefficiencies.

1.2 Objectives of the Study

The purpose of the analysis is to assess the efficiency of the financial ratios of the commercial banking system in Bangladesh during the period 2019. In general, this research paper aims to investigate the significant effects of the financial ratios on the performance of private commercial banks in Bangladesh. To accomplish the aforementioned research questions, the study's precise objectives would be as follows. The objectives of the research are to

(i) Identify the efficient private commercial banks based on the financial ratios employed in slack-based data envelopment analysis in Bangladesh.

(ii) Examines the policy suggestions for achieving the financial efficiency of private commercial banks in Bangladesh.

The remainder of the paper is structured in the following manner. Section 2 covers the current literature on the subject of the current investigation. Section 3 describes private commercial banks' ratios performance in Bangladesh. Section 4 contains data and methodology. Section 5 examines the financial ratios used by DEA to assess bank performance efficiency, including descriptive statistics. Section 6 outlines policy implications for achieving financial efficiency. The final portion discusses conclusions and limitations.

2. Literature Review

We examined the efficiency levels of conventional and Islamic banks that employed DEA by financial ratios. While the majority of these conventional and Islamic banks were scale-efficient, others were inefficient and operated at decreasing returns to scale (Rosman et al., 2014). According to DEA and stochastic frontier analysis (SFA) with financial ratios, conventional banks were more efficient than their Islamic equivalents in 18 OIC (Organization of Islamic Conference) nations during the GFC (Mobarek & Kalonov, 2014). The link between risk, capital, and efficiency is examined using SFA for Islamic and conventional banks. For conventional banks, greater cost efficiency correlates with decreased risk, but the opposite is true for Islamic banks (Saeed et al., 2020; Safiullah & Shamsuddin, 2020). In general, an Islamic bank is less technically efficient than a conventional bank.

Under the assumption of unit homogeneity, DEA measured selected input-output variables and weights, and analysed pitfalls and protocol (Dyson et al., 2001). DEA is a widely used technique for determining the financial ratios of the relative efficiency of homogeneous decision-making units (DMUs) (Ablanedo-Rosas et al., 2010; Cook et al., 2014; Zahedi-Seresht et al., 2021). The DEA model is examined in its primal and dual forms, as well as in single-stage and two-stage approaches (Green & Doyle, 1997). A two-stage dynamic network DEA approach in Taiwanese banks is created for measuring the performance of operational units concurrently (Yu et al., 2021), the Chinese commercial banking system is improved (Wang et al., 2014), and the resultant efficiency scores are calculated using a modified Slacks-based DEA model (Paradi et al., 2011). For the first time, the slacks-based DEA model is used to aggregate the efficiency

scores (Paradi & Schaffnit, 2004) and operating unit performance: production, profitability, and intermediation (LaPlante and Paradi, 2015).

The combination of a slacks-based measure of DEA, which finds peer-based standards for ratio analysis (Bar et al., 1993), and a modest profitability efficiency model, emerges as the most significant explanation for the variation in financial ratios (Avkiran, 2011). In the post-GFC period, the profit efficiency of 31 commercial banks operating in Bangladesh was determined using the Slack-based DEA approach. The market concentration is significantly unfavorable for SCBs but good for PCBs (Kamarudin et al., 2016). Numerous scholars have examined PCBs' performance efficiency of financial ratios by using the DEA model (e.g., Barr et al., 1993; Dyson et al., 2001; LaPlante and Paradi, 2015; Avkiran, 2011; Rosman et al., 2014).

Worldwide, economists are considering the aftermath of the terrible GFC, and emphasis has shifted to Islamic banking and finance as a possible alternative model to the demise of major Middle Eastern and Asian banks (Rosman et al., 2014) and Turkish banks (Sahin et al., 2016). The Malmquist productivity index is used to compare the performance and productivity of Islamic and conventional banks in the GCC group of countries (Alexakis et al., 2019), the European banking system (Degl'Innocenti et al., 2017), and Taiwan's commercial banks (Lin, Hsu, and Hsiao, 2007). As an incentive program, the government has initiated financial reform packages aimed at enhancing managerial efficiency (Isik and Hassan, 2002). Kao and Liu (2009) investigated the efficiency of Taiwan's commercial banks as a proxy for decision-making units (DMUs) using an additive two-stage DEA model.

The DEA model for managerial quality and quantified managerial efficiency in the US banking industry (Barr et al., 1993), and various managerial capacities for efficiency development in Canadian commercial banks (Paradi, Zhu, and Edelstein, 2012; Kundu et al., 2019). Cost efficiency has a greater impact on profitability when banks take on greater risk and face increased competition (Fang et al., 2019). The cost and profit efficiency of the Vietnamese banking system are quantified using the DEA model, and the average efficiency score of

the banking system is calculated using a bank size average of roughly 0.90 and 0.75, respectively (Nguyen et al., 2014).

An empirical investigation compared inefficient banks with efficient banks using simple ratio analysis in terms of performance. Financial ratios are used to estimate the Greek banking sector's efficiency using the DEA model (Halkos and Salamouris, 2004). The Turkish banking sector is diversified and plays a key role in terms of technical, scale, and allocative efficiency when a non-parametric method such as the DEA approach is used (Eyceyurt Batir et al., 2017). Moreover, Turkish banking is inefficient due to technological inefficiencies rather than allocative inefficiencies (Isik and Hassan, 2002). For example, Nonperforming Loans (NPLs) are an unfavorable outcome that has a detrimental effect on the technical efficiency of Turkish banks (Partovi & Matousek, 2019).

As mentioned previously, the majority of applications of the widely used frontier technique, DEA, examine the relationship between efficiency estimates and key performance measures. However, no empirical test for financial ratios of PCBs in Bangladesh using slack-based DEA has been discovered. We studied the impact of financial ratio risk on Private Commercial Banks (PCBs) in Bangladesh. It is generally considered that Basel-III covers financial ratio risk, and efficient financial ratios are a real reflection of the banking sector's long-term financial health and economic growth. The focus of this research article is on the use of financial-banking efficiency ratios as efficiency indicators, rather than the more commonly utilized input-output variables in practically all banking applications.

3. Style and Facts: Financial Ratios

The empirical analysis examines the financial ratios that influence PCBs' efficiency performance and so contributes to total banking efficiency in Bangladesh. The DEA model is estimated using the financial ratios of Bangladesh's thirty-four PCBS. This study examines the financial ratio efficiency of bank performance using data from several annual reports from private commercial banks in Bangladesh during the period 2019. The financial ratios, as

well as Return on Assets (ROA), Return on Equity (ROE), net interest margin, leverage, capital adequency ratio, coverage ratio, net interest to assets, cost to income ratio, cost to asset ratio, interest cost ratio, loans to assets ratio, and non-performing loans to total loans are shown in Appendix-2.

The Return on Assets (ROAs) measures the profitability of a company's assets that are generating revenue. Generally, ROA indicates that the capital intensity of the company depends on total assets. This figure suggests that ROA for the 10 commercial banks is more than one percentage, most of the commercial banks is less than one percentage, and only one commercial bank is experiencing a negative return. It is clearly seen from the figure that the ROA of Eastern Bank is 1.65 percent, which indicates that Eastern Bank's net income is 165 taka for each 100 taka of total assets. On the contrary, the ROA of Modhumoti Bank is -0.25 percent, which indicates that Modhumoti Bank's net loss is 25 taka for each 100 taka of total assets.

Return on Equity (ROE) evaluates a firm's profit before taxes in relation to its total shareholders' equity. This figure suggests that the ROE for the 14 commercial banks is more than ten percent, the remaining commercial banks' ROE is less than ten percent, and only one commercial bank's ROE is less than one percent. It is clearly seen from the figure that the ROE of NCC Bank is 19.7 percent, which indicates that NCC Bank returns 1970 taka on each 100 taka of total equity. On the contrary, the ROE of BRAC Bank, 0.74 percent, indicates that BRAC Bank returns 74 taka on each 100 taka of total equity.

The net interest margin is calculated as a percentage of net interest margins (net interest income less total expenses) as a percentage of total loans. According to this figure, most commercial banks' net interest margins are in the single digits, and the net interest margin of the company is higher. NRB Commercial Bank has a net interest margin of 16.35 percent, while BRAC Bank has a net interest margin of 0.31 percent. Leverage is determined by the ratio of total equity to total assets. The greater this ratio, the greater the financial leverage and, hence, the greater the risk and potential return. From the figure, the proportion of total equity as a share of the firm's total assets of AB Bank is the highest, at around 28.78 percent. The

remaining three commercial banks are all double digits, and most of the commercial banks are single digit leveraged.

Capital Adequency Ratio (CAR) is a ratio that expresses total equity as a percentage of the risk-weighted assets of a bank; it is also referred to as the capital to risk-weighted assets ratio. This percentage was employed to protect depositors and ensure the stability and efficiency of the world's financial markets. We have determined from the figure that AB Bank has the greatest CAR at roughly 52.96 percent, while the rest of the commercial banks have CARs ranging between 10 and 20 percent among the selected thirty-four commercial banks throughout 2019.

The coverage ratio is a number that indicates the provision for loan losses as a percentage of a bank's non-performing loans; Al Arafah Islami Bank had a coverage ratio of 126.91 percent, while Meghna Bank had a coverage ratio of 120.43 percent.This shows that two out of every thirty-four loans were written off, indicating that the allowance for nonperforming loans exceeds one hundred. The remaining 32 commercial banks are expected to grow by double digit percentages with positive figures in 2019. The net interest to asset ratio compares the firm's net interest revenue to its total assets over a specified time period. According to the statistics, the trust bank's net interest to asset ratio is the highest at 5.20 percent, implying that the trust bank earned 5.20 taka for every hundred taka of total assets in 2019. On the contrary, BRAC Bank's 0.22 percent ratio is the lowest among the UK's selected commercial banks.

The cost-to-income ratio is defined as the ratio of an organization's operating expenses to its operating income for a given year. In this context, operating expenses encompass all costs associated with running the firm, including fixed costs (rent, mortgage, insurance, utilities, and property taxes), whereas revenue includes sales revenues, fee income, and interest collected on loans. Eastern Bank has the highest total operating expenses at 67.79 percent, while Social Islami Bank has the lowest total operating expenses at 33.09 percent, in relation to operating income.

The cost-assets ratio compares the firm's operating expenses to its total assets over time. According to the statistic, Eastern Bank's cost-assets ratio is the highest at 5.12 percent, implying that the bank earned 5.12 taka for every hundred taka of total assets during the period. Around 2-3% of Bangladesh's commercial banks are closed. The interest-cost ratio is calculated by dividing the organization's interest expenses by its interest income for a particular year. The graphic illustrates how the thirty-four banks' returns on assets compare. Throughout 2019, Jamuna Bank has the highest at 83.79 percent, while ICB Islamic Bank has the lowest at 30.38 percent.

The loans-to-assets ratio indicates the proportion of loans to the business of the firm to total assets throughout time. This statistic reveals that the trust bank's loan-to-assets ratio is 146.72 percent, whereas NRB Commercial Bank's loan-to-assets ratio is 16.21 percent, indicating that loans to the firm's business were 16.21 percent of total assets in 2019. The non-performing loans ratio compares the amount of NPLs to total loans over a given time period. This chart illustrates the ratio of non-performing loans to total loans at NRB Commercial Bank. The value of 16.63 percent indicates that 16.63 taka for every hundred taka of total loans in 2019 is owed. Southeast Bank's ratio of 10.98 is the second highest in the country, while AB Bank's ratio of 0.43 is the lowest among selected commercial banks in Bangladesh.

4. Data and Methods

4.1 Data Sources

We use a cross-sectional dataset constructed from the balance sheets, income statements, and other financial statements of the PCBs. The secondary data was gathered from annual reports of thirty-four PCBs, including twenty-eight conventional PCBs and six islami shariah PCBs, in Bangladesh for the year 2019. The best financial ratios of PCBs were determined using cross-section data for Data Envelopment Analysis (DEA).

4.2 Data Envelopment Analysis: A Methodological Overview

Charnes, Cooper, and Rhodes (1978) pioneered Data Envelopment Analysis (DEA). DEA is a type of non-parametric linear programming in which Decision-Making Units (DMUs) are linearly combined to form an input-output model. It has become one of the most frequently applied methods used to assess financial organizations' efficiency (Banker et al., 1984). We demonstrate how the suggested DEA methodology is designed in favor of or in addition to an overall ratio analysis. This can be partly due to the disparity in data availability. "Assume n commercial banks' DMUs are appraised on r financial ratios $y_{rj}\left(r = 1,....., s\right)$ and the observed r financial ratios of jth DMUs $\left(j = 1,....., n\right)$. According to Charnes, Cooper, and Rhodes (1978), the efficiency of firm 0 is given by 1/zo". The mathematical formulation of the DEA model is

$$\max \varphi$$

$$\text{Subject to } \sum_{j=1}^{n} \lambda_j y_{rj} \geq \varphi y_{ro}$$

$$\sum_{j=1}^{n} \lambda_j = 1 \; ; \; \lambda_j \geq 0$$

We describe slack-based DEA approaches based on slack that may be utilized for empirical efficient frontier estimate, as well as performance evaluation and benchmarking. The additive model is based on the DEA model with input and output slack. This DEA model is an output-focused approach in which the outputs are maximized and the inputs are assumed to be constant.

$$\max \sum_{i=1}^{m} S_i^{-} + \sum_{i=1}^{s} S_r^{+}$$

Subject to

$$\sum_{j=1}^{n} \lambda_j x_{ij} + S_i^{-} = x_{i0} ; i = 1,2,......, m;$$

$$\sum_{j=1}^{n} \lambda_j y_{rj} - S_r^{+} = y_{r0} ; r = 1,2,....., s;$$

$$\lambda_j, S_i^{-}, S_r^{+} \geq 0; . j = 1,2,....., n$$

Consider that this input and output slack-based DEA model to be nonzero. "The nonzero optimal S_i^- detects an overutilization of the ith input and the non-zero optimal S_r^+ detects a shortfall in the rth output". Clearly, the DEA model is beneficial for establishing objectives for inefficient DMUs with a priori information on output and input adjustments.

Calculations:

(i) Output Target for an inefficient DMU = Observed Output / Efficiency.

(ii) Output Slack = Output Target - Observed Output.

(iii) Output Slack Percentage = (Output Slack/ Observed Output)×100

5. Results and Discussion

5.1 Descriptive Statistics

We analyse descriptive statistics about the relative efficiency of financial ratios of the commercial banking system in Bangladesh. The following Table-1 summarizes the descriptive statistics for financial ratios such as "ROA, ROE, net interest margin, leverage, capital adequency ratio, coverage ratio, net interest to assets, cost to income ratio, cost to asset ratio, interest cost ratio, loans to assets ratio, and non-performing loans to total loans during 2019". As we can be observed, the variables have large standard deviations and their median values are almost always less than their means, indicating a right-skewed distribution.

Table 1: Descriptive Statistics of Financial Ratios, 2019

Financial Ratios	Minimum	Mean	Maximum	Std. Dev.
Return on Assets (ROA)	-0.25	0.795	1.65	0.41
Return on Equity (ROE)	0.74	10.21	19.7	4.11
Net Interest Margin	0.31	4.18	16.35	2.68
Leverage	4.46	8.30	28.79	4.09
Capital Adequency Ratio	10.12	15.45	52.96	6.96
Coverage Ratio	20.10	48.25	126.91	22.70
Net Interest to Assets	0.22	2.67	5.20	1.02

Financial Ratios	Minimum	Mean	Maximum	Std. Dev.
Cost to Income Ratio	33.09	49.43	67.79	7.78
Cost to Asset Ratio	1.28	2.27	5.12	0.81
Interest Cost Ratio	30.38	64.77	83.79	10.87
Loans to Assets Ratio	16.21	69.94	146.72	17.35
NPL to Total Loans	0.43	5.32	16.63	2.87

Source: Authors' Calculations based on the Annual Reports from commercial Banks, Bangladesh, 2019

5.2 Data Envelopment Analysis

We apply both ratio analysis and slack-based DEA approaches to determine the effectiveness of financial ratios that are extensively used in the banking sector in Bangladesh and comparing generations[2]. To be more precise, the efficiency of a bank is determined by ratios such as "ROA, ROE, net interest margin, leverage, capital adequency ratio, coverage ratio, net interest to assets, cost to income ratio, cost to asset ratio, interest cost ratio, loans to assets ratio, and non-performing loans to total loans". Their usage of financial statistics might make it extremely difficult to identify and compare top performers. Table-2 summarizes the efficiency results obtained by DEA using Microsoft Excel.

According to an assessment of the outcomes among Bangladesh's PCBs, there are no discernible distinctions between the financial ratios of conventional PCBs and Islami shariah-based PCBs. The study examines the performance of PCBs in Bangladesh in terms of financial ratios. Table-2 summarizes each bank's efficiency score, peers of each bank, and ranking. These findings are based on an investigation of the average slack-based DEA efficiency scores of 34 private commercial banks in Bangladesh.

---

[2] Note that 1st generation banks mentioned which banks had been established up to 1990. 2nd generation banks mentioned that those banks had been established from 1991 to 2000. 3rd generation banks mentioned those banks' having been established from 2001 to 2010. 4th generation banks mentioned that those banks had been established from 2011 to 2020.

Table 2: Financial Ratios: DEA Analysis

DMUs	Output Slack %	Efficiency	Peers (Benchmarks)	Rank
Conventional PCBs (n=28)				
1ˢᵗ Generation Banks (Year: up to 1990)				
Bank 11	0	1	11	6
Bank 19	0	1	19	11
Bank 33	0.45	0.99	4,21,23,28,29,31	20
Bank 34	3.26	0.97	4,8,13	23
Bank 5	6.80	0.94	4,6,10,11,14,18,23,28,29	26
Bank 1	7.72	0.93	11,21,23,29,31	28
Bank 26	9.03	0.92	4,6,10,14,18,23	30
2ⁿᵈ Generation Banks (Year: 1991-2000)				
Bank 6	0	1	6	2
Bank 7	0	1	4,7,13,24,28,29	3
Bank 8	0	1	4,8,24,29,31	4
Bank 18	0	1	13,18,24,29,31	10
Bank 23	0	1	23	14
Bank 24	0	1	5,13,24,28	15
Bank 31	0	1	31	19
Bank 20	4.95	0.95	6,10,13,16,24,28,29,31	24
Bank 15	5.36	0.95	6,10,13,18,24,28,29	25
Bank 32	8.38	0.92	10,13,16,19,28,29,31	29
Bank 25	10.27	0.90	4,11,14,21,23,28,29,31	32
Bank 3	11.46	0.89	4,6,10,13,18,28,29,31	33
3ʳᵈ Generation Banks (Year: 2001-2010)				
Bank 4	0	1	4	1
Bank 13	0	1	13	7
4ᵗʰ Generation Banks (Year: 2011-2020)				
Bank 14	0	1	4,13,14,21,23,29	8
Bank 16	0	1	10,13,16,19,28,31	9
Bank 21	0	1	16,21,28,29,31	12
Bank 22	0	1	4,22,24,28	13
Bank 28	0	1	28	16
Bank 30	0	1	30	18

DMUs	Output Slack %	Efficiency	Peers (Benchmarks)	Rank
Bank 17	1.14	0.99	10,13,16,22,24,31	21
Islami Shariah-based PCBs (n=6)				
1st Generation Banks (Year: up to 1990)				
Bank 12	14.81	0.87	4,11,13,14,18,28,29	34
2nd Generation Banks (Year: 1991-2000)				
Bank 10	0	1	10,31	5
Bank 29	0	1	13,28,29,31	17
Bank 2	9.16	0.91	6,10,11,13,18,24,28,29,31	31
3rd Generation Banks (Year: 2001-2010)				
Bank 9	1.35	0.98	6,11,18,23,29,31	22
Bank 27	7.06	0.93	6,10,13,18,24,28,29	27

(Authors' Calculations)
Sources: Annual Reports from commercial Banks, Bangladesh, 2019

According to Table-2, the most efficient financial ratios' DMU is Bank 4 (BRAC Bank), which is third generation. The result, shown in appendix A1, indicates that return on assets (0.05), return on equity (0.74), net interest margin (0.31), leverage (6.25), capital adequacy ratio (10.12), coverage ratio (42.65), net interest to assets (0.22), cost to income ratio (49.94), cost to asset ratio (1.76), interest cost ratio (70.0), loans to assets ratio (70.17), and non-performing loans to total loans (2.67), which measures the DMU's financial ratios efficiency, is one by indicating the "best" financial ratios (outputs) amongst the selected thirty-four commercial banks in Banglaesh. On the contrary, the least efficient financial ratios' DMU is Bank 12 (ICB Islamic Bank), although it is first generation. The result shows that return on assets (0.97), return on equity (9.44), net interest margin (5.57), leverage (8.10), capital adequency ratio (13), coverage ratio (76.75), net interest to assets (3.59), cost to income ratio (57.47), cost to asset ratio (3.37), interest cost ratio (45.99), loans to assets ratio (64.54), and non-performing loans to total loans (3.85), which measures the DMU's financial ratios efficiency, is 0.87 by indicating "moderate" financial ratios (outputs) amongst the selected thirty-four commercial banks in Bangladesh.

Figure 1: Efficiency Score of Thierty-four PCBs
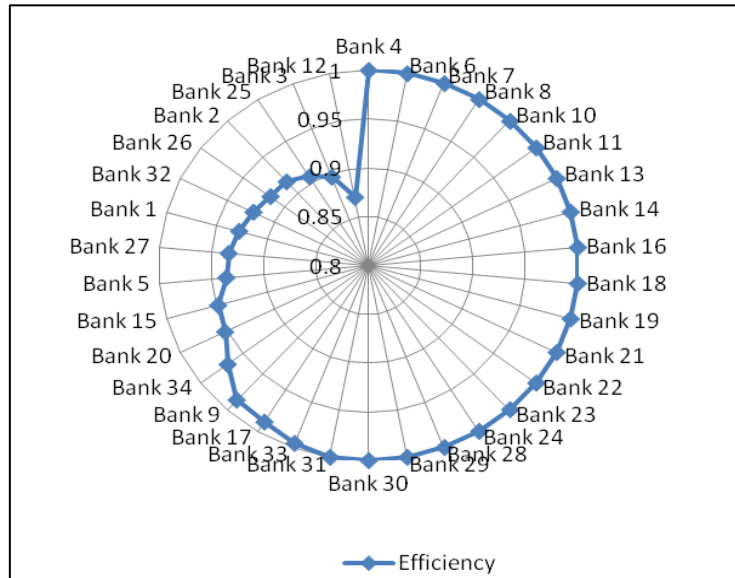
To calculate a bank's efficiency in terms of financial ratios, as shown in Figure-1, we employ slack-based DEA. BRAC Bank, Dhaka Bank, Dutch-Bangla Bank, Eastern Bank, First Security Islami Bank, IFIC Bank, Jamuna Bank, Meghna Bank, Midland Bank, Mutual Trust Bank, National Bank, NRB Bank, NRB Commercial Bank, One Bank, Premier Bank, Shimanto Bank, Social Islami Bank, South Bangla Agriculture and Commerce Bank, and Southeast Bank all received efficient financial ratio scores of 1 (or 100 percent) means output slack percentage is zero. On the contrary, United Commercial Bank, Modhumoti Bank, EXIM Bank, Uttara Bank, NCC Bank, Mercantile Bank, The City Bank, Shahjalal Islami Bank, AB Bank, Trust Bank, Pubali Bank, and Al Arafah Islami Bank obtained efficient financial ratios scores of more than 90 percent means output slack percentage is a single digit.

As regards Prime Bank's efficient financial ratios' score is 90 percent and its output slack is 10.27 percent, Bank Asia's efficient financial ratios' score is 89 percent and its output slack is 11.46 percent, and ICB Islamic Bank's efficient financial ratios' score is 87 percent and its output slack is 14.81 percent. This indicates that DMU_{32}, DMU_{33}, and DMU_{34} are inefficient; for the same level of

inputs, their output should grow by 10.27 percent, 11.46 percent, and 14.81 percent, respectively. Moreover, DMU_{20} (NCC bank) has a greater return on equity (19.7) than the comparable bank. Thus, banks may need to maximize their return on equity in order to increase their level of efficiency. As shown in Table-2, the majority of peers include DMU_4, DMU_6, DMU_{28}, and DMU_{31}. The efficient financial ratios' scores are obtained by the use of slack-based DEA and to identify banks' peers (Bar et al., 1993; Paradi et al., 2011).

6. Policy Implications

Commercial banks should be measured using slack-based DEA analysis to determine their output target. From the findings, 15 PCBs among the 34 PCBs financial ratios' are inefficient, including eleven conventional PCBs and four islami shariah-based PCBs. In this regard, inefficient DMUs can move towards the efficient frontier in order to become efficient. As a result, those DMUs with the most efficient financial ratios have the highest financial performance, and those DMUs with the least efficient financial ratios have the least financial performance. Thus, inefficient PCBs should be more regulated and policy adjusted for measuring performance and benchmarking against best practices.

7. Conclusions

The aforementioned research demonstrates that the financial ratios of PCBs in Bangladesh have been experimentally tested. This study paper examines slack-based data envelopment analysis, which determines the efficiency of bank performance by analyzing cross-sectional data from published annual reports of Bangladesh's PCBs (2019). Due to some of the constraints inherent in published annual reports of commercial banks in Bangladesh, thirty-four PCBs were chosen for the study, including twenty-eight conventional PCBs and six islami shariah-based PCBs. The results of DEA predicted that some banks' financial ratios would be relatively better than those of other banks in both areas (Halkos and Salamouris, 2004). Both Islamic and conventional banks have improved their technology, and Islamic banks have become quite diverse in the aftermath of the GFC (Alexakis et al., 2019). However, Islamic banks employ less sophisticated technology than conventional banks, rather than due to group-specific

technological inefficiencies in Bangladesh (Safiullah & Shamsuddin, 2020). The findings suggest that the efficiency score for the 19 commercial banks is 100 percent, the efficiency score for 12 commercial banks is greater than 90 percent, and the remaining three are approximately 90 percent, 89 percent, and 87 percent efficient. Thus, the authority of inefficient PCBs should be more concentrated and policies adjusted on financial ratios to achieve the desired level of efficiency.

References

Ablanedo-Rosas, J. H., Gao, H., Zheng, X., Alidaee, B., & Wang, H. (2010). A study of the relative efficiency of Chinese ports: A financial ratio-based data envelopment analysis approach. *Expert Systems*, *27*(5), 349–362. https://doi.org/10.1111/j.1468-0394.2010.00552.x

Alexakis, C., Izzeldin, M., Johnes, J., & Pappas, V. (2019). Performance and productivity in Islamic and conventional banks: Evidence from the global financial crisis. *Economic Modelling*, *79*(August 2018), 1–14. https://doi.org/10.1016/j.econmod.2018.09.030

Asmild, M., Kronborg, D., Mahbub, T., & Matthews, K. (2019). The efficiency patterns of Islamic banks during the global financial crisis: The case of Bangladesh. *Quarterly Review of Economics and Finance*, *74*, 67–74. https://doi.org/10.1016/j.qref.2018.04.004

Avkiran, N. K. (2011). Association of DEA super-efficiency estimates with financial ratios: Investigating the case for Chinese banks. *Omega*, *39*(3), 323–334. https://doi.org/10.1016/j.omega.2010.08.001

Ayadi, R., Naceur, S. Ben, Casu, B., & Quinn, B. (2016). Does Basel compliance matter for bank performance? *Journal of Financial Stability*, *23*(September 2013), 15–32. https://doi.org/10.1016/j.jfs.2015.12.007

Banker, R. D., Charnes, A., & Cooper, W. W. (1984). Some Models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis. *Management Science*, *30*(9), 1078–1092. https://doi.org/ 10.1287/ mnsc.30.9.1078

Barr, R. S., Seiford, L. M., & Siems, T. F. (1993). An envelopment-analysis approach to measuring the managerial efficiency of banks. *Annals of Operations Research*, *45*(1), 1–19. https://doi.org/10.1007/BF02282039

Basel Committee on Banking Supervision, 1997. Core Principles for Effective Banking Supervision, (https://www.bis.org/publ/bcbs30a.htm).

Basel Committee on Banking Supervision, 1999. Core Principles Methodology, (http://www.bis.org/publ/bcbs61.htm).

Basel Committee on Banking Supervision, 2006. Core Principles Methodology, http://www.bis.org/Publ/Bcbs130.htm.

Basel Committee on Banking Supervision, 2012. Core Principles for Effective Banking Supervision, http://www.bis.org/publ/bcbs230.htm

Charnes A, Cooper W, Rhodes E. (1978). Measuring the efficiency of decision-making units. European Journal of Operational Research, 2(6), pp. 429–44. https://personal.utdallas.edu/~ryoung/phdseminar/CCR1978.pdf

Cook, W. D., Tone, K., & Zhu, J. (2014). Data envelopment analysis: Prior to choosing a model. *Omega (United Kingdom)*, *44*, 1–4. https://doi.org/10.1016/j.omega.2013.09.004

Degl'Innocenti, M., Kourtzidis, S. A., Sevic, Z., & Tzeremes, N. G. (2017). Bank productivity growth and convergence in the European Union during the financial crisis. *Journal of Banking and Finance*, *75*, 184–199. https://doi.org/10.1016/j.jbankfin.2016.11.016

Dyson, R. G., Allen, R., Camanho, A. S., Podinovski, V. V., Sarrico, C. S., & Shale, E. A. (2001). Pitfalls and protocols in DEA. *European Journal of Operational Research*, *132*(2), 245–259. https://doi.org/10.1016/S0377-2217(00)00149-1

Eyceyurt Batir, T., Volkman, D. A., & Gungor, B. (2017). Determinants of bank efficiency in Turkey: Participation banks versus conventional banks. *Borsa Istanbul Review*, *17*(2), 86–96. https://doi.org/10.1016/j.bir.2017.02.003

Fang, J., Lau, C. K. M., Lu, Z., Tan, Y., & Zhang, H. (2019). Bank performance in China: A Perspective from Bank efficiency, risk-taking and market competition. *Pacific Basin Finance Journal*, *56*(February), 290–309. https://doi.org/10.1016/j.pacfin.2019.06.011

Figueira, C., Nellis, J., & Parker, D. (2009). The effects of ownership on bank efficiency in Latin America. *Applied Economics*, *41*(18), 2353–2368. https://doi.org/10.1080/00036840701222546

Green, R. H., & Doyle, J. R. (1997). Implementing data envelopment analysis: Primal or dual? *Infor*, *35*(1), 66–75. https://doi.org/10.1080/03155986. 1997.11732319

Halkos, G. E., & Salamouris, D. S. (2004). Efficiency measurement of the Greek commercial banks with the use of financial ratios: A data development analysis approach. *Management Accounting Research*, *15*(2), 201–224. https://doi.org/10.1016/j.mar.2004.02.001

Isik, I., & Hassan, M. K. (2002). Technical, scale and allocative efficiencies of Turkish banking industry. *Journal of Banking and Finance*, *26*(4), 719–766. https://doi.org/10.1016/S0378-4266(01)00167-4

Kamarudin, F., Sufian, F., & Nassir, A. (2016). Global financial crisis , ownership and bank profit efficiency in the Bangladesh ' s state owned and private commercial banks. *Contaduría y Administración*, *61*(4), 705–745. https://doi.org/10.1016/j.cya.2016.07.006

Kao, C., & Liu, S. T. (2009). Stochastic data envelopment analysis in measuring the efficiency of Taiwan commercial banks. *European Journal of Operational Research*, *196*(1), 312–322. https://doi.org/10.1016/j. ejor. 2008.02.023

Kundu, N., Sikdar, A., and Ahmed, H.U. (2019). Measuring Efficiency of Some Selected Commercial Banks between Canada and the UK: A Data Envelopment Analysis Approach. *Journal of Green Business School*, 2(1), 18-37. https://green.edu.bd/wp-content/uploads/2021/05/sl4.pdf

LaPlante, A. E., & Paradi, J. C. (2015). Evaluation of bank branch growth potential using data envelopment analysis. *Omega (United Kingdom)*, *52*, 33–41. https://doi.org/10.1016/j.omega.2014.10.009

Lin, Y. H., Hsu, G. J. Y., & Hsiao, C. K. (2007). Measuring efficiency of domestic banks in Taiwan: Application of data envelopment analysis and Malmquist index. *Applied Economics Letters*, *14*(11), 821–827. https://doi.org/10.1080/13504850600605960

Mahbub, T., Matthews, K., & Barker, K. (2019). Other people's money: The profit performance of Bangladeshi family dominated banks. *Journal of Behavioral and Experimental Finance*, *21*, 103–112. https://doi.org/10.1016/j.jbef.2018.11.005

Mobarek, A., & Kalonov, A. (2014). Comparative performance analysis between conventional and Islamic banks: Empirical evidence from OIC countries. *Applied Economics*, *46*(3), 253–270. https://doi.org/10.1080/000368 46.201 3.839863

Nguyen, T. P. T., Roca, E., & Sharma, P. (2014). How efficient is the banking system of Asia's next economic dragon? Evidence from rolling DEA windows. *Applied Economics*, *46*(22), 2665–2684. https://doi.org/10.1080/ 00036846.2014.909578

Paradi, J. C., Rouatt, S., & Zhu, H. (2011). Two-stage evaluation of bank branch efficiency using data envelopment analysis. *Omega*, *39*(1), 99–109. https://doi.org/10.1016/j.omega.2010.04.002

Paradi, J. C., & Schaffnit, C. (2004). Commercial branch performance evaluation and results communication in a Canadian bank - A DEA application. *European Journal of Operational Research*, *156*(3), 719–735. https://doi.org/10.1016/S0377-2217(03)00108-5

Paradi, J. C., Zhu, H., & Edelstein, B. (2012). Identifying managerial groups in a large Canadian bank branch network with a DEA approach. *European Journal of Operational Research*, *219*(1), 178–187. https://doi.org/10. 1016/j.ejor.2011.12.022

Partovi, E., & Matousek, R. (2019). Bank efficiency and non-performing loans: Evidence from Turkey. *Research in International Business and Finance*, *48*(December 2018), 287–309. https://doi.org/10.1016/j.ribaf.2018.12.011

Robin, I., Salim, R., & Bloch, H. (2018). Cost efficiency in Bangladesh banking: does financial reform matter? *Applied Economics*, *50*(8), 891–904. https://doi.org/10.1080/00036846.2017.1346361

Robin, I., Salim, R., & Bloch, H. (2019). Financial deregulation and productivity growth in banking sector: empirical evidence from Bangladesh. *Applied Economics*, *51*(47), 5104–5121.https://doi.org/10.1080/ 00036846.2019. 1607244

Rosman, R., Wahab, N. A., & Zainol, Z. (2014). Efficiency of Islamic banks during the financial crisis: An analysis of Middle Eastern and Asian countries. *Pacific Basin Finance Journal*, *28*, 76–90. https://doi.org/ 10.1016/j.pacfin.2013.11.001

Saeed, M., Izzeldin, M., Hassan, M. K., & Pappas, V. (2020). The inter-temporal relationship between risk, capital and efficiency: The case of Islamic and conventional banks. *Pacific Basin Finance Journal*, *62*(April), 101328. https://doi.org/10.1016/j.pacfin.2020.101328

Safiullah, M., & Shamsuddin, A. (2020). Technical efficiency of Islamic and conventional banks with undesirable output: Evidence from a stochastic meta-frontier directional distance function. *Global Finance Journal*, *May*, 100547. https://doi.org/10.1016/j.gfj.2020.100547

Sahin, G., Gokdemir, L., & Ozturk, D. (2016). Global Crisis and its Effect on Turkish Banking Sector: A Study with Data Envelopment Analysis. *Procedia Economics and Finance*, *38*(October 2015), 38–48. https://doi.org/10.1016/s2212-5671(16)30174-5

Vazquez, F., & Federico, P. (2015). Bank funding structures and risk: Evidence from the global financial crisis. *Journal of Banking and Finance*, *61*, 1–14. https://doi.org/10.1016/j.jbankfin.2015.08.023

Wang, K., Huang, W., Wu, J., & Liu, Y. N. (2014). Efficiency measures of the Chinese commercial banking system using an additive two-stage DEA. *Omega (United Kingdom)*, *44*, 5–20. https://doi.org/10.1016/ j.omega.2013.09.005

Yu, M. M., Lin, C. I., Chen, K. C., & Chen, L. H. (2021). Measuring Taiwanese bank performance: A two-system dynamic network data envelopment analysis approach. *Omega (United Kingdom)*, *98*, 102145. https://doi.org /10.1016/j.omega.2019.102145

Zahedi-Seresht, M., Khosravi, S., Jablonsky, J., & Zykova, P. (2021). A data envelopment analysis model for performance evaluation and ranking of DMUs with alternative scenarios. *Computers and Industrial Engineering*, *152*(December 2018), 107002. https://doi.org/10.1016/j.cie.2020.107002

Appendices

Appendix 1: Financial Ratios of PCBs

No. of Bank	ROA	ROE	Net Interest Margin	Leverage	Capital Adequacy Ratio	Coverage Ratio	Net Interest to Assets	Cost to Income Ratio	Cost to Asset Ratio	Interest Cost Ratio	Loans to Assets Ratio	NPL to Total Loans
Bank 1	0.05	0.74	0.32	6.25	10.12	42.65	0.22	49.94	1.76	70.00	70.17	2.67
Bank 2	0.64	10.05	3.54	6.34	14.58	42.71	2.68	44.82	1.68	64.57	75.71	4.89
Bank 3	0.59	8.16	3.70	6.96	17.93	43.94	2.39	42.33	1.95	63.26	64.68	4.55
Bank 4	1.65	16.29	6.79	11.03	16.16	57.78	4.87	67.79	5.13	45.05	71.78	3.99
Bank 5	0.7	9.9	4.39	7.17	15.2	40.93	3.05	54.68	2.82	59.61	69.62	5.77
Bank 6	0.56	9.28	2.33	6.04	16.12	49.59	1.60	43.53	1.65	78.93	68.64	4.74
Bank 7	1.2	17.2	6.94	7.03	15.5	45.36	4.56	58.21	4.02	30.38	65.64	4.38
Bank 8	1.3	16.52	3.57	7.56	14.74	120.43	2.45	44.22	1.96	64.90	68.61	3.35
Bank 9	0.61	8.48	2.21	6.76	12.55	52.06	1.76	47.04	1.42	76.23	79.48	4.33
Bank 10	0.51	4.58	5.34	6.01	11.41	56.46	3.89	51.69	2.48	74.30	72.97	9.62
Bank 11	0.8	10.5	2.82	7.76	12.8	49.20	2.03	54.92	1.91	73.65	72.12	5.37
Bank 12	0.5	9.39	3.22	4.46	12.95	31.25	2.33	48.70	1.62	59.42	72.42	3.61
Bank 13	1.11	14.8	16.35	7.01	14.26	49.01	2.65	49.00	2.31	63.85	16.21	16.63
Bank 14	0.29	8.31	4.27	10.94	17.89	33.96	2.97	60.62	2.59	65.61	69.63	7.41
Bank 15	0.78	10.99	3.63	6.61	13.92	39.30	2.72	44.26	1.87	67.81	74.88	4.86
Bank 16	1.05	8.24	4.02	13.30	21.13	34.13	2.41	45.11	1.97	70.06	60.01	2.64
Bank 17	1.29	12.31	4.34	9.28	13.92	43.83	2.60	33.09	1.44	65.85	59.76	2.53
Bank 18	0.56	17.4	2.86	6.22	12.91	30.30	2.12	53.25	2.33	70.48	74.10	5.39
Bank 19	0.96	8.87	2.89	10.58	13.38	28.45	2.25	44.67	1.54	69.94	77.82	10.99
Bank 20	0.86	11.51	3.57	7.50	13.41	62.16	2.47	42.10	1.90	68.71	69.31	4.81
Bank 21	-0.25	6.43	3.89	9.37	13.32	68.90	2.77	61.90	2.75	67.10	71.14	4.14
Bank 22	1.47	15.04	4.11	9.09	13.4	42.66	2.83	46.78	2.54	63.76	68.78	3.20
Bank 23	0.59	6	2.52	5.39	12.8	36.85	1.82	55.78	1.77	76.77	72.25	9.24
Bank 24	1.4	19.7	3.44	7.10	12.61	43.66	2.48	44.32	2.23	66.93	72.14	6.70
Bank 25	0.65	7.85	3.83	8.31	17.42	36.68	2.54	52.69	2.35	58.77	66.36	4.66
Bank 26	0.45	7.51	2.92	6.02	13.8	20.10	1.77	47.81	1.90	67.85	60.51	4.38
Bank 27	0.67	10.98	3.60	6.20	16.02	33.63	2.67	44.97	1.79	65.05	74.14	4.91
Bank 28	1.35	4.23	9.20	28.79	52.96	24.38	4.45	59.49	2.98	38.40	48.40	0.43
Bank 29	0.47	9.21	3.55	9.59	13.78	43.32	5.20	48.49	3.33	66.38	146.72	6.63
Bank 30	1.25	12.25	4.48	9.89	14.73	28.50	2.97	47.87	2.46	65.88	66.22	6.09

No. of Bank	ROA	ROE	Net Interest Margin	Leverage	Capital Adequacy Ratio	Coverage Ratio	Net Interest to Assets	Cost to Income Ratio	Cost to Asset Ratio	Interest Cost Ratio	Loans to Assets Ratio	NPL to Total Loans
Bank 31	0.62	8.56	1.44	7.22	11.52	126. 91	1.01	37.58	1.28	83.79	69.86	4.87
Bank 32	0.73	7.59	2.98	5.04	14.38	49.74	2.12	36.04	1.37	68.20	71.10	5.49
Bank 33	0.65	8.84	3.43	7.34	14.68	54.91	2.48	59.47	2.82	64.68	72.24	3.63
Bank 34	0.97	9.44	5.57	8.10	13	76.76	3.59	57.47	3.37	45.99	64.54	3.85

Appendix 2: Figure of Financial Ratios
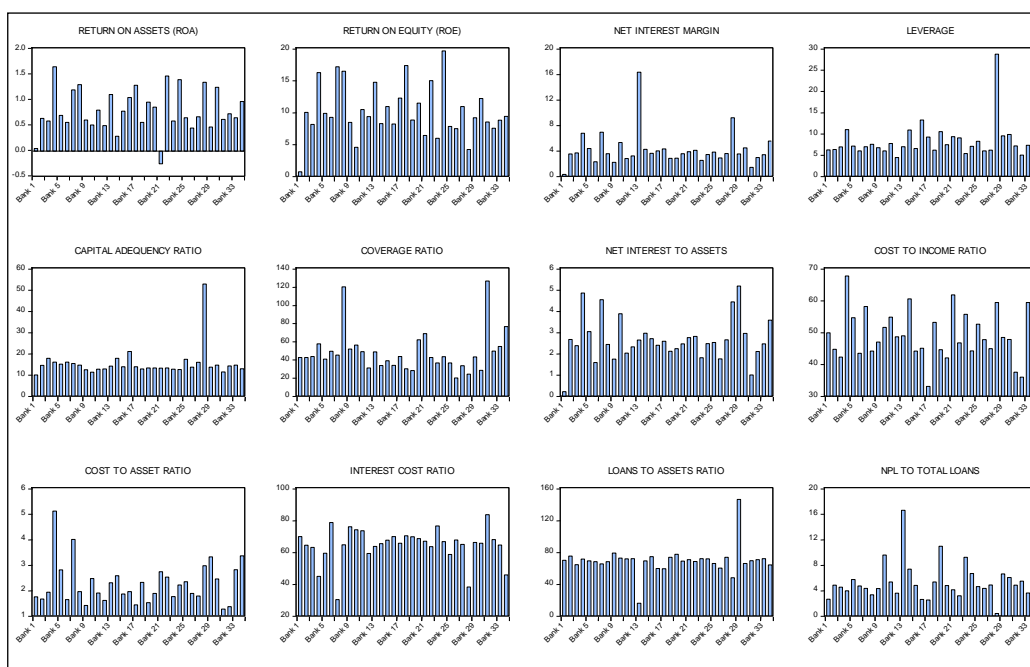
Sources: Annual Reports from Commercial Banks, Bangladesh, 2019

Appendix 3: List of Selected Commercial Banks

Name of Bank	No. of Bank	Generation
AB Bank Ltd.	Bank 1	1st
Al Arafah Islami Bank Ltd.	Bank 2	2nd
Bank Asia Ltd.	Bank 3	2nd
BRAC Bank Ltd.	Bank 4	3rd
City Bank Ltd.	Bank 5	1st
Dhaka Bank Ltd.	Bank 6	2nd
Dutch-Bangla Bank Ltd.	Bank 7	2nd
Eastern Bank Ltd.	Bank 8	2nd
EXIM Bank Ltd.	Bank 9	3rd
First Security Islami Bank Ltd.	Bank 10	2nd
IFIC Bank Ltd.	Bank 11	1st
ICB Islamic Bank Ltd.	Bank 12	1st
Jamuna Bank Ltd.	Bank 13	3rd
Meghna Bank Ltd.	Bank 14	4th
Mercantile Bank Ltd.	Bank 15	2nd
Midland Bank Ltd.	Bank 16	4th
Modhumoti bank Ltd.	Bank 17	4th
Mutual Trust Bank Ltd.	Bank 18	2nd
National Bank Ltd.	Bank 19	1st
NCC Bank Ltd.	Bank 20	2nd
NRB Bank Ltd.	Bank 21	4th
NRB Commercial Bank Ltd.	Bank 22	4th
One Bank Ltd.	Bank 23	2nd
Premier Bank Ltd.	Bank 24	2nd
Prime Bank Ltd.	Bank 25	2nd
Pubali Bank Ltd.	Bank 26	1st
Shahjalal Islamic Bank Ltd.	Bank 27	3rd
Shimanto Bank Ltd.	Bank 28	4th
Social Islami Bank Ltd.	Bank 29	2nd
SBAC Bank Ltd.	Bank 30	4th
Southeast Bank Ltd.	Bank 31	2nd
Trust Bank Ltd.	Bank 32	2nd
United Commercial Bank Ltd.	Bank 33	1st
Uttara Bank Ltd.	Bank 34	1st

Does Profitability Decide Size of Banks? A Study on Banks in Bangladesh

- Quazi Sagota Samina*

Abstract

Over the time, the banking services have emerged as an important part of economic activities. To support customer demand, the banking products and service range has increased remarkably along with increase in the number of banks all over the world. This trend leads to an increase in the total asset size of banks. It is expected that banks with higher profit will go for more expansion and thus will achieve more asset growth. This paper focuses on the issue that whether profitability influence the growth of assets of private sector commercial banks in Bangladesh. Using information collected from the annual report of 20 private sector commercial banks over 10 years (i.e. 2011-2020), GLS model has been applied to identify the determinant variables of bank asset size. From the study, it is found that higher profit leads increase in bank size but rather than profit there are other variables which influences the growth in bank size more.

Keywords: Commercial Banks, Asset, Growth, Profitability, Risk
JEL Classification: G2

1. Introduction

With globalization, expansion of international trade, technological revolutions and intense competition, banking service has become an essential part of our daily life. Both in urban and rural areas, business organizations as well as individuals at the recent time cannot operate their daily activities without taking advantage of banking activities. This massive demand of banking services has created new opportunities for banks to expand their diversity of operations and also to deliver their services. Along with the establishment of new banks and branches, banks are introducing new products like, ATM, phone-based banking, online banking, credit cards etc., based on current market demand and adopting the available technological facilities. This at one hand accelerates flow of fund in the economy, helps banks to achieve economies of scale and also enhances movement of bank operation from paper-based method to electronic based reducing cost at national level (Le and Ngo, 2020). Studies like Gaganis and Pasiouras, 2013; Sun et al,

---

*Quazi Sagota Samina is an Assistant Professor, Department of Business Administration, East West University, Bangladesh. The views expressed in this paper are the author's own.

2013; Lee and Chih, 2013; Moradi-Motlagh and Babacan, 2015 measure how efficiently banks earn profit over different countries. This earned profit banks usually invest to provide more loans, establish new branches to serve greater number of customers as well as to adopt more technology-oriented products. Thus, ultimately banks achieve growth in its assets size. Jang and Park, 2011 show that earned profit helps a firm to achieve growth in future.

Being a developing country, Bangladesh has achieved a pleasant growth rate in the GDP in last few years. In spite of the shock of Corona Virus, Bangladesh achieved a 5.2% growth in real GDP in the year 2020 (Bangladesh Bank, 2020). Behind this growth in economy, the role of commercial banks is unalterable. In the fiscal year 2019-2020, the banking sector contribution to GDP is 2.91% which is the highest among all the financial institutions (Bangladesh Bank, 2020). In collecting deposits, channelizing the deposit in productive sector, supporting international trade, collecting remittance, in every sector, commercial banks are playing important role in the economy. To accelerate the economic growth, at one hand, more and more banks are emerging in the country over the time; and at the same time, banks are diversifying their operations. The growing number of banks in the country with emergent number of branches enable them to expand their services to all categories of customers in every corner of the country through new, improved and user-friendly technologies. With these, over time banks' assets size is being increased. But the pattern in which banks' asset size is expanding is not same for all the banks operating in the country. The differences in the asset size of banks can be a contribution of various bank specific variables like capital strength of banks, their profit earning capacity, asset structure, risk level involved etc. Also, the economic condition of the country may induce the growth of banks. Among these different variables, profitability has drawn attention in literature. In many studies, focus has been put on the relationship between asset growth and profit earned by firms. The current study focuses on the issue that whether banks profit has any impact on determining the size of banks. It is important to evaluate the relationship as and identifies variables that may have influence over the size of banks. The paper follows as Section-2: Literature Review; Section-3: Growth of assets in Banking Sector in Bangladesh;

Section-4: Data, Variables & Methodology; Section-5: Findings and Section-6: conclusion.

2. Literature Review

The financial system of an economy comprises three key elements; financial institutions, instruments and market. Including these key elements, the financial system of an economy plays a significant role in the economic formation and development of a country. Being a financial institution, banks facilitate the flow of fund in an economy and thus accelerate the economic expansion of a country. Studies like, Coleman and Feler, 2015; Pradhan et. al., 2014; Mitchener and Wheelock, 2013; Ueda, 2013; Sassi and Goaied, 2013; Luo et al., 2012; J-L Wu et al., 2010; Leitao, 2010; Chang et al., 2006; Hondroyiannis et al., 2005 have found that financial sector significantly contributes in the growth of an economy. Sassi and Goaied, 2013; Levine, 2005 and other researchers theoretically relates banking development with positive economic growth through mobilization of savings, efficient resource allocation and stimulation of technical innovations.

The modern technology has brought an abrupt change in the banking services and operating process (Windasari et al., 2022). With technology-based products, like internet banking, mobile banking, SMS banking services, banks are trying to cover more expanded customer base and also to reach their services to the door-point of the customers. Thus, along with the increase in the number of banks, banking service diversity and growth in bank asset size has blowout all over the world. In a small economy like Bangladesh, there is a remarkable change in the banking industry over time. According to the statistics found in Annual Report of Bangladesh Bank, the number of banks has increased by 18.75% over last one decade with a 539.28% increase in the assets of banking sector. This enormous growth in assets is not an easy task. Banks need to make huge investments to achieve this growth. To make investment in the growth, one of effective internal source of fund is profit earned by the banks. Jang and Park, 2011; V. German-Soto and O´. Sanchez-Hiza, 2021 showed that firms earned profit has a positive impact on its growth. In studies like, Anbar and Alper, 2011 and Khrawish, 2011; Jeris, 2021 found a positive relation between profitability and bank size. In literature regarding banking industry of Bangladesh, Sufian and Kamaruddin,

2012; Hossain and Ahmed, 2015; Rahman et al., 2015; Samad, 2015. Sufian and Kamaruddin, 2012; Hossain and Ahmed, 2015; Rahman et al., 2015 found that size of bank has a positive and significant relationship with banks' profitability.

Besides, profitability, some bank specific variables as well as macroeconomic variables have been linked with banks' asset growth in different studies. Shaikh, 2014 and Jeris, 2021 in his study has shown positive relationship exists between collection of deposit and asset growth of banks. Terraza, 2015 found relationship between bank liquidity and size. Kohlscheen et al., 2018 and Boukhatem and Moussa, 2018 found bank credit has a positive influence over its growth. About the macroeconomic variables, researches like Yuksel et al., 2018; Tan et al., 2017; Duraj and Moci, 2015 have found that GDP has an effective influence on bank size and profitability. As a comparison among the macroeconomic variables and bank specific variables, Kohlscheen et al., 2018 has shown that GDP has less impact on banks' assets size compared to credit or loan growth. Among the studies on banking industry in Bangladesh, Sufian and Kamaruddin, 2012; Hossain and Ahmed, 2015; Rahman et al., 2015; Samad, 2015 found that size of bank has a positive and significant relationship with banks' profitability. On the other hand, Samad, 2015 on 42 banks in Bangladesh found that banks' size has no significant impact on profit. Matin, 2017 also focused on the factors affecting banks' profitability in Bangladesh.

Thus, in literature various aspect of bank operation along with economic measures have been linked with banks asset size. But in my concern, I found none of the studies has analyzed how profitability affects growth of a bank in Bangladesh. Also, there is no study in Bangladesh which accumulates all the factors that affect banks' growth together. My current study focuses on this literature gap in the context of banking industry in Bangladesh. Along with other effective bank specific and macroeconomic variables as found in literature, this study analyzes whether profitability of banks has an active role in explaining asset growth following Jang and Park, 2011; Lee, 2014 and V. German-Soto and O´. Sanchez-Hiza, 2021. The research will facilitate the banking policymakers to employ profits earned to achieve growth as well as to control other factors that someway affects banks' assets growth.

3. Growth of Assets of Banking Industry in Bangladesh

To reconstruct the economic condition in the post liberation period of Bangladesh, the then government decided to bring all the banking institutions under the government ownership. With the passes of time, as the economic condition of the country started to develop, in 1982, government of Bangladesh allowed private sector banks. After that there was a revolution in the banking sector of Bangladesh over the years. Just by next 20 years, i.e., by the end of 2002, the total number of private sector commercial banks became 30 (Bangladesh Bank, 2005-2006). At present, there are 43 banks in the private sector and 61 scheduled banks in total. The growth in the number of banks has initiated the growth in the banks' assets size. Table-1 shows the amount of total asset size of the banking sector in Bangladesh. The amount of total assets was Tk. 5,867.6 billion in 2011 which reached to Tk. 18,406.00 billion in 2020. If we look at the growth rate of assets over 2011- 2020, it is found that the highest growth in assets of banking sector took place in 2012 (18.12%). After 2012 the growth rate remains quite stable with a slight decrease over the time. However, on an average the growth rate in assets is 13.38% from 2011 to 2020.

Table 1: Asset Growth of Banking Industry in Bangladesh [2011-2020]

Year	Total Assets (in billion Tk)	Growth Rate
2011	5867.60	
2012	7030.70	18.12%
2013	8000.20	13.79%
2014	9143.00	14.28%
2015	10314.70	12.82%
2016	11626.60	12.72%
2017	13059.30	12.32%
2018	14572.90	11.59%
2019	16298.40	11.84%
2020	18406.00	12.93%

Source: Bangladesh Bank

4. Data, Variables and Methodology

The research is conducted on a panel data set including 20 private sector commercial banks operating in Bangladesh over a period of 2011-2020. The banks were selected following a simple random sampling. Thus, a data set with

200 observations is included to conduct the research by collecting data from secondary sources, specially, annual report of the sample banks and their websites.

4.1 Dependent Variable

As the study concentrates on size of bank and relates the bank specific variable along with macroeconomic variable with it, the dependent variable in the study is bank size. In most of the literature bank size has been defined as the log value of total asset of banks like, Căpraru and Ihnatov, 2014; Samad, 2015; Hossain and Ahmed, 2015; Petria et al. 2015; Yong Tan, 2016; Elekdag et al., 2020; Jeris, 2021.

4.2 Independent Variables

4.2.1 Bank Specific Variables

Profitability: As the paper analyzes effect of bank profitability on growth, the first independent variable is taken as profitability. A number of studies have focused on the relationship between bank size and profitability. To identify profitability different measurements are applied in different studies, like, ROA, ROE, NIM etc. ROE shows the rate of return a bank earns on the amount invested by its shareholders. According to Goddard et al., 2004, ROE is a better measurement of profitability. In this study to reflect profitability ROE has been considered following Elekdag et al., 2020; Tan, 2016; Hossain and Ahmed, 2015; Rahman et al., 2015; Căpraru and Ihnatov, 2014; Petria et al., 2015; Samad, 2015. Tan, 2016 and Jeris, 2021 remarked ROE as a measurement of profitability that is linked with banks' financing decision. Researchers like Jang and Park (2011) and V. German-Soto and O´. Sanchez-Hiza, 2021 has found that profitability has a positive impact on firm's asset growth whereas Lee, 2014 found that profitability negatively impacts growth.

Capital Strength: Equity to Risk-weighted Assets (RWA) shows against risk weighted assets, what amount of equity capital is maintained in a bank. Higher proportion of equity financing shows more capital strength and soundness of a bank and thus low risk. Banks which have higher equity capital are expected to

absorb shocks and perform more successfully in the long run (Hossain and Faruque, 2015). Thus this proportion of equity capital to risk weighted assets has been taken as a reflection of capital strength of banks following Le and Ngo, 2020.

Liquidity: Liquidity risk indicating the possibility of not having sufficient cash available to meet up customers' daily transactions, also can influence bank performance (Rahman et al., 2015). The proportion of loans and advances to total assets show liquidity condition of banks as has been found in literature as Elekdag et al., 2020; Hossain and Faruque, 2015. Higher proportion shows higher liquidity as banks can generate more cash flows from disbursed loan amount. Terraza, 2015 found that liquidity risk of banks changes with the change in the size of banks. According to him, larger banks have more demand deposits and better access to external fund and for this they do not need to maintain liquid assets to fulfil liquidity needs as much as smaller banks need. That means smaller banks have higher liquidity risk.

Asset Structure: Deposit to total assets measure the asset structure (Hossain and Faruque, 2015). As banks provide loans from deposit, higher proportion of deposit indicates better opportunity for banks to provide more amount of loans in market and thus achieve growth in size (Jeris, 2021).

Credit Risk: The ratio of non-performing loan to total loan amount is a measure of credit risk (Le and Ngo, 2020; Rahman et al., 2015; Petria et al., 2015; Samad, 2015; Căpraru and Ihnatov, 2014). The higher ratio indicates higher credit risk as increase in the amount of non-performing loan shows bank is facing trouble in getting back their disbursed loan. This affects the quality of loan and may hinder the expansion of the bank in size. According to Cooper, Jackson, & Patterson, 2003, credit risk may affect the health of a bank's loan portfolio. Thus, it is expected that banks with higher credit risk will have poor size.

Macroeconomic Variables

GDP: GDP is the mostly used parameter of economic condition of a country. It reflects overall economic activities and growth (Elekdag et al., 2020; Rahman et al., 2015; Samad, 2015; Petria et al., 2015; Căpraru and Ihnatov, 2014).

Economy that enjoys better GDP growth, ensures better production opportunities and thus demand of bank loan will increase in market which will ultimately help the banks to grow over time. Jeris, 2021 states that GDP can influence the loan disbursement amount of a bank which can affect the performance and size of banks. Thus, growth in GDP is expected to lead an improvement in bank performance Jeris, 2021.

Inflation: Inflation is another commonly used measure of economic changes in a country (Jeris, 2021; Petria et al., 2015; Samad, 2015; Căpraru and Ihnatov, 2014). Rahman et al., 2015 states that performance of banks can be highly affected by inflation in an economy. A control level of inflation ensures production opportunity in an economy along with increased employment opportunities. So, the demand for banks' credit products will increase both at business level as well as at individual level. Also, banks will find better scopes to make investment. This is expected to lead a development in banks.

Table 2: Variable Description

Variables	Measure	Expected Sign	Hypothesis
Dependent Variables			
Size of Banks	Logarithm of Total Assets		
Independent Variables			
Bank Specific Variables			
Profitability (ROE)	Net Profit/ Total Shareholders' Equity	+	H_0: Profitability has no impact on bank size. H_1: Profitability has impact on bank size.
Capital Strength (EQRWA)	Equity/ RWA	+	H_0: Capital strength does not affect bank size. H_1: Capital strength does not affect bank size.
Liquidity (LTA)	Loan/ Total Assets	+	H_0: Liquidity does not affect bank size. H_1: Liquidity does affect bank size.

Variables	Measure	Expected Sign	Hypothesis
Asset Structure (DPST)	Deposit/ Total Assets	+	H_o: Liquidity does not affect bank size. H_1: Liquidity does affect bank size.
Credit Risk (NPL)	NPL/ Total Loans	+	H_o: credit risk does not affect bank size. H_1: credit risk does affect bank size.
Macroeconomic Variables			
GDP	GDP growth	+	H_o: GDP does not have any influence on bank size. H_1: GDP have any influence on bank size.
Inflation	Inflation Rate	+	H_o: Inflation does not have any influence on bank size H_1: Inflation have any influence on bank size

Based on the collected information, the panel Generalized Least Square (GLS) method is applied to relate the independent variables with the dependent variable, i.e., asset size of banks. find out the determinant variables of banks' asset growth. The regression equation considered is as follows:

$$lTA_{jt} = \beta_0 + \beta_{jt}X_{jt} + \beta_j t_j + \epsilon_{jt}$$

Where, lTA_{jt} = Size of banks

   j = individual bank

   t = year

   X_j = Vector of independent variables include both bank specific and macroeconomic

Variables

   β_j = Vector of unknown parameters to be estimated

   t_j = year dummy variable

   ϵ_{jt} = Random error term which is assumed to be normally distributed.

The summary statistics of the variables are given in Table-3.

Table: 3: Summary Statistics

Variables	Description	No of Observation 2011-2020	Mean	Median	Standard Deviation
Size	Log TA	199	12.3219	12.3742	0.4374
Profitability	ROE	197	12.1897	11.3600	4.8341
Capital Strength	Equity to RWA	198	12.7736	12.5800	1.6436
Liquidity	TL/TA	199	0.6834	0.6906	0.0738
Asset Structure	Dep/TA	199	0.7668	0.7802	0.0828
Credit Risk	NPL/ TL	189	5.1156	4.7200	2.9721
GDP	GDP Growth Rate	200	12.3180	13.3000	2.7468
Inflation	Inflation Rate	200	6.8218	6.1600	1.6098

5. Empirical Results

The result of the GLS model [Table-4] shows the R-square value of 0.7505 which means that the selected explanatory variables influence asset size of banks by 75.05%. This result of R value is significant at 1% confidence level. This ensures the acceptability of the model. The value of rho (0.6593) also ensures the fitness of the model. Also, to observe whether the results of the study give us a proper indication, multicollinearity test has been conducted. The result of the VIF test [Table: 5, appendix] shows that none of the variables considered in the study has the multicollinearity problem.

The coefficient of ROE shows that profitability has a positive impact on bank size. The relationship is significant at 5% significance level rejecting the null hypothesis about profitability and establishes the alternative hypothesis. This finding shows more profitable banks are able to attain more assets. Profit enhances internal source of fund which a bank can utilize to acquire more assets and can achieve better growth. V. German-Soto and O. ´ Sanchez-Hiza, 2021 mention that firms prefer internal sources of fund over the external sources of financing. According to them, more profitable firms rely less on external sources and use a major portion of their earned profit to support investment which

ultimately stimulates assets of the organization. This positive effect of profitability upon banks' growth matches with the evolutionary theory which states that profitability accelerates firms' growth (Alchilan, 1950; Coad, 2007).

Table 4: Result of Regression Analysis

TA	Coefficient	Standard Error	Z	P>|z|
ROE	0.0055	0.0024	2.31	0.021
EQRWA	-0.0292	0.0083	-3.52	0.000
LTA	-1.0897	0.2216	-4.92	0.000
DPST	-1.4348	0.2125	-6.75	0.000
NPL	-0.0066	0.0037	-1.79	0.073
Year	0.1372	0.0067	20.41	0.000
GDP	0.0102	0.0034	3.04	0.002
Inflation	-0.0006	0.0095	-0.06	0.950
Constant	13.6074	0.1954	69.63	0.000
Sigma_u	0.1597			
Sigma_e	0.1148			
rho	0.6593			
Adjusted R Square	0.7505			
P value	0.000			

Opposite to profitability effect, capital strength (EQRWA) shows a significant negative impact on bank size rejecting the null hypothesis. The result indicates banks with higher capital strength grows slow. This may happen as smaller banks have lower amount of loan, they have lower RWA which enables them to strengthen themselves in maintaining sufficient capital. Just like capital strength, liquidity also has significant negative impact on size of banks. This finding matches the opinion of Terraza, 2015 that smaller banks need to maintain more liquidity as they have less demand deposit and have less access to external financing.

The asset structure (DPST) also shows negative impact on bank size indicating as banks' deposit collection increases against total assets, their asset size reduces. This finding is opposite of our expected result that as banks collect more deposit, they are able to distribute more loan and invest more and thus can enlarge their size as also has been mentioned by Shaikh, 2014. However, the conclusion that I find here in my research may be due to the fact that banks are more confident to use internal source of fund like earned profit to acquire new assets rather than to use external sources like deposit which is ultimately liability for banks. Thus, larger banks use more internal sources of fund and less deposits to finance assets whereas smaller banks rely more on deposit sources for new assets.

Next to asset structure, credit risk measurement of banks is an important variable to consider for bank operations. The coefficient of credit risk reflects that bank having high risk are usually small in size. This is quite logical. As banks find increased credit risk, i.e., the amount of non-performing loan increases out of the outstanding loan portfolio, banks have to be more cautious and selective in providing further loan. So, they cannot increase assets abruptly, rather will have to keep a control on their expansion. And also, if a loan remains due for a substantial period of time, bank may have to write off the loan from their record. That will rather reduce total asset amount of the bank. Similar relationship between bank credit risk and asset size has been stated by Cooper, Jackson, & Patterson, 2003.

Along with the bank specific variables as stated above, the time dummy variable (year) has been included in the regression model to observe the effect of time trend on bank expansion. The regression result shows that time has a significant positive influence on bank size. This shows keeping all other variables constant, over time the size of banks incases by 13.7%. This shows, as time passes and banks attain more experience and gets more familiarity in the society, they are able to distribute more loans and also have the pressure to retain the customers with updated products. These ultimately lead to an increase in asset size.

Among the macroeconomic variables, GDP has a significant positive impact on banks' growth as expected. As GDP of a country improves, it leads expansion of banks in asset size. Jeris, 2021 stated the same pattern of relationship. However,

the other macroeconomic variable, inflation, does not show any significant impact on bank size accepting the null hypothesis that inflation in an economy does not affect bank size significantly.

6. Conclusion

Banking industry all around the world has achieved enormous growth over last few decades. The same trend is found in Bangladesh. Taking a sample of 20 banks over a 10 years period, this study focuses on the factors that determines the size of banks in Bangladesh. Many studies have focused on the determinants of profitability of banks in developed countries as well as in Bangladesh but there are few studies focusing on bank size. By applying the GLS model on the panel data set, the study verifies the effect of bank specific variables and economic measures on the size of banks in Bangladesh. The analysis found that profitability has a direct and positive impact on bank size meaning. This finding indicates the fact that more profitable banks are usually bigger in size. This is because as banks earn profit, they can utilize this internal source of fund for acquiring better technology for their operation, provide more loans to customers which is their main form of assets and also are able to make more investments. All these attempts ultimately increase the asset size of banks. Along with the profit earning capacity, time trend and economic development of a country (GDP) also positively influence banks' asset size. On the other hand, other factors like asset structure, liquidity, capital strength and credit risk have negative effect on size of banks.

The findings of this study is helpful for bank management team and policymakers knowing about the factors that affect banks' assets growth. By controlling the effective variables, the bank management team can enhance their assets growth which will ultimately facilitate them to reach to the goal of value maximization of the firm. However, the study has limitations as only 20 banks were included in the sample. Further study can be done by increasing the sample size and also incorporating more explanatory variables to evaluate the effect of them on bank size. Along with that focus can be further drawn on the relationship between asset structure and bank size.

References

Alchilan, A. A. (1950). Uncertainty, evolution and economic theory. *Journal of Political Economy,* 58, 211-221.

Anbar, A., & Alper, D. (2011). Bank specific and macroeconomic determinants of commercial bank profitability: Empirical evidence from Turkey. Business and economics research journal, 2(2), 139-152.

Bangladesh Bank. (2020). Annual Report (2019-2020). *Bangladesh Bank.* https://www.bb.org.bd/pub/annual/anreport/ar1920/index1920.php

Bangladesh Bank. (2006). Annual Report (2005-2006). *Bangladesh Bank.* https://www.bb.org.bd/pub/annual/anreport/ar0506/index0506.php

Bashir, A. H. M. (2003). Determinants of profitability in Islamic banks: Some evidence from the Middle East. Islamic economic studies, 11(1).

Beck, T. and Levine, R. (2004) Stock markets, banks and growth: panel evidence, Journal of Banking and Finance, 28 (3), 423–442.

Beck, T., Cull, R., & Jerome, A. (2005). Bank privatization and performance: Empirical evidence from Nigeria. Journal of Banking & Finance, 29(8-9), 2355-2379.

Boukhatem, J., & Moussa, F. B. (2018). The effect of Islamic banks on GDP growth: Some evidence from selected MENA countries. Borsa Istanbul Review, 18(3), 231-247.

Capraru, B. & Ilhnatov, I. (2014). Banks' profitability in selected central and eastern European countries. Procedia Economics and Finance. 16, 587-591.

Chang, T. C., & Chiu, Y. H. (2006). Affecting factors on risk-adjusted efficiency in Taiwan's banking industry. *Contemporary Economic Policy*, 24(4), 634-648.

Coad, A. (2007). Testing the principle of "growth of the fitter": The relationship between profits and firm growth. *Structural Change and Economic Dynamics*, 18, 371–386.

Coleman, N. & Feler, L. (2015). Bank ownership, lending and local economic performance during the 2008-2009 financial crisis. Journal of Monetary Economics. 71(c), 50-66.

Cooper, M. J., Jackson III, W. E., & Patterson, G. A. (2003). Evidence of predictability in the cross-section of bank stock returns. Journal of Banking & Finance, 27(5), 817-850.

Dietrich, A., & Wanzenried, G. (2014). The determinants of commercial banking profitability in low-, middle-, and high-income countries. The Quarterly Review of Economics and Finance, 54(3), 337-354.

Duraj, B., & Moci, E. (2015). Factors influencing the bank profitability-empirical evidence from Albania. Asian Economic and Financial Review, 5(3), 483-494.

Elekdag, S., Malik, S. and Mitra, S. (2020). Breaking the bank? A probabilistic assessment of Euro area bank profitability. Jounal of Banking and Finance. 2020, 105949.

Gaganis, C., & Pasiouras, F. (2013). Financial supervision regimes and bank efficiency: International evidence. *Journal of Banking & Finance*, 37(12), 5463-5475.

German-Soto, V., & Sanchez-Hiza, O. (2021). The profitability-growth nexus in the Mexican manufacturing industry, Social Sciences & Humanities Open, Volume 4, Issue 1, 2021, 100220, ISSN 2590-2911, https://doi.org/10.1016/j.ssaho.2021.100220

Goddard, J., Molyneux, P., & Wilson, J. O. (2004). The profitability of European banks: a cross-sectional and dynamic panel analysis. The Manchester School, 72(3), 363-381.

Hondroyiannis, G., Lolos, S., & Papapetrou, E. (2005). Financial markets and economic growth in Greece,1986–1999. Journal of International Financial Markets, Institution sand Money, 15, 173–188.

Hossain, M. S. & Ahamed, F. (2015). Determinants of bank profitability: A study on the banking sector of Bangladesh. Journal of Finance and Banking. 13(1&2), 43-57.

Jahan, N. & Muhiuddin, K. M. G. (2014). Evaluation of Banking Sector's Development in Bangladesh in light of Financial Reforms. Developing Countries Studies. 4(22), 13-23.

Jang, S. and Park, K. (2011). Inter-relationship between firm growth and profitability. *International Journal of Hospitality Management*, 30, 1027-1035.

Jeris, S. S. (2021). Factors Influencing Bank Profitability in a Developing Economy: Panel Evidence from Bangladesh. International Journal of Asian Business and Information Management (IJABIM), 12(3), 333-346.

Jiang, G., Tang, N., Law, E., & Sze, A. (2003). The profitability of the banking sector in Hong Kong. Hong Kong Monetary Authority Quarterly Bulletin, 3(36), 5-14.

Khrawish, H. A., & Al-Sa'di, N. M. (2011). The impact of e-banking on bank profitability: Evidence from Jordan. Middle Eastern Finance and Economics, 13(1), 142-158.

Kohlscheen, E., Murcia Pabón, A., & Contreras, J. (2018). Determinants of bank profitability in emerging markets.

Le, T. DQ and Ngo, T. (2020). The determinants of bank profitability: A cross-country analysis. *Central Bank Review,* 20, 65-73.

Lee, S. (2014). The relationship between growth and profit: evidence from firm-level panel data. *Structural Change and Economic Dynamics*, 28, 1-11.

Lee, T. & Chih, S. (2013). Does financial regulation affect the profit efficiency and risk of banks? Evidence from China's commercial banks. *The North American Journal of Economics and Finance,* 26, 705–724.

Leitao, N. C. (2010). Financial development and economic growth: A panel data approach. Theoretical and Applied Economics, 15-24.

Levine, R. (2005). Finance and growth: theory and evidence. Handbook of economic growth, 1, 865-934.

Luo, Y., Bi, G., & Liang, L. (2012). Input/output indicator selection for DEA efficiency evaluation: An empirical study of Chinese commercial banks. Expert Systems with Applications, 39(1), 1118-1123.

Matin, A.K., 2017. Determinants of bank profitability in Bangladesh. *Bangladesh Economic Association*. www.bea-bd.org/site/images/pdf/new17/72.pdf, March 22, 2019.

Mitchener, K. J. & Wheelock, D. (2013). Does the structure of banking markets affect economic grpwth? Evidence from U.S. state banking markets. Explorations in Economic History. 50(2), 161-178.

Moradi-Motlagh, A., & Babacan, A. (2015). The impact of the global financial crisis on the efficiency of Australian banks. *Economic Modelling*, 46, 397-406.

Pradhan, R. P., Arvin, M. B., Norman, N. R. & Bele, S. K. (2014). Economic growth and the development of telecommunications infrastructure in the G-20 countries: A panel-VAR approach, Telecommunications Policy, Volume 38 (7), 634-649,

Pertia, N., Capraru, B. and Ihnatov, I. (2015). Determinants of banks' profitability: Evidence from EU 27 banking systems. Procedia Economics and Finance. 20, 518-524

Rahman, M. M., Hamid, Md. K. and Khan, Md. A. M. (2015). Determinants of bank profitability: Empirical evidence from Bangladesh. International Journal of Business and Management. 10, 8, 135-150.

Rahman, M.M. (2012), "Banking Sector Reforms in Bangladesh and its Impact", Asian Institute of Technology, Thailand, Retrieved from http://www.pmbf.ait.ac.th/www/images/pmbfdoc/research/report_mustafiz urrahman.pdf.

Samad, A. (2015). Determinants bank profitability: Empirical evidence from Bangladesh commercial banks. International journal of financial research, 6(3), 173-179.

Sassi, S. & Goaied, M. (2013). Financial development, ICT diffusion and economic growth: Lessons from MENA region. Telecommunications Policy. 37(4), 252-261.

Shaikh, S. A. (2014). Determinants of Islamic banking growth in Pakistan. Journal of Islamic Economics, Banking and Finance, 113(3580), 1-16.

Sufian, F., & Kamarudin, F. (2012). Bank-specific and macroeconomic determinants of profitability of Bangladesh's commercial banks. The Bangladesh Development Studies, 1-28.

Sun, J., Harimaya, K., & Yamori, N. (2013). Regional economic development, strategic investors, and efficiency of Chineese city commercial banks. *Journal of Banking & Finance*, 37, 1602-1611.

Tan, Y. (2016). The impacts of risk and competition on bank profitability in China. Journal of International Financial Markets, Institutions and Money, 40, 85-110.

Tan, Y., Floros, C., & Anchor, J. (2017). The profitability of Chinese banks: impacts of risk, competition and efficiency. Review of Accounting and Finance.

Terraza, V. (2015). The effect of bank size on risk ratios: Implications of banks' performance. Procedia Economics and Finance, 30, 903-909.

Ueda, K. (2013). Banks as coordinator of economic growth and stability: Micro-foundation for macroeconomy with externality. Journal of Economic Theory. 148(1), 322-352.

Windasari, N. A., Kusumawati, N., Larasati, N., & Amelia, R. P. (2022). Digital-only banking experience: Insights from gen Y and gen Z. *Journal of Innovation & Knowledge,* 7(2), 100170.

Wu, J. L., Hou, H., & Cheng, S. Y. (2010). The dynamic impacts of financial institutions on economic growth: Evidence from the European Union. Journal of Macroeconomics, 32(3), 879-891.

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.

Zhang, X. P., Cheng, X. M., Yuan, J. H., & Gao, X. J. (2011). Total-factor energy efficiency in developing countries. Energy Policy, 39(2), 644-650.

Appendix

Table 1: Multi-collinearity Test

Variable	VIF	1/VIF
lta	2.04	0.489891
DPST	2.03	0.493497
Inflation	1.49	0.669612
NPL	1.35	0.739579
EQRWA	1.34	0.745552
ROE	1.25	0.798444
GDP	1.05	0.955413
Mean VIF	1.51	0.955413

Impact of Financial Inclusion on the Poverty Reduction in India

-Rahul Singh Gautam[*]
- Shailesh Rastogi[**]
- Jagjeevan Kanoujiya[***]
- Aashi Rawal[****]

Abstract

MGNREGA is an important step taken by Indian government for its rural development. This study aims to assess the impact of MGNREGA on India's poverty reduction (PR) and rural development. The Panel Data Analysis (PDA) is used on secondary data of 22 states in India having timeframe 2018-20. The findings indicate that MGNREGA has no significant association with PR. However, it helps rural communities achieve financial inclusion (FI) and inclusive growth, as bank accounts opened under MGNREGA is positively linked with PR. The study captures conditional correlations between variables that are almost certain to occur in real-world circumstances. The findings will help the government observe the flaws existing in the Act on which they can improve in future. The existing researches on the relationship between MGNREGA and PR in India lacked empirical evidence. This study is unique, which addresses the problem empirically and indicates FI through MGNREGA helps PR.

Keywords: MGNREGA, Poverty, Financial Inclusion, Rural development, Banking
JEL Classification: O18, P2, P3

1. Introduction

Economic growth processes must make an effort to involve all facets of society, particularly when they are on a high growth trajectory. Small/marginal farmers' and the weaker segments of society's lack of access to financial services has been acknowledged as a severe challenge to economic development, particularly in emerging nations. Today one of the most crucial elements for inclusive growth (economic growth that improves the living standard of the large segment of population) and development of countries is financial inclusion.

[*] Rahul Singh Gautam is a Ph.D. Scholar, Symbiosis Institute of Business Management, Symbiosis International University, Pune, India, Email: bouddhrahul@gmail.com.; [**]Dr. Shailesh Rastogi is a Professor, Symbiosis Institute of Business Management, Symbiosis International University, Pune, India, Email:krishnasgdas@gmail.com.; [***]Jagjeevan Kanoujiya is a Ph.D. Scholar, Symbiosis Institute of Business Management, Symbiosis International University, Pune, India, Email: jagjeevan24288@yahoo.co.in. and[****] Aashi Rawal is a Ph.D. Scholar, Symbiosis Institute of Business Management, Symbiosis International University, Pune, India, Email: aashi.rawal07@gmail.com. The views expressed in this article are the authors' own.

When it was discovered that around 7.5 million people lacked a bank account, the term "financial inclusion" was first used in British slang. However, the idea of financial inclusion is not new in India. As per the committee on Financial inclusion headed by Dr. C. Rangarajan defines financial inclusion as "The process of ensuring access to financial services and timely and adequate credit where needed by vulnerable groups such as weaker sections and low-income groups at an affordable cost" (Rangarajan, 2008).

Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), earlier named as National Rural Employment Guarantee Act or NREGA, is one of the world's most extensive rural employment programs initiated by the government of India (Prattoy & Jagdish, 2011). MGNREGA is one of its kind, as, under this program, every needy and eligible unemployed individual in rural households can get a guaranteed wage job for 100 days each financial year. As we all know, India is mainly an agricultural country with unskilled rural labourers. The majority of the rural households rely on the wages they earn from unskilled, casual, and manual labour (Bhat & Mariyappan, 2015).

This Act got proposed for the first time by the country's former Prime Minister, P.V. Narasimha Rao, in 1991. Then later in 2006, it was passed in the parliament, and in the first stage of implementation, the Act came into force in 625 districts of India. This Act enables rural poor people to work during the lean season, keeping their consumption levels up and strengthening their livelihood and resource base during this critical period (Bhat & Mariyappan, 2015). MGNREGA plays a significant role in poverty reduction, development for poor peoples' socio-economic development and helps in employing women, SCs, STs (Chowdhury, 2019). This Act also ensures financial inclusion and transparency to the most vulnerable and marginalised members of society (Kumar & Kumar, 2021), as poor, underprivileged, and low-skilled rural households account for 70% of India's population (Karnataka, 2011). Financial inclusion can significantly improve the economic situation and living standards of the poor and the disadvantaged (Sahoo, 2013).

We all have heard how these innocent people from villages and small towns get scammed and lose money and other valuable belongings. This Act helps

prevent workers from being defrauded and gives them more control over their wages, as the wages are settled through the bank account of each worker working under this Act (Prasanna et al., 2014). As per one of the provisions of this Act, wage payments are automatically transferred solely to MGNREGA recipients' bank or post office accounts.

After the beginning of the COVID- 19 pandemic, its negative impact on all sectors of the economy resulted in widespread unemployment across the country (Turangi, 2021). This situation created panic among the working-class population. Many people experience depression and even decided to end their lives. The government can use MGNREGA and other programs to create new job opportunities and increase the employment rate once again in the country. Even before the pandemic, MNGREGA has provided jobs to millions of unemployed people living in India and helped them improve their living standards. However, as we are conducting our study including three years, 2018, 2019, and 2020, which includes the pre-pandemic period and the year it happened across the world. Therefore, this study gives us a chance to determine the impact of MNGREGA as a job providing instrument for rural poverty reduction even during the pandemic.

A few significant types of research have been conducted that include the maximum number of states in India to assess the impact of MGNREGA on poverty reduction. We felt the need to study this area deeper as MGNREGA plays an essential role in poverty reduction and rural development in a developing country like India. Hope all the provisions mentioned in the Act get applied efficiently and effectively in the country. In that case, it has the potentials to improve the financial conditions of people by providing jobs to migrant workers, women, and other individuals who are capable but currently do not have any job (Sarkar & Kumar, 2011; Kumar and Joshi, 2013; Kumbhar & Naik, 2021). All these factors motivated us to conduct a study that involves finding the impact that MNGREGA might have on reducing poverty in India.

This study will contribute in several ways to the present stock of knowledge. Firstly, most of the previous studies conducted are specific to one or two states in India, but in our study, we include data of 22 states of India. Secondly, no such

study has been conducted until now, which take the pandemic period. However, we include 2020 as one of the years to be studied for our research. Lastly, the MNGREGA has a significant role in our economy, as it helps generate employment, eventually leading to a vibrant economy. Therefore, researchers should keep conducting studies by including different types of states or areas, as it can help the government departments and officials in determining the actual effect that the Act has on different areas of the country. According to that, they can introduce some new changes in the Act.

The remaining paper is structured in the following manner. The next section comprises a brief review of the Literature. The subsequent section involves a description of data, tables, methods, and models used, followed by the results and discussions of the study. Finally, the conclusion and limitations section will conclude the paper.

2. Theoretical Model, Literature Review and Hypotheses Formulation

The literature study is divided into four sub-sections: the first discusses Financial Inclusion and Development, the second is MGNREGA and Financial Inclusion, the third is MGNREGA and Poverty, and the fourth involves a brief explanation about MGNREGA and Rural Development.

2.1 Financial Inclusion and Development in Asia

Many studies for instance Park and Mercado (2015), Gunarsi, Sayekti and Dewanti (2018), Ratnawati (2020) and Churchill and Marisetty (2020) have analyzed impact of Financial inclusion on economic development of Asian countries. Financial inclusion positively affects poverty reduction and financial stability, and economic development in Asia (Ratnawati, 2020; Churchill & Marisetty, 2020). Income disparity in emerging Asia is decreased through raising financial inclusion or decreasing obligatory financial barriers. More steps must be taken to address the financial obstacles of low-income groups from banking and finance to reduce income disparity further (Park & Mercado, 2015; Gunarsih, Sayekti & Dewanti, 2018). People now have greater access to financial services thanks to financial inclusion. Services like banking, lending, insurance, and secured savings have become increasingly popular among all facets of the

population. They are now viewed as being crucial. Consumers and companies have increased the utilization of financial services, which has boosted regional economies (Tran & Le, 2021; Okoye., Erin & Modebe, 2017). Financial inclusion in China due account holdings is his higher than other BRICS countries (Fungáčová & Weill, 2015). Zulfiqar et al. (2016) argue that lack of requisite formalities and money are main barriers for financial inclusion in Pakistan.

2.2 MGNREGA and Financial Inclusion

Wage payment through banks and post offices increases payment visibility and efficiency while also increasing banking habits among rural Indians. MGNREGS gives the government more financial inclusion and sustainable development (N.P. et al., 2014; Malakar, 2013). MGNREGA Contributes to financial inclusion by allowing salary payments through the bank and post office accounts (Singh., 2020). The country has come a long way in establishing financial inclusion policies. However, some significant steps are still required to connect every citizen in the banking and financial system of the country. It is necessary to increase financial literacy to become familiar with financial products and financial procedures (Choudhary, 2017). The direct transfer of wages to beneficiaries' bank and post office accounts ushered in a paradigm shift, hastening the rural poor's financial inclusion (Das, 2015).

Financial inclusion for MGNREGA beneficiaries is problematic, especially in the current economic situation. The world is already facing a pandemic, and all these problems directly impact citizens' financial condition, ultimately impacting their interest to get connected to the country's financial system. However, hopefully with time, creating awareness among different sections of the society will finally lead to more and more involvement of ordinary people.

According to the World Economic Forum, the MGNREGA initiative has enhanced farmers' access to financial services. It also shows that the country has enhanced agricultural and economic development (Arunachalam & Kanniappan, 2020). Access to financing for individuals who belong to weaker sections of society is a precondition for poverty alleviation and social stability, both of which have become critical components of our efforts to promote socio-economic

development. MGNREGA the UPA administration's flagship initiative, was innovative in its promise of inclusive development and financial inclusion, the right to work and worker integrity, and a rational, participatory engagement with the govt (Kapoor, 2014). While the importance of financial inclusion is widely recognised, no comprehensive metric would be used to compare the extent of financial inclusion among economies in the Literature (N.P. et al., 2014; N.P., 2020).

The government even tried to start one more program to improve peoples' overall connection to the banking system in 2014 by introducing Pradhan Mantri Jan Dhan Yojana (PMJDY). PMJDY has boosted the number of bank accounts for disadvantaged and poor populations by weakening KYC ("Know Your Customer"), yet account transactions are severely limited. Many accounts remain dormant. The lack of adequate income or a lack of funds to be deposited is the main reason for this situation (Bijoy, 2017). By reducing KYC, PMJDY has increased the number of bank accounts for disadvantaged and impoverished people, although account transactions are severely constrained. Due to a lack of sufficient revenue to route through them or money to deposit. Unemployment and poverty remain critical roadblocks to progress in developing economies such as India. Poverty and unemployment are frequently coupled with a shortage of social sector services, such as education, health, access to clean water, and nutritious food. The high prevalence of poverty and unemployment in rural regions has necessitated the implementation of a unique plan.

2.3 MGNREGA and Poverty

India is a country with about 1.3 billion population, with more than 70% of its population living in rural areas (Sarkar & Kumar, 2011). Before the advent of MGNREGA, they were primarily reliant on seasonal farm labourers and were compelled to travel to metropolitan areas to search for a job (Kumar & Kumar, 2021). Poverty existed at various levels in various states (Badodiya et al., 2011). MGNREGA serves a significant purpose in involving rural people in development. It contributes to poverty reduction in rural regions by offering 100 days of guaranteed employment (Rahmatullah, 2013). Infrastructure is built in villages, which is critical for the growth of rural and urban regions. MGNREGA also aids in the improvement of rural people's living standards (Bhat &

Mariyappan, 2015). Indeed, revenue created in rural regions will migrate to urban areas, and infrastructure development makes it easier for individuals to commute to cities regularly (Fischer & Ali, 2019). MGNREGA also improves rural people's living conditions (Das, 2016).

MGNREGA also intends to improve the rural areas by improving the socio-economic status of the people (Sarkar & Kumar, 2011). The rural economy is vital for the economic development of India. Employing rural residents will undoubtedly help in boosting the economy (Kumbhar & Naik, 2021). MGNREGA can reduce rural-to-urban migration. When a family's income increases, it usually significantly impacts their spending habits (Yadav, 2018). It is considered the world's most extensive anti-poverty program. It is indeed the largest anti-poverty initiative globally (Majhi, 2017).

MGNREGA is much more than an initiative to reduce poverty in rural areas by improving the economy. Instead, it is a collection of policies that promote rural development while adhering to environmental protection (Das, 2019).

2.4 MGNREGA and Rural Development

MGNREGA is generating significant gains in employment generation and contributing to the general development of the rural sector by increasing water availability and soil fertility, resulting in improved agricultural production, afforestation, infrastructure development, environmental protection and socio-economic development. MGNREGA is helping rural areas achieve financial inclusion and inclusive growth (Rahmatullah, 2013; Dey, 2020). Economic growth that reduces poverty and opens up employment opportunities is referred to as inclusive growth. It improves the living standard of the large segment of population and is fairly distributed across society (Rahmatullah, 2013; Dey, 2020). MGNREGA was established to ensure the livelihood of a group of unskilled workers in rural areas in the state. It has instilled strength and confidence in the rural poor, particularly among women who work in environmental clean-up, deforestation, and road construction. The vast potential of this scheme enabled the poor to overcome the issues of poverty, education, and the need for modern health care facilities to a large extent (Pamecha & Sharma, 2015).

The MGNREGA is the most realistic solution to rural poverty and unemployment. This legislation has signified a paradigm change from past employment programs (Singh, 2019). It promotes women's empowerment and reduces migration from rural areas, which is critical for rural and urban regions (Singh, 2014; Narayanan, 2017).

The actual development of any country depends on the villagers or tribes living in rural areas. Most of the poor rural areas of the country mainly depend on the income earned through unskilled casual, physically regular labour (Das, 2016; Vettriselvan et al., 2018). Panchayati Raj wants to implement programs, among other things; However, paucity of funds, salary, and gaps are all hindering the success of MGNERGA (Fischer & Ali, 2019; Bora, 2013; Das, 2019).

Rural development refers to the process of enhancing the standard of living and financial security of residents of rural communities, which are frequently secluded and sparsely populated. The traditional focus of rural development has been the exploitation of land-intensive natural resources like agriculture and forestry.

The current study involves exploring whether the initiative launched by the government of India, MGNREGA, is having any impact on poverty reduction and helping in the development of rural areas of the country. As far as the previously conducted studies are concerned, the existing research on the relationship between MGNREGA and poverty reduction in India lacked empirical evidence. The procedure also requires a unique perspective that has not been seen previously in the Literature. Therefore, the following hypothesis has been framed to empirically test the impact of MGNREGA on poverty reduction and rural development in Indian states.

H1: MGNREGA positively impacts poverty reduction in India.

3. Data and Methodology

The current section discusses the sample data, panel data model specifications, and variables used in the present study.

3.1 Data

The current paper has used the panel data for the following variables; 1) the poverty score,2) the number of farmers registered in MGNREGA,3) the number of bank accounts associated with MGNREGA, and 4) the number of transactions through the MGNREGA scheme. All these data are a representation of financial inclusion in rural India. The sample data has been collected for 22 Indian states considering three-year data (2018-2020). Table A1 reports the list of selected states. Only 22 states and three years (2018-2020) are chosen as the cross-section and period, respectively, due to the availability of enough data for the study to provide the present reflection and reliable outcome. The sample data is sourced from the database presented in RBI (Reserve Bank of India) and NABARD. Table-1 reports the variable definition.

Table 1: Definitions of the Variables

Variable Name	Symbol	Definition	Literature
Poverty score	ps	Poverty is a state or circumstance in which an individual or a group lacks the financial means and necessities for a bare living level. Poverty is defined as a situation where one's earnings from work are insufficient to meet fundamental human requirements.	(SOUTHTRIPURA DISTRICT, 2006; Yadav, 2018; Sarkar & Kumar, 2011).
Registered in MGNREGA (Number)	Mgnrega_n	The MGNREGA was passed on August 25, 2005, known as the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). Adult members of every rural family willing to conduct public work-related unskilled manual labour at the statutory minimum pay are legally guaranteed one hundred days of employment every financial year	(Badodiya, et al., 2011; Bhat & Mariyappan, 2015).

Variable Name	Symbol	Definition	Literature
		under the MGNREGA. This Act was enacted to increase the buying power of rural people, mainly through providing semi-skilled or un-skilled jobs to those living in poverty in rural India.	
Bank account (Number)	BA_n	MGNREGA helps poor households to conduct critical financial responsibilities such as storing money safely outside the house by facilitating the creation of bank or post office accounts and salary payment transactions through these accounts.	(Sahoo, 2013; SIMDEGA, 2017; SOUTHTRIPURA DISTRICT, 2006).
Bank transaction (Number)	BT_n	In May 2008, the government announced that wage payments under the MGNREGA Act, the world's most significant rural public works programme, would be made through banks and post offices to ensure prompt payment to MGNREGA employees and financial inclusion. The traditional metric for the breadth of financial services is the percentage of persons in a specific area who have a bank account. Poor households can utilise a bank account to accomplish critical financial responsibilities. These include safely storing money outside the home, obtaining credit, making loans or premium payments, and transferring money.	(Sahoo, 2013; SIMDEGA, 2017; SOUTHTRIPURA DISTRICT, 2006).

Note: Where Mgnrega_n, BA_n and BT_n Represent Financial Inclusion.

3.2 Methodology

The panel data analysis (PDA) has been employed to test the assumed hypothesis. The current paper has used PDA due to its advantage over only time-series or cross-section analysis. As per Baltagi et al. (2009) and Baltagi (2008), PDA reveals the cross-section and time-series approach characteristics and

provides more information and variability. The present study specifies three PDA models presented as follows:

Model 1: $Y_{it} = const. + \beta lm\_reg_{it} + u_{it}$ (1)

Where Yit is the dependent variable poverty score (i.e. ps). Const is a constant term. β is coefficient for independent variables are number of registered people in MGNREGA.

Model 2: $Y_{it} = const. + \beta lm\_ba_{it} + u_{it}$ (2)

Where Yit is the dependent variable poverty score (i.e. ps). Const is a constant term. β is coefficient for independent variables are number of the bank accounts.

Model 3: $Y_{it} = const. + \beta lm\_amt_{it} + u_{it}$ (3)

Where Yit is the dependent variable poverty score (i.e. ps). Const is a constant term. β is coefficient for independent variables are number of the transaction amount where all the values of independent variables are in natural log values. u_{it} is the error term. The subscript it represents i[th] state at time t. A detailed description of the variables is reported in Table-1.

4. Results and Analysis

This section explains the results of descriptive statistics, correlation matrix, and the outputs of all the three models specified in the previous section.

4.1 Descriptive Statistics

Table 2: Descriptive Statistics

Variables	Mean	SD	Min	Max
ps	58.667	10.557	28	76
m_reg	7159483.258	7388803.331	14782	25437311
m_ba	3754557.494	4046959.774	7466	16259498
m_amt	141276.470	152061.914	25.63	587366.7

Note: Mean, SD, Min and Max are mean values, standard deviation, the minimum and maximum value of the used variables, respectively.

Table-2 and Table-3 demonstrate the descriptive statistics and correlation matrix, respectively, for the variables used in the study. The mean value of the poverty score is 58.667 signalling a moderate poverty level in India. Its Standard deviation is 10.557; therefore, these scores do not much away from its mean value. The maximum and minimum poverty scores are 76 and 28, respectively. The mean value of the number of MGNREGA registrations (m_reg) is 7159483 showing that many people are registered in the scheme. The standard deviation of number of m_reg is 7388803.331. This result indicates a high deviation from its mean value. The minimum and maximum values m_reg for are 14782 and 25437311, respectively.

Further, the mean value of the number of MGNREGA bank accounts (m_ba) is 3754557.494, which shows that m_ba are allotted to many people across India. The standard deviation of 4046959.774 is high from the average value of m_ba. The minimum and maximum values of m_ba are 7466 and 16259498, indicating a vast difference between states' minimum and the maximum number of MGNREGA bank accounts. Lastly, the mean value of the MGNREGA transaction amount in carore (m_amt) is INR 141276.470. This result indicates that a good amount of transactions through MGNREGA has taken place in these states on average. Its standard deviation is 152061.914 showing a high deviation from the mean value. The minimum and maximum values for m_amt, are 25.63 and 587366.7. It also indicates a vast difference between the states' minimum and maximum transactions.

Table 3: Correlation Matrix

Variables	ps	m_reg	m_ba	m_amt
ps	1			
m_reg	-0.1974	1		
m_ba	-0. 126	.9767*	1	
m_amt	-0. 0133	.9347*	.9315*	1

Note: values represent the coefficient of correlation. * represents significance level at 5%.

In Table-3, the correlation matrix of variables is depicted. The correlation between m_reg and m_ba is .9767 showing a strong, positive, and significant at 5%. The m_reg and m_amt also have a strong positive correlation (0.9347 at 5%

significance). The m_ba and m_amt also show a strong positive correlation (0.9315 at 5% significance. The rest of the correlations between variables has not been found significant.

4.2 Result of Model 1

Table 4: Result of Regression Analysis (Model 1) (Fixed Effect Model)

Part A (Coefficient Analysis) Dependent Variable: ps						
Variable Name	Standard Errors (Normal)			Robust Standard Errors		
	Coefficient	SE	p-value	Coefficient	SE	p-value
Constant	-1149.714*	555.6393	0. 043	-1149. 714	573.49	.054
lm_reg	81.7359*	37.5838	0. 034	81.7359*	38.791	0.044.

Part B (Model Estimates)	
F-test (Model)	4.73*(.0335)
R-Square	0.0720
$\sigma_{\mu i}$	0.9975 0.9975
F-test Fixed Effect	3.11* (.0001)
Breush-Pagan Test	12.02* (.0003)
Hausman Teat	4.68 *(.0306)
No of observations (n)	93
Degree of freedom	61
Wald test for Heteroscedasticity[1]	1.1e+06* (.0000)
Wooldridge Autocorrelation Test[2] AR (1)	19.181* (.0001)

Note: [1]Wald test of heteroscedasticity has the null of no heteroscedasticity. [2]Wooldridge test of autocorrelation in the panel has the null of no autocorrelation (with 1 lag). $\sigma_{i\mu}$ is the variance of individual effect (states in this case). Theta estimates the fitness of the random effect model (higher is better). Robust estimates are estimated due to significant Heteroscedasticity and Autocorrelation. DV is ps (Poverty Score). It is measured on a scale of 1-100, and the lower means poor. lm_reg is the log of the MGNREGA registrations in number. * sig at 5%. ** sig at 10%.

Table-4 reports the outcomes of the regression analysis of Model 1 having ps (poverty score) as the dependent variable and lm_reg (log value of m_reg) as the explanatory variable. First, considering the model diagnostics, F-test signals for fixed effect (F.E.) model but Bruesh -Pagan test contradicts for F.E. and indicates for random effect (RE) as both tests have significant p-value (0.0001 and 0.0003 for F-test and B-test, respectively) at 1 per cent. Therefore, the Hausman test has been performed, which supports the fitness of F.E. as its p-value is significant (0.03<0.05) (Torres-Reyna, 2007; Baltagi, 2008).

R-square value comes out to be 7.2 per cent. The value of σiμ is 0.9975 showing the variance in individual effect which associates to intercept (as Model is FE). Wald test confirms the presence of heteroscedasticity as the p-value is lower than 5 per cent (Torres-Reyna, 2007; Baltagi, 2008). Wooldridge test validates the existence of autocorrelation (Wooldridge, 2010) as having a significant p-value at 5 per cent. Due to heteroscedasticity and autocorrelation, robust estimates have also been mentioned (Baltagi, 2008; Baltagi et al., 2009).

The coefficient of lm_reg is 81.735, and its p-value is 0.03. This output indicates a positive and significant relationship between lm_ba and ps (poverty score). Robust estimates also confirm a similar result. Therefore, lm_reg (MGNREGA registrations) positively influences poverty in India. Hence, it supports the assumed hypothesis H1.

4.3 Result of Model 2

Table 5: Result of Regression Analysis (Model 2) (Fixed Effect Model)

Part A (Coefficient Analysis) Dependent Variable: ps						
Variable Name	**Standard Errors (Normal)**			**Robust Standard Errors**		
	Coefficient	**SE**	**p-value**	**Coefficient**	**SE**	**p-value**
Constant	-516.4254*	80.1974	0.000	-516. 4254*	95.466	0.000
lm_ba	40.835*	5.6943	0.000	40.835*	6.7787	0. 000
Part B (Model Estimates)						
F-test (Model)	51.43*(.0000)					
R-Square	0.4574					
σμi	0.9946			0.9946		
F-test Fixed Effect	6.91* (.0000)					
Breush-Pagan Test	11.82*(.0003)					
Hausman Teat	33.92*(.0000)					
No of observations (n)	93					
Degree of freedom	61					
Wald test for Heteroscedasticity[1]	18449.54* (.0000)					
Wooldridge Autocorrelation Test[2] AR (1)	0.199* (.6584)					

Note: [1]Wald test of heteroscedasticity has the null of no heteroscedasticity. [2]Wooldridge test of autocorrelation in the panel has the null of no autocorrelation (with 1 lag). σiμ is the variance of individual effect (states in this case). Robust estimates are estimated due to significant Heteroscedasticity and Autocorrelation. DV is ps (Poverty Score). It is measured on a scale of 1-100, and lower means poor. lm_ba is the log of the MGNREGA bank accounts in number. * sig at 5%.

In Model-2, the association between ps and lm_ba (i.e., natural log of m_ba) is investigated. Table-5 presents the regression outcomes of Model-2. The F-test supports the fixed-effect model as its p-value is significant at 0.05. However, Bruesh-Pagan test indicates the random effect as it is significant at 0.01. As there is no consensus on F.E. or RE in the existing model, the Hausman test is further performed, which confirms the fixed effect model to be followed due to having a significant p-value (0. 00<0.05) (Torres-Reyna, 2007; Baltagi, 2008). The R-square value shows only 45.74 per cent variability in ps can be explained by the independent variable lm_ba. The σiμ value of 0.9946 shows the variance in individual effect associated with intercept (as the model has F.E.). Moreover, the Wald test rejects the null of no heteroscedasticity as its p-value is significant at 0.05(Torres-Reyna, 2007; Baltagi, 2008). The Wooldridge test confirms that there is no first-order autocorrelation (Wooldridge, 2010) as its value is insignificant (p-value> 0.05). As heteroscedasticity exists, robust estimates are also reported (Baltagi, 2008; Baltagi et al., 2009).

The explanatory variable lm_ba also has a negative coefficient (44.835) and p-value (0.000) lower than 0.05. This result indicates that lm_ba has positive and significant connectivity to poverty scores (ps). The identical results are reported in the Robust estimates as well. Therefore, it supports hypothesis H1. It implies that MGNREGA bank accounts positively affects poverty in India.

4.4 Result of Model 3

Table 6: Result of Regression Analysis (Model 3) (Random Effect Model)

Part A (Coefficient Analysis) Dependent Variable: ps

Variable Name	Standard Errors (Normal)			Robust Standard Errors		
	Coefficient	SE	p-value	Coefficient	SE	p-value
Constant	63.4289*	7.8486	0	63.4389*	5.279	0
lm_amt	-0. 4404	0.7128	0.537	-0.4404	0.5187	0.396

Part B (Model Estimates)

F-test (Model)	0.38(.5366)	
R-Square	0.0285	
σ$_{\mu i}$	0.4121	0.4121
F-test Fixed Effect	3.08* (.0001)	

Part A (Coefficient Analysis) Dependent Variable: ps

Variable Name	Standard Errors (Normal)			Robust Standard Errors		
	Coefficient	SE	p-value	Coefficient	SE	p-value
Breush-Pagan Test	13.46*(.0001)					
Hausman Teat	2.29*(.1303)					
No of observations (n)	93					
Degree of freedom	61					
Wald test for Heteroscedasticity[1]	5034.93* (.0000)					
Wooldridge Autocorrelation Test[2] AR (1)	29.202* (.0000)					

Note: [1]Wald test of heteroscedasticity has the null of no heteroscedasticity. [2]Wooldridge test of autocorrelation in the panel has the null of no autocorrelation (with 1 lag). $\sigma_{i\mu}$ is the variance of individual effect (states in this case). Robust estimates are estimated due to significant Heteroscedasticity and Autocorrelation. DV is ps (Poverty Score). It is measured on a scale of 1-100, and **lower means poor**. lm_amt is the log of the MGNREGA amount of bank transactions in INR. * sig at 5%.

Model-3 investigates the relationship between ps and lm_amt (MGNREGA amount transaction log value). Table 6 demonstrates the outputs of Model 3. In this, both F-test and the Bruesh -Pagan test contradict each other for the presence of F.E. or RE as both tests exhibit the significant p-value (i.e., 0.0001) at 1 per cent. Hence, the Hausman test employed to check the suitability of RE or F.E. The Hausman test also indicates for the random effect to be considered as it has the p-value exceeding significance level (0.13>0.05) (Torres-Reyna, 2007; Baltagi, 2008). R-square value exhibits 2.85 per cent variability in ps that the independent variable lm_amt can explain. The $\sigma_{i\mu}$ value of 0.4121 shows the variance in individual effect, which connects to the error term (as the model has RE). Wald test rejects the null of no heteroscedasticity as its value is lower than 5 per cent significance (Torres-Reyna, 2007; Baltagi, 2008). The Wooldridge test also confirms the availability of autocorrelation (Wooldridge, 2010) as its value is significant at 5 per cent. Due to the presence of heteroscedasticity and autocorrelation, the robust estimates are taken into consideration (Baltagi, 2008; Baltagi et al., 2009).

The explanatory variable lm_amt has a negative coefficient (-0.4404) with an insignificant p-value (0.396) greater than 0.05. This output indicates that lm_amt has no significant link to ps. The robust estimates also confirm a similar result. This further implies lm_amt has no significant impact on poverty. Therefore, it rejects hypothesis H1.

5. Discussion

With the help of the methodology used in our paper, the hypothesis formulated is proved significant and cannot be rejected. According to the study, it is found that MGNREGA is directly beneficial in producing income for rural families by providing wage employment. This might be due to people engagement in job offerings by MGNREGA resulting in poverty alleviation. However, when transaction amount is concerned, it does not significantly affect poverty. This might be the case that the wages offered to the people through the MGNREGA scheme is not sufficient for improving their livelihood standard. Therefore, it is insignificant for poverty alleviation. The current study evaluates MGNREGA's influence on poverty reduction: 1) it can reduce rural-to-urban migration (Pamecha & Sharma, 2015); 2) it has various advantages in job creation and general rural development; and 3) it also facilitates enhanced water availability and soil fertility, which leads to more excellent agricultural production, afforestation, infrastructural development, improvement of living standards, and pollution prevention (Singh, 2014). MGNREGA is still the most suitable approach for alleviating rural poverty, unemployment situation and helping in policy formulation (Das, 2016).

Unlike most studies conducted in this area, we decided to study the impact of MGNREGA on poverty reduction in India using Panel Data Analysis (PDA). PDA approach is beneficial in many ways. It monitors unobserved variables and assists in determining the cumulative effect of reason on the output while also accounting for mutual covariance. PDA better captures the behavioural aspects of MGNREGA and its impact on poverty reduction than by traditional econometric or deterministic analysis (Baltagi, 2008; Baltagi et al., 2009). Deployment of the PDA models makes this study different and comparatively more reliable than previously conducted researches in this area.

Our research has the following research implications. Firstly, our study can be used by the governmental departments responsible for village development in India to determine whether the provisions and regulations mentioned in the Act are helpful for the betterment of society on the ground level. Secondly, the common people of India can also gain some knowledge about the overall effects that these types of acts can have on the development of the country. Eventually, people will become more interested in knowing the positive and negative impacts of other kinds of initiatives run well by the government in the country.

6. Conclusion and Limitations

6.1 Conclusion

This paper aims to explore the impact of the implementation of MGNREGA on poverty reduction and development in rural areas of Indian states. We analysed in this paper that MGNREGA has a significant and positive relationship with poverty reduction. It implies that MGNREGA helps in poverty alleviation in rural India. The findings indicate that Infrastructure is built in the villages, which is critical for the growth of both rural and urban communities. Indeed, development in rural areas will make it comparatively more accessible for individuals to migrate to cities regularly or find job opportunities in their villages. This initiative is assisting rural areas in achieving financial inclusion and inclusive growth.

6.2 Limitations

Two significant factors, poverty reduction and rural development, have been covered in our study. However, many other problems need to be eradicated to create a fully developed country. The major limitation observed in our paper is that the period covered in the study is too short. So, it is advised to future researchers to include other factors in their study, and they can also increase the number of years to be studied in the study. Hence, the scope for future research work on this issue is clearly noted.

References

Badodiya, S. K., Kushwah, R. S., Garg, S. K., & Shakya, S. K. (2011). Impact of Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA) on poverty alleviation. *Rajasthan Journal of Extension Education, 19*, 206-209. Retrieved from http://www.rseeudaipur.org/wp-content/uploads/2013/02/471.pdf.

Baltagi, B. H. (2008). Forecasting with panel data. *Journal of forecasting*, *27*(2), 153-173. https://doi.org/10.1002/for.1047.

Baltagi, B. H., Demetriades, P. O., & Law, S. H. (2009). Financial development and openness: Evidence from panel data. *Journal of development economics*, *89*(2), 285-296. https://doi.org/10.1016/j.jdeveco.2008.06.006.

Bhat, B. B., & Mariyappan, P. (2015). MGNREGA: A new hope to reduce rural poverty. *International Journal of Innovative Research and Development*, *4*(8), 347-351.

Bijoy, K. (2017). Financial Inclusion in India and PMJDY: A Critical Review. *In ICITKM, 14*, 39-46. Retrieved from https://annals-csis.org/proceedings/icitkm2017/pliks/32.pdf.

Bora, P. (2013). Manifesting Livelihood: The Role of Mgnrega in Assam. *International Journal of Innovative Research & Studies*, *2*(5), 463-473.

Choudhary, A. (2017). Financial Inclusion: A need for Sustainable Economic Inclusion. *International Journal of Research in Economics and Social Sciences (IJRESS)*, *7*(8), 331-343.

Chowdhury, T. (2019). Role of Mgnrega in Poverty Alleviation: A Study of Karimganj District in Assam, India. *Pratidhwani the Echo*, *7*(4), 282-306. Retrieved from https://www.thecho.in/files/32.-TUMPA-CHOWDHURY-1.pdf.

Churchill, S. A., & Marisetty, V. B. (2020). Financial inclusion and poverty: a tale of forty-five thousand households. *Applied Economics*, *52*(16), 1777-1788. Retrieved from https://ideas.repec.org/a/ taf/applec/ v52y2 020i1 6p1 777-1788.html

Das, A. N. (2015). Financial Inclusion Through Two Selective Innovative Interlinkage Mechanisms. *Intercontinental Journal of Banking Insurance and Finance*, *2*(9), 20-26. https://web.archive.org/web/2018042201 5118id_/http://researchscripts.org/sep_2015/IJBIF/20150903.pdf.

Das, D. (2016). Role of MGNREGA in Rural Employment: A Study of Barpeta District of Assam, India. *International Journal of Humanities & Social Science Studies*, *2*(6), 241-248.

Das, S. (2019). The Impact of MGNREGA on Economic and Environmental Sustainability in West Bengal. *Research Review International Journal of Multidisciplinary*, *4*(3), 1434-1438. Retrieved from https://www.academia. edu/41903094/The_Impact_of_MGNREGA_on_Economic_and_Environ mental_Sustainability_in_West_Benga.

Dey, D. (2020). Assessment of "Right to Work" Based Public Policy and Its Impact on Local Self-Government in India: An Analyses of MGNREGA, 2005. *International Journal of Research and Analytical Reviews (IJRAR)*, *7*(2), 35-41. Retrieved from https://www.researchgate.net/profile/Dipankar -Dey-6/publication/344442131_Assessment_of_Right_to_Work_Based_ Public_Policy_and_Its_Impact_on_Local_Self-Government_in_India An_ Analyses_of_MGNREGA_2005/links/5f75e2e7299bf1b53e03fb8c/ Assessment-of-Right-to-Work-Based-Public-Policy-and-Its-Impact-on- Local-Self-Government-in-India-An-Analyses-of-MGNREGA-2005.pdf.

Fischer, H. W., & Ali, S. S. (2019). Reshaping the public domain: Decentralisation, the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), and trajectories of local democracy in rural India. *World Development*, *120*, 147-158. https://doi.org/10.1016/ j.worlddev.2018.09.013.

Fungáčová, Z., & Weill, L. (2015). Understanding financial inclusion in China. *China Economic Review*, 34, 196-206.

Government of Karnataka (2011). Study on the Role of MGNREGA in Enhancing Financial Inclusion", *Department of Rural Development and Panchayati Raj*. Retrieved from https://cbps.in/wp-content/uploads/ 2015/11/Final-Report_NREGA-and-FI.pdf.

Gunarsih, T., Sayekti, F., & Dewanti, R. L. (2018). Financial inclusion and poverty alleviation: Evidence from Indonesia. *International Journal of Economics, Business and Management Research*, *2(*03), 468-480. Retrieved from https://www.ijebmr.com/uploads/pdf/archivepdf/2020/ IJEBMR_02_221.pdf

Jain, A., & Jain, A. (2013). Achieving financial inclusion under MGNREGA in a tribal hill district: a study of Chamba (H.P.). *Journal of Land and Rural Studies*, *1*(2), 173-198. https://doi.org/10.1177%2F2321024913513382.

Jena, S. K., & Ghosh, M. K. (2015). Financial Inclusion of Excludes through MGNREGA in Odisha-An Analysis. Retrieved from https://www.resea rchgate.net/profile/Sanjeeb-Jena-2/publication/282274929_Financial_ Inclusion_of_Excludes_through_MGNREGA_in_Odisha_-_An_Analysis/ links/564eebf508aeafc2aab278fd/Financial-Inclusion-of-Excludes- through-MGNREGA-in-Odisha-An-Analysis.pdf.

Kapoor, A. (2014). Financial inclusion and the future of the Indian economy. *Futures*, *56*, 35-42. https://doi.org/10.1016/j.futures.2013.10.007.

Kumar, J., & Kumar, U. (2021). Impact study of MNREGA among the beneficiaries and working system of MNREGA. *Medical care*, *89*(11), 11- 00. Retrieved from https://www.thepharmajournal.com/archives/2021/ vol10issue4S/PartC/S-10-3-103-315.pdf .

Kumar, P., & Joshi, P. K. (2013). Household Consumption Pattern and Nutritional Security among Poor Rural Households: Impact of MGNREGA §. *Agricultural Economics Research Review*, *26*(1), 73-82. Retrieved from https://www.indianjournals.com/ijor.aspx?target=ijor:aerr&volume=26&is sue=1&article=007.

Kumbhar, R. K., & Naik, R (2021). Impact of Mgnrega on Poverty Reduction: A Case Study of KBK Region in Odisha. *Vidyabharati International Interdisciplinary Research Journal*, *13*(1), 87-96. Retrieved from http://www.viirj.org/vol13issue1/12.pdf.

Majhi, S. (2017). Role of MGNREGA in Rural Development. *The Researchers' International Research Journal*, *3*(2), 45-49. Retrieved from https://theresearchers.asia/Papers/Vol-III,%20Issue-II-2017/Role%20of%20MGNREGA%20in%20Rural%20Development.pdf.

Malakar, D. (2013). Role of Indian Post in Financial Inclusion. *IOSR Journal of Humanities and Social Science (JHSS)*, *6*(4), 4-7.

N.P., A. A. (2020). Financial Inclusion Through MGNREGS: Problems and Prospects. Retrieved from https://dx.doi.org/10.2139/ssrn.3523078.

N.P., A. A., Alam, M., & Akthar, S. M. (2014). Index of Financial Inclusion Through MGNREGS: A Special Reference to Kerala. S.M. Jawed. *Index of Financial Inclusion Through MGNREGS: A Special Reference to Kerala*. https://dx.doi.org/10.2139/ssrn.3523072.

Narayanan, A. (2017). MGNEGA" And Rural Development. *VISTAS-A Multidisciplinary Research Journal*,*6(*1), 12-16. Retrieved from https://www.stjosephs.edu.in/upload/papers/93e04c2b6bac9e8bfc51b6bba60ef427.pdf.

Okoye, L. U., Erin, O., & Modebe, N. J. (2017). Financial inclusion as a strategy for enhanced economic growth and development. *The Journal of Internet Banking and Commerce*, 1-14. Retrieved from https://www.semant icscholar.org/paper/Financial-Inclusion-as-a-Strategy-for-Enhanced-and-Okoye-Adetiloye/e5f5d4293bb188b76d 1d3682b b3053 ea1c9bfc10

Pamecha, S., & Sharma, I. (2015). Socio-economic Impact of MGNREGA-A Study undertaken among beneficiaries of 20 villages of Dungarpur district of Rajasthan. *International Journal of Scientific and Research Publications*, *5(*1), 1-4. Retrieved from https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.678.916&rep=rep1&type=pdf.

Park, C. Y., & amp; Mercado, R. (2015). Financial inclusion, poverty, and income inequality in developing Asia. *Asian Development Bank Economics Working Paper Series*, (426). Retrieved from https://www.adb.org/sites/default/files/publication/153143/ewp-426.pdf

Prasanna, N., Natarajamurthy, P., & Kurinjimalar, R. (2014). Socio-economic impact of MGNREGA in Tamil Nadu, India. *International Journal of Economic Policy in Emerging Economies*, *7*(4), 399-409. Retrieved from https://www.inderscienceonline.com/doi/abs/10.1504/IJEPEE.2014.066629.

Prattoy, S., & Jagdish, K. (2011). Impact of MGNREGA on reducing rural poverty and improving socio-economic status of rural poor: a study in Burdwan district of West Bengal. *Agricultural Economics Research Review*, *24*, 437-448. Retrieved from https://ageconsearch.umn.edu/record/119395/files/10-P-Sarkar.pdf.

Rahmatullah, M. (2013). MGNREGA: The Role in Inclusive Growth. In Annual International Seminar on Economics, Politics and Civil Society. *Organised by DSPSR and Rottary Club, India Habitat Centre, New Delhi*. Retrieved from https://www.academia.edu/download/35277868/9._Rahmatullah.pdf.

Ratnawati, K. (2020). The impact of financial inclusion on economic growth, poverty, income inequality, and financial stability in Asia. *The Journal of Asian Finance, Economics and Business*, *7*(10), 73-85. Retrieved from https://doi.org/10.13106/jafeb.2020.vol7.no10.073

Sahoo, M. (2013). MGNREGA and Financial Inclusion–An Inter-District Analysis of Odisha. *IOSR Journal of Humanities and Social Science (IOSR-JHSS), 14*(2), 54-61.

Sarkar, P., & Kumar, J. (2011). Impact of MGNREGA on Reducing Rural Poverty and Improving Socio-economic Status of Rural Poor: A Study in Burdwan District of West Bengal §. *Agricultural Economics Research Review*, *24*, 437-448. Retrieved from https://www.indianjournals.com/ijor.aspx?target=ijor:aerr&volume=24&issue=conf&article=010.

SIMDEGA (2017). Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA). Retrieved from https://simdega.nic.in/en/scheme/mahatma-gandhi-national-rural-employment-guarantee-act-mgnrega/.

Singh, K. (2014). MGNREGA and Rural Development: An Empirical Study of Harak, Block in Barabanki. *Online International Interdisciplinary Research Journal*, *4*, 357-368. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1043.8764&rep=rep1&type=pdf.

Singh, K. (2020). The extent of financial inclusion through MGNREGS: a district level analysis in West Bengal, India. *International Journal of Social Economics*, *48*(1), 121-139. https://doi.org/10.1108/IJSE-11-2019-0659.

Singh, S. (2019). Role of MGNREGA in Rural Development. *IJRAR-International Journal of Research and Analytical Reviews*, *6*(1), 383-384. Retrieved from https://theresearchers.asia/Papers/Vol-III,%20Issue-II-2017/Role%20of%20MGNREGA%20in%20Rural%20Development.pdf.

Southtripura District (2006). Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA). Retrieved from https://southtripura.nic.in/scheme/mahatma-gandhi-national-rural-employment-guarantee-act-mgnrega/.

Torres-Reyna, O. (2007). Panel data analysis fixed and random effects using Stata (v. 4.2). Data & Statistical Services. *Priceton University*, 112. Retrieved from https://www.academia.edu/download/57152357/-_Panel101.pdf.

Tran, H. T. T., & Le, H. T. T. (2021). The impact of financial inclusion on poverty reduction. *Asian Journal of Law and Economics*, *12*(1), 95-119. Retrieved from https://ideas.repec.org/a/bpj/ajlecn/v12y2021i1p95-119n3.html

Turangi, S. (2021). MGNREGS Employment: Seasonality and COVID-19 Effect. *Journal of Rural Development*, *40(*1), 61-79.http://dx.doi.org/ 10.25175/jrd%2F2021%2Fv40%2Fi1%2F166503.

Vettriselvan, R., Anto, M. R., & Sam, A. (2018). Role of MGNREGA in Generation of Employment and Eradication of Rural Poverty in Tamil Nadu (2006-2012). *International Journal of Research and Analytical Reviews*, *5(*3), 365-369. Retrieved from http://ijrar.com/upload_issue/ ijrar_issue _1238.pdf.

Wooldridge, J. M. (2010), "Econometric analysis of cross section and panel data", *MIT press*. Retrieved from https://doc1.bibliothek.li/aca/ FLMF024129.pdf.

Yadav, H. (2018). Depress Poverty and Impress Rural Development through MNREG. *Journal of Commerce*, *13(*2), 52-60. Retrieved from http://jctindia.org/images/articles/15542117721.pdf.

Zulfiqar, K., Chaudhary, M. A., & Aslam, A. (2016). Financial inclusion and its implications for inclusive growth in Pakistan. *Pakistan Economic and Social Review*, *54*(2), 297-325.

Examining Consumer Attitude towards AI-powered M-banking Chatbots: A Study on Elderly Users in an Emerging Market

- Menka Pathria[*]
- Ramandeep Saini[**]
- Mohit Manchanda[***]

Abstract

The current study aims to fill these identified gaps: a) the use of chatbots in mobile banking (M-banking) amongst the elderly remains an under-researched area from an emerging market perspective; and b) the majority of studies on m-banking have taken a static view of adoption and loyalty, and thus lack a longitudinal study. Using a Google survey-based questionnaire, the perceptions of 593 elderly m-banking users are gathered in order to test the conceptual model using AMOSv.22-based structural equation modelling while conducting multi-group analysis to differentiate the behaviour of chatbot-enabled m-banking users versus chatbot-disabled m-banking users for a reputable bank. At both the pre-adoption and post-adoption stages of chatbot-enabled m-banking, the findings indicate that perceived intelligence, perceived ease of use, and anthropomorphism led by chatbots have a significant impact on attitudes towards m-banking. Additionally, chatbot-based m-banking (as opposed to chatbot-disabled m-banking) has a substantial impact on bank attitude and customer loyalty in the post-adoption phase of m-banking. In addition, the use of chatbot-based m-banking over time significantly increases customer loyalty and usage frequency towards a bank. As a result, the study has substantial theoretical and practical implications for developers and banks in emerging nations that target elderly consumers, such as India. This study provides unique insights into the AI and m-banking literature that are applicable to scenarios involving vulnerable populations and emerging markets, which have been mostly disregarded by previous research. Such observations have substantial ramifications for banks and developers in terms of product design, communication, and customer life cycle management applicable to elderly consumers in India's expanding market.

Keywords: Adoption, Loyalty, Chatbots, Elderly, Emerging Markets
JEL Classification: G20, G21, G29

---

[*]Menka Pathria is a Doctoral Student at Punjab Technical University (IKGPTU), India, Email: menkapathria@gmail.com; [**]Dr. Ramandeep Saini is a Director Principal (Business School) & Dean International Affairs, Chandigarh Group of Colleges, Landran, Mohali, Punjab, India, Email: ramandeepsaini2000@gmail.com; [***]Dr. Mohit Manchanda is an Independent Marketing Researcher, Follow in Management, IIM Kashipur, Uttarakhand, India, Email: mohitmanchanda83@gmail.com. The views expressed in this article are the authors' own.

1. Introduction

Mobile banking (m-banking) is the most innovative technological development that has revolutionised banking globally by enabling money transfers, bill payments, opening deposits, and investments with cost efficiency and convenience by allowing consumers to connect with the bank whenever and wherever they choose (Merhi et al., 2020; Thusi & Maduku, 2020; Geebren et al., 2021). Despite these benefits, customers in developing countries are hesitant to adopt and use this technology. This phenomenon is more pronounced among the elderly, thus creating a digital divide in technology adoption (Choudrie et al., 2018). Scholars have argued that it is essential to study m-banking among the elderly from an emerging market perspective, as the vast majority of previous research has been conducted from the perspective of developed nations (Choudrie et al., 2018; Hassan & Wood, 2020). Various studies on m-banking have revealed that age and gender play a significant role in determining the adoption and utilisation of m-banking (Chaouali & Souiden, 2018; Choudrie et al., 2018). In contrast, Malaquias and Hwang (2019) found that age has no bearing on the adoption and utilisation of m-banking, which further motivates the study of the elderly segment. According to research, the elderly are vulnerable consumers who are more likely to be socially excluded, raising concerns about how to improve their inclusion in service disciplines such as technology adoption and use (Bianchi, 2021). Age-related impairments that limit the visual, auditory, motor, and cognitive abilities of elderly consumers, as well as a lack of formal training in technology, lower self-efficacy, and frustration with new technology, are some of the obstacles to the adoption and use of new technology (Lee et al., 2011). COVID-19 is known to have led to more internet-based services, but it has also shown again how hard it is for older people to learn how to use and adopt new technologies (Seifert et al., 2020). In addition, the last decade was the era of Artificial Intelligence (AI), and there are numerous accounts of its use in mobile banking (Brynjolfsson and McAfee, 2014; Eren, 2021). Innovative solutions such as chatbots have revolutionised Human-computer Interactions (HCI) by allowing humans to ask questions and receive answers from machines without any limitations, led by natural language programming (Karri and Kumar, 2020), and this has been utilised by banks to promote their products and services online in

real time in a cost-effective manner (Eren, 2021). Existing literature on m-banking with HCI has examined how chatbots are instrumental in promoting mobile banking adoption and customer loyalty, particularly from the perspective of developed economies (Payne et al., 2018; Eren, 2021; Payne et al., 2021). Sinha & Sheth (2018) say that research results from developed economies can't be used directly in emerging markets because of differences in culture, security, social, political, and technological factors. Moreover, most studies on adoption or usage of AI amongst the elderly are either focused on elderly care or shopping contexts (Iwamura et al., 2011; Caic et al., 2018; Wirtz et al., 2018; Ling et al., 2021), and the authors are unaware of any study that examines the context of chatbot adoption and usage for mobile banking amongst the elderly. Dinsmore *et al.* (2017) and Fang (2019) have emphasised the importance of examination of technology adoption and loyalty for each specific context. In addition, there is no study comparing the effects of initial adoption versus continuous use of chatbots on m-banking and bank loyalty. However, a recent body of research on mobile commerce recommends a longitudinal approach to better understand consumers' attitudes and behaviour over time by re-contacting the same set of respondents (Fong et al., 2017; Fang, 2019). Keeping the preceding context in mind, and using a combination of problematization (challenging existing assumptions through a rationale/contrast/alternative study) and gap- spotting approaches (highlighting confusion/neglect in the current work) (Sandberg & Alvesson, 2011), research questions were formulated in accordance with the works of Chaudhuri and Singh (2021), Chavan et al. (2021), and Rahman (2021).

(1) Does chatbot-based m-banking promote loyalty and usage among elderly users in emerging markets?

(2) How does chatbot-based m-banking promote loyalty and usage among elderly users in an emerging market's pre-adoption versus post-adoption stages?

In order to answer the questions above, the goal of this study is to use a longitudinal method to look at how older Indian consumers use m-banking with and without chatbots. In line with established literature on technology adoption and usage (Chaouali et al., 2017; Chi, 2018; Mclean et al., 2020), the study

develops an extended Technology Acceptance Model (TAM) adapted to the AI context , and in doing so, it examines the effects of 'perceived intelligence', 'anthropomorphism', 'Perceived Ease of Use' (PEOU), and 'perceived usefulness' (PU) of chatbot-based m-banking, and in-turn on its consequences thereof; whereby 'perceived intelligence' (Balakrishnan & Dwivedi, 2021) and 'anthropomorphism' (Chen, 2017) remain well documented concepts instrumental in adoption of new technologies, especially AI being studied under TAM), alongside 'PEOU' and ') (Singh & Srivastava, 2018), which gets studied under the ambit of TAM conventionally. The instant research is structured to contain several sections. In the post-introduction section, we define the theoretical background, hypotheses, and conceptual model. Subsequently, we discuss materials and methods, which include the sampling procedure, scales identified, and the analysis. Furthermore, we explain the results followed by discussion, including theoretical and managerial implications, and limitations thereof with future directions thereof.

2. Theoretical Background and Hypotheses

2.1 AI-based Chatbots & M-banking

Chatbots (Chatter bots) are considered a type of computer-based assistant interacting with humans either by voice or text messaging (Maudlin, 1994). Banks have started assisting their customers through text-based chatbots to avoid human interaction handling issues with voice-based chatbots like voice pitch, gesture, and voice modulation. AI-based chatbots have been considered cost-efficient and can save up to $8 billion in the banking and insurance sectors by 2022 (Foye, 2018). It is one of the best AI-based innovations since 2018 which has become trendy among millennials, suiting their quirks and also spreading like the 'Chatbot tsunami' initiated in 2010 (Grudin & Jacques, 2019; Folstad & Skjuve, 2019; Kasilingam, 2020; Sheehan *et al.,* 2020). It is also predicted that by 2022, 85% of customers will be served through chatbots (Clark et al., 2019). Gupta & Sharma (2019) and Sarbabidya & Saha (2020) found that m-banking customers are interested in using chatbots because they are curious, technology is getting better, and it's easy. Recently, banks have started using chatbots to serve customers through Customer Relationship Management (CRM), sell, and

recommend the best products to customers (Eren et al., 2020). With voice-based chatbots like Amazon's Alexa, Apple's Siri, and Microsoft's Cortana, this technology has come a long way, adding a human angle to interactions (Rapp et al., 2021).

2.2 Revised Technology Acceptance Model

Extant literature on technology adoption considers Perceived Ease of Use (PEOU) and perceived usefulness to positively influence consumers' attitude towards technology (Davis et al., 1989), where PEOU signifies the extent to which a user believes that the technology under use will be easy and will be free from effort, and perceived usefulness means the extent to which a user perceives that using a given technology will enhance the performance of the task (Davis, 1989). According to studies such as Chaouali et al. (2017), Chi (2018), and Mclean et al. (2020), TAM should be tailored to the specific contexts. Extant literature on AI suggests that perceived intelligence and anthropomorphism are two key distinct features of chatbots which act as antecedents for adoption of chatbots (Pillai & Sivanthu, 2020; Balakrishnan and Dwivedi, 2021); where perceived intelligence is the perception that the intelligent agent's behaviour is efficient and autonomous with the ability to process and produce natural language and deliver effectual output (Moussawi & Koufaris, 2019); and anthropomorphism signifies human-like aspects like warmth and pain being experienced in non-human interface by the user (Epley et al., 2007). In line with the work of Pillai & Sivanthu (2020) and Balakrishnan & Dwivedi (2021) on AI-led m-commerce and chatbot-based tourism, respectively, we propose combining perceived intelligence and anthropomorphism to fit the current situation.

2.3 Perceived Intelligence

It is always found to be difficult when a machine interacts with humans for a long time, hence it is always expected of AI machines like chatbots to intelligently behave and provide competent solutions (Pillai & Sivathanu, 2020; Driebe et al., 2021). In the case of travel planning, perceived intelligence influences adoption intention (Pillai & Sivathanu, 2020). Human Robot Interaction (HRI), which forms a major part of using chatbots, is based on many

concepts, one of which is perceived intelligence, along with anthropomorphism, likeability, animacy, and perceived safety (Luo et al., 2021). There has been a major problem with AI linked to understanding human behaviour due to the extent to which robotic intelligence is needed (Epley et al., 2007; Sheehan et al., 2020). It is a difficult task for robots to reciprocate intelligently, and they are scrutinised minutely by humans in a long interaction (Bertneck et al., 2009; Rau et al., 2009; Luo et al., 2021). It remains a well-established feature of HRI that the perceived intelligence of the chatbots positively affects the adoption intention of these as they are expected to behave intelligently (Pillai & Sivathanu, 2020). The intelligence provided by machines increases the operational efficiency with good quality of service (Yang et al., 2020). In another study, Balakrishnan & Dwivedi (2021) found that how smart people think digital assistants are affects how they feel about them and whether they plan to buy them in the future. In line with above, we hypothesise:

H1a: Perceived intelligence (chatbot-enabled) has a stronger and positive effect on attitude towards m-banking than the effect of perceived intelligence (chatbot-disabled) (pre-adoption scenario)

H1b: Perceived intelligence (chatbot-enabled) has a stronger and positive effect on attitude towards m-banking than the effect of perceived intelligence (chatbot-disabled) (post adoption scenario)

H1c: Perceived intelligence (chatbot-enabled) (post adoption scenario) has a stronger and positive effect on attitude towards m-banking than the effect of perceived intelligence (chatbot-disabled) (pre-adoption scenario)

2.4 Perceived Ease of Use

As discovered and used in the technology acceptance model (TAM) by Davis (1989), perceived ease of use, which is a part of the theory of reasoned action, has been defined as the "degree to which an individual believes that using a particular technology will be free from mental effort" (Davis et al., 1989). TAM has been considered as the most appropriate model for studying customers' intentions in alternate banking channels (Alalwan et al., 2016). Customers are more likely to accept and use technology that is easier for them to use. Through

TAM, it is deduced that perceived ease of use with perceived usefulness is the most influential factor for acceptance of mobile banking in Jordan (Alalwan et al., 2016). It has been well established that a customer has a preconceived notion about the level of difficulty of the technology to be used (Jan & Contreras, 2011; Kasilingam, 2020). Perceived ease of use is also estimated as a determining factor in the acceptance of chatbots in India (Kasilingam, 2020). Also, in the case of attitudes towards m-commerce mobile apps, perceived ease of use was found to be an indicator (McLean et al., 2020). Based on the studies done earlier about the impact of perceived ease of use on attitudes, the following hypothesis has been framed:

H2a: PEOU $_{(chatbot-enabled)}$ has a stronger and positive effect on attitude towards m-banking than the effect of PEOU $_{(chatbot-disabled)}$ (pre-adoption scenario)

H2b: PEOU $_{(chatbot-enabled)}$ has a stronger and positive effect on attitude towards m-banking than the effect of PEOU $_{(chatbot-disabled)}$ (post adoption scenario)

H2c: PEOU $_{(chatbot-enabled)}$ (post adoption scenario) has a stronger and positive effect on attitude towards m-banking than the effect of PEOU $_{(chatbot-disabled)}$ (pre-adoption scenario)

2.5 Perceived Usefulness

Originally proposed by Davis et al. (1989), perceived usefulness refers to the degree to which a specific system improves the efficiency of work. Mobile banking usage is positively influenced by perceived usefulness (Akturan & Tezcan, 2012). It has been suggested that it plays a crucial role in Australian consumers' intentions to adopt mobile banking (Wessels & Drennan, 2010). Perceived utility has played a significant role in Iran's adoption of mobile banking (Hanafizadeh et al., 2014). Performance expectatancy, as proposed by Venkatesh et al. in 2003, has been viewed as a replica factor of perceived usefulness, which has been identified as a critical factor for internet banking usage among Jordanian customers (Qeisi & Abdallah, 2013). In the travel industry, Pillai & Sivathanu (2020) found that how useful people think chatbots are has a big impact on how many people use them. Alalwan et al. (2021) determined that perceived

usefulness is the most influential factor in the usage and adoption of mobile banking in Jordan.

H2d: PU (chatbot-enabled) has a stronger and positive effect on attitude towards m-banking than the effect of PEOU (chatbot-disabled) (pre-adoption scenario)

H2e: PU (chatbot-enabled) has a stronger and positive effect on attitude towards m-banking than the effect of PEOU (chatbot-disabled) (post adoption scenario)

H2f: PU (chatbot-enabled) (post adoption scenario) has a stronger and positive effect on attitude towards m-banking than the effect of PEOU (chatbot-disabled) (pre-adoption scenario)

2.6 Anthropomorphism

Humanlike characteristics, motivations, and intentions portrayed by AI-supported machines which interact with humans are at the core of anthropomorphism (Epley et al., 2007). Cognitive and motivational determinants of anthropomorphism: elicited agent knowledge, which is established knowledge from within and acquired knowledge about non-humans used to affix established knowledge, is clubbed with effectance motivation and social motivation (Epley et al., 2007). It can be explained as a process of understanding uncertainty by increasing predictability with feelings of efficacy. Anthropomorphism has recently been used for consumer behaviour in human-computer interaction (HCI) (Adam et al., 2020; Manchanda & Deb, 2021; Moussawi et al., 2021). For chatbot development, it is the main factor considered as there is a direct interaction between humans and non-humans (Sheehan et al., 2020). Hence, since humans have been anthropomorphising since childhood due to the motivation of society, using chatbots for customer assistance makes them feel comfortable, especially lonely people (Wellman & Evans, 2010; Epley et al., 2021).

H3a: Perceived anthropomorphism (chatbot-enabled) has a stronger and positive effect on attitude towards m-banking than the effect of perceived anthropomorphism (chatbot-disabled) (pre-adoption scenario)

H3b: Perceived anthropomorphism (chatbot-enabled) has a stronger and positive effect on attitude towards m-banking than the effect of perceived anthropomorphism (chatbot-disabled) (post adoption scenario)

H3c: Perceived anthropomorphism (chatbot-enabled) (post adoption scenario) has a stronger and positive effect on attitude towards m-banking than the effect of perceived anthropomorphism (chatbot-disabled) (pre-adoption scenario)

2.7 Attitude towards Mobile Banking

Fishbein & Ajzen (1975) defined attitude as a construct with three dimensions: cognitive, affective, and conative dimensions. As demonstrated by numerous past studies (David et al., 1989), TAM based on TRA explains the attitude of customers toward technology with the determining factors of perceived ease of use and perceived usefulness. This attitude also influences behavioural intent, which ultimately leads to the actual use of technology (Davis et al., 1989; Gu et al., 2009). Lin (2011) also found that attitude is a big factor in whether or not people keep using mobile banking (Mohammadi, 2015). It is a factor that accelerates adoption by eliminating obstacles (Leiva et al., 2017). Whereas Harrison (2015) suggested that mobile banking attitudes are influenced by credibility, performance expectations, and social influence, which in turn influence mobile banking behaviour intention (Leiva et al., 2017; Kim & Hall, 2020; Kim & Chen, 2021).

H4a: Attitude towards m-banking (chatbot-enabled) has a stronger and positive effect on attitude towards bank than the effect of attitude towards m-banking (chatbot-disabled) (pre-adoption scenario)

H4b: Attitude towards m-banking (chatbot-enabled) has a stronger and positive effect on usage frequency of the bank than the effect of attitude towards m-banking (chatbot-disabled) (pre-adoption scenario)

H4c: Attitude towards m-banking (chatbot-enabled) has a stronger and positive effect on loyalty towards the bank than the effect of attitude towards m-banking (chatbot-disabled) (pre-adoption scenario)

H4d: Attitude towards m-banking (chatbot-enabled) has a stronger and positive effect on attitude towards bank than the effect of attitude towards m-banking (chatbot-disabled) (post-adoption scenario)

H4e: Attitude towards m-banking (chatbot-enabled) has a stronger and positive effect on usage frequency of the bank than the effect of attitude towards m-banking (chatbot-disabled) (post-adoption scenario)

H4f: Attitude towards m-banking (chatbot-enabled) has a stronger and positive effect on loyalty towards the bank than the effect of attitude towards m-banking (chatbot-disabled) (post-adoption scenario)

H4g: Attitude towards m-banking (chatbot-enabled) (post-adoption scenario) has a stronger and positive effect on attitude towards bank than the effect of attitude towards m-banking (chatbot-disabled) (pre-adoption scenario)

H4h: Attitude towards m-banking (chatbot-enabled) (post-adoption scenario) has a stronger and positive effect on usage frequency of the bank than the effect of attitude towards m-banking (chatbot-disabled) (pre-adoption scenario)

H4i: Attitude towards m-banking (chatbot-enabled) (post-adoption scenario) has a stronger and positive effect on loyalty towards the bank than the effect of attitude towards m-banking (chatbot-disabled) (pre-adoption scenario)

2.8 Usage Frequency

Continuous usage of a technology is significantly more crucial to its success than adoption, which serves as a metric for evaluating the implementation of that technology (Tsai et al., 2014). This can be done well by controlling how satisfied customers are, since it is thought that satisfied customers after adoption has a direct effect on how much they use it in the future (Hong et al., 2002). Based upon the available literature, the following hypothesis has been framed.

H5a: Attitude towards bank (chatbot-enabled) has a stronger and positive effect on usage frequency of the bank than the effect of attitude towards banking (chatbot-disabled) (pre-adoption scenario)

H5b: *Attitude towards bank (chatbot-enabled) has a stronger and positive effect on usage frequency of the bank than the effect of attitude towards banking (chatbot-disabled) (post-adoption scenario)*

H5c: *Attitude towards bank (chatbot-enabled) (post-adoption scenario) has a stronger and positive effect on usage frequency of the bank than the effect of attitude towards banking (chatbot-disabled) (pre-adoption scenario)*

2.9 Loyalty towards Bank

According to the existing literature on relationship marketing, loyalty refers to a consumer's ongoing commitment to reuse and/or repurchase a preferred brand, regardless of any situational considerations or incentives from a competitor brand to switch such customer (Mclean et al., 2020). It has been studied in the past that a customer's behaviour and satisfaction with mobile banking are the causes of his loyalty intention towards a bank (Baabdullah et al., 2019; Zhou et al., 2021). In the case of chatbot usage in mobile banking, it is also observed that chatbot technology has led to customer retention and hence loyalty (Hair et al., 2016; Sarbabidya & Saha, 2020).

H6a: *Loyalty towards bank (chatbot-enabled) has a stronger and positive effect on usage frequency of the bank than the effect of loyalty towards bank (chatbot-disabled) (pre-adoption scenario)*

H6b: *Loyalty towards bank (chatbot-enabled) has a stronger and positive effect on usage frequency of the bank than the effect of loyalty towards bank (chatbot-disabled) (post-adoption scenario)*

H6c: *Loyalty towards bank (chatbot-enabled) (post-adoption scenario) has a stronger and positive effect on usage frequency of the bank than the effect of loyalty towards bank (chatbot-disabled) (pre-adoption scenario)*

In line with aforementioned hypotheses, Figure-1 captures the proposed conceptual mode

Figure 1: Proposed Conceptual Model
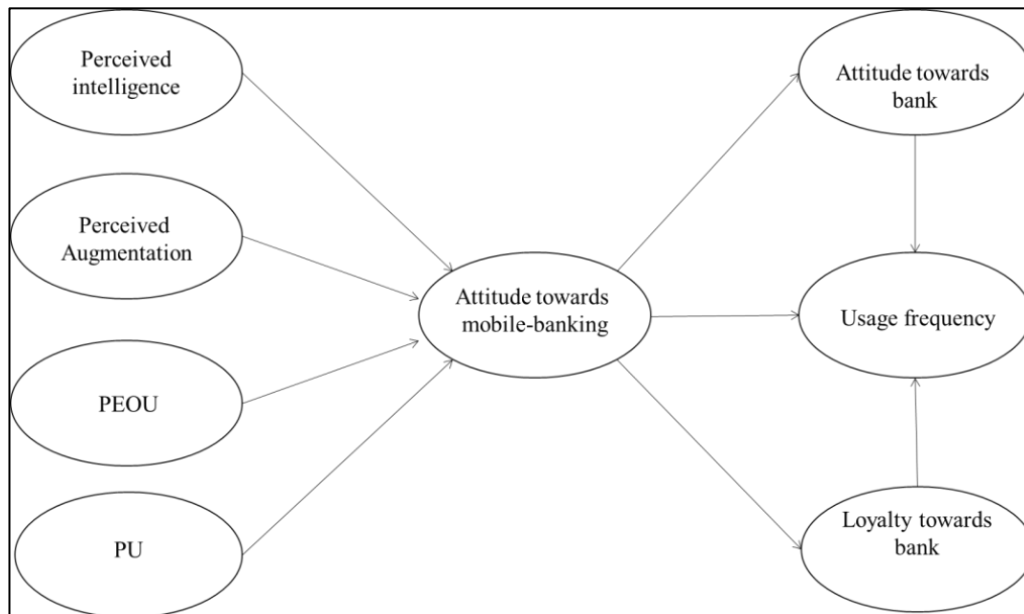
Source: Author's Conceptual Model

3. Methodological Issues Involved

In accordance with Bryman's recommendations, a Google-survey-based questionnaire (along with a set of screening questions) was shared with a group of academic marketing experts from a reputable management institute for content validity testing (2016). To conduct a pilot study with 53 elderly mobile banking users in the Delhi-NCR region, certain language-related changes were made based on the input of these specialists. We conclude, based on interviews with these users, that all of them were familiar with the questionnaire items and that there was no redundancy between the questionnaire items and their screening questions. Subsequently, a list of branches for a well-known government bank in the Delhi-NCR region was compiled, and branch managers were approached for permission to conduct the study. Starting in January 2020, elderly bank customers were approached at the exit gate and the link to the questionnaire was sent to their mobile phone (with their consent). This activity resulted in almost three months

of spending 2.5 to 3 hours per working day in the bank. In accordance with Mclean et al. (2020), we restricted our study to users who had just begun using a mobile banking app within the previous month (i.e., more than 7 days but less than 30 days). In addition, they were asked whether they had used the chatbot assistant in the mobile banking app within the past month (Y/N) (i.e., less than 30 days). 687 of the total 995 contacts completed the questionnaire, while 94 did not, despite receiving two reminders. To this end, a sample of 593 users (henceforth referred to as Dataset-I) was collected, including 312 chatbot users who consented to the current and subsequent studies and gave permission to be contacted via their mobile phone numbers. Nine months later, in October 2020, these respondents were contacted again (via their mobile numbers) and provided with the same questionnaire. Despite reminders, 67 of 593 respondents did not complete the questionnaire; of the remaining 267, those who had previously used the chatbot continued to use it; 15 respondents who had not used the chatbot previously began using it; and 22 respondents had stopped using the chatbot but continued to use the mobile banking app. Consequently, a sample of 526 users was determined (referred to hereafter as Dataset-II). By November 2020, the task had been accomplished. Table-3.1 depicts the respondent characteristics for both survey samples.

Table 3.1: Respondents' Characteristics

	N=59, Dataset-I	*N=526, Dataset-II*
Gender		
Male	63%	59%
Female	37%	41%
Education		
Undergraduate	8%	4%
Graduate	62%	64%
Post-graduate	30%	32%
Monthly income		
INR 30000-50000	14%	10%
INR 50000-100000	68%	70%
INR above 100000	18%	20%
Occupation		
Business	43%	39%
Retired	31%	34%
Professional	26%	27%

Source: Authors' Calculation

The ibid. questionnaire was based upon established marketing scales. Anthropomorphism was adapted from Han (2021), both perceived usefulness and PEOU were adapted from Chi (2018), and we used Moussawi & Koufaris's (2019) measure for perceived intelligence for this context. Additionally, usage frequency was measured by adapting Mclean et al.'s (2020) scale, Spears & Singh's (2004) scale was adapted to measure attitude towards banks, and Kim et al.'s (2016) scale was adapted to measure attitude towards m-banking. Adapted from Menidjel et al.'s (2017) scale was adapted to measure loyalty towards a bank. The questionnaire so developed measured users' perception on a likert scale (strongly disagree (1)-strongly agree (5)).

4. Findings and Analysis

4.1 Confirmatory Factor Analysis

While subjecting both sets of data to normality (skewness and kurtosis tests) and multicollinearity (variance inflation factor and tolerance limit tests) in SPSSv.22, the results (as captured in Table-4.1) suggest that both the datasets have normality and are devoid of multicollinearity (Hair et al., 2013; Malhotra & Dash, 2016). Subsequently, exploratory factor analysis was performed using SPSSv.22 with principal component analysis with the condition Eigen value greater than 1; this led to loading of all the items on the respective constructs with a minimum factor loading of 0.70 for both the datasets. Additionally, Table-4.1 also reveals that Cronbach's alpha values were above 0.88 (explaining internal consistency), and the percentage variance explained under the Harman single factor test was below 35% for both the datasets (explaining the absence of common method bias).

Table 4.1: Preliminary Tests

Particulars	*N=593; Dataset-I*	*N=526; Dataset-II*
Skewness	-0.8 to 0.91	-0.98 to 0.92
Kurtosis	-1.61 to 1.82	-1.73 to 1.97
VIF	2.11 to 5.62	2.22 to 5.88
Tolerance value	0.22 to 0.51	0.27 to 0.57
Cronbach's alpha	0.91	0.89
Harman single factor test	32.41%	34.81%

Source: Authors' Calculation

Subsequently, using AMOSv.21, confirmatory factor analysis was conducted for both the datasets with a maximum likelihood condition. Tables-4.2 and 4.3 also capture item wise loadings, composite reliability (CR), and average variance extracted (AVE), suggesting the realisation of construct validity for both datasets as CR>AVE, CR>0.7, and AVE>0.5 (Hair et al*.,* 2013; Malhotra & Dash, 2016).

Table 4.2: Exploratory Factor Analysis (Dataset-I)

	PI	PEOU	Anthro	ATB	ATM	LOY	UF	PU
PI1	0.865							
PI2	0.878							
PI3	0.891							
Anthro1			0.814					
Anthro2			0.823					
Anthro3			0.856					
PEOU1		0.852						
PEOU2		0.884						
PEOU3		0.893						
ATM1					0.892			
ATM2					0.898			
ATM3					0.879			
ATB1				0.916				
ATB2				0.925				
ATB3				0.913				
UF1							0.884	
UF2							0.886	
UF3							0.887	
LOY1						0.873		
LOY2						0.857		
LOY3						0.859		
PU1								0.902
PU2								0.873
PU3								0.889

Source: Authors' Calculation

Table 4.3: Exploratory Factor Analysis (Dataset-II)

	PI	**PEOU**	**Anthro**	**ATB**	**ATM**	**LOY**	**UF**	**PU**
PI1	0.851							
PI2	0.863							
PI3	0.881							
Anthro1			0.801					
Anthro2			0.811					
Anthro3			0.848					
PEOU1		0.841						
PEOU2		0.865						
PEOU3		0.882						
ATM1					0.876			
ATM2					0.888			
ATM3					0.868			
ATB1				0.896				
ATB2				0.899				
ATB3				0.89				
UF1							0.872	
UF2							0.868	
UF3							0.897	
LOY1						0.868		
LOY2						0.843		
LOY3						0.851		
PU1								0.914
PU2								0.921
PU3								0.908

Source: Authors' Calculation

Notes: *PI=Perceived intelligence; Anthro=Anthropomorphism; ATM= Attitude towards m-banking; ATB= Attitude towards m-banking; UF= Usage frequency; LOY= Loyalty towards bank; PU= Perceived usefulness.*

Additionally, Table-4.4 (for Dataset-I) and Table-4.5 (for Dataset-II) also attest to the realisation of discriminant validity for both the datasets having AVE> MSV (maximum shared variance), and each value of the square root of AVE for a given construct is greater than the correlation of such construct with other constructs under study (Hair et al., 2013; Malhotra & Dash, 2016). In Table-4.6, CMIN/DF was less than 3, GFI and AGFI were both greater than 0.9, and NFI, TLI, RFI, and CFI were all greater than 0.95. This means that both datasets fit well with the model (Hair et al., 2013; Malhotra & Dash, 2016).

Table 4.4: Convergent and Discriminant Validity (Dataset-I)

	Loading	R^2	Error	Composite Reliability	Composite Variance	MSV	PI	Anthro	PEOU	ATM	ATB	UF	LOY	PU
PI1	0.82	0.66	0.34											
PI2	0.85	0.72	0.28	0.891	0.732	0.510	**0.86**	0.43	0.35	0.51	0.41	0.30	0.39	0.38
PI3	0.90	0.81	0.19											
Anthro1	0.87	0.76	0.24											
Anthro2	0.91	0.83	0.17	0.89	0.73	0.58	0.43	**0.86**	0.56	0.58	0.38	0.33	0.36	0.36
Anthro3	0.78	0.61	0.39											
PEOU1	0.81	0.66	0.34											
PEOU2	0.89	0.79	0.21	0.89	0.72	0.56	0.35	0.56	**0.85**	0.55	0.34	0.28	0.29	0.44
PEOU3	0.85	0.72	0.28											
ATM1	0.87	0.76	0.24											
ATM2	0.88	0.77	0.23	0.90	0.74	0.61	0.51	0.58	0.55	**0.86**	0.51	0.58	0.61	0.55
ATM3	0.83	0.69	0.31											
ATB1	0.90	0.81	0.19											
ATB2	0.91	0.83	0.17	0.92	0.80	0.57	0.41	0.38	0.34	0.51	**0.89**	0.53	0.57	0.51
ATB3	0.87	0.76	0.24											
UF1	0.83	0.69	0.31											
UF2	0.90	0.81	0.19	0.90	0.75	0.59	0.30	0.33	0.28	0.58	0.53	**0.87**	0.59	0.47
UF3	0.87	0.76	0.24											
LOY1	0.87	0.76	0.24											
LOY2	0.88	0.77	0.23	0.91	0.77	0.61	0.39	0.36	0.29	0.61	0.57	0.59	**0.88**	0.43
LOY3	0.88	0.77	0.23											
PU1	0.86	0.74	0.26											
PU2	0.85	0.72	0.28	0.89	0.74	0.55	0.38	0.36	0.44	0.55	0.51	0.47	0.43	**0.86**
PU3	0.87	0.76	0.24											

Source: Authors' Calculation

Notes: *PI=Perceived Intelligence Anthro=Anthropomorphism; ATM= Attitude towards m-banking; ATB= Attitude towards m-banking; UF= Usage frequency; LOY= Loyalty towards bank; PU= Perceived usefulness.*

Table 4.5: Convergent and Discriminant Validity (Dataset-II)

	Loading	R^2	Error	Composite Reliability	Composite Variance	MSV	PI	Anthro	PEOU	ATM	ATB	UF	LOY	PU
PI1	0.78	0.61	0.39											
PI2	0.79	0.62	0.38	0.86	0.67	0.540	*0.82*	0.48	0.45	0.54	0.46	0.43	0.45	0.33
PI3	0.88	0.77	0.23											
Anthro1	0.87	0.76	0.24											
Anthro2	0.88	0.77	0.23	0.90	0.75	0.51	0.48	*0.87*	0.51	0.53	0.48	0.38	0.41	0.29
Anthro3	0.85	0.72	0.28											
PEOU1	0.78	0.61	0.39											
PEOU2	0.82	0.67	0.33	0.86	0.67	0.58	0.45	0.51	*0.82*	0.58	0.41	0.37	0.44	0.38
PEOU3	0.85	0.72	0.28											
ATM1	0.86	0.74	0.26											
ATM2	0.86	0.74	0.26	0.89	0.74	0.65	0.54	0.53	0.58	*0.86*	0.54	0.61	0.65	0.51
ATM3	0.86	0.74	0.26											
ATB1	0.85	0.72	0.28											
ATB2	0.85	0.72	0.28	0.88	0.72	0.62	0.46	0.48	0.41	0.54	*0.85*	0.57	0.62	0.48
ATB3	0.84	0.71	0.29											
UF1	0.79	0.62	0.38											
UF2	0.80	0.64	0.36	0.85	0.65	0.65	0.43	0.38	0.37	0.61	0.57	*0.80*	0.65	0.43
UF3	0.82	0.67	0.33											
LOY1	0.85	0.72	0.28											
LOY2	0.86	0.74	0.26	0.89	0.73	0.65	0.45	0.41	0.44	0.65	0.62	0.65	*0.86*	0.41
LOY3	0.86	0.74	0.26											
PU1	0.81	0.6561	0.3439											
PU2	0.83	0.6889	0.3111	0.87	0.68	0.51	0.33	0.29	0.38	0.51	0.48	0.43	0.41	*0.83*
PU3	0.84	0.7056	0.2944											

Source: Authors' Calculation

Notes: *PI=Perceived intelligence; Anthro=Anthropomorphism; ATM= Attitude towards m-banking; ATB= Attitude towards m-banking; UF= Usage frequency; LOY= Loyalty towards bank; PU= Perceived usefulness.*

Table 4.6: Confirmatory Factor Analysis

	Dataset-I	*Dataset-II*
CMIN/*df*	2.73	2.89
GFI	0.935	0.924
AGFI	0.912	0.905
NFI	0.96	0.95
RFI	0.96	0.95
IFI	0.97	0.96
TLI	0.97	0.96
CFI	0.97	0.96
RMSEA	0.052	0.055

Source: Authors' Calculation

4.2. Multi-group Analysis

We conducted a multi-group analysis to investigate the differences in mobile banking attitudes between chatbot-enabled and chatbot-disabled m-banking users. To accomplish Structural Equation Modelling (SEM) with the maximum likelihood method, AMOS v.21 was utilised. The nested comparison models performed with structural weights failed to explain any model-level differences. For estimating CMIN, degrees of freedom, and structural weights, the Excel package for macro statistics by Gaskin was used. Using the ibid package, Z-scores were calculated by inserting the regression coefficients and critical ratios for each cohort (chatbot-enabled m-banking users and chatbot-disabled m-banking users) in order to identify any differences at the path level. Tables-4.7, 4.8, and 4.9 summarise the results.

Table 4.7: Multi-group Analysis (Pre-adoption)

Hypothesis	Relationship	Chatbot-disabled		Chatbot-abled		
		Coefficient	*p*	Coefficient	*p*	Z-score
H1a	PI$\rightarrow$AT$_M$	0.06	.04	0.25	.002	-1.771*
H2a	PEOU$\rightarrow$AT$_M$	0.15	.09	0.26	.005	-1.34**
H2d	PU$\rightarrow$ AT$_M$	0.12	.04	0.31	.002	-2.178*
H3a	Anthro$\rightarrow$AT$_M$	0.08	.1	0.11	.01	-1.562*

Hypothesis	Relationship	Chatbot-disabled		Chatbot-abled		
		Coefficient	p	Coefficient	p	Z-score
H4a	$AT_M \rightarrow AT_B$	0.19	.04	0.27	.001	-0.981
H4b	$AT_M \rightarrow UF$	0.11	.05	0.18	.03	-0.843
H4c	$AT_M \rightarrow LOY$	0.13	.03	0.19	.05	-0.637
H5a	$AT_B \rightarrow UF$	0.18	.004	0.26	.001	-0.798
H6a	$LOY \rightarrow UF$	0.18	.08	0.21	.001	-0.424

Source: Authors' Calculation

Table 4.8: Multi-group Analysis (Post-adoption)

Hypothesis	Relationship	Chatbot-disabled		Chatbot-abled		
		Coefficient	p	Coefficient	p	Z-score
H1b	$PI \rightarrow AT_M$	0.09	.08	0.37	.004	-2.971**
H2b	$PEOU \rightarrow AT_M$	0.17	.04	0.31	.05	-2.62*
H2e	$PU \rightarrow AT_M$	0.15	.09	0.37	.02	-2.468**
H3b	$Anthro \rightarrow AT_M$	0.11	.09	0.23	.01	-1.371*
H4d	$AT_M \rightarrow AT_B$	0.17	.06	0.33	.002	-1.881*
H4e	$AT_M \rightarrow UF$	0.12	.04	0.26	.001	-1.663
H4f	$AT_M \rightarrow LOY$	0.15	.1	0.29	.005	-1.679**
H5b	$AT_B \rightarrow UF$	0.21	.003	0.31	.01	-0.98
H6b	$LOY \rightarrow UF$	0.19	.04	0.23	.03	-0.575

Source: Authors' Calculation

Table 4.9: Multi-group Analysis (Pre-adoption Versus Post-adoption)

Hypothesis	Relationship	Pre-adoption (Chatbot-abled)		Post-adoption (Chatbot-abled)		
		Coefficient	p	Coefficient	p	Z-score
H1c	$PI \rightarrow AT_M$	0.26	.05	0.38	.001	-1.143
H2c	$PEOU \rightarrow AT_M$	0.27	.001	0.30	.01	-0.253
H2f	$PU \rightarrow AT_M$	0.30	.005	0.38	.01	-0.638
H3c	$Anthro \rightarrow AT_M$	0.12	.04	0.21	.004	-0.941
H4g	$AT_M \rightarrow AT_B$	0.26	.01	0.34	.03	-0.948
H4h	$AT_M \rightarrow UF$	0.16	.06	0.27	.005	-1.165*
H4i	$AT_M \rightarrow LOY$	0.17	.07	0.28	.001	-1.248*
H5c	$AT_B \rightarrow UF$	0.26	.02	0.32	.005	-0.721
H6c	$LOY \rightarrow UF$	0.20	.008	0.21	.03	-0.242

Source: Authors' Calculation

4.3 Results

Table-4.7 (representing the results of pre-adoption stage) depicts that: a) perceived intelligence positively impacts attitude towards mobile banking ($\beta_{chatbot\ disabled}$ = 0.06, p < .010; $\beta_{chatbot\ enabled}$ = 0.25, p < .005; z = -1.771, p < .05), b) perceived anthropomorphism positively impacts attitude towards mobile banking ($\beta_{chatbot\ disabled}$ = 0.08, p < .005; $\beta_{chatbot\ enabled}$ = 0.11, p < .05; z = -1.562, p< .005), c) perceived usefulness positively affects attitude towards mobile banking ($\beta_{chatbot\ disabled}$ = 0.12, p < .05; $\beta_{chatbot\ enabled}$ = 0.31, p < .005; z = -2.178, p < .05), and d) perceived ease of use positively affects attitude towards mobile banking ($\beta_{chatbot\ disabled}$ = 0.15, p < .10 N.S; $\beta_{chatbot\ enabled}$ = 0.26, p < .010; z = -1.34, p < .05).

It also depicts: a) the positive impact of attitude towards mobile banking on attitude towards bank ($\beta_{chatbot\ disabled}$ = 0.19, p < .10; $\beta_{chatbot\ enabled}$ = 0.27, p < .005; z = -0.981, N.S), b) the positive impact of attitude towards mobile banking on user frequency ($\beta_{chatbot\ disabled}$ = 0.11, p < .10; $\beta_{chatbot\ enabled}$ = 0.18, p < .05; z = -0.843, N.S), and c) the positive impact of attitude towards mobile banking on loyalty with the bank ($\beta_{chatbot\ disabled}$ = 0.13, p < .05; $\beta_{chatbot\ enabled}$ = 0.19, p < .10; z = -0.637, N.S). It also shows the positive impact of attitude towards bank on usage frequency ($\beta_{chatbot\ disabled}$ = 0.18, p < .004; $\beta_{chatbot\ enabled}$ = 0.26, p < .05; z = -0.798, N.S) and loyalty on usage frequency ($\beta_{chatbot\ disabled}$ = 0.18, p = .08 N.S; $\beta_{chatbot\ enabled}$ = 0.21, p < .005; z = -0.424, N.S).

Table-4.8 (representing the results of post-adoption stage) depicts that: a) perceived intelligence on mobile banking ($\beta_{chatbot\ disabled}$ = 0.09, p < .010; $\beta_{chatbot\ enabled}$ = 0.37, p < .005; z = -2.971, p < .005), b) perceived ease of use on attitude towards mobile banking ($\beta_{chatbot\ disabled}$ = 0.17, p < .05; $\beta_{chatbot\ enabled}$ = 0.31, p < .10; z = -1.371, p < .05), c) perceived usefulness positively affects attitude towards mobile banking ($\beta_{chatbot\ disabled}$ = 0.15, p < .1 N.S; $\beta_{chatbot\ enabled}$ = 0.37, p < .05; z = -2.468, p < .005), and d) perceived anthropomorphism on attitude towards mobile banking ($\beta_{chatbot\ disabled}$ = 0.11, p < .10; $\beta_{chatbot\ enabled}$ = 0.23, p < .10; z = -2.62, p < .05). It also depicts the positive effect of: a) attitude towards mobile banking on attitude towards bank ($\beta_{chatbot\ disabled}$ = 0.17, p < .10; $\beta_{chatbot\ enabled}$ = 0.33, p < .005; z = -1.881, p < .05), b) attitude towards mobile banking on usage frequency ($\beta_{chatbot\ disabled}$ = 0.12, p < .05; $\beta_{chatbot\ enabled}$ = 0.26, p < .005; z = -1.663, N.S), and c) attitude towards mobile banking on loyalty ($\beta_{chatbot\ disabled}$ =

0.15, $p < .5$; $\beta_{chatbot\ enabled} = 0.29$, $p < .05$; $z = -1.679$, $p < .005$). It is also noticed in Table B that the attitude towards bank positively affects usage frequency ($\beta_{chatbot\ disabled} = 0.21$, $p < .005$; $\beta_{chatbot\ enabled} = 0.31$, $p < .05$; $z = -0.98$, N.S) and loyalty on usage frequency in post adoption stage ($\beta_{chatbot\ disabled} = 0.19$, $p < .05$; $\beta_{chatbot\ enabled} = 0.23$, $p < .05$; $z = -0.575$, N.S).

Table-4.9 (representing the results of longitudinal study by comparing pre-adoption and post adoption stage for chatbot-enabled customers) shows the positive effect of: a) perceived intelligence on attitude towards mobile banking ($\beta_{pre\ adoption} = 0.26$, $p < .10$; $\beta_{post\ adoption} = 0.38$, $p < .005$; $z = -1.143$, N.S), b) perceived ease of use on attitude towards mobile banking ($\beta_{pre\ adoption} = 0.27$, $p < .005$; $\beta_{post\ adoption} = 0.30$, $p < .05$; $z = -0.941$, N.S), c) perceived usefulness positively affects attitude towards mobile banking ($\beta_{chatbot\ disabled} = 0.30$, $p < .005$; $\beta_{chatbot\ enabled} = 0.38$, $p < .05$; $z = -0.638$ N.S), and d) perceived anthropomorphism on attitude towards mobile banking ($\beta_{pre\ adoption} = 0.12$, $p < .05$; $\beta_{post\ adoption} = 0.21$, $p < .005$; $z = -0.253$, N.S). It also depicts the positive effect of: a) attitude towards mobile banking on attitude towards bank ($\beta_{pre\ adoption} = 0.26$, $p < .05$; $\beta_{post\ adoption} = 0.34$, $p < .05$; $z = -0.948$, N.S), b) attitude towards mobile banking on usage frequency ($\beta_{pre\ adoption} = 0.16$, $p < .10$; $\beta_{post\ adoption} = 0.27$, $p < .05$; $z = -1.165$, $p < .05$), and c) attitude towards mobile banking on loyalty ($\beta_{pre\ adoption} = 0.17$, $p < .10$; $\beta_{post\ adoption} = 0.28$, $p < .005$; $z = -1.248$, $p < .05$). It also shows the positive effect of: a) attitude towards bank on usage frequency ($\beta_{pre\ adoption} = 0.26$, $p < .05$; $\beta_{post\ adoption} = 0.32$, $p < .05$; $z = -0.721$, N.S), and b) loyalty on usage frequency when chatbot is enabled ($\beta_{pre\ adoption} = 0.20$, $p < .05$; $\beta_{post\ adoption} = 0.21$, $p < .05$; $z = -0.242$, N.S).

4.4 Discussion

In line with the research objectives, the study conducts three sets of analysis concerning: a) the pre-adoption stage, differentiating chatbot-enabled versus chatbot-disabled mobile banking users; b) the post-adoption stage, differentiating chatbot-enabled versus chatbot-disabled mobile banking users; and c) comparing pre-adoption versus post-adoption behaviour of chatbot-enabled mobile banking users.

In doing so, for the pre-adoption stage, the study establishes that perceived intelligence (chatbot-enabled) has a stronger and more positive effect on attitude towards m-banking than the effect of perceived intelligence (chatbot-disabled); this provides evidence for H1a. The effect of PEOU (chatbot-enabled) carries a stronger and more positive effect on attitude towards m-banking than the effect of PEOU (chatbot-disabled); hence, hypothesis H2a is realized. Additionally, the study identifies that anthropomorphism (chatbot-enabled) has a stronger and more positive effect on attitude towards m-banking than the effect of anthropomorphism (chatbot-disabled); hence evidence for H3a. Simultaneously, we find a larger coefficient in the chatbot-enabled scenario (versus the chatbot-disabled scenario) while examining the effect of attitude towards m-banking on attitude towards bank , attitude towards m-banking on usage frequency , attitude towards m-banking on loyalty , attitude towards bank on usage frequency, and loyalty towards bank on usage frequency. Hence, the study doesn't provide evidence for H4a, H4b, H4c, H5a, and H6a. This could be largely attributed to the reason that the consumers were in a pre-adoption stage and had yet to form considered perceptions regarding loyalty and usage frequency towards the bank.

Similarly, in the post-adoption stage, the study establishes that perceived intelligence (chatbot-enabled) has a stronger and positive effect on attitude towards m-banking than the effect of perceived intelligence (chatbot-disabled); this provides evidence for H1b. PEOU (chatbot-enabled) carries a strong and positive effect on attitude towards m-banking than the effect of PEOU (chatbot-disabled) ; hence hypothesis H2b is realized. Additionally, the study identifies that Anthropomorphism (chatbot-enabled) has a stronger and positive effect on attitude towards m-banking than the effect of anthropomorphism (chatbot-disabled); hence an evidence for H3b. Additionally, we found that attitude towards m-banking (chatbot-enabled) has stronger and positive effect on attitude towards the bank (versus the effect of m-banking (chatbot-disabled)); in accordance with H4d. Similarly, the effect of attitude towards m-banking (chatbot-enabled) is stronger and positive on loyalty towards bank (versus the effect of m-banking (chatbot-disabled)); in line with H4f. However, the study couldn't provide evidence for H4e, H5b and H6b.

While comparing chatbot-enabled m-banking scenarios in pre-adoption versus post-adoption stages (i.e., longitudinally), we find a stronger and positive effect of attitude towards m-banking on usage frequency and loyalty, thus providing evidence for H4h and H4i. However, while examining the effects of perceived intelligence on attitude towards m-banking, PEOU on attitude towards m-banking, and anthropomorphism on attitude towards m-banking, we did not find a significant difference between the two cohorts; thus H1c, H2c, and H3c couldn't be realized. It could be that the users had formed a positive perception with respect to the features of chabots during the pre-adoption stage itself, thereby positively affecting their attitude towards m-banking. Similarly, while examining the pre-adoption versus post-adoption stage amongst chatbot users, there is no significant difference in the effect of attitude towards m-banking on attitude towards banks; thus, H4g couldn't be realized. This could be because the chatbot users would have formed a positive attitude towards the bank at the pre-adoption stage itself, which didn't change much. Similarly, there is no significant difference between the effects of attitude toward the bank and loyalty on usage frequency; thus, H5c and H6c could not be realized. From the afore-mentioned results, it could be concluded that chatbot usage over a period of time engenders increased usage frequency and loyalty towards the bank.

5. Policy Implications

5.1 Theoretical Implications

The study makes several important contributions to the theory. *Firstly*, this is probably the first study to have examined the chatbot's effect on loyalty and usage behaviour towards the bank amongst elderly users from an emerging market perspective. *Secondly*, the study establishes that users using a chatbot during m-banking behave differently than those who do not use chatbots in both pre-adoption and post-adoption stages of the chatbot. In the pre-adoption stage, the study establishes that chatbot-based m-banking is superior to chatbot-disabled m-banking in generating a positive attitude towards m-banking. This is largely driven by perceived intelligence, anthropomorphism, and perceived ease of use in the case of chatbot-based m-banking, which is largely perceived as absent in

chatbot-disabled m-banking. Past research on chatbots and m-banking is largely oblivious to this insight.

Thirdly, the study provides evidence that, in the post-adoption stage, chatbot-enabled m-banking (versus chatbot-disabled m-banking) is also instrumental in promoting a superior attitude towards m-banking, led by the effect of perceived intelligence and anthropomorphism (perceived as absent in chatbot-enabled m-banking) and superior perceived ease of use. The study also establishes that attitude towards m-banking (in a chatbot-disabled scenario) doesn't seem to affect attitude towards the bank and loyalty towards the bank. The evidence that there exists a significant difference in chatbot-abled m-banking versus chatbot-disabled m-banking in terms of examining the effect of attitude towards m-banking on attitude towards the bank and loyalty towards the bank was absent in the pre-adoption phase. This suggests that such effects need to be studied longitudinally.

Fifthly, the study establishes that over a period of time, the usage of chatbot-based m-banking promotes usage frequency and loyalty towards the bank. It provides evidence that users do not perceive a significant difference in the effect of perceived intelligence, anthropomorphism, and perceived ease of use on their attitude towards m-banking despite using chatbot-enabled m-banking over a period of time. This suggests that the positive perception of features of a new technology does not change over time post usage. Similarly, there is no effect of attitude towards m-banking on attitude towards the bank, the bank's effect on usage frequency, and the loyalty effect on usage frequency.

5.2 Practical Implications

This study has several practical implications too. *Firstly*, from an elderly user perspective, the study provides valuable practical insights on the antecedents and consequents of loyalty towards the bank, where the chatbot plays an important role. As evident from the results, while there exists a significant difference between the chatbot-abled m-banking and the chatbot-disabled m-banking when the effect of perceived intelligence, anthropomorphism, and perceived ease of use on attitudes towards m-banking is considered in the pre-adoption stage, there is

no significant difference in the consequences of attitudes towards m-banking. This suggests that chatbots can be a great enabler in bringing the elderly into the ambit of m-banking.

Secondly, in the post-adoption phase, with the evidence that there exists a significant difference in chatbot-abled m-banking versus chatbot-disabled m-banking in terms of examining the effect of attitude towards m-banking on attitude towards the bank and loyalty towards the bank, which was absent in the pre-adoption phase, This suggests that developers and banks need to measure the effect of newly launched technological products over a period of time, i.e., longitudinally. As a word of caution for the developers and banks, it would not be appropriate to measure the effect of chatbot-based m-banking on attitudes towards banks and loyalty towards banks with a static view and at a pre-adoption stage.

Thirdly, the study establishes that using chatbot-based m-banking over a period of time engenders improved loyalty towards the bank and improved usage frequency. This means that developers and banks need to work together to make chatbot-based mobile banking more engaging for customers in order to increase loyalty and frequency of use.

Fourthly, now that the study has shown that chatbot-enabled m-banking is better than chatbot-disabled m-banking, developers and banks need to help the elderly learn about chatbots through handholding by bank staff. This will make the elderly more loyal to the bank.

Fifthly, the results show that there is no significant change over time in the effect of antecedents on attitude toward m-banking in a chatbot-enabled m-banking scenario. This means that banks and developers need to keep working on algorithms to improve perceived intelligence, anthropomorphism, and perceived ease of use to make elderly users feel good about m-banking, which will increase loyalty and usage frequency.

5.3. Limitations and Future Directions

Instant study carries several limitations too. As the current study captures the perception of educated elderly m-banking users of a given bank from a metropolitan area in India, the insights cannot be directly generalised and would need further examination in other contexts. Future sets of studies can work in the direction of examining the effects of other sets of antecedents which influence attitudes towards m-banking, where the current study examines only perceived intelligence, perceived ease of use, and anthropomorphism. The present study examines the context amongst m-banking users. A future set of studies can examine the context from a non-user perspective and generate insights therefrom. Examining the difference in the behaviour of the elderly versus young adults would be an interesting area of further research. Further studies can be evaluated by examining the effect of involvement as a moderator. Alongside this, differentiating chatbot-based m-banking versus retail banking would be an interesting contribution in this area too.

6. Conclusion

The current study fills the noted gaps in the m-banking literature, namely: a) the use of chatbots in mobile banking (m-banking) among the elderly is under-researched from an emerging market viewpoint; and b) most studies on m-banking take a static view of adoption and loyalty, and hence lack a longitudinal analysis. Using a Google survey-based questionnaire, 593 elderly m-banking users' perceptions are gathered to test the conceptual model using AMOSv.22-based structural equation modelling while conducting multi-group analysis to differentiate the behaviour of chatbot-enabled m-banking users versus chatbot-disabled m-banking users for a reputable bank. At both the pre-adoption and post-adoption stages of chatbot-enabled m-banking, perceived intelligence, perceived ease of use, and anthropomorphism driven by chatbots affect m-banking attitudes. In the post-adoption phase of m-banking, chatbot-based m-banking affects bank attitude and customer loyalty. Chatbot-based m-banking boosts consumer loyalty and usage frequency. The study has theoretical and practical ramifications for developers and banks in emerging nations like India that target elderly clients. This study presents novel AI and m-banking insights applicable to vulnerable

populations and emerging markets, which earlier studies largely ignored. Such observations can help banks and developers design products, communicate with customers, and manage customers' lives in India's growing economy.

References

Ajzen, I., & Fishbein, M. (1975). A Bayesian analysis of attribution processes. *Psychological bulletin*, *82*(2), 261.

Akturan, U., & Tezcan, N. (2012). Mobile banking adoption of the youth market: Perceptions and intentions. *Marketing Intelligence & Planning.*

Alalwan, A.A., Dwivedi, Y.K., Rana, N.P. & Williams, M.D., 2016. Consumer adoption of mobile banking in Jordan: Examining the role of usefulness, ease of use, perceived risk and self-efficacy. *Journal of Enterprise Information Management.*

Albashrawi, M., Kartal, H., Oztekin, A. & Motiwalla, L., 2017. The impact of subjective and objective experience on mobile banking usage: an analytical approach.

Al Qeisi, K., & Al-Abdallah, G. (2013). Internet banking adoption in Jordan: A behavioral approach. *International Journal of Marketing Studies*, 5(6), 84.

Baabdullah, A. M., Alalwan, A. A., Rana, N. P., Kizgin, H., & Patil, P. (2019). Consumer use of mobile banking (M-Banking) in Saudi Arabia: Towards an integrated model. *International Journal of Information Management*, 44, 38-52.

Balakrishnan, J., & Dwivedi, Y. K. (2021). Conversational commerce: Entering the next stage of AI-powered digital assistants. *Annals of Operations Research*, 1-35.

Baptista, G. & Oliveira, T., 2017. Why so serious? Gamification impact in the acceptance of mobile banking services. *Internet Research.*

Bartneck, C., Kulić, D., Croft, E., & Zoghbi, S. (2009). Measurement instruments for the anthropomorphism, animacy, likeability, perceived intelligence, and perceived safety of robots. *International journal of social robotics*, 1(1), 71-81.

Bianchi, C. (2021). Exploring how internet services can enhance elderly well-being. Journal of Services Marketing.

Bryman, A. (2016). *Social research methods*. Oxford university press.

Brynjolfsson, E., & McAfee, A. (2014). The second machine age: Work, progress, and prosperity in a time of brilliant technologies. WW Norton & Company.

Čaić, M., Odekerken-Schröder, G., & Mahr, D. (2018). Service robots: value co-creation and co-destruction in elderly care networks. *Journal of Service Management.*

Chaouali, W., Souiden, N., & Ladhari, R. (2017). Explaining adoption of mobile banking with the theory of trying, general self-confidence, and cynicism. *Journal of Retailing and Consumer Services*, 35, 57-67.

Chaouali, W., & Souiden, N. (2019). The role of cognitive age in explaining mobile banking resistance among elderly people. *Journal of Retailing and Consumer Services*, 50, 342-350.

Choudhury, M., & Singh, R. Measuring Customers' Satisfaction in Bancassurance Channel: An Investigation Using Gap Model. BANK PARIKRAMA, 43.

Chavan, M., Galperin, B. L., Ostle, A., & Behl, A. (2021). Millennial's perception on cyberloafing: workplace deviance or cultural norm?. *Behaviour & Information Technology*, 1-18.

Chavali, K., & Kumar, A. (2018). Adoption of mobile banking and perceived risk in GCC. *Banks & bank systems*, (13, Iss. 1), 72-79.

Chen, K. J. (2017). Humanizing Brands: An Examination of the Psychological Process of Anthropomorphism and its Effects on Consumer Responses. *Journal of Marketing Management*, 5(2), 75-87.

Chi, T. (2018). Understanding Chinese consumer adoption of apparel mobile commerce: An extended TAM approach. *Journal of Retailing and Consumer Services*, 44, 274-284.

Choudrie, J., Junior, C. O., McKenna, B., & Richter, S. (2018). Understanding and conceptualising the adoption, use and diffusion of mobile banking in older adults: A research agenda and conceptual framework. *Journal of Business Research*, 88, 449-465.

Clark, L., Pantidi, N., Cooney, O., Doyle, P., Garaialde, D., Edwards, J., ... & Cowan, B. R. (2019, May). What makes a good conversation? Challenges in designing truly conversational agents. *In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (pp. 1-12).

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management science*, 35(8), 982-1003.

Dinsmore, J. B., Swani, K., & Dugan, R. G. (2017). To "free" or not to "free": Trait predictors of mobile app purchasing tendencies. *Psychology & Marketing*, 34(2), 227-244.

Epley, N., Waytz, A., & Cacioppo, J. T. (2007). On seeing human: a three-factor theory of anthropomorphism. *Psychological review*, 114(4), 864.

Fang, Y. H. (2019). An app a day keeps a customer connected: Explicating loyalty to brands and branded applications through the lens of affordance and service-dominant logic. *Information & Management*, 56(3), 377-391.

Fong, L. H. N., Lam, L. W., & Law, R. (2017). How locus of control shapes intention to reuse mobile apps for making hotel reservations: Evidence from Chinese consumers. *Tourism management*, 61, 331-342.

Foye, J. (2018). A comprehensive test of the Fama-French five-factor model in emerging markets. *Emerging Markets Review*, 37, 199-222.

Geebren, A., Jabbar, A., & Luo, M. (2021). Examining the role of consumer satisfaction within mobile eco-systems: Evidence from mobile banking services. *Computers in Human Behavior*, 114, 106584.

Grönroos, C. (1991). The marketing strategy continuum: towards a marketing concept for the 1990s. *Management decision*.

Grudin, J., & Jacques, R. (2019, May). Chatbots, humbots, and the quest for artificial general intelligence. *In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (pp. 1-11).

Gupta, A., & Sharma, D. (2019). Customers' Attitude towards Chatbots in Banking Industry of India. *International Journal of Innovative Technology and Exploring Engineering*, 8(11), 1222-1225.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2013). Partial least squares structural equation modeling: Rigorous applications, better results and higher acceptance. *Long range planning*, 46(1-2), 1-12.

Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). A primer on partial least squares structural equation modeling (PLS-SEM). Sage publications.

Han, M. C. (2021). The impact of anthropomorphism on consumers' purchase decision in chatbot commerce. *Journal of Internet Commerce*, 20(1), 46-65.

Hanafizadeh, P., Behboudi, M., Koshksaray, A. A., & Tabar, M. J. S. (2014). Mobile-banking adoption by Iranian bank clients. *Telematics and informatics*, 31(1), 62-78.

Harrison, D. (2015). Mobile banking acceptance among young con-sumers in Germany: An empirical analysis (Doctoral dissertation, Doctoral dissertation, BI Norwegian Business School).

Hassan, H. E., & Wood, V. R. (2020). Does country culture influence consumers' perceptions toward mobile banking? A comparison between Egypt and the United States. *Telematics and Informatics*, 46, 101312.

Iwamura, Y., Shiomi, M., Kanda, T., Ishiguro, H., & Hagita, N. (2011, March). Do elderly people prefer a conversational humanoid as a shopping assistant partner in supermarkets?. *In Proceedings of the 6th international conference on Human-robot interaction* (pp. 449-456).

Jan, A. U., & Contreras, V. (2011). Technology acceptance model for the use of information technology in universities. *Computers in Human Behavior*, 27(2), 845-851.

Karri, S. P. R., & Kumar, B. S. (2020, January). Deep learning techniques for implementation of chatbots. *In 2020 International Conference on Computer Communication and Informatics (ICCCI)* (pp. 1-5). IEEE.

Kasilingam, D. L. (2020). Understanding the attitude and intention to use smartphone chatbots for shopping. *Technology in Society*, 62, 101280.

Khan, S., & Rabbani, M. R. (2020, November). Chatbot as Islamic Finance Expert (CaIFE) When Finance Meets Artificial Intelligence. In Proceedings of the 2020 4th International Symposium on Computer Science and Intelligent Control (pp. 1-5).

Kim, S. C., Yoon, D., & Han, E. K. (2016). Antecedents of mobile app usage among smartphone users. *Journal of marketing communications*, 22(6), 653-670.

Lane, J. D., Wellman, H. M., & Evans, E. M. (2010). Children's understanding of ordinary and extraordinary minds. *Child development*, 81(5), 1475-1489.

Lee, B., Chen, Y., & Hewitt, L. (2011). Age differences in constraints encountered by seniors in their use of computers and the internet. *Computers in Human Behavior*, 27(3), 1231-1237.

Lin, H. F. (2011). An empirical investigation of mobile banking adoption: The effect of innovation attributes and knowledge-based trust. *International journal of information management*, 31(3), 252-260.

Ling, E. C., Tussyadiah, I., Tuomi, A., Stienmetz, J., & Ioannou, A. (2021). Factors influencing users' adoption and use of conversational agents: A systematic review. *Psychology & Marketing*, 38(7), 1031-1051.

Malaquias, R. F., & Hwang, Y. (2019). Mobile banking use: A comparative study with Brazilian and US participants. *International Journal of Information Management*, 44, 132-140.

Malhotra, N., & Kumari, D. (2016). Determinants of Exports in Major Asian Economies. *Journal of International Economics* (0976-0792), 7(1).

Manchanda, M., & Deb, M. (2021). On m-commerce adoption and augmented reality: a study on apparel buying using m-commerce in Indian context. *Journal of Internet Commerce*, 20(1), 84-112.

Mauldin, M. L. (1994, August). Chatterbots, tinymuds, and the turing test: Entering the loebner prize competition. In AAAI (Vol. 94, pp. 16-21).

McLean, G., Osei-Frimpong, K., Al-Nabhani, K., & Marriott, H. (2020). Examining consumer attitudes towards retailers'm-commerce mobile applications–An initial adoption vs. continuous use perspective. *Journal of Business Research*, 106, 139-157.

Menidjel, C., Benhabib, A., & Bilgihan, A. (2017). Examining the moderating role of personality traits in the relationship between brand trust and brand loyalty. *Journal of Product & Brand Management*.

Merhi, M., Hone, K., Tarhini, A., & Ameen, N. (2020). An empirical examination of the moderating role of age and gender in consumer mobile banking use: a cross-national, quantitative study. Journal of Enterprise Information Management.

Mohammadi, H. (2015). Investigating users' perspectives on e-learning: An integration of TAM and IS success model. *Computers in human behavior*, 45, 359-374.

Moussawi, S., & Koufaris, M. (2019, January). Perceived intelligence and perceived anthropomorphism of personal intelligent agents: Scale development and validation. *In Proceedings of the 52nd Hawaii international conference on system sciences*.

Munoz-Leiva, F., Climent-Climent, S., & Liébana-Cabanillas, F. (2017). Determinants of intention to use the mobile banking apps: An extension of the classic TAM model. Spanish journal of marketing-ESIC, 21(1), 25-38.

Payne, E. M., Peltier, J. W., & Barger, V. A. (2018). Mobile banking and AI-enabled mobile banking: The differential effects of technological and non-technological factors on digital natives' perceptions and behavior. *Journal of Research in Interactive Marketing*.

Payne, E. H. M., Peltier, J., & Barger, V. A. (2021). Enhancing the value co-creation process: artificial intelligence and mobile banking service platforms. *Journal of Research in Interactive Marketing*.

Pillai, R., & Sivathanu, B. (2020). Adoption of AI-based chatbots for hospitality and tourism. *International Journal of Contemporary Hospitality Management*.

Rahman, A. Ethics in Banking: Interfacing Financial Inclusion for Socially Responsible Development. *BANK PARIKRAMA*, 18.

Rapp, A., Curti, L., & Boldi, A. (2021). The human side of human-chatbot interaction: A systematic literature review of ten years of research on text-based chatbots. International *Journal of Human-Computer Studies*, 151, 102630.

Li, D., Rau, P. L., & Li, Y. (2010). A cross-cultural study: Effect of robot appearance and task. *International Journal of Social Robotics*, 2(2), 175-186.

Sarbabidya, S., & Saha, T. (2020). Role of Chatbot in customer service: A study from the perspectives of the banking industry of Bangladesh. *International Review of Business Research Papers*, 16(1), 231-248.

Seifert, A., Cotten, S. R., & Xie, B. (2021). A double burden of exclusion? Digital and social exclusion of older adults in times of COVID-19. *The Journals of Gerontology: Series B*, 76(3), e99-e103.

Sheehan, B., Jin, H. S., & Gottlieb, U. (2020). Customer service chatbots: Anthropomorphism and adoption. *Journal of Business Research*, 115, 14-24.

Singh, S., & Srivastava, R. K. (2018). Predicting the intention to use mobile banking in India. *International Journal of Bank Marketing.*

Sinha, M., & Sheth, J. (2018). Growing the pie in emerging markets: Marketing strategies for increasing the ratio of non-users to users. *Journal of Business Research*, 86, 217-224.

Skjuve, M., Haugstveit, I. M., Følstad, A., & Brandtzaeg, P. B. (2019). Help is my Chatbot Falling into the Uncanny Valley? An Empirical Study of User Experience in Human-Chatbot Interaction. *Human Technology*, 15(1).

Spears, N., & Singh, S. N. (2004). Measuring attitude toward the brand and purchase intentions. *Journal of current issues & research in advertising*, 26(2), 53-66.

Srivastava, S. C., Chandra, S., & Theng, Y. L. (2010). Evaluating the role of trust in consumer adoption of mobile payment systems: An empirical analysis. Communications of the Association for Information systems, 27, 561-588.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.

Wessels, L., & Drennan, J. (2010). An investigation of consumer acceptance of M-banking. *International Journal of bank marketing*.

Wirtz, J., Patterson, P. G., Kunz, W. H., Gruber, T., Lu, V. N., Paluch, S., & Martins, A. (2018). Brave new world: service robots in the frontline. *Journal of Service Management*.

Yang, Y., Liu, Y., Lv, X., Ai, J., & Li, Y. (2021). Anthropomorphism and customers' willingness to use artificial intelligence service agents. *Journal of Hospitality Marketing & Management*, 1-23.

Dynamic Relationship of Behavioural and Socio-Economic Factors on Retail Investors Investment Decisions

- Swati Prasad[*]
- Ravi Kiran[**]
- Rakesh Kumar Sharma[***]

Abstract

The present research assesses the impact of financial literacy, behavioural factors & socio-economic factors on retail investors' decisions regarding investment. Applying Partial least square-structure equation modeling, the results underline that financial literacy & socio- economic factors have a significant direct influence on investment-decisions. Socio-economic significantly influence behavioural factors and they subsequently have a significant affirmative influence on financial literacy. The mediating role of financial literacy between behavioral factor and investment-decisions has been supported in the current research. The findings of clearly demonstrate that financial literacy, behavioral & socio-economic factors influence their investment-decisions. The current research is valuable for potential investors and will help them rely on these factors to get the maximum benefits of investment.

Keywords: Financial Literacy; Behavioural Factors; Socio-Economic Factor; Investment Decisions
JEL Classification: G11, G41

1. Introduction and Background of the Study

India is an emerging market economy. As a country, India saves roughly 30 percent of its gross domestic product (GDP). To channelize the savings of its citizen, the banking system of India and its capital market have to play a pivotal role. Indian financial system India offers various financial alternatives for saving and investment for its citizens. Frequently used investment alternatives include, fixed deposits; unit linked insurance plans, mutual funds, gold, real estate and industry stocks etc.

[*]Dr. Swati Prasad is an Assistant Professor, Parul Institute of Business Administration, Parul University, Vadodara, Gujarat, India, Email: swatiprasad0389@gmail.com; [**]Dr. Ravi Kiran is a Professor, Department of School of Humanities & Social Science, Thapar Institute of Engineering and Technology (Deemed University), Patiala, Punjab, India, Email: rkiran@thapar.edu; and [***]Dr. Rakesh Kumar Sharma is a Assistant Professor, Department of School of Humanities & Social Science, Thapar Institute of Engineering and Technology (Deemed University), Patiala, Punjab, India, Email: rakeshsharmarv@gmail.com. The views expressed in this paper are the authors' own.

Investment decisions (ID) related products are complex & carry greater risk than debt-related products, in view market variations. Markets fluctuate due to various economic or non- economic, internal as well as external shocks. These result from diverse perceptions of stock market investors'. Financial position of the company also plays a vital role in stock prices. Against this backdrop, Financial Literacy (FL) of investors' will enable them to arrive at optimum ID and will also assist in tackling adverse market scenarios.

FL literature supports dominance and importance of FL in ID. It is important that surplus money available with people may be invested in alternatives offering higher returns & lower risk. A good return can be induced with adequate knowledge of diverse financial products. This indicates the high relevance and role of FL. Remund (2010) indicates that FL enhances a person's capability to manage funds. It encompasses the individuals competence to enable him/her to accomplish material security (Johnson & Sherraden, 2007). Inadequacy of financial awareness imposes a a severe challenge faced by developing economies (Mihalcova et al., 2014). The increased reliance on FL is sensed in view of surging and diverse financial products, volatility of stock markets, and due to changing business environment in view of globalised scenario.

ID vary from person to person, but still majorly are associated with risk, returns, product choices &product inclinations. Financially literate investors are at an advantage to undertake suitable investment decisions with high confidence and will be able to manage risk also suitably (Awais et al.,2016). ID are well grounded in economic theory. They are related with macro-economic dimensions but rely on micro-economic dimension covering utility theory. People will tend to enhance & augment utility through relation consumption & investment (Merikas, 2011; Vozikis & Prasad, 2004).

Retail investors' have tendency to overestimate the confidence on ID (Campbell, Goodie, and Foster, 2004). Financially literate people are overconfident (Cordell, Smith, and Terry, 2011). Those retail investors who are overconfident tend to overestimate returns, however tend to understate risks (Goel and Thakor, 2008; Prasad et al., 2021). When the incentives for accuracy increase, they reflect overconfidence (Williams and Gilovich, 2008). Debondt

&Thaler (1995) opined that investors' behavior affects the market. People's respond to price changes or news in different ways. There is a tendency of associating future trends to past movements, however the focus may be on popular stocks. The market factors, viz. price changes, market information, consumer choices too influence investors' decisions (Waweru et al. 2008). Investors' behaviours are identified by herding effect in financial market. Regular investors are mostly careful regarding the existence of herding. Investors have selected information of the securities price deviation.   The impact of changes in stock prices can influence the attributes of risk & return theories. Along with these Asset pricing models also stimulate investment decisions (Tan et al., 2008). Herding investors like prehistoric men have sparse knowledge, but such an investor gather in groups for safe returns (Caparrelli et al., 2004).

2. Literature Review and Theoretical Framework

It is vital to re-wind and re-examine the literature review related with retail investors behaviour. The review has been categorized into: Behavioral Factors (BF), Socio-economic Factors (SEF), Financial Literacy (FL) and Investment Decisions (ID). Prior literature supports that FL is influenced by income & profession. Banking professionals and financial advisors have higher levels of literacy and may have an advantage (Al-Tamimi et al., 2009; Prasad et al., 2021). Many studies have examined FL from gender perspective, like (Kabra et al. 2010; Chijwani, 2014) highlighted low level of literacy of women. Other researchers have also indicated that that investors' risk-taking behaviour relies on gender, income, learning & occupation (Prashar 2010; Lease et al., 1977; Geetha et al., 2014; Marinelli et al., 2017). The higher financially literacy of males in relation to females finds its support where authors like Potrich et al., (2017) relate it with risk taking attitude of males. However, Arena et al., (2016) expressed that lone women are risk-seekers.

The diversity of FL programs in India may be due to socio-economic status (Hood et al., 2014). Risk tolerance along with investment choices, and investment goals could be improved with FL (Waggle and Agarwal, 2015). FL may help liberating women from covetous lenders relying on extortionate interests (Karsidi

et al., 2015). High FL may encourage risk seeking behavior and could play a vital role in diverting money from traditional bank deposits (Seay. et al., 2016) to equity or portfolio-based investment, which is the need of the hour (Calcagno et al., 2015; Arena et al., 2016).

Financial websites help in providing useful information to investors for decision making (Lee et al., 2008). Majority of small and medium retail investors prefer to purchase new issue market rather than invest in secondary market as they are unable to rely on stock brokers (Gupta, 1991). Company repute, EPS, P/E, and stock market volatility are important factors to be considered by the investors (Heshmat, 2012). Low levels of FL encourage investors to rely on self-perceptions rather than seeking financial assistance of professionals (Anderson et al., 2017). A little knowledge is a dangerous thing, and wrong perceptions may make you move away from investing in share markets. FL may be helpful not only in good current investment but could assist in planning well for retirement (Fedorova et al., 2015). FL with endorsements from strong financial experts could go a long way in making the right choice of portfolio to reduce risks and encourage high returns (Lin et al., 2017). Financially literate people may be influenced by overconfidence bias, but still are not undisciplined investors (Takeda et al., 2013). FL enhances investment in derivatives (Hsiao et al., 2018).

Decision-making through BF helps to understand emotions and omit cognitive blunders (Waweru et al., 2008). BF assist in gauging the stock market performance, including the uptrends & downtrends (Gao and Schmidt, 2005). Hence, understanding the behavioral elements has a stimulating effect on ID. Strong preference and use of behavioral models help to explain the preferred ID (Caparrelli et al., 2004; Fogel & Berry, 2006). Ritter (2003) relates investment decisions with cognitive biases. This helps in eluding regret by refusing to through purchase of shares not performing well (Forgel & Berry, 2006; Lehenkari & Perttunen, 2004). As indicated by Barberis & Thaler, (2003) public is more vexed by losses, than contented by equivalent gain. Barberis & Huang (2001) concluded that a loss seems to be more painful, while a loss coming after prior gain is proved less painful. Studies highlight the strong effect of Loss aversion in investors decision making (Lehenkari and Perttunen, 2004). Risk verse and risk

seeking behavior has been underscored by many researchers (Odean, 1998; Thaler, 2003). Mental accounting supports in handling portfolio through separate accounts (Barberis & Thaler, 2003; Ritter, 2003). BF could benefit investing safe and allow in managing portfolio (Anderson, Henker and Owen, 2005).

Nagy et al. (1994) indicate accounting information, image of company, social relevance, recommendations and financing requirements as other factors influencing decision making (Dawar et al., 2011). FL and accounting information are important for risky investment avenues. In terms of risky investments, study by Lodhi (2014) stressed that it decreases with age or as a person grows more mature & experienced. Certain factors like Religiosity had lower influence on investment decisions (Al-Tamimi, 2009) and this is also a strong factor challenging researchers to study in deep (Awais et al., 2016). FL assists persons to defend themselves against shocks (Klapper, 2013).

Mehmet (2015) highlighted that along with income levels, past investment experiences also are factors to be considered. Chandra et al., (2012) also corroborated supported influence of levels of income on decision-making. Self-esteem always needs to be considered. Portfolio management, likings, risk insights also influence retail investors' decision making (Kaur and Vohra, 2012; Jagongo et al., 2014). Risk-taking capability of superannuated investors is moderately low (Al-Ajmi, 2008).

Behavioral models highlight the role of herding, biases and beliefs diverging from the rationality theory and models and these researchers have time and again emphasized the importance of BF. The socio-economic factors include demographic factors like gender, age and income and education. Not only company reputation, ownership structure, dividend and bonuses need not be ignored. (Shafi, 2014). Ranganathan (2006) added fund related qualities, fund sponsor qualities and investor related services also to be considered. Real estate especially buying a home are complex investments, however FL can play a vital role here, especially in terms of loan advancement, amortization and return (Gathergood 2017).

Earlier researchers have examined the direct impact of FL on ID, but this research intends to scrutinize the mediating role of FL between BF and SEF. Besides there are wide variations in results too. Moreover, earlier studies relate more with exploratory factor analysis, the present study besides considering BF also consider SEF and designs a SEM-PLS model to provide deeper insight on how these factors along with financial influence retail investors decision-making. Considering these gaps, the following objectives have been underlined

2.1. Objectives of the Study

   i. To investigate the relationship between financial literacy and investment decisions.

   ii. To analyse the influence of Behavioural and socio-economic factors on Investment decisions.

   iii. To design a model linking retail investors' behaviour with investment decisions.

## 3. Research Design and Methods

3.1 Sampling Details

The resent research relates with three important regions of India, viz. Punjab, Himachal Pradesh & Haryana. After piloting questionnaire by ten academicians and seven practitioners from banks/ financial institutions the questionnaire was finalised. A 5-point likert scale instrument used has four sections. These are: demographic profile ii) Behavioral and Socio-economic factors; iii) financial literacy and iv) investment decisions. Data were collected from 514 retail investors although 600 questionnaires are distributed to investors from a list obtained from the brokerage firm.

3.2 Designing a Strategic Model Linking Behavioral Factors, Socio-economic Factors, Financial Literacy with Investment Decisions

Eight behavioral factors that influence retail investors' investment decisions and that have been included are: personal factors, herding factors, overconfidence, ability bias, loss aversion, regret bias and mental accounting.

Socio-economic factors considered in the current research include: i) Market; ii) Firm and iii) Social. BF and SEF are independent variables and investment decisions is a dependent variable. Three sub-factors considered in in investment decisions are: prior information, risk and returns. The subsequent phase was to discover relation between FL & ID through behavioral and socio-economic factors.

Figure 1: Proposed Model
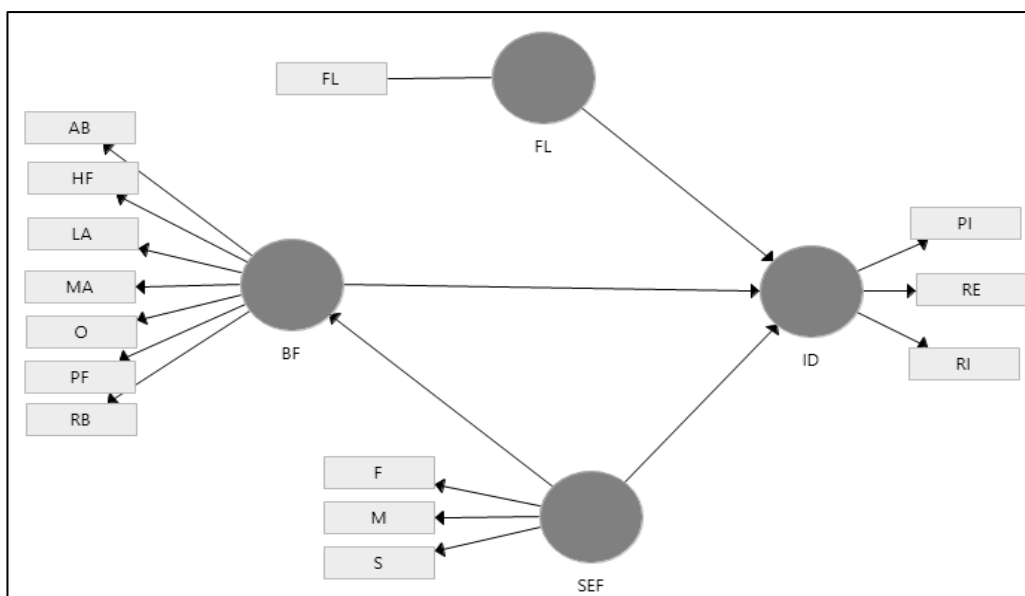
In this study, we theorise that the BF; SEF and FL significantly influence investment decisions. This model is represented through Figure-1.

Behavioural Factors (BF)

Behavioural factors covered are: personal factors, herding, overconfidence, ability bias, loss aversion, regret bias, personal factor & mental accounting.

Table 1: Dimensions of Behavioural Factors

Behavioral Factors (BF)	Items	Authors (Year)
Personal Factors	Personal income influences Investment decisions.	Asaad, C. T. (2015)
	Life style influences Investment decisions.	Klapper, Lusardi & Panos (2013)
	Family income affects Investment decisions.	Faulkner (2015)
	Family expenditure affects Investment decisions.	Lusardi (2015),
	Income from other sources (Rent from house property, interest, royalty etc) influence Investment decisions.	Agarwal, Amromin et al. (2015)
	Future plan affects Investment decisions.	Cutler (2013)
Herding Factors	Peer stock selection criteria significantly influence ID	Mandell & Klein (2009)
	Decisions of the stock volume influences ID.	Asaad (2015), Faulkner (2015)
	Buying & selling of stocks influences ID.	Jayaraj (2013), Musundi (2014)
	Following others' reactions to the stock market.	Aren & Zengin (2016)
Overconfidence	Knowledge of stock-market helps to perform well.	Klapper, Lusardi & Panos (2013)
	Normally able to anticipate.	Worthington (2006)
	Optimistic trend of market continues	Almenberg (2015)
	Consistently time the market.	Asaad (2015)
Ability Bias	Predict changes in stock prices on the basis of recent trends.	Mandell & Klein (2009)
	Prefer to buy local stocks due to availability of information.	Cutler (2013)
	Capable of ability to gauge market changes accurately.	Asaad (2015)
Loss Aversion	More stressed by prospective losses.	Lusardi (2015),
	Avoid selling shares that have diminished value.	Asaad (2015)
	Willingly remain in risky stock position, hoping a bounce in price.	Faulkner (2015)
	Previous loss increases averseness to risk.	Almenberg (2015)
Regret Bias	Avoid selling a stock due to regret of bad investment.	Agarwal, Amromin et al., (2015),

Behavioral Factors (BF)	Items	Authors (Year)
		Klapper, Lusardi & Panos (2013),
	Regret when a stock you considered buying didn't increase in value.	Musundi (2014)
	Buy only stocks that everyone else is buying.	Cutler (2013)
Mental Accounting	Hesitate to sell an investment which fell from monstrous gains to modest gains	Klapper, Lusardi & Panos (2013),
	During bullish market getting accustomed to healthy gains.	Faulkner (2015),
	Hesitant to sell at the smaller profit margin.	Aren & Zengin (2016)
	Wait for the return of the gainful period to sell your stock.	Musundi (2014)

Source: Authors Compilation

The related Hypothesis is:

H1a: Behavioural factors directly influence financial literacy.

H1b: Behavioural factors are significant determinant of investment decisions.

Socio-Economic Factors (SF)

Next it becomes important to examine how socio- economic factors influence investment decisions. Socio-economic factors cover market factor, social factor and firm factor. The details of these items along with relevant literature are given in Table-2.

Table 2: Determinants of Socio-Economic Factors

Socio-Economic Factors (SEF)	Items	Authors (Year)
Market Factors	Price changes in stocks where you intend to invest.	Klapper, Lusardi, & Panos (2013)
	Market information is vital for investment.	Mandell & Klein (2009)
	Past trends of stocks induce your investment.	Musundi (2014)
	A track of market changes to help you in investment.	Almenberg (2015)
Firm Factors	Firm's image before investment.	Mandell & Klein (2009)

Socio-Economic Factors (SEF)	Items	Authors (Year)
	Past investment experiences in firms before investment.	Jappelli & Padula (2013)
	Concerned about security grading before investment.	Faulkner (2015), Jayaraj (2013)
	Invest in firms which have are socially responsible.	Musundi (2014)
	Norms and Values of Firms Influences investment.	Almenberg (2015)
	Firms with environmental & social concerns have a higher cost of equities.	Cutler (2013)
Social Factors	Investment is affected by Social Structure.	Klapper, Lusardi & Panos (2013)
	Investment is affected by Religious views.	Lusardi (2015)
	Investment is affected by Political views.	Asaad (2015)
	Family structure affects investment Behaviour.	Klapper, Lusardi & Panos (2013)
	Family financial budget affects investment Behaviour.	Musundi (2014)

Source: Authors Compilation

The related Hypothesis is:

$H_{2a:}$ Socio-economic factors significantly influence investment decisions of retail investors.

$H_{2b:}$ Socio-economic factors have a positive and significant effect on behavioural factors.

Financial literacy (FL)

Financial literacy may play an important role in influencing behavioural factors to induce investment decisions. Hence it becomes pertinent to examine its role as a mediating factor. The item of financial literacy scale along with relevant literature is shown through Table-3.

Table 3: Determinants of Financial Literacy

Financial Literacy (FL)	Authors (Year)
i. Proficient in managing financial future investments (Buying insurance)	Worthington (2006)
ii. High-risk and high-return investment planning.	Agarwal, Amromin et al., (2015)
iii. Finances are a significant source of apprehension.	Panos (2013)
iv. Control of financial situation.	Almenberg (2015)
v. Circumvent being victimized by financial scams.	Van Rooij, Lusardi & Alessie (2011)
vi. Buying good insurance for protect from risks of catastrophe.	Klapper, Lusardi & Lusardi (2015)
vii. Financial security by imbibing healthy spending habits.	Cutler (2013)
viii. Maintain adequate financial records.	Mandell, L., & Klein (2009)
ix. Keeping records of income and expenditures.	Almenberg (2015)
x. Buy insurance products for investment.	Jappelli & Padula (2013)
xi. Possess appropriate information of investment alternatives.	Cutler (2013)
xii. Investment alternatives to assist tax planning.	Asaad (2015)
xiii. Possess knowledge to use Bullish and Bearish trends for investing and buying /selling of stocks.	Faulkner (2015)
xiv. Capable of gauging market trends	Musundi (2014)

Source: Authors Compilation

The related Hypothesis is:

H_{3a}: Financial literacy mediates between behavioural factor and investment decisions.

H_{3b}: Financial literacy have a strong direct significant impact on investment decisions.

Investment Decisions (ID): Investment decisions scale is a formative construct covering returns; risk and prior information.

Table 4: Determinants of Investment Decisions

Investment Decisions (ID)	Items	Authors (Year)
Returns	Return rates of current stocks match expectancy.	Faulkner (2015)
	Return rates are higher than the average market return rate.	Jayaraj (2013)
	Contended by prior year investments.	Van Rooij, Lusardi & Alessie (2011)
	Increase in time-horizon enhances ROI.	Musundi (2014)
Risk	A good knowledge of how risks influence Investments.	Mandell & Klein (2009)
	Riskier investments yield higher returns.	Jappelli & Padula (2013)
	Reduce risk through portfolio diversification.	Cutler (2013)
	Invest in stocks having higher Beta values.	Faulkner (2015)
Prior Information	Information of high rank on listing day influences Investment decisions.	Agarwal, Amromin et. al.,(2015)
	Possess how active trading information of past influences Investment decisions.	Asaad (2015), Cutler (2013),
	Acquired knowledge of how market-capitalization influences Investment decisions.	Jayaraj (2013)

Source: Authors Compilation

4. Data Analysis and Results

SEM-PLS was used to investigate the relation amongst behavioral factors, socio-economic factors and investment decisions. Financial literacy has taken as a mediating variable in behavioral factors and investment decisions.

Table 5: Reliability and Validity Measurement

	Items Code	Items	LV	Cronbach's Alpha	CR	AVE	Square Root of AVE
	PF	Personal Factor	0.625				
	HF	Herding Factor	0.680				
BF	LA	Loss Aversion	0.796	0.846	0.882	0.518	0.720
	MA	Mental Accounting	0.769				
	RB	Regret Bias	0.677				

	Items Code	Items	LV	Cronbach's Alpha	CR	AVE	Square Root of AVE
	O	Overconfidence	0.766				
	AB	Ability Bias	0.710				
FL	FL	Financial Literacy	1.000	1.000	1.000	1.000	1.000
ID	PI	Prior Information	0.861	0.868	0.919	0.791	0.889
	RE	Return	0.902				
	RI	Risk	0.905				
SEF	F	Firm	0.839	0.711	0.839	0.638	0.799
	M	Market	0.883				
	S	Social	0.657				

Source: Authors Compilation

For gauging reliability and validity Cronbach alpha, Composite Reliability (CR), Average Variance Extracted (AVE) have been used. As suggested by (Nunnally, 1978) internal consistency is crucial and this has been examined using Cronbach alpha. Composite reliability & validity of: Behavioral Factors (BF), Investment Decisions (ID) and Socio-economic Factors (SEF) have been analysed to see whether they meet the requirements. Table-5 represents the results of these tests. In general, the internal consistency of the survey instrument is considered as excellent if Cronbach alpha value is greater than 0.90. Range of 0.80-0.90 is considered as good. Alpha value ranges between 0.70 & 0.80 are considered as acceptable and between 0.60 & 0.70 is questionable. Below that reflects poor internal consistency. Internal consistency of SEF is 0.71. For BF and ID it lies in the range between 0.80 & 0.90, hence representing good levels. According to Hamid et al. (2017) CR value should be greater than 0.70 and AVE value should be higher than 0.50. All latent variables have CR >0.70 & AVE >0.50. The square root of AVE as per Fornel and Larcker (1981) criteria is also justified, hence Discriminant Validity (DV) criteria is also satisfied. This has been depicted through table 6. Campbell and Fiske (1959) suggested that successful DV range reflects that constructs are different. The criteria suggested by Fornell and Larcker (1981) & Heterotrait-Monotrait (HTMT) ratio of correlations are acceptable.

Table 6: Discriminant Validity Fornell-Larcker Criterion

	BF	FL	ID	SEF
Behavioral Factors (BF)	**0.720**			
Financial Literacy (FL)	0.558	**1.000**		
Investment decisions (ID)	0.600	0.678	**0.889**	
Socio economic Factors (SEF)	**0.760**	0.623	0.712	**0.799**

Source: Authors Compilation

Table 7: Heterotrait-Monotrait (HTMT) Ratio

	BF	FL	ID	SEF
Behavioral Factors (BF)				
Financial Literacy (FL)	0.573			
Investment decisions (ID)	0.666	**0.724**		
Socio economic Factors (SEF)	0.844	0.756	**0.886**	

Source: Authors Compilation

Table-6 depicts DV according to Fornell-Larcker criterion. Diagonal values of Table-6 depict the square root of AVE. As seen through table in the present model there is DV as square root of AVE is more than coefficient, all values are in range, hence justified to move ahead with analysis

The second criteria to check DV is Heterotrait-Monotrait Ratio (HTMT). Values approximating 1 indicates a lack of DV. If the value of the HTMT is more than this threshold, one can conclude that there is a lack of discriminant validity. Some authors suggest a value of 0.85 (Kline, 2011). Gold et al. (2001) argued and proposed a value of 0.90. According to HTMT ratio, DV criteria is justified, as no value is greater than 0.90.

Table 8: VIF Values

Inner VIF Values	FL	ID	Outer VIF Values			
Behavioral factors	1.000	2.286		VIF		VIF
Financial Literacy		1.709	AB	1.903	FL	1.000
Investment decisions			PF	1.387	M	1.781
Socio economic Factors		2.586	RB	1.721	S	1.205
			HF	1.853	F	1.667
			LA	2.294	RE	2.646
			O	2.499	RI	2.853
			MA	1.683	PI	1.881

Source: Authors Compilation

Table-8 indicates inner & outer Variance Inflation Factor (VIF) used for gauging whether there is multi-collinearity among variables. Values beyong 10 states suggest criticality of problem (Neter et al., 1989; Kennedy, 1992; Hair et al., 1995 and Marquardt, 1970). Some suggest (Hocking and Pendelton 1983; Craney and Surles 2002) have recommended a value less than 3. All values of VIF are lower than threshold limit.

Figure 2: Structural Model
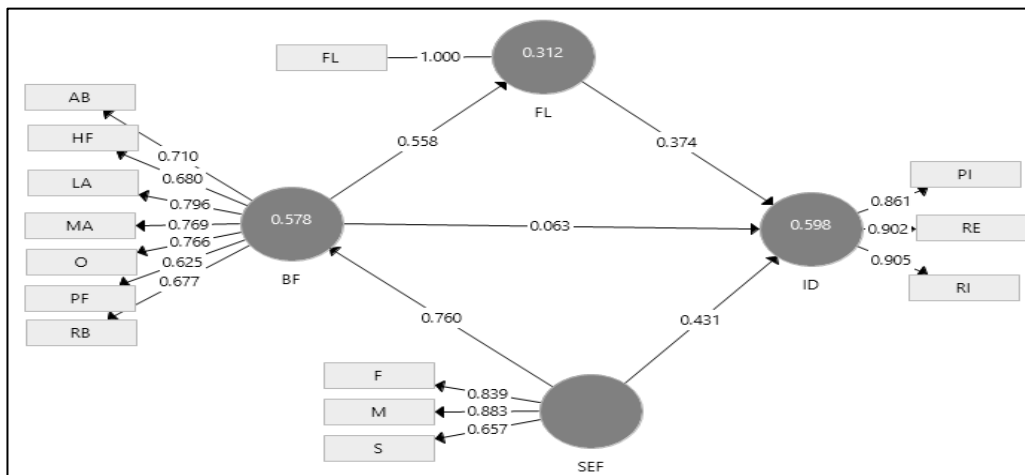
Figure 3: Bootstrapping Model
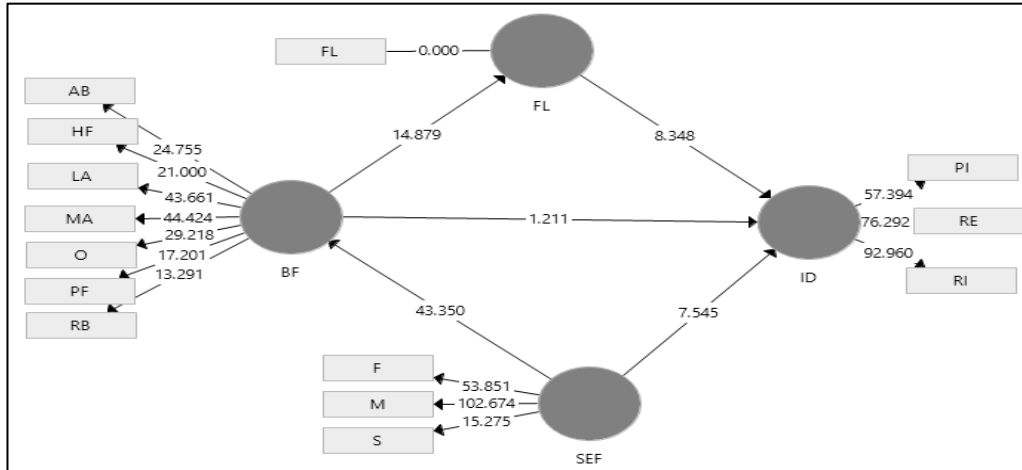
Table 9: Outer Model

	Original Sample (O)	Sample Mean (M)	Standard Error (STERR)	T-Statistics (|O/STERR|)	P-Values
AB <- BF	0.710	0.707	0.029	24.755	0.000***
F <- SEF	0.839	0.837	0.016	53.851	0.000***
HF <- BF	0.680	0.678	0.032	21.000	0.000***
LA <- BF	0.796	0.796	0.018	43.661	0.000***
M <- SEF	0.883	0.884	0.009	102.674	0.000***
MA <- BF	0.769	0.770	0.017	44.424	0.000***
O <- BF	0.766	0.762	0.026	29.218	0.000***
PF <- BF	0.625	0.623	0.036	17.201	0.000***
PI <- ID	0.861	0.861	0.015	57.394	0.000***
RB <- BF	0.677	0.674	0.051	13.291	0.000***
RE <- ID	0.902	0.903	0.012	76.292	0.000***
RI <- ID	0.905	0.903	0.010	92.960	0.000***
S <- SEF	0.657	0.654	0.043	15.275	0.000***

Source: Authors compilation

Table 10: Path Coefficients of Model

	Original Sample (O)	Sample Mean (M)	Standard Error (STERR)	T Statistics (|O/STERR|)	P Values
BF -> FL	0.558	0.558	0.038	14.879	**0.000***
BF -> ID	0.063	0.062	0.052	1.211	**0.227**
FL -> ID	0.374	0.379	0.045	8.348	**0.000***
SEF-> BF	0.760	0.762	0.018	43.350	**0.000***
SEF-> ID	0.431	0.428	0.057	7.545	**0.000***
	R Square			**R Square Adjusted**	
BF	0.578			0.577	
FL	0.312			0.310	
ID	0.598			0.596	

Source: Authors compilation

The results of path analysis have been presented through Figure-2, Figure-3 and Table- 10. It was pertinent to check whether financial literacy acts as a mediating variable between BF & ID. BF reflects direct significant impact on ID as seen through t-statistics (1.211) and p-value (0.227) higher than 0.05. Results highlight that BF show significant positive impact on the financial literacy as t-statistics (14.879) which is much higher than 2.58 and p value<0.01. Since BF are not directly significantly related with ID, but BF influence increases and is significant with mediation of FL. In nutshell, behavioral factors indirectly influence ID through FL.

SEF emerged as the important factor influencing BF and ID. T-statistics of this factor is 43.350 & 7.545 and p-value<0.01. It reflects that SEF have significant impact on BF & ID. Hypothesis formulated earlier hold true that socio-economic factors significantly influence behavioral factors and investment decisions has been empirically supported.

FL significantly effects ID, as divulged from the t-statistics (8.348) and corresponding p-value less than 0.01. The hypothesis that financial literacy has a positive impact on investment decisions has been empirically supported

The value of R-square is 0.598 for investment decisions. It means all three explanatory factors (Socio-Economic Factors, Behavioural factors & Financial

literacy) explain 59.8% of variance of dependent variable i.e., investment decisions. The adjusted R- square (0.596) of model is also good.

Table 11: Status of Hypothesis

Sr. No.	Hypothesis	Status
01.	H1a: Behavioural factors directly influence financial literacy.	Accepted
02.	H1b: Behavioural factors are significant determinant of investment decisions.	Rejected
03.	$H_{2a:}$ Socio-economic factors significantly influence investment decisions of retail investors.	Accepted
04.	$H_{2b:}$ Socio-economic factors have a positive and significant effect on behavioural factors.	Accepted
05.	H_{3a}: Financial literacy mediates between behavioural factor and investment decisions.	Accepted
06.	H_{3b}: Financial literacy have a strong significant impact on investment decisions.	Accepted

Source: Authors compilation

There is a little deviation from the proposed model, as behavioral factors were expected to be significant direct determinant of investment decision. But in the present model, these factors are showing indirect affect through mediation of FL. Socio economic factors are also found to be significant. So, the formulated hypotheses except one that behavioral factors have significant direct impact on ID have been empirically supported.

5. Conclusion & Discussion

The current study uses primary data collected from retail investors. The main objective was to investigate the impact of behavioral and socio-economic factors along with financial literacy on the investment decisions. Behavioral factors considered cover: personal factors, herding factors, overconfidence, ability bias, loss aversion, regret bias and mental accounting) was computed. Socio-economic factors include: market, firm and social factors influencing retail investors' investment decisions average was computed. Returns, risk & prior information are the major factors influencing investment decisions as observed from the previous studies. Financial literacy, socio-economic factors have a positive and significant impact on investment decisions as highlighted earlier. BF indirectly

influence ID of Indian retail investors. Adjusted R-Square is 0.599 representing that the predictors explain 59.9 per cent of variation in ID.

Earlier studies have supported the impact of SEF on ID, like Nagy *et.al.* (1994), opined that individual investor behavior is influenced by accounting information. Lodhi (2014) also indicated that FL & accounting information assisted in investing in risky instruments. The results underline that technical knowledge also influence FL. Zeljko *et. al.* (2007) indicated that they were anxious about fundamental & technical analysis. The findings suggest that ID is influenced by risk analytics, prior information and return analytics. As pointed by Heshmat, (2012) investors preferred to own stocks where they had knowledge, thus FL is of vital importance and will encourage investors to widen their portfolio and consider risky investment too.

6. Implications of the Study

This study will assist the potential investors and help them into maximizing returns, reduce risks by focusing on factors highlighted in the study. The study will help banks and financial institutions to frame policies to enhance FL levels. The study has pointed to improved impact of BF on ID if FL is taken as mediating variables. The research underlines that government and other authorities need to frame policies and initiate programs to promote FL. A financially learned and literate investor will be able to widen his investment, will try to invest in bonds and debentures and will assist in increasing growth.

References

Anderson, A., Henker, J., and Owen, S. (2005). Limit Order Trading Behavior and Individual Investor Performance. *The Journal of Behavioral Finance*, 6 (2), 71–89. http://dx.doi.org/10.1207/s15427579jpfm0602_3

Agarwal, S., Amromin, G., Ben-David, I., Chomsisengphet, S., & Evanoff, D. D. (2015). Financial literacy and financial planning: Evidence from India. *Journal of Housing Economics*, *27*, 4–21. http://dx.doi.org/10.1016/ j.jhe. 2015.02.003

Al-Ajmi, J. Y. (2008). Risk tolerance of individual investors in an emerging market. *International research journal of finance and economics*, 17(1), 15-26.

Almenberg, J., & Dreber, A. (2015). Gender, stock market participation and financial literacy. *Economics Letters*, 137, 140–142. https://doi.org/10.1016/j.econlet.2015.10.009

Anderson, A., Baker, F. and Robinson, D. T. (2017). Precautionary savings, retirement planning and misperceptions of financial literacy R. *Journal of Financial Economics*. Elsevier *B.V.*, 126(2), 383–398. DOI: 10.1016/j.jfineco.2017.07.008

Aren, S. and Zengin, A. N. (2016). Influence of Financial Literacy and Risk Perception on Choice of Investment. *Procedia - Social and Behavioral Sciences*, 235(10), 656–663. https://doi.org/10.1016/j.sbspro.2016.11.047

Asaad, C. T. (2015). Financial literacy and financial behavior: Assessing knowledge and confidence. *Financial Services Review*, *24*, 101–117.

Awais, M., Laber, M. F., Rasheed, N., & Khursheed, A. (2016). Impact of Financial Literacy and Investment Experience on Risk Tolerance and Investment Decisions: Empirical Evidence from Pakistan. International Journal of Economics and Financial Issues, 6(1), 73–79. Retrieved from https://www.econjournals.com/index.php/ijefi/article/view/1414

Barberis, N., Thaler, R. (2003). *A survey of behavioral finance. In: Constantinides, G., Harris, M., Stulz, R. (Eds.),* Handbook of the Economics of Finance. North-Holland, Amsterdam.

Barberis, N. and Huang, M. (2001). Mental Accounting, Loss Aversion, and Individual Stock Returns. *The Journal of Finance*, 56 (4), 1247-1292. https://doi.org/10.1111/0022-1082.00367

Calcagno, R. and Monticone, C. (2015). Financial literacy and the demand for financial advice. *Journal of Banking and Finance*. Elsevier B.V., 50, 363–380. https://doi.org/10.1016/j.jbankfin.2014.03.013

Caroline, A. *et al.* (2017). How well do women do when it comes to financial literacy? Proposition of an indicator and analysis of gender differences. *Journal of Behavioral and Experimental Finance*. Elsevier B.V. http://dx.doi.org/10.1016/j.jbef.2017.12.005

Caparrelli, F.D., Arcangelis, A.M & Cassuto, A. (2004). Herding in the Italian stock market: a case of behavioral finance. *Journal of Behavioral Finance*, 5(4), 222–230. https://doi.org/10.1207/s15427579jpfm0504_5

Craney, T.A., and Surles, J.G. (2002).Model-Dependent Variance Inflation Factor Cut-off Values. *Quality Engineering*, 14(3), 391-403. https://doi.org/10.1081/QEN-120001878

Chandra, A. and Kumar, R. (2012). Factors Influencing Indian Individual Investor Behaviour: Survey Evidence. *Decision (0304-0941)*, 39(3), 141–167.

Chijwani, M. and Vidyapeeth, D. Y. P. (2014). A Study of Financial Literacy among Working Women in Pune. *International Journal for Scientific Research & Development*, 1(11), 20–22.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, 56(2), 81–105. https://doi.org/10.1037/h0046016

Cordell, D. M., Smith, R., & Terry, A. (2011). Overconfidence in financial planners. *Financial Services Review*, 20, 253-263.

Cutler, N. E. (2013). Quantitative Financial Literacy: The Signal and the Noise. *Journal of Financial Service Professionals*, 67, 24–29.

Dawar, G. & Wadhwa, C. (2011). Factors influencing Investor Behaviour: An Emperical study in Punjab. *International Journal of Research in commerce, Economics and Management,* 1(3), 125-130.

DeBondt, W. F. M. & Thaler, R. H. (1995). *Financial Decision-Making in Markets and Firms: A Behavioral Perspective.* Handbooks in Operations Research and Management Science, 9(13), 385-410.

Dittrich, D. A. V., Güth, W. and MacIejovsky, B. (2005). Overconfidence in Investment r: An experimental approach. *European Journal of Finance*, 11(6), 471–491. https://doi.org/10.1080/1351847042000255643

Fedorova, E. & Nekhaenko, V. & Dovzhenko, S.. (2015). Impact of financial literacy of the population of the Russian Federation on behavior on financial market: Empirical evaluation. *Studies on Russian Economic Development*, 26. 394-402. https://doi.org/10.1134/S1075700715040036.

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. Journal of Marketing Research, 18(1), 39–50. https://doi.org/10.2307/3151312

Faulkner, A. E. (2015). A Systematic Review of *Financial Literacy* as a Termed Concept: More Questions than Answers. *Journal of Business & Finance Librarianship*, *20*(1–2), 7–26. https://doi.org/10.1080/08963568.2015. 982446

Gathergood, J. and Weber, J. (2017). Financial literacy, present bias and alternative mortgage products R. *Journal of Banking and Finance*. Elsevier B.V., 78, 58–83. https://doi.org/10.1016/j.jbankfin.2017.01.022

Geetha, S. N. and Vimala, K. (2014). Perception of Household Individual Investors towards Selected Financial Investment Avenues (With Reference to Investors in Chennai City). *Procedia Economics and Finance*. Elsevier B.V., 11(14), 360–374. https://doi.org/10.1016/S2212-5671(14)00204-4

Gao, L. and Schmidt, L. (2005). Self is never neutral: why economic agents behave irrationally. *Journal of Behavioral Finance*, 6 (1), 27–37. https://doi.org/10.1207/s15427579jpfm0601_5

Goel, A. M., & Thakor, A. V. (2008). Overconfidence, CEO selection, and corporate governance. *Journal of Finance*, 63, 2737-2784. https://doi.org/10.1111/j.1540-6261.2008.01412.x

Gold, Andrew & Malhotra, Arvind & Segars, Albert. (2001). Knowledge Management: An Organizational Capabilities Perspective. *Journal of Management Information Systems*. 18. 185-214. https://doi.org/10.1080/ 07421222.2001.11045669

Gupta, L. C. (1991). *Mutual funds and asset preference- the 2nd round of household investors' survey.* Conducted by society for capital market research and development New-Delhi.

Hamid *et al.,* (2017). Discriminant Validity Assessment: Use of Fornell & Larcker criterion versus HTMT Criterion. *Journal of Physics Conf. Ser.* 890(1):012163 http://dx.doi.org/10.1088/1742-6596/890/1/012163

Hair, J. F. Jr., Anderson, R. E., Tatham, R. L. & Black, W. C. (1995). *Multivariate Data Analysis*, 3rd edn. New York: Macmillan.

Hassan Al-Tamimi, H. A. and Anood Bin Kalli, A. (2009). Financial literacy and Investment decisions of UAE investors. *The Journal of Risk Finance*, 10(5), 500–516. http://dx.doi.org/10.1108/15265940911001402

Heshmat, N. A. (2012). Non-professional investors' behavior: an empirical study of female Saudi investors. *International Journal of Commerce*, 22(1), 75–90.

Hood, M., Nofsinger, J. R. and Varma, A. (2014). Conservation, Discrimination, and Salvation: Investors' Social Concerns in the Stock Market. *Journal of Financial Services Research*, 45(1), 5–37. DOI: 10.2139/ssrn.1954895

Hocking, R. R. and Pendelton, O. J. (1983). The Regression Dilemma," Communications in Statistics. *Theory and Methods*, 12(5), 497-527. https://doi.org/10.1080/03610928308828477

Hsiao, Y. J. and Tsai, W. C. (2018). Financial literacy and participation in the derivatives markets. *Journal of Banking and Finance*, 88, 15–29. DOI: 10.1016/j.jbankfin.2017.11.006

İslamoğlu, M., Apan, M., & Ayvalı, A. (2015). Determination of Factors Affecting Individual Investor Behaviours: A Study on Bankers. *International Journal of Economics and Financial Issues*, 5(2), 531–543. Retrieved from https://www.econjournals.com/index.php/ijefi/ article/ view/1063

Jappelli, T. and Padula, M. (2013). Investment in financial literacy and saving decisions. *Journal of Banking and Finance*. Elsevier B.V., 37(8), 2779–2792. DOI: 10.1016/j.jbankfin.2013.03.019

Jayaraj, D. (2013). The Factor Model for Determining the Individual Investment Behavior in India. *IOSR Journal of Economics and Finance, 11*(4), 21–32. DOI:10.9790/5933-0142132

Jagongo, A. & Mutswenje, V. S. (2014). A Survey of the Factors Influencing Investment decisions: The Case of Individual Investors at the NSE. International *Journal of Humanities and Social Science*, 4(4), 92-102 http://www.ijhssnet.com/journals/Vol_4_No_4_Special_Issue_February_2014/11.pdf

Johnson, E. and Sherraden, M. S. (2007). From Financial Literacy to Financial Capability among Youth. *Journal of Sociology & Social Welfare*, 34 (3), 119–147. https://scholarworks.wmich.edu/jssw/vol34/iss3/7

Kabra, G., Mishra, P. K. and Dash, M. K. (2010). Factors Influencing Investment Performance of Generations in India : An Econometric Study. *Asian Journal of Management Research*, 1(1), 308–326.

Karsidi R, Trinugroho I,Nugroho LI, Prabowo A (2015). Why Households Borrow from Informal Predatory Lenders: Evidence from Indonesia. J*ournal of Economics and Economic Education Research,* 16(2), 173-185.

Kaur, M. & Vohra, T. (2012). Understanding individual investors' behavior: A review of Empirical evidence. *Pacific business review international,* 5(6)

Kennedy, P. (1992). *A Guide to Econometrics*. Oxford: Blackwell

Kline RB (2011) *Principles and Practice of Structural Equation Modeling* Third Edition (New York: The Guilford Press).

Klapper, L., Lusardi, A. and Panos, G. A. (2013) Financial literacy and its consequences: Evidence from Russia during the financial crisis. *Journal of Banking and Finance*. Elsevier B.V., 37(10), 3904–3923. https://doi.org/10.1016/j.jbankfin.2013.07.014

Kun Chang Lee, Namho Chung and Inwon Kang (2008). Understanding individual investor's behavior with financial information disclosed on the web sites. *Behaviour & Information Technology*. 27(3), 219-227. https://doi.org/10.1080/01449290601138146

Lehenkari, M. and Perttunen, J. (2004). Holding onto the losers: finish evidence. The *Journal of Behavioral Finance*, 5 (2), 116–126. https://doi.org/10.1207/s15427579jpfm0502_5

Lewellen W.G, R.C. Lease, and G.C.Schlarbaum (1977). Patterns of investment strategy and behaviour among individual investors. *Journal of Business* 50, 296-333. https://doi.org/10.1086/295947

Lusardi, A. (2015). Financial Literacy Skills for the 21st Century: Evidence from PISA. *Journal of Consumer Affairs*, *49*(3), 639–659. https://doi.org/10.1111/joca.12099

Lodhi, S. (2014). Factors Influencing Individual Investor Behavior: An Empirical Study of City Karachi. *IOSR Journal of Business and Management*, 16(2), 68–76. https://doi.org/10.9790/487X-16236876

Mandell, L., & Klein, L. S. (2009). The Impact of Financial Literacy Education on Subsequent Financial Behavior. *Journal of Financial Counselling and Planning*, *20*(206), 15–24.

Marinelli, N., Mazzoli, C. and Palmucci, F. (2017). How does gender really affect investment behavior? *Economics Letters*. Elsevier B.V., 151, 58–61. https://doi.org/10.1016/j.econlet.2016.12.006

Marquardt, D. W. (1970). Generalized inverses, ridge regression, biased linear estimation and nonlinear estimation. Technometrics, 12, 591-612. https://doi.org/10.2307/1267205

Merikas, A. and Merikas, A. (2011). Economic factors and individual investor behavior: The case of the Greek stock exchange. *Journal of Applied Business Research*, 20(4), 93–98. http://dx.doi.org/10.19030/jabr. v20i4. 2227

Mihalcova, B., Csikosova, A. and Antosova, M. (2014). Financial Literacy – The Urgent Need Today. *Procedia - Social and Behavioral Sciences*, 109, 317–321. http://dx.doi.org/10.1016/j.sbspro.2013.12.464

Musundi, K. M. (2014). The Effects of Financial Literacy on Personal Investment decisions in Real Estate in Nairobi County.

Nagy, Robert A. and Obenberger, Robert W. (1994). Factors influencing Individual investor Behaviour. *Financial Analysts Journal,* 50(4), 63-68. https://doi.org/10.2469/faj.v50.n4.63

Neter, J. Wasserman, W., and Kutner, M.H. (1989). *Applied Linear regression Models*. 2nd Edition. Irwin Homewood IL: Irwin.

Nunnally, J. C. (1978). *Psychometric theory*. New York: McGraw-Hill.

Odean, T. (1998a). Volume, volatility, price and profit when all trades are above average. *Journal of Finance*, 53 (6), 1887–1934. https://doi.org/10.1111/0022-1082.00078

Prashar, N. (2010). An Emperical study on Personality Variation and Investment choice of Retail Investors. *Journal of Management Information Technology,* 2(1),33-41

Prasad, S. Kiran, R. Sharma, R. K. (2021). Behavioral, socio-economic factors, financial literacy and investment decisions are men more rational and women more emotional? *The Indian Economic Journal*, 69(1):66-87.. https://doi.org/10.1177%2F0019466220987023

Prasad, S, Kiran, R, Sharma, RK. (2021). Influence of financial literacy on retail investors' decisions in relation to return, risk and market analysis. *International Journal of Finance & Economics*, 26: 2548– 2559. https://doi.org/10.1002/ijfe.1920

Ranganathan, K. (2006). A Study of Fund Selection Behaviour of Individual Investors Towards Mutual Funds - with Reference to Mumbai City. *SSRN Electronic Journal*, 1–21. http://dx.doi.org/10.2139/ssrn.876874

Remund, R. L. (2010). Financial literacy explicated: The case for a clearer definition in an increasingly complex economy. *Journal of Consumer Affairs*, *44*(2), 276–295. https://doi.org/10.1111/j.1745-6606.2010.01169.x

Ritter, J. R. (2003). Behavioral Finance. *Pacific-Basin Finance Journal*, 11 (4), 429-437. https://doi.org/10.1016/S0927-538X(03)00048-9

Seay, M. C., Tae Kim, K. and Heckman, S. J. (2016). Exploring the demand for retirement planning advice: The role of financial literacy. *Financial Services Review Financial Services Review*, (25) 331–350.

Shafi, M. (2014). Determinants Influencing Individual Investor Behavior in Stock Market : A Cross Country Research Survey. *Arabian Journal of Business and Management Review*, 2(1), 60–71.

Takeda, K., Takemura, T. and Kozu, T. (2013) Investment Literacy and Individual Investor Biases : Survey Evidence in the Japanese Stock Market. 31–42. https://doi.org/10.1007/s12626-012-0031-z

Tan, L., Chiang, T. C., Mason, J. R. & Nelling, E. (2008). Herding behavior in Chinese stock markets: An examination of A and B shares. *Pacific-Basin Finance Journal,* 16(1-2), 61–77. https://doi.org/10.1016/ j.pacfin.2007. 04.004

Van Rooij, M., Lusardi, A. and Alessie, R. (2011). Financial literacy and stock market participation. *Journal of Financial Economics*. Elsevier, 101(2), 449–472. https://doi.org/10.1016/j.jfineco.2011.03.006

Waggle, D. and Agrrawal, P. (2015). Investor Sentiment and Short-Term Returns for Size-Adjusted Value and Growth Portfolios. *Journal of Behavioral Finance*, 16(1), 81–93. https://doi.org/10.1080/15427560.2015.1000329

Waweru, N., M., Munyoki, E., & Uliana, E. (2008). The effects of behavioral factors in Investment decisions-making: a survey of institutional investors operating at the Nairobi Stock Exchange. *International Journal of Business and Emerging Markets*, 1(1), 24-41. https://doi.org/10.1504/ IJBEM. 2008.019243

Williams, E. F., & Gilovich, T. (2008). Do people really believe they are above average? *Journal of Experimental Social Psychology*, 44, 1121-1128. http://dx.doi.org/10.1016/j.jesp.2008.01.002

Worthington, A. (2006). Predicting financial literacy in Australia. *Financial Services Review*, *15*(1), 59–79.

Oil Prices and Equity Returns: Analysis of Oil Exporting Economies

- Areej Aftab Siddiqui[*]
- Silky Vigg Kushwah[**]

Abstract

The paper assesses the effect of volatility in oil prices on the stock returns of some major oil-exporting economies. The study uses time-series data of oil prices and stock index returns of oil-exporting economies, namely, Canada, Mexico and Brazil, from 2007 to 2019 to examine this relationship between oil price movements and stock returns of oil-exporting economies. The dynamic ordinary least square regression method is applied to test the relationship. The study results indicate a significant and positive impact of oil price movements on stock index returns of oil-exporting economies. The results can be beneficial for domestic and foreign investors in deciding their timings for entry and exit in the stock markets of oil-exporting economies depending on the volatility of oil prices.

Keywords: Oil Prices**,** Stock Markets, Oil Exporting Economies, Panel Data
JEL Classification: E44, G15

I. Introduction

Oil is one of the crucial raw materials used for production by any economy, industrial or agricultural. Oil price volatility may disturb the overall cost of production, which in turn may affect various macroeconomic variables, including output in an economy (Hamilton, 1983, 1996, 2003, 2004; Lee, Ni and Ratti, 1995; Mork, Olsen and Mysen, 1994; Ratti and Vespignani, 2016; Barsky and Kilian, 2004). In some sectors where oil is used as one of the main raw materials in production, as production costs rise (due to increased oil prices), overall output and income reduce. This might affect consumers spending, both consumption and investment, which reduces the overall demand and output of the economy (Joskow, Bohi, and Gollop, 1989). Almost all oil-importing economies have witnessed the above mechanism. Research has also been conducted on the impact of a rise in oil price on the macroeconomic variables of oil-exporting economies

[*] Dr. Areej Aftab Siddiqui is a student, Dubai Business School, University of Dubai, Dubai, United Arab Emirates, Email: areejaf@gmail.com; and [**] Dr. Silky Vigg Kushwah, Associate Professor, New Delhi Institute of Management, New Delhi, India. The views expressed in this paper are the authors' own.

(Jimenez-Rodriguez and Sanchez, 2005; Sachs and Warner, 2001; Eltony and Al-Awadi, 2001; Ayadi, 2005 and Berument, Ceylan and Dogan, 2010).

The impact of oil prices on the stock market is also an interesting topic in economics, and such studies have received considerable attention recently. Earlier research examining the effect of oil price movements on the stock market returns indicates mixed results. Some of the previous studies reflect no connection between oil price movements and stock returns, Zhu, Guo, and You (2015). The study examines the asymmetric effects of oil price shocks on stock returns by utilizing a regime-switching model. The study period is between 1986 and 2015. On the other hand, some studies indicate a strong relationship between the two variables (Coronado, Jiménez-Rodrguez and Rojas, 2018; Narayan, 2019; Narayan and Gupta, 2015; Wong and El Massah, 2018. Under the group of studies highlighting the existence of a relationship, there is a set of studies that proves positive impact of oil price on stock returns (Yıldırım, Erdoğan and Çevik , 2018; Mishra, Sharif, Khuntia, Meo and Khan, 2019), while other set witnesses the negative impact of oil price movement on stock returns (Köse and Ünal, 2019; Thorbecke, 2019; Al-hajj, Al-Mulali, and Solarin, 2018; Jones & Kaul, 1996; Papapetrou, 2001; El-Sharif, Brown, Burton, Nixon and Russell , 2005; Nandha and Faff, 2008; Sadorsky, 1999). There is also research focusing that the impact of oil price movement on the stock returns varies from economy to economy. The effect is different for the importing economies as compared to the exporting economies. Studies say that the stock market returns of oil-importing economies are negative to the oil price movements, while the impact is positive on the oil-exporting economies' stock returns (Youssef and Mokni, 2019; Cunado and de Gracia, 2003; Park and Ratti, 2008; Filis, Degiannakis and Floros, 2011; Wang, Wu and Yang, 2013).

As discussed earlier, higher oil prices result in declining the income and wealth of oil-importing economies. The scenario might be different for oil-exporting economies as they produce oil and sell it. There might be two different situations for them. In one situation, as the oil price increases, the suppliers of oil generate more income and wealth transferred from the oil importers. If this extra income is transmitted by the oil producers (usually governments) to their

economies by buying products and services in their nation, it will result in enhancing the overall output, income and demand in the domestic economy. The increased income due to oil prices rise can also lead to more business and investment opportunities within the oil-exporting economies. However, such economic activities may result in higher inflation. The other situation may be entirely different. As the oil price rises, the oil-importing economies face recessionary pressure and may reduce their demand for other goods and services from the oil-exporting economies. If any oil-exporting economy has a vast export sector, this reaction of oil-importing economies may cause unfavourable conditions for the oil-exporting economy. Although, in the literature, there is no concrete proof that establishes any of the relationships mentioned above. It has been empirically seen that one of the oil-exporting economies, Norway, has witnessed a similar experience (the first situation) at the time of the rise in oil price. Norway was a beneficiary with greater wealth generation and increased macroeconomic variables during a higher oil price regime for a long period. But some oil-exporting economies like the U.K. and Canada behaved more like oil-importing economies, with decreased output on increased oil prices (Jimenez, Rodriguez and Sanchez, 2005 and Bjornland 1998, 2000). The investigation can be expanded further.

Inspired by the complicated pattern of oil price movements and its time-varying impact on the stock market returns in recent years, this study, therefore, focuses on examining the oil price impact on the movements on one of the macroeconomic variables, returns of stock market index for the oil-exporting economies of the world namely, Canada, Mexico and Brazil for the period 2007-2019. The remaining paper is structured as follows: the next section gives the background for undertaking the study (Section-II) review of the literature (Section-III) followed by objectives and hypotheses (Section-IV), followed by methodological issues involved, which also includes events used in the study, data description and preliminary test applied on data used (Section-V). Section-VI represents findings and analysis of the results, Section-VII represents policy implications and Section VIII gives the conclusion.

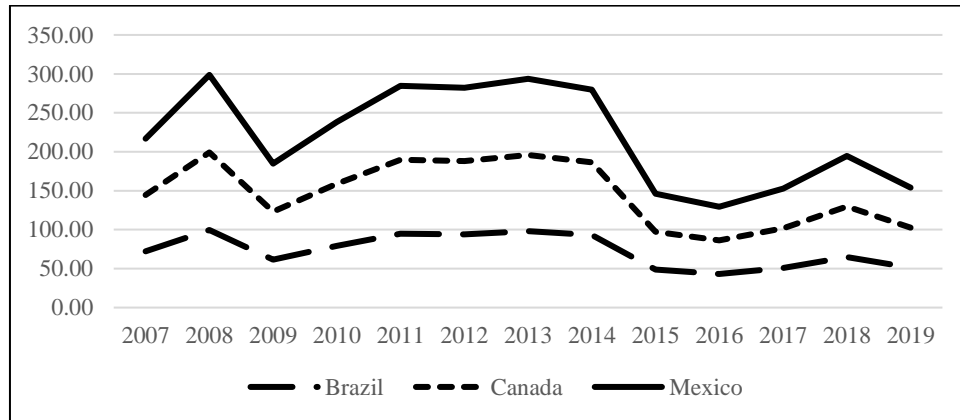## II. Background of the Study

From the review of literature, a hypothesis can be revealed that oil prices have a substantial role in determining the stock returns of oil-exporting countries. Oil-exporting countries are highly dependent on the proceeds realized by exporting oil. Due to high volatility in oil prices, the impact on linked industries is far-reaching. The top oil-exporting nations are illustrated in Table-I.

Table I: Top Exporters of Oil (Billion US Dollar)

Exporters	2014	2015	2016	2017	2018
Saudi Arabia	2505.23	1297.46	1119.68	1336.23	-
Russian Federation	1538.88	895.76	736.76	933.06	1290.49
Iraq	841.30	529.68	463.14	650.28	917.84
Canada	**881.20**	**501.90**	**394.86**	**539.99**	**669.16**
Iran, Islamic Republic of	389.38	192.57	350.74	471.86	508.23
United Arab Emirates	720.72	337.87	329.99	461.18	584.17
Kuwait	692.98	341.43	306.95	381.52	517.27
Nigeria	723.66	343.83	269.18	329.65	435.60
Angola	564.40	313.94	255.78	310.57	365.39
Kazakhstan	536.27	267.73	193.78	265.84	377.96
Norway	462.55	253.52	228.32	258.75	332.93
Venezuela, Bolivarian Republic of	538.27	279.35	204.94	246.84	263.80
United States of America	123.09	87.69	94.62	225.02	482.62
Mexico	**356.38**	**184.51**	**155.82**	**199.30**	**264.83**
United Kingdom	288.57	161.93	131.87	191.45	248.58
Brazil	**163.57**	**117.81**	**100.74**	**166.25**	**251.31**

Source: U.N. Comtrade

From Table-I, it is seen that the top oil-exporting countries in the world are mainly countries in the Gulf region and Africa, along with Canada, Brazil, Mexico, U.S. and U.K. For the present study, Canada, Brazil and Mexico have been selected due to the inadequate accessibility of data and well-developed stock markets. Another key reason for selecting these three countries is the size of GDP and total exports. As the study focuses on developing a relationship between oil imports and oil stock returns, it is essential to select countries with a growing base of GDP and exports. Figure-I specifies stock market indices return of Canada stock exchange, Brazil stock market and Mexico stock market of oil-exporting economies.

**Figure I: Stock Indices Return of the Oil-exporting Countries**

Oil prices for the selected years indicate volatility (Figure-II). In 2008, due to the sub-prime crisis, oil prices fell and gained momentum in 2009 but witnessed a fall from 2010-2016. Even after 2016, oil prices have been quite volatile.

Figure II: Oil Price in U.S. $/barrel

As per the present review of literature, significant variables which may affect stock market returns are Gross Domestic Product, inflation, and exports. The trend in GDP of the selected countries from 2007-2019 is as indicated in Figure-III.

Figure III: The Trend of GDP of Three Selected Countries (Average)
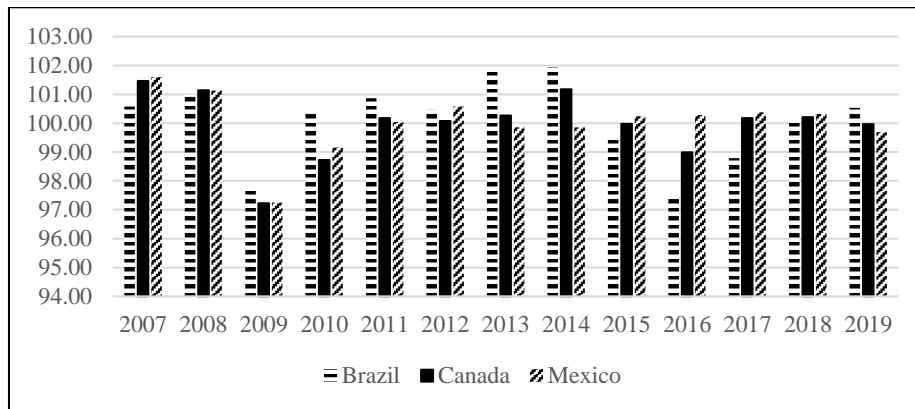
The movements in inflation and exports can be seen in Figure-IV and Figure-V, respectively. It is seen that inflation in Brazil and Mexico rose, but it has been stable in Canada. In the case of exports, Mexico's exports rose at a higher rate as compared to Brazil. In Canada, the export trends have been stable.

Figure IV: Inflation (Average)
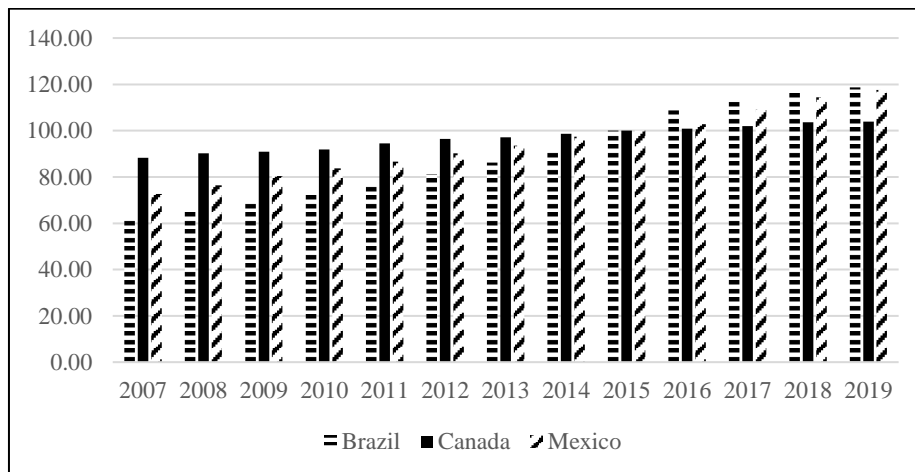
Figure V: Exports (Average)
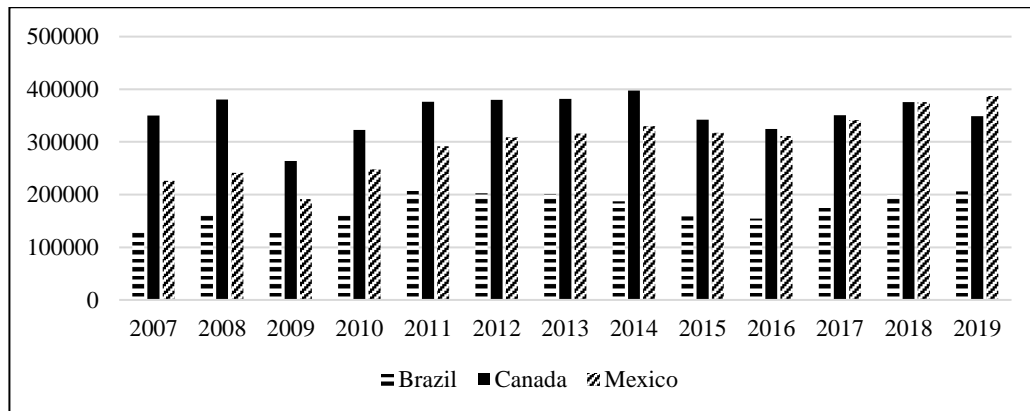
Thus, the trends in selected parameters, motivate the authors to analyse the relationship between the oil prices and stock returns.

III. Review of Literature

As compared to the numerous studies conducted on investigating the relationship between oil price fluctuations and macroeconomic variables (Olomola and Adejumo, 2006, Akpan, 2009, Aliyu, 2011, Chukwu, 2011), the studies on examining the effect of oil price shocks on financial markets, especially the equity markets are relatively few (Zhang, 2017; Maghyereh, Awartani and Bouri, 2016; Broadstock and Filis, 2014; Kang, Ratti and Yoon, 2015; Sadorsky, 1999; Kang and Ratti, 2015; Jones and Kaul, 1996). The approach used by Kang and Ratti, 2015 and Kang, Ratti and Yoon, 2015 is the time-varying VAR model. Moreover, the literature available to investigate the relationship between oil shocks and stock returns is not conclusive (Coronado et al., 2018). There are three major strands of this literature. Some of the studies suggest a significant relationship between the two variables indicating that oil price movements have a significant negative effect on stock returns (Bani and Ramli, 2019; Elian and Kisswani, 2018; Sharma, Giri, Vardhan, Surange, Shetty and Shetty, 2018; Diaz, Molero and de Gracia, 2016; Ekong and Ebong, 2016; Jebran, Chen, Saeed and Zeb, 2017; Miller and Ratti, 2009; Echchabi and Azouzi, 2017; Park and Ratti, 2008; Driesprong, Jacobsen and Maat, 2008). Sadorsky

(1999) and Papapetrou (2001) were the two researchers who added knowledge to the oil shocks study. They concluded that higher oil price increases the overall cost of production, which cannot be transferred to the customers all the time, so eventually, it results in decreased earnings reflected in the stock prices and returns. In similar research conducted by Jones and Kaul (1996) suggested that oil price movements have a significant negative effect on the stock returns of these economies. In another study, dynamic relationships between stock markets, exchange rates and gold prices are studied, and the findings highlight that oil prices negatively impact the stock prices, Singhal, Choudhary and Biswal (2019). Rahman and Serletis (2019) conduct a similar study on U.S. high-frequency data. The results witness that the oil price shocks have a significant negative impact on stock market returns.

In a study by Basher and Sadorsky (2006), 21 emerging economies were examined to analyze the effect of oil shocks on the aggregate stock market returns. The data used was daily, weekly and monthly for 13 years from 1992 to 2005. They also suggested an impact of oil shocks on the stock returns of emerging stock markets. In another study, a similar relationship was investigated by Park and Ratti (2008), analyzing the effect of oil shocks on aggregate stock returns was analyzed using monthly data of crude oil and stock returns for almost 20 years till 2005. The results indicated a significant effect on stock returns. A study conducted by Basher, Haug and Sadorsky (2012) on the effect of oil price fluctuations on the emerging stock markets' returns suggested that the stock prices are negatively impacted.

The second strand throws light that stock returns and oil shocks have a positive relationship (Sakaki, 2019; Wang et al., 2013; Mohanty, Nandha, Turkistani and Alaitani, 2011; Hammoudeh and Aleisa, 2004; Kang and Ratti, 2013; Narayan and Sharma, 2011). In a study by Sakaki (2019) on the ten S&P 500 sectoral indices, a positive relationship between stock returns and oil shocks is evident. El-Sharif et al. (2005) studied the United Kingdom stock market returns from 1989 to 2001 and witnessed similar results. In research by Hammoudeh and Aleisa (2004), the same relationship was studied for GCC counties and the results indicated positive influence of one variable on the other

except for Saudi Arabia. In another similar research conducted in Australian market, a positive significant impact was seen not only on the oil and gas sector but other sectors too, Faff and Brailsford (1999). A study of the U.S. economy showed dissimilar positive significant oil price sensitivity on the two major stock indices, oil and transportation, Hammoudeh and Li (2005). One more result was highlighted in the results. The oil sector came out to be the most sensitive sector among all. Research by Narayan and Sharma (2011) contradicted the study. They suggested that the positive effect of oil price movement was proved only on energy and transportation, whereas all other sectors showed a negative effect of oil shocks on their stock returns.

In a similar study on the U.K. stock returns, the impact of oil prices was positively significant on the oil and gas industry, El Sharif et al. (, 2005). A new insight came out from massive research of 35 global sector indices that oil shocks positively impact only the oil and gas sector whereas all other sectors have a negative impact of oil shocks, Nandha and Faff (2008). While the last strand of the literature shows no substantial influence of oil shocks on returns of the stock (Henriques and Sadorsky, 2008; Le and Chang, 2015; Sukcharoen, Zohrabyan, Leatham and Wu, 2014; Reboredo and Rivera-Castro, 2014; Apergis and Miller, 2009; Chen, Roll and Ross, 1986 and Wei, 2003). In their research, Huang, Masulis and Stoll (1996) tried to analyze the relationship between oil futures prices and stock returns in the U.S., and they suggested that prices are not linked with returns of the stock, except for returns of the oil sector. In another research by Reboredo and Rivera-Castro, 2014, wavelet multi-resolution analysis is utilized to investigate the similar relationship and results highlight no significant impact of oil price fluctuations on the U.S. stock prices. Similarly, Hammoudeh and Choi (2006) tried to investigate the impact of oil price movements on equity stock returns in GCC economies. Their results also supported the same theory.

IV. Objectives and Hypotheses

After going through the literature on oil shocks, it can be concluded that there are contradictory theories on the effect of oil shocks on stock returns. There exist research gaps as some studies show a positive impact; some show a negative impact, and others show no impact on the stock returns. It is also reflected from

the previous studies that the impact of oil shocks may be different for different sectors within certain economies. Some sectors like oil and gas positively impact oil price movements, while some sectors negatively impact oil shocks. Lastly, one more hypothesis that is revealed is that the relationship between oil shocks and equity returns is different for oil-importing and oil-exporting economies, Driesprong et al. (2008). They witnessed that oil price movement positively impacts oil-exporting economies while it harms oil-importing economies. Thus, from the research gaps enumerated, the objective of the present paper is to analyze the impact of oil price shocks on selected oil-exporting economies' stock market index returns.

V. Methodological Issues Involved

The present study examines the cause and impact of the relationship between oil prices and stock returns in top oil-exporting countries, i.e. Canada, Mexico and Brazil, for the time period 2007-2019. The independent variable is oil price, while the dependent variable is stock index return. Based on the review of literature, the controlled variables are exports, inflation and GDP. The data collected for the study is monthly time series for the selected variables. The source of data for oil prices is Brent Crude prices, stock market returns have been collected from official websites of stock markets, namely Bovespa (Brazil Stock Exchange), Mexican Bolsa (Mexican Stock Exchange) and Toronto Stock Exchange (Canada). The monthly data for GDP, Exports, and Inflation has been collected from "Federal Reserve Economic Database" by Federal Reserve.

The association between the study variables are reflected below is:

$\ln\text{Stock} = \beta_0 + \beta_1 \ln\text{Oilprice} + \beta_2 \ln\text{EXP} + \beta_3 \ln\text{GDP} + \beta_4 \text{Inf} + \varepsilon$ ---- (1)

Where Oil price refers to oil price, the stock refers stock market index returns, GDP refers to Gross Domestic Product, Inf represents monthly CPI and EXP are the exports.

Through panel root tests, the data is checked for stationarity, as non-stationary data may give spurious results.

Panerl cointegration tests are applied to check the level of cointegration, as long run equilibrium may exist.

The model represented in equation (2) takes into consideration sector-specific factors.

$$Y_{it} = \beta_1 X_{it} + \beta_2 Z_{it} + \eta_i + \epsilon_i \text{-----------------------------------}(2)$$

Where Y is the dependent variable, X and Z are independent variables for N units and T time period. Thus, the total number of observations is N times T. Dynamic Ordinary Least Squares regression is applied as it takes care of small sample bias and endogeneity bias by taking the leads and lags of the first-differenced regressors (Masih and Masih 1996).

The dynamic linear regression model can be reparameterized as equation (6)

$$\Delta Y_{it} = \beta_0 X_{it} + \beta_1 X_{it-1} + \beta_k X_{tk-1} + \epsilon_t \text{----------------------}(3)$$

The dynamic model incorporates lagged variables in order to detect better results.

VI. Findings and Analysis

To assess the basic feature of the data, descriptive statistics are depicted (Table-II). The selected variables are normally distributed, as can be seen from the mean and median values. The values for each of the variable is as per the explanation stated in Data and Methodology section.

Table II: Descriptive Statistics (Monthly Data from 2007-2019)

	Oil Prices	Stock Market Index	GDP	INF	EXP
Mean	1.85	2.84	2.00	1.95	10.41
Median	1.87	2.88	2.00	1.96	10.47
Maximum	2.12	4.08	2.01	2.07	10.64
Minimum	1.48	0.41	1.98	1.78	10.06
Std. Dev.	0.142	0.61	0.005	0.06	0.14
Skewness	-0.38	-0.55	-0.82	-0.62	-0.50
Kurtosis	2.17	3.08	3.46	2.79	1.97
Jarque-Bera	22.65	22.57	53.44	28.89	36.82
Probability	0.000	0.000	0.000	0.000	0.000

Stationarity test is applied on the log-transformed data and the findings reflect that they are non-stationary at both level as well as the first difference level (Refer Table-III).

Table III: Summary of Panel Root Test

Variables	Level	Levin, Li and Chu t-test for common unit root
Oil prices	**Level**	0.19 (0.57)
	First Diff	-7.27** (0.0000)
Stock Market Index	**Level**	0.016 (0.50)
	First Diff	14.41 (1.0000)
GDP	**Level**	1.259 (0.891)
	First Diff	3.23 (0.999)
Exports	**Level**	-0.643 (0.259)
	First Diff	-2.19* (0.014)
Inflation	**Level**	-0.759 (0.223)
	First Diff	-5.14** (0.0000)

Notes: *Significant at 5 % level of significance, **Significant at 1 % level of significance

Thus, due to non-stationarity, panel cointegration has to be checked through Pedroni Panel cointegration test and the results suggest cointegration between the variables, as shown in Table-IV below.

Table IV: Pedroni Panel Cointegration Test

Statistic	Stat	Probability
Panel v Statistic	4.95	0.000**
Panel rho Statistic	-4.28	0.000**
Panel PP Statistic	-3.86	0.000**
Panel ADF Statistic	-2.59	0.000**

Notes: *Significant at 5 % level of significance, **Significant at 1 % level of significance

Thus, use of dynamic panel least squares to equation (1) to estimate the relationship between the variables is suggestive (Kushwah & Siddiqui, 2020; Masih and Masih, 1996). The impact of oil prices on stock index returns are reflected in the regression results in Table-V.

Table V: Panel Least Squares Results for Impact on Oil Stock Returns)

Variable	Coefficient	Std. Error	t-statistic	Prob.
Oil Prices	0.486	0.236	2.058	0.04*
GDP	-19.01	6.425	-2.959	0.003**
Inflation	-0.39	0.637	0.274	0.539
Exports	0.174	0.636	-0.613	0.783

Notes: *Significant at 5 % level of significance, **Significant at 1 % level of significance

R-squared	0.45
Adjusted R-squared	0.389

The results highlight a significant positive impact of oil prices on stock index returns, while GDP exerts a significant and negative impact on stock index returns. The R squared value indicates 45% accuracy. Granger Causality test is applied as indicated in Table-VI.

Table VI: Granger Causality Test

Null Hypothesis	F-statistic	Prob.
Inflation does not cause Stock Returns	8.808	0.0002***
Stock returns do not cause Inflation	4.718	0.0094***
Exports do not cause Stock Returns	34.688	1.E-14***
Stock returns do not cause Exports	3.755	0.024**

Notes: *Significant at 5 % level of significance, **Significant at 1 % level of significance, *** Significant at 10 % level of significance

As per the Granger causality test, it is seen that causality runs from Oil prices and GDP to exports. In contrast, causality is two ways for exports, oil prices and oil stock returns.

The current study's literature indicates mixed results. Not many studies have been conducted similar to the current study where the impact of oil shocks is studied for oil-exporting economies. The results of our study are in line with that of Hammoudeh and Aleisa (2004), who studied the same relationship for five GCC counties, and the results indicated that there is a positive relationship between oil price changes and stock returns for the rest of the countries except for Saudi Arabia. The current results are also similar to that of Faff and Brailsford (1999), who conducted a study on the Australian oil market and found a positive impact of oil shocks on the stock returns of oil and natural gas and all the sectors of the Australian economy. Another study conducted in the U.K. economy supports our results. The impact of oil prices was positively significant on the oil and gas industry, El Sharif et al. (2005). The results are also in line with that of Nandha and Faff (2008). It also indicates that volatility in oil prices leads to volatility in stock returns of the selected economies (especially oil-exporting economies). It may be because of two factors, macroeconomic and microeconomic. Firstly, the decentralization of oil prices by most of the economies in the world may have played its role. Earlier, under the centralized system, oil prices were controlled and managed by the nation's regulators and government. But after the decentralization of oil prices, the price movement is purely dependent on the demand and supply process. A rise in oil prices may lead to a rise in foreign exchange received by the exporting countries which when transferred by the government in the domestic economy may impact GDP and exports positively and limit inflation. So, the fluctuations are transferred to the macroeconomic indicators of the economy like GDP, inflation and exports. On the microeconomic front, it affects firms' profitability due to the rise in the supply of oil and profit margins Profit margins further lead to rise in net worth and stock prices of firms resulting in rise in stock returns.

VII. Policy Implications

The current study has tried to analyze the impact of oil price movements on stock index returns of oil-exporting economies only, one of the crucial macroeconomic variables and the findings suggest that rise in oil price has a positive impact on the variable, stock index return. The results directly affect the investment decision of capital market investors who may use these findings to

construct their portfolio comprising of equity or related financial instruments of oil-exporting economies.

VIII. Conclusion

Higher economic growth is desired across all nations in the years to come. This phenomenon is directly related to the growth in oil demand. This may lead to fluctuations in oil prices. The impact of such oil fluctuations has been witnessed in the past by all the world economies, both at macro and micro levels. Literature on oil price effect study shows mixed results. Some studies indicated a positive impact of oil price rise on macroeconomic variables (Hammoudeh and Aleisa, 2004; Faff and Brailsford, 1999; Nandha and Faff, 2008). On the other hand, some studies show a negative impact on these variables (Park and Ratti, 2008; Driesprong *et al.*, 2008; and Miller and Ratti, 2009). It can be concluded from the study that as the demand for oil increases, oil prices may rise, which in turn will increase stock market returns of oil-exporting economies.

A major limitation of the paper is that all the industries within a country are not affected in the same manner and the same direction by the change in oil prices. Therefore, stock returns of the individual firm and industry sector within a given country are worthy of investigation to provide new insight. For future work, examining the time-series relation between oil price and stock return of individual countries can be explored.

References

Akpan, E. O. (2009). Oil price shocks and Nigeria's macroeconomy. In *A Paper Presented at the Annual Conference of CSAE Conference, Economic Development in Africa,* 22-24.

Al-hajj, E., Al-Mulali, U., & Solarin, S. A. (2018). Oil price shocks and stock returns nexus for Malaysia: Fresh evidence from nonlinear ARDL test. *Energy Reports*, *4*, 624-637.

Aliyu, S.U.R. (2011). Impact of Oil Price Shock and Exchange Rate Volatility on Economic Growth in Nigeria: An Empirical Investigation, *Research Journal of International Studies, 11*(3), 103 – 120.

Apergis, N., & Miller, S. M. (2009). Do structural oil-market shocks affect stock prices?. *Energy Economics*, *31*(4), 569-575.

Ayadi, O. F. (2005). Oil price fluctuations and the Nigerian economy. *OPEC Review*, *29*(3), 199-217.

Bani, Y., & Ramli, S. N. (2019). Does Oil Price Matter for the Malaysian Stock Market?. *International Journal of Economics, Management and Accounting*, *27*(2), 315-329.

Barsky, R. B., & Kilian, L. (2004). Oil and the macroeconomy since the 1970s. *Journal of Economic Perspectives*, *18*(4), 115-134.

Basher, S. A., & Sadorsky, P. (2006). Oil price risk and emerging stock markets. *Global finance journal*, *17*(2), 224-251.

Basher, S. A., Haug, A. A., & Sadorsky, P. (2012). Oil prices, exchange rates and emerging stock markets. *Energy Economics*, *34*(1), 227-240.

Berument, M. H., Ceylan, N. B., & Dogan, N. (2010). The impact of oil price shocks on the economic growth of selected MENA1 countries. *The Energy Journal*, *31*(1), 1-7.

Bjornland, H. (1998). The economic effects of North Sea oil on the manufacturing sector. *Scottish Journal of Political Economy*, *45*(5), 553-585.

Bjornland, H. C. (2000). The dynamic effects of aggregate demand, supply and oil price shocks—a comparative study. The Manchester School, 68(5), 578-607.

Broadstock, D. C., & Filis, G. (2014). Oil price shocks and stock market returns: New evidence from the United States and China. *Journal of International Financial Markets, Institutions and Money*, *33*, 417-433.

Chen, N. F., Roll, R., & Ross, S. A. (1986). Economic forces and the stock market. *Journal of business*, 383-403.

Chukwu, I. (2011). How verdict on 86 oil wells affect Rivers, Akwa Ibom economies. *Business Day*, 12.

Coronado, S., Jiménez-Rodrguez, R., & Rojas, O. (2018). An empirical analysis of the relationships between crude oil, gold and stock markets. *The Energy Journal*, *39*(Special Issue 1).

Cunado, J., & de Gracia, F. P. (2003). Do oil price shocks matter? Evidence for some European countries. *Energy Economics*, *25*(2), 137-154.

Diaz, E. M., Molero, J. C., & de Gracia, F. P. (2016). Oil price volatility and stock returns in the G7 economies. *Energy Economics*, *54*, 417-430.

Driesprong, G., Jacobsen, B., & Maat, B. (2008). Striking oil: another puzzle?. *Journal of financial economics*, *89*(2), 307-327.

Echchabi, A., & Azouzi, D. (2017). Oil price fluctuations and stock market movements: An application in Oman. *The Journal of Asian Finance, Economics, and Business*, *4*(2), 19-23.

Elian, M. I., & Kisswani, K. M. (2018). Oil price changes and stock market returns: Cointegration evidence from emerging market. *Economic Change and Restructuring*, *51*(4), 317-337.

El-Sharif, I., Brown, D., Burton, B., Nixon, B., & Russell, A. (2005). Evidence on the nature and extent of the relationship between oil prices and equity values in the U.K. Energy economics, 27(6), 819-830.

Ekong, N. P., & Ebong, D. W. (2016). On the crude oil price, stock market movement and economic growth Nexus in Nigeria evidence from cointegration and VAR analysis. *Asian Journal of Economic Modelling*, *4*(3), 112-123.

Eltony, M. N., & Al-Awadi, M. (2001). Oil price fluctuations and their impact on the macroeconomic variables of Kuwait: a case study using a VAR model. *International Journal of Energy Research*, *25*(11), 939-959.

Faff, R. W., & Brailsford, T. J. (1999). Oil price risk and the Australian stock market. *Journal of Energy Finance & Development*, *4*(1), 69-87.

Filis, G., Degiannakis, S., & Floros, C. (2011). Dynamic correlation between stock market and oil prices: The case of oil-importing and oil-exporting countries. *International review of financial analysis*, *20*(3), 152-164.

Hamilton, J. D. (1983). Oil and the macroeconomy since World War II. *Journal of political economy*, *91*(2), 228-248.

Hamilton, J. D. (1996). This is what happened to the oil price-macroeconomy relationship. *Journal of monetary economics*, *38*(2), 215-220.

Hamilton, J. D. (2003). What is an oil shock?. *Journal of econometrics*, *113*(2), 363-398.

Hamilton, J. D., & Herrera, A. M. (2004). Comment: oil shocks and aggregate macroeconomic behavior: The role of monetary policy. *Journal of Money, credit and Banking*, 265-286.

Hammoudeh, S., & Aleisa, E. (2004). Dynamic relationships among GCC stock markets and NYMEX oil futures. *Contemporary economic policy*, *22*(2), 250-269.

Hammoudeh, S., & Choi, K. (2006). Behavior of GCC stock markets and impacts of U.S. oil and financial markets. *Research in International Business and Finance*, *20*(1), 22-44.

Hammoudeh, S., & Li, H. (2005). Oil sensitivity and systematic risk in oil-sensitive stock indices. *Journal of economics and business*, *57*(1), 1-21.

Henriques, I., & Sadorsky, P. (2008). Oil prices and the stock prices of alternative energy companies. *Energy Economics, 30*(3), 998-1010.

Huang, R. D., Masulis, R. W., & Stoll, H. R. (1996). Energy shocks and financial markets. *The Journal of Futures Markets (1986-1998)*, *16*(1), 1.

Jebran, K., Chen, S., Saeed, G., & Zeb, A. (2017). Dynamics of oil price shocks and stock market behavior in Pakistan: evidence from the 2007 financial crisis period. *Financial Innovation*, *3*(1), 1-12.

Jimenez-Rodríguez, R., & Sánchez, M. (2005). Oil price shocks and real GDP growth: empirical evidence for some OECD countries. *Applied economics*, *37*(2), 201-228.

Jones, C. M., & Kaul, G. (1996). Oil and the stock markets. *The journal of Finance*, *51*(2), 463-491.

Joskow, P. L., Bohi, D. R., & Gollop, F. M. (1989). Regulatory failure, regulatory reform, and structural change in the electrical power industry. *Brookings papers on economic activity. Microeconomics*, *1989*, 125-208.

Kang, W., & Ratti, R. A. (2013). Oil shocks, policy uncertainty and stock market return. *Journal of International Financial Markets, Institutions and Money*, *26*, 305-318

Kang, W., & Ratti, R. A. (2015). Oil shocks, policy uncertainty and stock returns in China. *Economics of Transition*, *23*(4), 657-676.

Kang, W., Ratti, R. A., & Yoon, K. H. (2015). The impact of oil price shocks on the stock market return and volatility relationship. *Journal of International Financial Markets, Institutions and Money*, *34*, 41-54.

Köse, N., & Ünal, E. (2019). The impact of oil price shocks on stock exchanges in Caspian Basin countries. *Energy*, *190*, 116383.

Kushwah, S. V., & Siddiqui, A. A. (2020). Relationship between oil price movements and stock returns of oil firms in oil importing economies. *Global Business Review*, 0972150920917018.

Le, T. H., & Chang, Y. (2015). Effects of oil price shocks on the stock market performance: Do nature of shocks and economies matter?. *Energy Economics*, *51*, 261-274.

Lee, K., Ni, S., Ratti, R.A., 1995. Oil shocks and the macroeconomy: the role of price variability. *Energy J. 16* (4), 39-56.

Maghyereh, A. I., Awartani, B., & Bouri, E. (2016). The directional volatility connectedness between crude oil and equity markets: New evidence from implied volatility indexes. *Energy Economics*, *57*, 78-93.

Masih, R., & Masih, A. M. (1996). Stock-Watson dynamic OLS (DOLS) and error-correction modelling approaches to estimating long-and short-run elasticities in a demand function: new evidence and methodological implications from an application to the demand for coal in mainland China. *Energy Economics*, *18*(4), 315-334.

Miller, J. I., & Ratti, R. A. (2009). Crude oil and stock markets: Stability, instability, and bubbles. *Energy Economics*, *31*(4), 559-568.

Mishra, S., Sharif, A., Khuntia, S., Meo, M. S., & Khan, S. A. R. (2019). Does oil prices impede Islamic stock indices? Fresh insights from wavelet-based quantile-on-quantile approach. *Resources Policy*, *62*, 292-304.

Mohanty, S. K., Nandha, M., Turkistani, A. Q., & Alaitani, M. Y. (2011). Oil price movements and stock market returns: Evidence from Gulf Cooperation Council (GCC) countries. *Global Finance Journal*, *22*(1), 42-55.

Mork, K. A., Olsen, O., & Mysen, H. T. (1994). Macroeconomic responses to oil price increases and decreases in seven OECD countries. *The Energy Journal*, *15*(4).

Nandha, M., & Faff, R. (2008). Does oil move equity prices? A global view. *Energy Economics*, *30*(3), 986-997.

Narayan, P. K. (2019). Can stale oil price news predict stock returns?. *Energy Economics*, *83*, 430-444.

Narayan, P. K., & Gupta, R. (2015). Has oil price predicted stock returns for over a century?. *Energy Economics*, *48*, 18-23.

Narayan, P. K., & Sharma, S. S. (2011). New evidence on oil price and firm returns. *Journal of Banking & Finance*, *35*(12), 3253-3262.

Olomola, P. A., & Adejumo, A. V. (2006). Oil price shock and macroeconomic activities in Nigeria. *International Research Journal of Finance and Economics*, *3*(1), 28-34.

Papapetrou, E. (2001). Oil price shocks, stock market, economic activity and employment in Greece. *Energy Economics*, *23*(5), 511-532.

Park, J., & Ratti, R. A. (2008). Oil price shocks and stock markets in the U.S. and 13 European countries. *Energy Economics*, *30*(5), 2587-2608.

Rahman, S., & Serletis, A. (2019). Oil prices and the stock markets: Evidence from high frequency data. *The Energy Journal*, *40*(Special Issue).

Ratti, R. A., & Vespignani, J. L. (2016). Oil prices and global factor macroeconomic variables. *Energy Economics*, *59*, 198-212.

Reboredo, J. C., & Rivera-Castro, M. A. (2014). Wavelet-based evidence of the impact of oil prices on stock returns. *International Review of Economics & Finance*, *29*, 145-176.

Sachs, J. D., & Warner, A. M. (2001). The curse of natural resources. *European economic review*, *45*(4-6), 827-838.

Sadorsky, P. (1999). Oil price shocks and stock market activity. *Energy Economics*, *21*(5), 449-469.

Sakaki, H. (2019). Oil price shocks and the equity market: Evidence for the S&P 500 sectoral indices. *Research in International Business and Finance*, *49*, 137-155.

Sharma, A., Giri, S., Vardhan, H., Surange, S., Shetty, R., & Shetty, V. (2018). Relationship between crude oil prices and stock market: Evidence from India. *International Journal of Energy Economics and Policy*, *8*(4), 331-340.

Singhal, S., Choudhary, S., & Biswal, P. C. (2019). Return and volatility linkages among International crude oil price, gold price, exchange rate and stock markets: Evidence from Mexico. *Resources Policy*, *60*, 255-261.

Sukcharoen, K., Zohrabyan, T., Leatham, D., & Wu, X. (2014). Interdependence of oil prices and stock market indices: A copula approach. *Energy Economics*, *44*, 331-339.

Thorbecke, W. (2019). How oil prices affect East and Southeast Asian economies: Evidence from financial markets and implications for energy security. *Energy Policy*, *128*, 628-638.

Wang, Y., Wu, C., & Yang, L. (2013). Oil price shocks and stock market activities: Evidence from oil-importing and oil-exporting countries. *Journal of Comparative Economics*, *41*(4), 1220-1239.

Wei, C. (2003). Energy, the stock market, and the putty-clay investment model. *American Economic Review, 93*(1), 311-323.

Wong, V. S., & El Massah, S. (2018). Recent evidence on the oil price shocks on Gulf Cooperation Council stock markets. *International Journal of the Economics of Business*, *25*(2), 297-312.

Yıldırım, D. Ç., Erdoğan, S., & Çevik, E. İ. (2018). Regime-dependent effect of crude oil price on BRICS stock markets. *Emerging Markets Finance and Trade*, *54*(8), 1706-1719.

Youssef, M., & Mokni, K. (2019). Do crude oil prices drive the relationship between stock markets of oil-importing and oil-exporting countries?. *Economies*, *7*(3), 70.

Zhang, D. (2017). Oil shocks and stock markets revisited: Measuring connectedness from a global perspective. *Energy Economics*, *62*, 323-333.

Zhu, H., Guo, Y., & You, W. (2015). An empirical research of crude oil price changes and stock market in China: evidence from the structural breaks and quantile regression. *Applied Economics*, *47*(56), 6055-6074.

NOTE FOR CONTRIBUTORS AND GENERAL READERS

I.   *Bank Parikrama*, a professional refereed journal dedicated to banking and finance, is the quarterly publication of the Bangladesh Institute of Bank Management (BIBM). Usually, four issues are published in March, June, September and December each year.

II.   *Bank Parikrama* is listed in 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%.**

IV.   Articles must be original and in consonance with the objectives of the journal.

V.   If the article is accepted for publication elsewhere, it must be communicated immediately.

VI.   If the Editorial Board is of the opinion that article provisionally accepted for publication needs to be shortened or particular expressions deleted or rephrased, such proposed changes will be sent to the author(s) of the article for clearance prior to its publication. The author(s) may be requested to recast any article in response to the review there of by any reviewer.

VII. No submission fee or publication fee is required.

VIII. The title of the article should be short. Brief subheadings may be used at suitable points throughout the text. The Editorial Board reserves the right to alter the title of the article.

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 article in the first page.

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.

XI. Article to be submitted should be organized generally into the following sections:

Abstract: within 150 words

Keywords: 3-5

JEL Classification/ Code: At least One (01)

1. Introduction: Stating the Background and Problem
2. Literature Review
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)

(XII) Formatting:

- Paper size: A4 Size (wide 8.5" and long 11")
- Margins: Top=1", Bottom=1", Left=1", Right=1"
- All paragraphs must be justified, i.e., both left-justified and right-justified.
- Line Spacing: Multiple (1.5)
- Font Name: Times New Roman
- The length of the manuscripts should not exceed 30 pages, including footnotes, references, appendices, charts, figures, and tables.
- All the Figures and Tables must be in Black-and-White in Color.
- Sources must be mentioned below each Tables and Figures of the article.
- Page Numbers must be included.

All communications should be addressed to:
Research, Development & Consultancy (R.D.&C.) Wing
Bangladesh Institute of Bank Management (BIBM)
Plot-4, Main Road-1 (South), Mirpur-2, Dhaka-1216, Bangladesh
PABX : 48032091-4; 48032097-8, 48032104 (Ext. 135)
E-mail : bibmresearch@bibm.org.bd

Please visit: www. journal.bibm.org.bd

PUBLICATIONS OF BIBM

Type of Publications	Name of the Publications	Year of Publications	Price
Journal	Bank Parikrama - A Quarterly Journal of Banking & Finance (Volume XLVII, Nos. 1 & 2, March & June 2022) 1. Ethics in Banking 2. The New Role of Monetary Policy in Promoting Developmental Central Banking: The Bangladesh Experience 3. Dynamics of Inflation, Money Supply and Economic Growth in Bangladesh: A Multivariate Analysis 4. Economic Uncertainty, Money-Demand Stability and Monetary Policy in the United Kingdom 5. Does Inflation Target Lead to More Stable Exchange Rate? Evidence from India 6. Are Job Satisfaction and Employee Commitment Beneficial to Organization? A New Look of Organizational Performance 7. Impact of Microfinance on Women Economic Empowerment with Moderating Effect of Demographic Variables 8. COVID-19 Pandemic: Challenges and Opportunities for 1. Islamic Banking Industry of Bangladesh	2022	Tk. 400 US$ 20
Magazine	BIBM Bulletin – A Quarterly-Periodical of BIBM	Regular	Tk. 100
Independent Review	1. Bank Review 2010-2017 (7 Issues)	2012-18	Tk. 300 US$20
	2. Review of Non-Bank Financial Sector 2010-2017 (7 Issues)	2012-18	Tk. 300 US$20
Policy Brief	BIBM Policy Brief 2017-2020 (4 Issues)	2017-20	-------
Conference Proceeding	1. Compilation of Annual Banking Conference held in 2012-2019 (8 Issues)	2013-20	Tk. 500 US$20
	2. Compilation of Regional Banking Conference held in 2018 (01 Issue)	2020	Tk. 500

Type of Publications	Name of the Publications	Year of Publications	Price
Nurul Matin Memorial Lecture	1. Ethics in Banking (Compilation of Ten Years Memorial Lectures) **Insides Speeches of** i. Justice Shahabuddin Ahmed ii. Justice Muhammad Habibur Rahman iii. Professor Rehman Sobhan iv. M. Syeduzzaman v. Professor Wahiuddin Mahmud vi. Professor Nurul Islam vii. Dr. Bimal Jalan viii. Professor Muzaffer Ahmad ix. Dr. Akbar Ali Khan x. Professor Dr. Mohammad Farashuddin	2011	Tk. 300 US$ 10
	2. Ethics in Banking 11th Lecture - Dr. Mirza Azizul Islam 12th Lecture - Dr. Yaga Venugopal Reddy 13th Lecture - Professor Sanat Kumar Saha 14th Lecture - Dr. Amiya Kumar Bagchi 15th Lecture - Dr. Mohiuddin Alamgir 16th Lecture - Dr. Duvvuri Subbarao 17th Lecture - Dr. Qazi Kholiquzzaman Ahmad 18th Lecture - Dr. Junaid Kamal Ahmad 19th Lecture - Dr. Atiur Rahman 20th Lecture - Dr. Sadiq Ahmed 21st Lecture – Dr. AKM Saiful Majid	2011-22	Tk. 200 US$5
A K N Ahmed Memorial Lecture	1. Central Banking 1st Lecture - Dr. Chakravarthi Rangarajan 2nd Lecture - Dr. Mirza Azizul Islam	2018-19	Tk. 200 US$5
MAM Kazemi Memorial Lecture	1. 1st Lecture - Dr. Atiur Rahman	2022	Tk. 200 US$5
Banking Research Series	Compilation of Review Workshops of BIBM **Latest Issues** 1. Volume No. 10, Issue No. 01: How to Develop a Framework for Enterprise Risk Management of Banks in Bangladesh? 2. Volume No. 10, Issue No. 02: Implementation Challenges of Security Operation Center (SOC) in Banks of Bangladesh 3. Volume No. 10, Issue No. 03: Are Banks Engaged in SME Cluster Financing? 4. Volume No. 11, Issue No. 01: Introducing Sukuk in Bangladesh: Key Issues 5. Volume No. 11, Issue No. 02: Role of Banks in Managing the Covid-19 Effect on Inward Remittance in Bangladesh 6. Volume No. 11, Issue No. 03: Transformation and Restructuring of the Banking Sector in the New Normal: Bangladesh Perspective	2022	Tk. 400 US$20

Type of Publications	Name of the Publications	Year of Publications	Price
Banking Review Series	Compilation of Review Workshops of BIBM **Banking Review Series 2021 (Inside Papers)** 1. Credit Operations of Banks 2. Internal Control and Compliance of Banks 3. IT Operations of Banks 4. Trade Services Operations of Banks 5. Treasury Operations of Banks	2022	Tk. 500 US$20
Roundtable Discussion Series	Compilation of Keynote Papers of Roundtable Discussions **Roundtable Discussion Series 2021** 1. Volume No. 6, Issue No. 1: Infrastructure Lending by Banks: Corporate Vs. Project Financing Approach 2. Volume No. 6, Issue No. 2: Artificial Intelligence in the Banking Sector of Bangladesh: Applicability and the Challenges 3. Volume No. 6, Issue No. 3: How can Mudaraba and Musharaka be More Effective in Bangladesh? 4. Volume No. 6, Issue No. 4: Credit Derivatives to Overcome the Antagonistic Effects of Loan Rescheduling and Loan Restructuring	2022	Tk. 400 US$20
	Roundtable Discussion Series 2021 1. Volume No. 7, Issue No. 1: Developing Tailor-Made Products for CMSMEs by Banks: Do Business Characteristics Matter? 2. Volume No. 7, Issue No. 2: Assessment of Stimulus Packages on COVID-19: Bankers' Perspective	2022	Tk. 400 US$20
Book	1. Inclusive Finance and Sustainable Development	2013	Tk. 1000 US$20
	2. A Review of the Supervisory Initiatives by Bangladesh Bank	2014	Tk. 200 US$10
	3. Trade Services of Banks in Bangladesh (4th Edition)	2021	Tk. 500 US$20
	4. Green Banking in Bangladesh	2014	Tk. 400 US$20
	5. Green and Sustainable Banking in Bangladesh 3rd Edition	2021	Tk. 400 US$20
	৬. গ্রীন ব্যাংকিং পরিবেশ রক্ষায় ছাদে বাগান	2015	Tk. 200
	7. Bangladesh Vision 2030	2015	Tk. 1000 US$20
	8. An Unconventioanl Genius (Selected Writings of A.K.N. Ahmed)	2017	Tk. 750 US$20
	9. Growth with Equity: Contemporary Development Challenges of Bangladesh	2018	Tk. 600 US$15

Type of Publications	Name of the Publications	Year of Publications	Price
Book	10. Dimensions and New Horizons of Credit Operation of Banks 11. Examining Probable Effects of COVID-19 on Selected Areas of the Banking Sector in Bangladesh 12. Banking and Financial Sector Implications of COVID-19 13. Learning Guide: Trade Service Operations of Banks 14. Learning Guide: Credit Operations and Management of Banks 15. Proceedings of Central Banking in the New Normal 16. Financing Public-Private Partnership in Bangladesh		
Research Monograph	56. Liability Management and Profitability in Banks 57. Employee Selection in Banks of Bangladesh: A Mixed Method Analysis 58. Financial Inclusion: Bank Based Initiatives and Achievements in Bangladesh 59. SME Financing in Bangladesh: Do Local Banking Market Structures Matter? 60. Board, Chief Executive Officer and Performance of Banks in Bangladesh 61. Effectiveness of NPL Recovery Measures of Banks in Bangladesh 62. Shadow Banking in Bangladesh with Special Reference to New Normal	2022	Tk. 300

Communication should be addressed to:

Publications-Cum-Public Relations (PPR)

Bangladesh Institute of Bank Management (BIBM)

Plot-4, Main Road-1 (South), Mirpur-2, Dhaka-1216, Bangladesh

PABX: 48032091-4; 48032097-8, 48032104 (Ext. 120)

Email: ppr@bibm.org.bd

almamun@bibm.org.bd

Printed by   ....